Ninth Annual

Celebration of Student Academic Excellence

Friday, April 12, 2013

Center for the Arts
Ninth Annual

Celebration of Student Academic Excellence

Friday, April 12, 2013 | Center for the Arts

INDEX

Page 1  School of Architecture & Planning
Page 3  College of Arts & Sciences
Page 14 School of Engineering & Applied Sciences
Page 18 LSAMP (Louis Stokes Alliance for Minority Participation)
Page 19 School of Management
Page 20 Ronald E. McNair Scholars Program
Page 21 School of Medicine & Biomedical Sciences
Page 29 School of Nursing
Page 30 School of Pharmacy & Pharmaceutical Sciences
Page 31 School of Public Health & Health Professions
Page 33 Undergraduate Academies
   Global Perspectives Academy
   Research Exploration Academy
   Civic Engagement Academy

KEY

$H$ = Member of Honors College

$e$ = CURCA Funded Project
   (Center for Undergraduate Research & Creative Activities)

$S$ = Member of CSTEP
   (Collegiate Science & Technology Entry Program)
SCHOOL OF ARCHITECTURE & PLANNING

STUDENT
Isabella Fonseca de Almeida Brito

MAJOR
Architecture

RESEARCH MENTOR
Bradley Wales, Arts.B

Title
Cycles2

Abstract
Cycles2 is a proposal to design and install three projector structures running along the new bicycle path on Elmwood Avenue, and to project onto the Burchfield Penney’s curving East Elevation, as has been done in recent events. The three-screen Cycles2 installation proposes to frame the video projections between the existing roof overflow scuppers and the Burchfield Penney Art Center letters. As in the original version of Cycles, the overall thematic concept of Cycles2 will explore Charles Burchfield’s interest in the cycles of the seasons.

The winner design was Transitions, created by Isabella Brito. The primary conceptual ideas in the Transitions scheme are to create a flowing shape connecting the two main focal points in the structure: the ground and the head, container of the projector.

The depressed freeway replaced a beautiful parkway that was designed by Frederick Law Olmstead. In order to accommodate commutes between the city core and the suburbs, the new road severed the east side and contributed to a historical decline for the area. The project hurt surrounding property values and as they fell, redlining began. This trend created one of the most clearly seen divides between race, income and investment that is still visible today.

Commissioned by the NYS DOT, our research in collaboration with the Urban Design Project will look to resolve issues that were created by the Kensington Expressway. Analyzing previous proposals by DOT engineers, we intend to expand upon and rethink ways to reinvest in the freeway. Factors weighing into our research range from history, social implications and economic effects, while retaining the high speed corridor below. Initial designs propose a park built over the sunken highway system as homage to Olmstead’s original design. We hope to create a vision that will help leverage surrounding investment as a byproduct, while creating an asset for the surrounding communities.

STUDENT
Eric Ennis

MAJOR
Environmental Design

RESEARCH MENTOR
Daniel Baldwin Hess, Ph. D.

Title
OnTrack Transit Rail in Syracuse, NY: Its Founding, Fallout & Chance for Revival

Abstract
The OnTrack transit rail system operated in the City of Syracuse, NY for more than 13 years. The 10.1-mile track, consisting of three main stops, featured stations in some of the major attractions in Syracuse including the Central Business District/Armory Square, Carousel Center Mall and the Syracuse University Campus/Carrier Dome. The public transit system was initially welcomed in 1994 with excitement and early success. In 2008, however, it closed due to struggling ridership and a lack of funding to expand to expand & add new stops.

The goal of this project is to examine the period when the OnTrack system functioned, and outline the reasons why it failed. Specific analysis is being placed on the strengths the transit rail exhibited and what could have been differently to allow success to be sustained. A final element of the project will be to develop plans and designs for a new transit rail system in Syracuse, through implementing the lessons learned from the original OnTrack system. The City of Syracuse has gone through significant changes since the years when OnTrack functioned, and one could argue that a new transit rail system would prosper in the revived urban environment of Central New York.

STUDENT
Kathryn Hobert

MAJOR
Architecture

RESEARCH MENTOR
Sergio Lopez-Pineiro, M. Arch.

Title
Empiric Land-scape

Abstract
The majority believes in a “reality,” one which we find ourselves capable of perceiving using various senses. We understand what our senses tell us as real and have no choice but to believe them. Few regularly question them, especially going about our hectic daily lives. This is a design project intended to open my own and others’ imaginations up to other realms of reality that may be hiding in the cracks of space and within our own minds. It will consist of a landscape of “follies” that people can spatially and sensually experience and interact with. Their individual designs will draw from personal experiences and from research (mainly philosophical writings on subjects relating to phenomenology and various architectural precedents). If only
for a short time one can concentrate particular senses (while depriving others) and explore dream-like perceptions, maybe one can emerge with a better comprehension and appreciation of the world we live (both the natural and built) in our day to day lives.

Students
Ariel Resnick & Christa Trautman

Major
Architecture

Research Mentors
Martha Bohm, M.Arch. & Christopher Romano, M.Arch.

Title
MonteverDEPORTES, Sustainable Futures

Abstract
Through our proposal for a community-oriented sports facility for the municipality of Monteverde, Costa Rica we synthesized our design of the surrounding landscape with our proposal for a new sports arena. The plan for the arena includes a series of buildings housing various sport courts, including a soccer and track field with stadium seating, multifunctional gym with space for indoor soccer, volleyball and other sports, as well as a pool. Auxiliary spaces were also carefully integrated within the complex. Phasing, circulation and community transportation were part of the plan that was then presented to the municipality of Monteverde, to be used to gain funding for the project. In terms of design, local vernacular and sustainable design initiatives were researched and implemented in creation of this project.

Student
Steven Smigielski

Major
Architecture

Research Mentor
Nerea Feliz Arrizabalaga, M.Arch.

Title
Diffuse House

Abstract
Buffalo’s Elmwood Village is a highly dense urban environment. Residents of the area range in a variety of 20 different ethnic ancestries. This area also contains roughly 20% of inhabitants whose racial make-up is not Caucasian. Furthermore, nearly 25% of Elmwood inhabitants originate from outside the Buffalo region. These conditions provide a unique opportunity for understanding different cultures.

Cultural diffusion is the process in which ideas are shared and exchanged across cultural boundaries. This site along, busy Elmwood Avenue would allow for the free and uninhibited flow of knowledge amidst cultures. Therefore, a housing unit consisting of foreign residents along with a public cultural/learning center is being proposed. This cultural/learning center would be able to operate in both directions. It would allow for the incoming foreign residents to become accustomed to local culture while also allowing current and local residents a chance to become enlightened of a vast array of cultural experiences.

Student
Christopher D. Snyder

Major
Environmental Design

Research Mentor
Kathryn Friedman, Ph.D.

Title

Abstract
Recently the City of Buffalo, New York launched a new zoning ordinance called the Buffalo Green Code. The mission of the Buffalo Green Code is to “[…] establish land use and zoning regulations that accommodate appropriate uses and forms, respond to market demands, and provide access to goods and services, and reflect a local ‘sense of place’” (Buffalo Green Code, 2012, para. 1). The rezoning and reapporti tears of different neighborhood land tracts in the City of Buffalo is in the spirit of the New Urbanist movement and follows the current trends in smart growth, which favor form-based zoning methodology. The Buffalo Green Code hopes to use New Urbanist and smart growth concepts to create a better sense of community by reflecting the past. A comparative assessment of past projects that parallel the Buffalo Green Code will be studied in order to assess impacts of community based zoning ordinances, as well as possible effects on the physical, environmental, economic, and social climate of the Buffalo-Niagara MSA as a whole.

Student
Paul Stephan

Major
Urban and Public Policy Studies

Research Mentor
Professor Robert Silverman

Title
The U.S. Government Response to Hurricanes Katrina and Sandy

Abstract
Numerous systemic failures and shortcomings characterized the governmental response to Hurricane Katrina in 2005. A 2006 report by the U.S. Senate’s Homeland Security and Governmental Affairs Committee found “gross dereliction of duty on the part of nearly all the agencies involved and of those in a position to lead.” After Katrina, the federal government replaced the National Response Plan with the National Response Framework, and made other changes to emergency management planning policy. The student’s project examines the changes made after Katrina, how well those changes improved the response to Hurricane Sandy in 2012, and what further changes should be made to the United States’ disaster response plans.
Joseph Swerdlin

**Major**
Architectural Studies

**Research Mentors**
Joyce Hwang, AIA; Nick Bruscia

**Title**
Emergent Representation

**Abstract**
This thesis develops a sequential drawing process that results in ambiguity in its representation. Analysis of the single-line axonometric catalog drawing produced by Sol LeWitt as an explanation of, “Variations of Incomplete Open Cubes,” provides a means to understand drawing as an ordered set of rules where both process and representation are expressed through the drawn product. Building on the sequential nature of the drawing process, computation is introduced. Through time and motion, these drawings will allow ambiguity in representation to be utilized as design space.

Dominique Ameroso

**Major**
Biology and Psychology

**Research Mentor**
Derek Daniels, Ph.D.

**Title**
Involvement of Both the Forebrain and Hindbrain in the Hypodipsic Effects of Glucagon-like Peptide-1 Receptor Agonists

**Abstract**
Glucagon-like peptide-1 (GLP-1) is a peptide produced in the intestines and the brain. It is considered a feeding specific satiety signal, however, evidence shows that it also suppresses water intake independent of its effect on food. There is evidence from our laboratory that both forebrain and hindbrain substrates are involved in the hypodipsic effect of GLP-1 receptor (GLP-1R) agonists suppressing water intake. An injection of the GLP-1R agonist, Exendin-4, into the fourth ventricle (4V) suppresses overnight intake, indicating that there is hindbrain involvement. In addition, a lower dose of Exendin-4 is effective at suppressing water intake when injected into the lateral ventricle (LV) than the fourth ventricle, suggesting that there is also forebrain involvement. In an initial experiment to determine which specific brain regions are involved, we have preliminary evidence suggesting that a direct injection of Exendin-4 into the nucleus of the solitary tract in the hindbrain causes hypodipsic behaviors.

Barinaepkee Banuna

**Major**
Biological Sciences and Psychology

**Research Mentor**
Gene D. Morse, PharmD

**Title**
An Update on HIV: Trends, Research, Prevention Strategies, and New Approaches

**Abstract**
Thirty years after the first known incidence, HIV remains a major concern in the United States with approximately fifty thousand new infections annually. This study investigates progression of HIV, statistical trends, high-risk populations, and health disparities in an effort to present current challenges and areas of focus for future research. Literature review utilizing peer-reviewed searches from PubMed, Medline, Google Scholar, organizational and government agencies published between 2000 to 2012 was performed to develop a comprehensive summary of the evolution of HIV in the United States. The studies showed that young, black men who have sex with men were disproportionately affected. There was significant increase of 2,100 in new HIV infections in this group from 2006 to 2009. Guided by the National HIV/AIDS Strategy, new approaches are underway to reduce new infections, and HIV prevalence in high risk populations. Integrating Treatment as Prevention (TasP) and Pre-Exposure Prophylaxis (PrEP) into clinical settings are among initiatives to reduce new transmission. To achieve the goal of reducing annual number of new infections by...
25% in 5 years, expanded research, treatment, and targeted prevention in disproportionately affected groups is necessary. New preventive interventions should be further evaluated and evidence regarding the outcomes should be provided.

**Student** Mary Barrett

**Major** Speech and Hearing Sciences; Psychology

**Research Mentor** Dr. Richard Salvi, Distinguished Professor

**Title** Apoptosis and Neuronal Damage due to Noise Blast Trauma

**Abstract** The purpose of our research is to determine if intense blast wave noise exposure leads to neural degeneration that extends to the hippocampus—the region of the brain associated with memory and spatial navigation. By using a blast wave generator that creates pressure waves that peaks between 185-196 decibels, we deafen the rats unilaterally to cause immense damage in the central nervous system. The rats being tested were sacrificed 3 months after noise blast exposure. The Caspase-3 immunohistochemistry staining procedure that we are using is expected to stain for Caspase-3, a protein released before apoptosis (programmed cell death). If we find apoptosis markers in the hippocampus of these blast-exposed rats, this will segue into more research to determine the impact of blast exposure on animals and humans. This research may also have implications in cases such as Traumatic Brain Injury and concussions and their effects on the hippocampus.

**Student** Andrew Baumgartner

**Major** Nuclear Medicine Technology, Psychology

**Research Mentor** Jackie-James Creedon

**Title** Investigating Polycyclic Aromatic Hydrocarbon and Heavy Metal Deposition in Tonawanda Surface Soil

**Abstract** After residential complaints of a “black, gooey substance” depositing on gardens, houses and vehicles, members of the Tonawanda Community Fund initiated a preliminary soil study, measuring the airborne deposition of Polycyclic Aromatic Hydrocarbons and Heavy Metals in a small neighborhood directly in the heart of Tonawanda’s industrial center.

A total of 7 composited surface soil samples were taken from the neighborhood of interest, with one background sample from Beaver Island State Park. Concentrations of PAHs and Heavy Metals were compared with various regulatory agency guidelines.

While Heavy Metal concentrations were below guideline levels, 3 of the residential samples had a total BAP-TEQ concentration higher than 1.5 mg/kg, a level used by the EPA to determine clean-up in a similar study. All of the residential samples had total BAP-TEQ concentrations higher than that of the background, and 5/7 had concentrations higher than the 98th percentile of NYS soil according to DEC values.

**Students** Emily Butler, Chelsea Jordan, Michelle Keller

**Research Mentor** Renee Ruffino

**Title** Chromatics: The Science of Color

**Abstract** Chromatics is defined as the science of color. The spectrum of light interacting with the light receptors and cones in our eyes causes us to perceive color in different ways. When the human eye looks at a certain color, psychological signals are sent to the brain causing us to feel certain emotions or evoke certain thoughts. These theories can be applied to the world of branding, and can be noticed in brands such as McDonalds, Coca-Cola, social networking sites, and clothing brands. For example, the colors of McDonalds, red and yellow, send signifiers to the brain that we are unaware of. Red and yellow are the first colors that the brain processes. This makes both of these colors stand out and be remembered. Also, color theory states that red can increase appetite, and yellow signifies friendliness. In our poster, we plan to look further into the anatomy behind the eye to further explain how the spectrum of light influences how we perceive color, and which colors expose certain emotions.

**Students** Trevor Boyd, Jeremy Cournyea, Matthew Damiano, Karen Hanley, Jonathan Inbody, James Jurkowski, Ryan Monolopolus, Emily Pumm, Robert Romero, Nao Sakamoto, Kareen Soffer, James Thompson

**Major** Media Studies

**Research Mentor** Dien Vo

**Title** ’Let Them Have Their Way’ - A Buffalo Made Feature Film, Two Years in the Making

**Abstract** ’Let Them Have Their Way’ explores the subject of human interaction in contemporary life. Directed by Media Studies masters student, Dien Vo, the film’s six protagonists try to navigate a world in which inflexible rationality, programmatic living, political polarization, and consumerism compete against desires for warmth and candid emotional expression. With over 200 people collaborating on the project, Media Studies students and Buffalo natives alike, the film has been in production for almost two years, and is finally making its release at the end of April 2013.

**Students** Made Feature Film, Two Years in the Making

**Research Mentor** Media Studies students and Buffalo natives alike, the film has been in production for almost two years, and is finally making its release at the end of April 2013.
Abstract
Phosphatidylinositol-(4,5)-bisphosphate (PIP2) has been known to play an important role in many cellular events such as cytoskeletal remodeling, membrane trafficking, transmembrane permeability, and mitogenesis, despite its relatively low concentration within cell membrane. Recently, PIP2 was found to form clusters at high calcium concentration, which may explain unsolved biophysical mechanism of events that involve PIP2. Since cell membranes are complex entities containing different species of lipids and proteins, it is difficult to observe a simple cause-and-effect relationship regarding just one aspect of cell membrane. Using a model system, only an intended aspect of cell membrane can be captured directly. Here, we show that agarose supported lipid bilayer is a sufficient model system to test the effect of calcium on PIP2 by comparing measured diffusion and interaction tracer lipid within lipid bilayer with traditional solid support lipid bilayer. Diffusion and interaction of tracer were quantified using binned-imaging fluorescent correlation spectroscopy, a novel FCS technique that our lab recently developed. Furthermore, the effect of different physiologically relevant concentrations of calcium on simple PIP2 containing system (DOPC/PIP2/PIP2-TopFluor) was observed.

Student
Rowena Chin

Major
Psychology

Research Mentor
David Wm. Shucard, Ph.D., FAASM

Title
An Event-Related Brain Potential Study of the effects of perceptual task difficulty on cognitive control

Abstract
Decision-making relies on contextual cues that we derive from our environment. When pursuing goals, cognitive control allows us to allocate attentional resources to particular stimuli and to ignore other irrelevant ones. In a dense electrode, event-related brain potential (ERP) study, participants were required to complete two versions of a Go-NoGo continuous performance task (Go-NoGo CPT). First, participants were presented with letters of the alphabet and responded by button press to the letter “X” only if it was preceded by an “A.” They had to withhold their response to the “X” if it was not preceded by an “A.” In the second task, degraded letters were used in order to increase perceptual difficulty. Two key ERP components were examined in order to study conflict resolution and response inhibition under easy and more difficult task conditions. These components are purportedly linked to brain structures involved in detection of conflict and response inhibition.

Student
Junhong Choi

Major
Physics, Chemistry

Research Mentor
Arnd Pralle, Ph.D.

Title
Influence of Calcium on PIP2 Cluster Formation in Agarose Supported Lipid Bilayers

Abstract
Cell membranes are complex entities containing different species of lipids and proteins, making it difficult to observe a simple cause-and-effect relationship regarding just one aspect of cell membrane. Using a model system, only an intended aspect of cell membrane can be captured directly. Here, we show that agarose supported lipid bilayer is a sufficient model system to test the effect of calcium on PIP2 by comparing measured diffusion and interaction tracer lipid within lipid bilayer with traditional solid support lipid bilayer. Diffusion and interaction of tracer were quantified using binned-imaging fluorescent correlation spectroscopy, a novel FCS technique that our lab recently developed. Furthermore, the effect of different physiologically relevant concentrations of calcium on simple PIP2 containing system (DOPC/PIP2/PIP2-TopFluor) was observed.

Student
Stephanie Chummar

Major
Biology

Research Mentor
Ashu Sharma

Title
Designer oral streptococci for vaccine delivery: proof-of-principle study in a periodontitis disease mouse model

Abstract
We attempt to genetically modify oral non-pathogenic streptococci to express a virulence factor of the periodontal pathogen Tannibella forsythia. We will test in a mouse model if oral colonization with modified streptococci expressing surface antigen BspA provides protection against T. forsythia infection. My objectives during the past research period were to generate the recombinant DNA constructs for BspA-expressing S. gordonii. BspA gene was amplified by PCR from the T. forsythia genomic DNA and cloned into a plasmid vector for chromosomal integration into S. gordonii by genetic transformation. Our preliminary data showed that immunization with BspA in mice elicits BspA-specific serum IgG response, and protects mice against T. forsythia infection. In this proof-of-principle study, genetically modified S. gordonii expressing BspA will be tested in a mouse model of periodontitis against T. forsythia infection. We predict that oral immunization with Sg-BspA vaccine vector would reduce T. forsythia-associated alveolar bone loss in mice.

Student
Alex Condoluci

Major
Communication

Research Mentor
Debra Kolodczak, Ph.D.

Title
Reinterpreting American Memory: Portraits of Guitar Players
project gathers archival photos of guitar players in order to apply discrete color to best emphasize that passion.

**Student**
Marielle L. Darwin

**Major**
Psychology

**Research Mentor**
Rebecca J. Houston, Ph.D

**Title**
Attentional Bias and Response Inhibition in Alcohol-Dependent Individuals in Treatment

**Abstract**
Attentional bias (AB) and impulse control refer to automatic processes relevant in alcohol dependence treatment outcome. The interplay between these processes has not yet been explored. We examined these processes in alcohol-dependent individuals in treatment via a task that involved responding to alcohol-related and soft drink cues and an additional element of response inhibition. Analysis of reaction times for “go” stimuli indicated faster reaction times in response to soft drink cues compared to that for alcohol-related cues. This was interpreted as evidence of an avoidant AB toward alcohol-related cues. Reaction times for alcohol-related cues was also negatively related to post-treatment drinking providing further support for avoidant AB. No significant effect for response inhibition was revealed. These findings suggest that post-treatment abstinence may be predicted from evidence of avoidant AB towards alcohol-related cues.

**Students**
Michael Demyan and Adam Rutz

**Research Mentor**
Paul J. Meyer, Ph.D.

**Title**
Gold Nanoparticle Arrays for Surface-Enhanced Raman Spectroscopy on Optical Fibers

**Abstract**
The ability to monitor cellular chemical environments in vivo has become a source of interest for diagnostic and analytical science. Abnormal chemical environments at the cellular and subcellular levels, including imbalances in pH and ion concentrations, are an indicator of many disease states. The development of a surface-enhanced Raman scattering (SERS) active optical fiber probe that could measure in vivo chemical environments in a minimally intrusive way would assist in diagnosing these disease states.

The sensitivity of SERS-devices for sensing is highly dependent on the morphology and uniformity of the metal coatings. Block copolymer thin films can be used to fabricate SERS active arrays of nanoparticles (NPs) in a reproducible manner. Gold NPs particle morphology, size and uniformity are easily defined by the selection and composition of the block copolymer.

**Students**
Michael Demyan and Adam Rutz

**Research Mentor**
Paul J. Meyer, Ph.D.

**Title**
Nicotine enhances the motivational value of reward stimuli

**Abstract**
Previous studies using Pavlovian conditioning have shown that the attractiveness of reward cues is associated with drug-taking and other measures of motivation. The purpose of this study was to determine whether nicotine alters the motivational value of a reward-associated cue. To do this, we injected rats with nicotine or saline, and then presented them with a visual cue that predicted the delivery of a food reward. We then measured the approach to and interaction with the visual cue (“sign-tracking”) and reward location (“goal-tracking”). We found that nicotine specifically enhanced sign-tracking but not goal tracking. These results indicate that nicotine specifically enhances the motivational value of reward stimuli, and that this occurs independently of its effects on learning.

**Student**
Brianna DeVito

**Major**
Provider-Patient Communication

**Research Mentor**
Lance S. Rintamaki, PhD

**Title**
When and Why Patients Lie to Health Care Providers about Sexual Health

**Abstract**
Good sexual health is an essential component of overall health; however, numerous barriers have been identified that impede open and honest dialogue between physicians and patients regarding matters of sexual health. This mixed-methods study examines the frequency, contexts, and reasons people lie to health care providers about sexual issues. Findings provide insight and strategies that physicians can integrate into their standard practice to better recognize and prevent patient deceptions regarding sexual health issues.

**Student**
Emily Fiore

**Major**
Biology and Anthropology

**Research Mentor**
Dr. Pavani Ram

**Title**
The Killing Fields Kill Long After the War is Over: An Overview of the Burden of Disease of Landmines In Post-Conflict Settings

**Abstract**
According to the International Committee of the Red Cross and the
Red Crescent Societies (ICRC), there are approximately 110 million landmines in roughly 64 countries around the globe. Landmines cause devastating and often lethal injuries to combatants, innocent civilians and children. The 26,000-28,000 deaths per year attributed to landmines make them one of the world's most deadly health hazards. De-mining efforts have been historically slow and expensive. Recent pressure on governments to ratify treaties to ban the production, sale and use of landmines has helped to manage this global emergency. Novel approaches to effectively and efficiently disable landmines are currently being developed and implemented. The focus of this discussion is two-fold. First, a proper background of the global issues that relate to land mines must be thoroughly examined in order to effectively assess and propose potential models of change for providing low-cost solutions for the de-mining of these areas. Waterborne illnesses, lack of available resources for proper sanitation, incomplete or damaged infrastructure, malnutrition, iodine deficiency disorders, lack of vaccination, psychiatric disorders, along with bloodborne illnesses are all found to be related to the presence of land mines. Secondly, the discussion will focus on the various current models of change at all levels of society and government as they relate to the above factors.

**Student**
Carrie Fisher

**Major**
Psychology

**Research Mentor**
Dr. Julie Bowker

**Title**
Does Other-Sex Popularity Impact Same-Sex Peer Experiences?

**Abstract**
Theory and research has demonstrated that same-sex peer experiences, such as friendships, impact later other-sex peer experiences, such as romantic relationships. This is the first study to evaluate whether other-sex peer experiences (other-sex popularity) impact later same-sex peer experiences (same-sex popularity and preference). Participants were 270 sixth-grade students (Mage = 11.54 years) who completed peer nomination measures of popularity and preference/liking in their classrooms at two time points. Regression analyses revealed that Time 1 other-sex popularity predicted Time 2 same-sex popularity, after controlling for Time 1 same-sex popularity ($\beta = .127, p = .008$). A significant interaction involving gender and Time 1 other-sex popularity was evinced when predicting Time 2 same-sex preference and controlling for Time 1 same-sex preference ($\beta = .356, p = .001$). Follow-up correlational analyses revealed that Time 1 other-sex popularity was a positive predictor of Time 2 same-sex preference for girls ($r = .332, p = .019$), but a negative predictor for boys ($r = -.292, p = .001$). Findings suggest that being popular with other-sex peers helps adolescents become more popular with same-sex peers, but that the effects of being popular with the other-sex on later liking with same-sex peers differs for boys and girls.

**Student**
Timothy Hansen

**Major**
Biological Sciences

**Research Mentor**
Dr. Shermali Gunawardena

**Title**
Components of the PI3K-AKT Signaling Pathway and Their Role With Molecular Motors

**Abstract**
The PI3K-Akt pathway is a signaling cascade known to be involved in regulating cell death. Previous studies have shown that inhibition of this pathway leads to increased neuronal cell death. Since disruption of transport can lead to neuronal death, here we tested the hypothesis that axonal transport defects activate cell death via PI3K-Akt pathways. One prediction of this hypothesis is that components of the PI3K-Akt pathway are transported within axons. Using Drosophila we evaluated interactions between proteins in the PI3K-Akt pathway and the molecular motors kinesin and dynein. When Akt was overexpressed in the presence of 50% reduction of kinesin, transport defects were observed. Overexpression of Akt in the presence of 50% reduction in dynein gave similar results. Overexpressing PI3K in the presence of a 50% reduction in kinesin also showed defects in transport. Larvae containing a 14-3-3Zeta loss-of-function mutation along with 50% kinesin reduction showed transport defects. 14-3-3Zeta loss-of-function larvae with 50% reduced dynein showed a more severe phenotype. Collectively our data suggests that the proteins in the PI3K-Akt pathway may genetically interact with both kinesin and dynein motors. Perhaps perturbations in axonal transport may lead to the inhibition of the PI3K-Akt pathway, activating neuronal cell death and neurodegeneration.
**Student**  
Kathryn Horn

**Major**  
History

**Research Mentor**  
Carole Emberton, Ph.D.

**Title**  
“The Roots of Tourism at Gettysburg: 1863-1913”

**Abstract**  
In his 1863 “Gettysburg Address,” President Abraham Lincoln stated, “The world will little note, nor long remember what we say here, but it can never forget what they did here.” President Lincoln envisioned the Gettysburg battlefield becoming a sacred place where American citizens could reflect on the importance of the American Civil War, and never forget the blood sacrifice that 51,000 men made there. Instead, Gettysburg has evolved from sanctified ground into a place for amusement, entertainment, and commercial opportunities. Today, people visit Gettysburg as tourists seeking an amusing and entertaining experience, not necessarily to learn the comprehensive history of the Civil War or reflect on the sacrifices the nation made to end the bondage of African Americans. It is this tension between history, education, and entertainment that my project seeks to explore.

My research has focused on the transformation of the Gettysburg battlefield into a tourist destination. In order to have a better understanding of what the battlefield has become, I traveled to Gettysburg. At the Gettysburg National Military Park, I conducted archival research and explored the well known battlefield. From my research, I can conclude that Gettysburg transformed into a tourist site during the late 19th century.

**Research Mentor**  
Melanie Aceto

**Title**  
Emerging Choreographers Showcase: Hourglass

**Abstract**  
I submitted and created a dance piece into Emerging Choreographers Showcase entitled Hourglass which symbolizes the journey of our lives. Our journey starts with discovery; the simplest things are fascinating to us because we are experiencing it for the first time. Then, we become ignorant refusing to believe time is passing, we indulge in the time we have. It is a jubilation, a celebration in which we think will never end; that time will literally freeze and we will remain young forever. However, time is forever fleeting and the realization that time has been passing without our knowledge or permission is terrifying. We must succumb to the fact that one day the sand in our hourglass will run out and the question is, when that day comes will we be able to accept it knowing that with the time we were given we really lived?

**Students**  
Gary Iacobucci, Aida Andrades Valtteña, Noura Abdel Rahman

**Major**  
Biological Sciences

**Research Mentor**  
Dr. Shermali Gunawardena

**Title**  
Spatial and temporal analysis of axonal transport in primary neuronal cultures from Drosophila larvae

**Abstract**  
Efficient intracellular transport by motor proteins is essential for cellular function and structure. Transport defects have recently been implicated as an event in neurodegeneration. Filleted Drosophila larvae have been used to provide spatial analysis of transport. However, filleted larvae do not live thus losing the temporal dimension which allows characterization of transport changes over time. To spatially and temporally determine how transport defects initiate, we developed a primary neuronal culture system from Drosophila larvae. In culture, neurons grew normally. Immunohistochemical characterization indicated that some markers specifically localized to cell bodies, axonal projections, and growth cones. To characterize transport in vivo, we visualized, live, movement of six cargos/organelles at day 1 and day 2 old cultures and analyzed movement using a single-particle tracker program. Significant velocity changes at day 2 relative to day 1 correlated with changes in pause frequency and duration. Contrary to WT cultures, motor protein reduction neurons showed reduced cargo movement with excessive stalled cargo and blockages. Strikingly, our analysis indicated that blocks are not static which impede transport as previously thought, but resolve under some genetic conditions. Changes in motor protein levels cause increased static block and decreased dynamic blocks indicating that static blockages are caused by lack of motors. We propose that static blocks initiate deleterious pathways leading to degeneration while dynamic blocks are benign. In conclusion, spatial and temporal analysis enables us to elucidate novel transport characteristics.

**Students**  
Dante Iozzo

**Major**  
Physics, Mathematics

**Research Mentor**  
Dr. Bernard Weinstein, George Lindberg

**Title**  
Comparative Photoluminescence Study of Three II-VI Semiconductors

**Abstract**  
We compare the photoluminescence (PL) spectra in the zincblende structure ZnSe, ZnTe, and CdSe. Whereas ZnSe and ZnTe occur naturally in this form, it is a metastable phase for CdSe, which normally has the wurtzite structure. Vapor-grown crystals of 68Zn76Se, 64ZnNATTe, and an epitaxial film of CdSe were measured at 13K and
ambient pressure using a closed cycle helium cryostat. Both sharp-line exciton recombination and broad donor-acceptor pair bands are observed. Close examination of the literature allows these PL features to be assigned with confidence to a number of impurity and defect species.

**Students**
Jodie Keith and Erin Redfield

**Research Mentor**
Renee Ruffino

**Title**
The Science of Typography

**Abstract**
The goal of our research project is to educate non-art majors as well as the general public about the anatomy and practice of typography.

We will describe typefaces, families, subsystems and typesetting. Aside from illustrating the basic make up of typography itself, we plan to explain the relationship it has to systems theory. Typographers are essentially creative problem solvers, similar to other researchers. We are often given a mass of abstract data with the responsibility to break it down, reconstruct and organize it in a way that achieves balance between effective communication and aesthetics. We accomplish this by creating clear and concise layouts using visual hierarchy. Our research project will include direct comparison of effective vs. ineffective uses of typography. We plan to illustrate our data visually; our poster will be a living example of our research. We hope that our viewers will walk away with more knowledge and more awareness of these systems that they are surrounded by. Information does not have to be boring; words can be creative and visually interesting.

**Student**
Jessica Lemons

**Major**
Communication

**Research Mentor**
Lance S. Rintamaki, PhD

**Title**
Strategic Communication for HIV Allies

**Abstract**
PLWHIV are especially sensitive to such interactions and may be prone to misinterpret the behaviors of even the most well-intentioned healthcare personnel. This mixed-methods study with 289 people living with HIV (PLWHIV) identifies behaviors healthcare personnel can perform that send positive, reassuring signals to PLWHIV may help disarm their heightened sensitivity to stigma, as well as inspire confidence in the care being provided. Such behaviors signal the presence of an HIV ally (someone unafraid and/or supportive of PLWHIV). Performance of these behaviors by healthcare personnel may foster a sense of safety and even higher quality of care in the eyes of PLWHIV; however, care must be taken in their performance, as insincere behaviors may have unintended (and even detrimental) effects.

Also, general measurements were taken of the teeth such as crown height(CH), buccolingual(BL), and mesiodistal(MD). The importance of such a project is to help determine how migrations into the Americas from Asia occurred, and how many migrations occurred. By studying the movement of certain dental traits, through time and space, flow of genetic information can be tracked. Learning the origin of modern tribes is crucial in repatriation efforts and for scientific studies in regard to the peopling of the Americas. A great deal is known about material culture in prehistoric America, but little is known about the flow of genetic material from the origin of Native Americans in Asia and their current and ancestral tribes.

**Student**
Alesia King

**Major**
Anthropology

**Research Mentor**
Joyce Sirianni

**Title**
Dental Variation in Archaic Native Americans from the Ohio Region and Migration evidence

**Abstract**
Metric and nonmetric dental traits of Native American remains from the Archaic Period (8,000–4,000 years old) were studied. Methods from Christy G. Turner II were used to measure certain dental traits on a numeric scale of expression to account for interobserver and intraobserver error.
Contrast Agents
Chemical Exchange Saturation Transfer
Nickel (II) Complexes as Paramagnetic

Dr. Janet R. Morrow
Research Mentor
Medicinal Chemistry
Major
Student

Abstract
Magnetic resonance imaging (MRI) is a powerful imaging technique used to visualize soft tissue in the body. The addition of contrast agents (CAs) allows a better distinction between healthy and damaged tissues in the body. Paramagnetic chemical exchange saturation transfer (paraCEST) agents are a new class of MRI contrast agents. ParaCEST requires a paramagnetic complex with exchangeable protons (NH, OH), which chemically exchange with bulk water in the body. Recently, the Morrow group showed that the paramagnetic properties of the nickel (II) ion, combined with a stable diaza-crown ether macrocycle (L1) containing exchangeable protons provided a NiCEST approach to creating paraCEST agents. The L1 ligand provides increased stability and inertness of the NiCEST agents. In the presence of different biologically relevant anions and cations, the complexes were relatively inert towards loss of nickel (II) ion and produced good CEST contrast as monitored by UV-vis and NMR spectroscopy experiments, respectively.

De Chang Daniel Lim
Major
Psychology
Research Mentor
Dr. Michael J. Poulin, Ph.D.
Title
Lifetime Adversity And Prosocial Behavior: A Sense Of Closeness To Others In Need

Abstract
Past research suggests that life adversity (e.g., disasters, bereavement) predicts altruistic behavior (Orion, Poulin, Friedman & Silver, 2011; Staub & Vollhardt, 2008), but the reasons for this association are unknown. In a survey using Amazon's Mechanical Turk (N=359), we tested this association along with a set of theoretically-plausible mediators. Results replicated the aforementioned findings; in addition, self-other overlap (measured using the Inclusion of Other in the Self scale) between potential volunteers and persons in need may be a mediating factor. Specifically, individuals who experienced adverse life events reported greater IOS overlap with others who experienced adverse life events as well, especially with adversity related to bereavement or disasters. Moreover, self-other overlap predicted greater volunteerism, both in general and on behalf of those who experienced types of events similar to those experienced by volunteers. Overall, our results suggest that self-other overlap partially mediates the positive association between lifetime adversity and volunteering.

Samantha Mackey
Major
Medicinal Chemistry
Research Mentor
Dr. Janet R. Morrow
Title
Nickel (II) Complexes as Paramagnetic Chemical Exchange Saturation Transfer Contrast Agents

Sarah Elder
Major
Media Study, Sociology
Research Mentor
Sarah Elder
Title
"Recovery"

Abstract
This work is a documentary on Matthew Faulkner and his recovery process from a traumatic brain injury in 2009. After a car accident, Matthew was in a coma for several weeks, with little hope for a recovery; against all odds he battled back to relearn how to speak, walk, drive and eventually return to school again. The film is centered around Freud's stages of recovery, in four acts, and through the use of re-enactments, in depth interviews and an exploration of Matt's life today seeks to understand how tragedy can lead to triumph; speaking to a broader human question: how do we move on? The film will screen at UB CFA on March 23rd, 2013.

www.recoveryfilm.blogspot.com
Examining How Affective Reactions of Young Adolescents to Friendship Dissolution Impact Their Behavior

Having friends is important for healthy adjustment during adolescence, but the significance of losing friends is not clear. This study considers for the first time whether adolescents’ emotional reactions to friendship losses impact their subsequent behaviors. Participants were 271 sixth-grade students (Mage = 11.54 years) who reported on recent friendship losses and their externalizing and internalizing emotional reactions to such losses, and completed measures of socially withdrawn and overtly and relationally aggressive behavior at two time-points (T1, T2). Regression analyses revealed that T1 withdrawal predicted T2 withdrawal (β = 0.374, p = .005), T1 overt aggression predicted T2 overt aggression (β = 0.585, p = .001), and T1 relational aggression predicted T2 relational aggression (β = 0.456, p = .002). When predicting T2 overt aggression, the interaction involving gender and externalizing emotional reactions was significant (β = -0.103, p = 0.018). Follow-up analyses revealed that externalizing emotional reactions were a significant predictor of increases in overt aggression for boys (β = 0.152, p = 0.007), but not girls (β = -0.31, p = 0.566). Adolescents are stable in their behavior, but findings suggest that losing a friendship and reacting with anger may lead some boys to become more overtly aggressive.
Student: Jayne O'Connor  
Major: Anthropology  
Research Mentor: Joyce Siriani, Peter Biehl  
Title: The Fact in the Fiction: An Examination of Perception vs. Reality in the Field of Forensic Anthropology, and the "CSI Effect"  
Abstract: This thesis explores the impact of television shows and popular media portrayals of forensic anthropology on the public's understanding of the field and the role it plays in court proceedings. This research analyzes the stereotypes and misconceptions that result from learning about the field through shows like Bones and CSI, compares them to the realities of the field, and examines the way in which those stereotypes may influence jurors' expectations and decisions in a trial setting.

Student: Ashley Peters  
Major: B.F.A. Dance & B.A. Psychology  
Research Mentor: Anne Burnidge  
Title: [WO]man; Evolution in Jazz Dance through Performance  
Abstract: In this research project I am exploring the development of Jazz Dance as it is effected by popular culture, gender roles and misogyny. Jazz dance, similar to jazz music, is a true American art form and thus a representation of its society. As society evolves, the creative output it inspires grows and changes as well, adapting to new trends, technology, and cultural values. My research is a juxtaposition of Jazz Dance's past and present through the use of classical jazz movements distorted or influenced by contemporary Hip Hop dancing and current issues surrounding misogyny and gender. The core of this piece unfolds with the portrayal of women through the eyes of men, and visa versa. I have created this dance work with the inspiration of observed human relationships and the portrayal of women by men. This project is a representation of Jazz Dance currently, while still observing the traditional components that helped define it as an individual art medium.

Student: Shu Yee Rachel Lim  
Major: Communication  
Research Mentor: Debra Kolodczak, Ph.D.  
Title: The Barbie Doll: Profile of an American Icon  
Abstract: This project aims to re-discover history through one of America's iconic toys - the Barbie doll. There has been a considerable amount of change in Barbie's packaging, marketing, and wardrobe ever since her inception, and the goal is to analyze the evolution of societal trends Barbie has embodied over the years, as well as her representation in popular culture. The project will capture photographs of the collection and develop a profile of Kathy Mecca, a Barbie collector ever since the doll was introduced in early '60s. The collection includes 275 Barbie dolls in mint condition, all of which offer glimpses into popular culture with themes of Hollywood, fashion over the decades, and theme-based dolls (such as Architect Barbie), to demonstrate the manufactured desires of young women. By examining the collection and profiling the collector, this project will examine how this alluring icon developed, and its impact on popular culture.

Student: Chelsey Reed  
Major: Biological Sciences  
Research Mentor: Elizabeth Repasky PhD.  
Title: Understanding metabolic stress-induced inhibition of tumor response to therapy  
Abstract: It has been suspected for a long time that stress plays a role in cancer, but the direct effects of stress on cancer cells is only beginning to be studied. Recent studies are showing that mice used for laboratory tumor models are under chronic cold stress due to the temperature at which they are housed. At the standard room temperature of 22ºC, mice use extra energy for thermogenesis to keep their core temperature at 37ºC. However, mice use the least amount of energy to maintain body temperature (and therefore are least stressed) when housed at 30ºC. Previous work in the lab has found that at 22ºC, tumors have decreased sensitivity to therapies which kill cells by activating apoptosis compared to tumors in animals at 30ºC. Therefore, this project was designed to study the expression of pro-survival molecules, which inhibit apoptosis, to determine if cold stress causes increased expression of these molecules. To do this, pancreatic tumors from mice housed at 22ºC or 30ºC were collected at specific time points over the course of four weeks and analyzed for changes in expression of pro-survival molecules or infiltrating immune cells within the tumor which may be causing resistance to therapies.

Student: Laurel Screven  
Major: Psychology  
Research Mentor: Dr. Micheal Dent
Title
The Role of Time Cues in Stream Segregation in Budgerigars (Melopsittacus undulatus)

Abstract
The current experiment was designed to study the potential of the beginning of a tone sequence to convey information. Five budgerigars were assigned randomly to three conditions: 2-4 kHz pure tone, 2-4.5 kHz pure tone, or 2-4 kHz birdcalls. Each bird ran on all conditions. The birds were tested on their perceptual identification of either one or two streams when an ambiguous stimulus was presented. The ambiguous stimuli had varying ratios of synchronous and asynchronous tones in order to identify at what point the beginning of the sequence becomes facilitative in their identification. It was hypothesized that the beginning will facilitate in their identification earlier in the sequence when the sequence begins with asynchronous tones than when the sequence begins with synchronous tones.

Student
Hannah Sigurdson

Major
Art History, History

Research Mentor
Livingston V. Watrous

Title
Object Photography on Minoan Archaeological site of Gournia

Abstract
This project was focused around the photographing and cataloguing of artifacts for study research purposes. The Minoan artifacts date from approximately 3,000 years ago and required delicate handling. This work was important for the dig coordinators because it allows them to have a way to examine the artifacts while away from the dig site so that their research can continue during the off-season. There has been ongoing archaeological research at the dig site, called Gournia, for the past 3 years and I was incredibly happy to be able to join the dig team during the summer after my freshman year. Having this research experience under my belt, I feel confident that I will be able to secure internships in museums and other organizations in which artifacts need to be carefully and respectfully handled. My two months at Gournia were indispensable towards my education here at UB. I wish to show other students in the humanities that research is possible and the opportunities are endless, so long as you look and are active in the university community.

Student
Yin Sung Song

Major
Psychology B.S.

Research Mentor
Leonard J. Simms, Ph.D

Title
Positive and Negative Valence as a Personality Disorder Evaluator

Abstract
I plan to investigate the evaluative component of the positive and negative valence in predicting personality disorders. Specifically, I plan to investigate how each of these valences plays a role as an evaluative dimension in predicting personality disorders going beyond what the Big Five model has already measured. Recent psychiatric patients will be recruited from the Western NY area and will be given multiple questionnaires and an interview pertaining to personality traits and disorders. I predict that positive valence will significantly predict narcissistic and histrionic personality disorder in patients, along with positive emotional traits that are associated with these dimensions. I also predict that negative valence will be positively related to most of the personality disorder in general, with a higher positive correlation to borderline and antisocial personality disorders than narcissistic and histrionic personality disorders. I also predict that the predictive incremental values of positive and negative valence will be higher in my patient sample compared to the previously studied university/community samples in the literature.
**Student**  
Yisen Zheng  
**Major**  
Biological Sciences  
**Research Mentor**  
Katharina Dittmar de la Cruz  
**Title**  
Molecular Phylogenetic Analysis of Nycteribiid Bat Flies  
**Abstract**  
Bacterial associates are known to be ubiquitous within the ectoparasitic, blood-sucking bat flies Hippoboscoidea (Dittmar, et al. 2006). The function and diversity of these microbes within their hosts is vitally important to understanding host-parasite co-evolution as well as the evolution of host specificity. The parasites in question are bat flies (Hippoboscoidea; Nycteribiidae), which are obligate parasites on bats (Dick & Patterson, 2006; McAlpine, 1989). However, there are many areas where studies utilizing DNA evidence from bat flies are lacking. As such, the purposes of this scientific study are as follows: 1) analyze the genetic data of 11 unstudied bat fly specimens of the family Nycteribiidae, of which many are believed to be species that have yet to be identified, 2) create phylogenetic trees which graphically represent patterns of host-bacterial evolution, 3) find appropriate placement for these species on the bat fly phylogeny. It is anticipated that genetic data obtained from analyzing the DNA of these bat flies will show a pattern of co-evolution with their bacterial associates. Furthermore, it is anticipated that certain physiological characteristics of bacteria allow for host traits that would otherwise unlikely be observed.

---

**School of Engineering & Applied Sciences**

**Student**  
Aubrey Beckinghausen  
**Major**  
Chemical Engineering  
**Research Mentor**  
Dr. David Blersch  
**Title**  
Association of E. coli Contamination With Nuisance Filamentous Algal Blooms At Public Recreational Beaches  
**Abstract**  
The closing of public beaches by health officials is most often due to microbial contamination that poses a danger to beach patrons. This project aims to investigate the role of algal masses as incubators of E. coli in the environment. Hypothesized mechanisms of incubation include shielding from UV radiation and natural predators, supplying organics through exudence from the algae, and providing incubation through higher temperature. Presence/absence experiments will be performed using beaker tests of Cladophora algal species inoculated with a known concentration of E. coli and monitored over a period of 30 hours. E. coli concentration will be determined by a standard method colony count, with measurements taken of both the water in the beaker and washed algae. These tests will be compared to experimental controls consisting of water alone, E. coli in water without algae, and algae samples in water without E. coli. We hypothesize that the E. coli behavior when exposed to algal masses will be different than behavior by itself.

---

**Student**  
Marie Catalano  
**Major**  
Industrial & Systems Engineering  
**Research Mentor**  
Dr. Jun Zhuang  
**Title**  
A 2008-2012 Case Study: US Visa Applicant Security Screening Wait Time Analysis  
**Abstract**  
Security screening reduces risk in several situations such as airport security, employee selection and visa application processes; however, it can create delays that deter normal applicants and thus, decrease the welfare of the approver (authority, manager, and screener). This research studies trends in a data set including US visa applicant profiles from 2008 to 2012. One data set contains over 5,000 data points of information such as visa type, academic major and waiting time that we use to understand the visa application process more thoroughly. The second data set is the US government travel website with statistics of visa issuances, by year, visa type and region. We compare and contrast the two data sets to provide insight into the visa screening process. We show that the number of applicants increases at the beginning of each academic semester, visa type generally does affect wait time, wait times for most academic majors depends on the number of data points observed, and the probability of waiting greater than 60 days for a visa notification decreases as the number of applicants increases.

---

**Student**  
Christopher M. Dundas  
**Major**  
Chemical Engineering  
**Research Mentor**  
Dr. Sheldon Park  
**Title**  
Novel Puriﬁcation of Biotinylated Ligands Using Engineered Streptavidin Monomer  
**Abstract**  
The extraordinarily high affinity (Kd ~ 10-14 M) between wild-type streptavidin tetramer and biotin has led to the development of many useful tools and techniques for biotechnology applications. However, this strong
association has precluded its use for affinity purification of biotinylated ligands. The relative irreversibility of biotin binding necessitates strong denaturing conditions to remove biotin from the tetramer. Such a harsh environment often disrupts target ligand structure, rendering it unusable for subsequent applications. Although the streptavidin monomer has lower affinity for biotin (10-6 M), this reduction in binding is too low for effective capture of biotinylated targets. Recent progress has been made in engineering a streptavidin monomer with improved biotin affinity (10-9 M) and high thermal stability (Tm of 60 °C). Affinity purifications using this protein would enable selective capture of biotinylated ligands, and subsequent elution without the need for denaturing conditions. Use of excess biotin, in conjunction with elevated temperature, would allow for effective release of the captured targets. The aim of this research is to develop a novel protein purification system using a resin composed of immobilized monomeric streptavidin. This system would present an alternative to, as well as complement, existing affinity chromatography techniques such as the 6xHis tag and GST tag. It would enable simple capture of biotinylated ligands, and when combined with existing methods, allow for more stringent purification of target molecules.

Students
Zachary Fisher, Joe Groele, Andrew Lyons, Varun Vrudhula, Frank Repetti

Major
Mechanical and Aerospace Engineering

Research Mentor
Dr. Manoranjan Majji

Title
Design and Development of a UAV Tracking System

Abstract
The goal of the “Design and Development of a UAV Tracking System” project is to develop a prototype autonomous fixed wing unmanned aerial tracking system. In addition to the multitude of intelligence, surveillance and reconnaissance (ISR) applications, autonomous tracking systems are useful in urban traffic management and disaster mitigation applications. The prototype system is designed to be capable of autonomous flight at an altitude of 1000 feet, and utilizes a computer vision based tracking system to track objects as they move on the ground in three successive tracking missions. The aircraft system streams a video feed to a ground station in real time where a dedicated computer performs tracking operations to display the video feed with a marker over the desired object.

The aerial system is based on a Hobby-Lobby 12’ Telemaster RC aircraft with a wingspan of 12 feet and a takeoff weight of approximately 40 pounds. Onboard is an Ardunio board loaded with accompanying open source autopilot software to control the plane in flight. Additionally, a wireless camera gimbal system is mounted to the underside of the aircraft to stream a video feed to the ground.

The tracking software uses the open source OpenCV computer vision libraries to receive the video feed and pre-determined object. Specifically, the system will track a pickup truck as it moves through obstructions, and will distinguish and track an individual person as he/she exits the truck carrying an object. We plan to demonstrate the capabilities of this system in the UAS tracking challenge hosted by Texas A&M University and other industrial venues.

Student
H

Giovanni X. Madejski

Major
Industrial Engineering

Research Mentor
Dr. Jun Zhuang

Title
A Game-Theoretic Approach to Modeling Attacks and Defenses of Smart Grids

Abstract
As optimization, user capabilities, and data-taking abilities are incorporated into the power grid, the next generation power grid or smart grid faces the new risk of cyber threats. With the current electrical grid, physical access is required to cause damage, while with the smart grid it will be possible for users to remotely attack and severely damage the grid. We propose the use of a game-theoretic model to model three levels of defenses and attacks (Power Plants, Utility Companies, and Home Networks) in smart grid network security. To our knowledge, such an approach to smart grid network security has never been taken, our paper fills this gap by characterizing both the defender’s and attacker’s best response functions and the corresponding Nash equilibrium. We find that the defender’s best response is not only a function of direct attacks but of the spread from connected networks. Sensitivity analysis of the equilibrium shows that when the success probability of an attack against power plants reaches a certain threshold, and attacker’s best response is a low launch weight. The University at Buffalo’s Nanosatellite team is demonstrating the potential efficacy of utilizing low-cost Nanosatellites to augment space situational awareness capabilities for the US Air Force. The success of this mission is dependent on the reliability of the satellite’s attitude

Student

Kristina Monakhova

Major
Electrical Engineering

Research Mentor
Dr. Crassidis

Title
Attitude Determination and Control System for a Nanosatellite

Abstract
Small satellites are advantageous for space missions due to their relatively low cost, fast development time, and low launch weight. The University at Buffalo’s Nanosatellite team is demonstrating the potential efficacy of utilizing low-cost Nanosatellites to augment space situational awareness capabilities for the US Air Force. The success of this mission is dependent on the reliability of the satellite’s attitude
determination and control (ADC) subsystem. This subsystem must actively orient the satellite towards a target of interest, maintain the target within the camera’s field of view, as well as point the satellite to enable ground-station communications and solar panel charging. The satellite’s state can be estimated by combining several sensors including rate gyros, magnetometers, sun sensors, and a star tracker into a Kalman Filter. From the state estimate, reaction wheels and magnetorquers are utilized to skew the satellite towards a desired orientation. This poster outlines the general concept of operations for the ADC system for a small satellite, details the component selection, and presents an overview of several of the key control algorithms employed.

**Student**  
Alanna Olear

**Major**  
Environmental Engineering

**Research Mentor**  
Dr. James Jensen

**Title**  
Paper Towel Study

**Abstract**  
A life cycle analysis (LCA) was conducted on high tech hand dryers and paper towels at the University at Buffalo. The LCA was used to determine the carbon footprint tradeoff between Dyson Airblade hand dryers and paper towels. Resulted in significant loss of both inner and outer hair cells in the cochlea, as well as a significant reduction in DPOAE amplitude, indicating impaired outer hair cell function. Exposure to blast waves also resulted in a significant reduction in neurogenesis in the hippocampus. The results confirmed the effectiveness of the low cost blast tube as a tool for investigating the co-morbid auditory and brain injuries seen in military personnel following blast wave exposure in a rodent model.

**Student**  
Daniele Spineli

**Major**  
Environmental Engineering

**Research Mentor**  
Dr. David Blersch

**Title**  
Paper Towel Study

**Abstract**  
The object of this research is to investigate the performance of low-cost bench-scale prototype reactors for cultivation of attached filamentous algae. The cultivation of filamentous algae is a low-cost and sustainable strategy proposed for mitigation of water quality problems. The eutrophication of surface water, due to the runoff of nutrients from landscape causes an excess production and decay of algae affecting the water quality in the region. The proposed technology is the cultivation of attached filamentous algae. Periodically harvesting the algae biomass removes pollutants from the water stream, and in addition produces algal biomass, which may have economic value as a fertilizer amendment or feedstock for biofuels refinery. The prototype reactors have been constructed and assessed for its effectiveness in a rodent model. Exposure to blast waves resulted in significant loss of both inner and outer hair cells in the cochlea, as well as a significant reduction in DPOAE amplitude, indicating impaired outer hair cell function. Exposure to blast waves also resulted in a significant reduction in neurogenesis in the hippocampus. The results confirmed the effectiveness of the low cost blast tube as a tool for investigating the co-morbid auditory and brain injuries seen in military personnel following blast wave exposure in a rodent model.
capital costs, spreading the technology to economically-depressed rural regions. The research investigated the performance of the reactors involving different nutrient/light scenarios, evaluating the average rate of biomass production.

**STUDENT**
Varun Vruddhula

**MAJOR**
Mechanical and Aerospace Engineering

**RESEARCH MENTOR**
Dr. Andrew Olewnik

**TITLE**
Understanding product usage using embedded sensors

**ABSTRACT**
The cyber-empathic method represents an approach that provides real-time usage information through embedded sensors, making the knowledge exchange between user and artifact bidirectional and thus, more symmetric. In particular, the proposed research is among the first steps aimed at formalizing a design methodology that combines user- and customer-centered design goals with objective data derived from actual consumer usage (via embedded sensors). The expanding cyber infrastructure and decreasing cost and size of sensors facilitate the pursuit of this research objective.

**STUDENTS**
Amanda Wach, Abhiram Rao, Calvin Cheah, Elizabeth Capogna, Laura Brown, Daniel Ericson, Ryan Hasselkus

**MAJOR**
Biomedical Engineering

**RESEARCH MENTOR**
Dr. Ciprian Ionita, Ph.D, Dr. Stephen Rudin, Ph.D

**TITLE**
Shape-Memory Based Catheter Tip Actuation Mechanism For Coil Embolization of Intracranial Aneurysms

---

**STUDENT**
Mack Ward

**MAJOR**
Electrical Engineering, Computer Engineering

**RESEARCH MENTOR**
Dr. Milutin Stanacevic

**TITLE**
Gradient Flow Acoustic Localization with the Khepera II Robot

---

**STUDENT**
Yan Lin Zhang

**MAJOR**
Chemical Engineering

**RESEARCH MENTOR**
Gersh Berium

**TITLE**
Profile Of A Liquid Film Near A Rough Solid Surface

---

**ABSTRACT**
Acoustic localization has applications in a broad range of fields from advanced hearing aid devices to military vehicle tracking. It is commonly performed by comparing temporal differences between sound waves impinging on microphone arrays to determine a sound source location relative to the array. However, when microphone arrays become smaller and smaller, the process of simply comparing temporal delays as shifts in the microphone signals fails due to the smaller time delays between signals. The process of gradient flow localization solves this issue by converting the temporal differences of sound waves impinging on microphone arrays from phase shifts to altitudinal differences, which can then be used to more accurately localize a sound source. This method of acoustic localization was utilized to design an acoustic navigation system for the Khepera II robot, in order to demonstrate the robustness and applicability of such algorithm. It was implemented in the Khepera II though the use of MATLAB®, a custom analog microphone array chip, a digital communication chip, and personal computer connections.

---

**STUDENT**

**MAJOR**

**RESEARCH MENTOR**

**TITLE**

---

$\mathcal{H} = \text{Honors}$

$\epsilon = \text{CURCA}$

$\$ = \text{CSTEP}$
with reservoir of fluid in vapor phase at given chemical potential. Our goal is to study the fluid density inside the slit as function of fluid-pillar interactions at various geometries of the pillars.

To conduct this research, we employ the numerical minimization of the total free energy of the fluid in the slit by solving an appropriate Euler-Lagrange equation. For each considered geometry of the slit, we varied the fluid-pillar interaction magnitude ($\varepsilon_{wp}$), and determined the fluid density distribution in the slit and free energy of the system by using C++. The density profile graph of the compiled data from C++ is created through MATHEMATICA. EXEL was used to create a density vs. $\varepsilon_{WP}$ graph for given $\lambda$. To characterize the density of fluid, two reference points were selected. One of them was taken in the center of the nanochamber and other one was taken in the center of the channel.

It was shown that the fluid density in the nanochambers and in nanochannels first increases smoothly with increasing $\varepsilon_{wp}$, then grows very rapid at some value of $\varepsilon_{wp}$. After that, it remains almost constant in nanochambers but changes more significant in the nanochannels (decreases in the case of narrow pillars but increases in the case of wide pillars). The rapid growth of the fluid density can be explained by the capillary condensation which occurs at some specific value, $\varepsilon_{wp,c}$, of the $\varepsilon_{wp}$, which depends on the geometry of the slit. Analysis of adsorption and desorption isotherms show that the width of the hysteresis loop decreases with decreasing width of the channels and with increasing their length.

The results from this research can improve our understanding of fluid behavior in nanoslits. This can lead to possibilities of allowing only specific fluids through nanoslits, which can then greatly impact the way aerosol technology operates today.

**LSAMP (Louis Stokes Alliance for Minority Participation)**

**Student**
Paul Glenn

**Major**
Mathematics

**Research Mentor**
Dr. Avner Peleg

**Title**
The Photonic N-body Problem: Fast Collisions of NLS Solitons

**Abstract**
Energy loss due to pulse collisions in optical fibers is an important problem for information transmission in broadband systems. Nonlinear loss also plays a nontrivial role in the stabilization of mode-locked lasers. We study the effects of fast collisions between Nonlinear Schrödinger (NLS) solitons in the presence of weak loss of order $-i\alpha\frac{1}{2m+1}|\psi|^2m\psi$, where $m$ determines the nonlinearity of the loss. We give general formulae for soliton amplitude dynamics and for calculating collision-induced amplitude shift. We also characterize the dependence of the amplitude shift on the pulse parameters and the strength of the nonlinear loss.

**Student**
Andrea Martinez

**Major**
Electrical Engineering

**Research Mentor**
Dr. Jennifer Zirnheld

**Title**
Evaluating Effects of Transient Currents in Pulse Initiated Systems

**Abstract**
Systems that are triggered by pulses must operate reliably and repeatedly when energized at a specified value. Signals injected into the system from external sources, result in the system being exposed to pulsed and transient signals that may have deleterious effects on the system. These extraneous pulses may cause unforeseen damage to the operational mechanism. This poster will examine the potential for these signals to lead to aging, malfunction, and possibly failure of the system. This work will address the process of quantifying any effects, in order to understand the mechanics of failure due to pulsed and other transient currents that are less than what is required to initiate the system. A theoretical system will be built modeled in a finite element multi-physics simulation. Upon completion, any changes in resistive properties will be evaluated to determine if there were quantifiable effects that have contributed to the aging process.

**Student**
Alvin Okoroji

**Major**
Mechanical/Aerospace Engineering

**Research Mentor**
Dr. Puneet Singla and Dr. Manoranjan Majji

**Title**
A Quadrotor Research

**Abstract**
The mission of this research is to redesign the dragonfly quadrotor in the LAIRS (Lab for Autonomous Intelligent Robotics Systems). This redesigning has many sectors in it, including the dynamics and structural part, and I have been working on the structural part. This structural part will be similar in form to the dragonfly quadrotor that has already been built, except that this structural part will be completely manufactured by us using light weight materials that will give the utmost optimization of the thrust in the motors to perform the desired flight conditions.


**Student**
Erika Salem

**Major**
Mechanical Engineering

**Research Mentor**
Dr. Luis Colon

**Title**
Zirconia and Hafnia Monolithic Structures for Electrokinetic Micropumps

**Abstract**
Electrokinetic micropumps allow for liquid to be propelled through conduits by means of an applied voltage. This eliminates the need for pressure and allows it to more effectively be explored for utilization in space. The electrokinetic pump under study utilizes a porous monolith, specifically zirconia and hafnia, as the pumping element for various dilutions of a methanol-water solution and ammonium hydroxide by applying voltage from a combination of batteries. Various EK micropumps have been constructed to determine how the exposure of the electrode to the solution affects the flow rate of the fluid. After the construction of the electrokinetic pump, tests were conducted to determine their generated flow rate (μL/min) as a function of voltage for the mentioned fluids. The performance of the two different metal oxide monolithic electrokinetic micropumps were evaluated and compared. The electrokinetic micropumps fabricated with zirconia monoliths generated higher flow rates than the hafnia monoliths.

---

**Student**
Benjamin Fine

**Major**
Business Administration

**Research Mentor**
Martha Salzman

**Title**
The World of Sports

**Abstract**
Over the past four years, I have interned with two baseball teams (Hudson Valley Renegades and Buffalo Bisons), gaining all sorts of sports marketing and sports management experience. I share my experiences with others to show how much work and marketing goes into a baseball stadium, which only makes a profit on 38-72 days of the entire year when there are games and events being hosted.

---

**Student**
Sooyeon Han

**Major**
Accounting

**Research Mentor**
Sudhir Suchak

**Title**
Understanding Total Return in the International Equity Market

**Abstract**
In investing in foreign equity markets, currency exchange rates have effects on investors’ total returns. In this study, we try to show how the total return will be adjusted for the currency exchange rate.

---

**Student**
Kyoungah Lee

**Major**
Business Administration

**Research Mentor**
Stella Fey

**Title**
Professional & Business Owner Women

**Abstract**
The purpose of this project is to empower professional and business owner women to be more active in their financial planning. Our goal is to identify what financial concerns women have and why they have them. We have conducted a survey of 50 women, based on the 2010 Smart Money magazine article: “The Forgotten Majority” by Reshma Kapadia. Questions include:

- How did the article “The Forgotten Majority” make you feel?
- In what ways did you relate to the article?
- If you are married/cohabitating, how involved in the finances are you on a day to day basis and long term basis?
- How satisfied are you with the amount of money you save annually?
- What top 3 financial concerns do you have and why?
- Do you work with a financial professional? If yes, what is your level of confidence with the plans you have in place? If no, what are your reasons for not working with one?

We categorize reliable numerical data to analyze cause and effect, deriving common concerns.

---

**Student**
Lauren Meiler

**Major**
Business Administration

**Research Mentor**
Natalie Simpson

**Title**
Modeling Process Flow at United Parcel Service

**Abstract**
The main objective of this project is to show how UPS uses management science to configure how it operates. The use of time studies, and statistical
information allows management to make accurate staffing decisions. After personally working for UPS for the past 7 years, I have great insight on bridging the gap between knowledge and actual work experience. Many people recognize UPS in the community, yet how do the packages get on those trucks? The project will explain how the inbound process works, from the unload trailer to the package car.

**Student**
Olivia Ng

**Major**
Business Administration

**Research Mentor**
Chay Xiang Loong

**Title**
80 Hours

**Abstract**
I describe and discuss my internship experience as a door-to-door salesman in South Carolina, which required me to work at least 80 hours per week for twelve weeks.

**Student**
Joseph Ramia

**Major**
Psychology and Business Administration

**Research Mentor**
Dr. Brouer

**Title**
Increasing the work effort and performance of the psychologically entitled: The role of need for achievement and participative leadership

**Abstract**
This paper explores the moderating effects of need for achievement and unmet expectations on the outcomes of work effort and performance, suggesting that this negative relationship is weakened by participative leadership styles. In addition to this we explain how centralized decision-making can create an environment that does not support the use of participative leadership and therefore hinders its moderating abilities.

**Student**
Twiesha Vachhrajani, Chenlu Yang, Elizabeth Dashnaw

**Major**
Business Administration

**Research Mentor**
Dr. Natalie Simpson

**Title**
Insourcing v. Outsourcing in a Complex Time-Sensitive Transportation Network

**Abstract**
People Inc. is one of Western New York’s leading non-profit human services agencies, serving over five hundred clients living with disabilities, enabling them to lead healthier, more independent and productive lives. This project explores People Inc.’s current outsourcing transportation methods in addition to potential insourcing opportunities that use their existing client transport capabilities. Although some amount of client transportation is provided by People Inc., the majority of the firm’s transportation is outsourced to two major carriers, who provide transportation using their own resources. After experiencing significant cost increases in regards to their current system, People Inc. is looking to not only optimize their current methods but also explore the opportunity of expanding their self-transport services and utilizing the current facilities they own in order to insource some of their transportation requirements.

Our team has been working closely with People Inc. personnel, analyzing current subcontracting and self-transport systems through site visits, data and spreadsheet analysis, data visualization and GIS technology. Through our analysis we hope to find the optimal mix of insourcing and outsourcing of People Inc.’s transportation services.

**Student**
Ziqian Wang

**Major**
Business Administration

**Research Mentor**
Martha Salzman

**Title**
The Use of Sharrows to Increase Cyclist Safety in Urban Areas

**Abstract**
Several Cities including Buffalo, NY are adding more shared lane markings or “sharrows” to roadways in an effort to reduce driver-cyclist accidents and in order to promote cycling. This study aims to show how Buffalo uses “sharrows”, and to evaluate the effectiveness of their use in promoting a safer bicycle environment. To do...
this, video recordings of bicycle-vehicle interactions are conducted for two roads in the city, one with “sharrows” (Richmond Ave) and one without (Elmwood Ave). By comparing the recordings from the two roads, the study provides insight into the effectiveness and impact of sharrows in promoting cycling and improving safety.

Student  
Michael McClurkin

Major  
Biological Sciences

Research Mentor  
Dr. Hal Blumenfeld, MD, PhD

Title  
Retrospective Evaluation of Seizure Classification Using the Responsiveness in Epilepsy Scale II

Abstract  
Traditionally, partial seizures were classified as either "simple" or "complex" based on impairment of consciousness. This classification scheme is considered to be imprecise due to the difficulty of defining consciousness; which has led others to suggest revisions of epilepsy classification. With RES I; a standardized testing battery used to prospectively assess behavioral performance during seizures, performance on the initial question asked upon onset of a partial seizure showed a bimodal distribution of impairment, which correlates to the traditional categories of "simple" and "complex". This suggests that partial seizures can be separated into those with or without impairment. This study aims to report initial results of testing with RES II and to gather evidence to validate impairment of consciousness as a seizure classification paradigm.

Student  
Ruth McCoy

Major  
Economics and Finance

Research Mentor  
Dr. Steven Ko

Title  
Creating a more energy aware integrated development environment (IDE) for smartphones

Abstract  
With the advent of increased computing on mobile devices such as phones and tablets, it has become crucial to pay attention to the energy consumption of mobile applications. The software engineering field is now faced with a whole new spectrum of energy-related challenges, ranging from power budgeting to test and debugging the energy consumption.[1] To that end, we are creating a plugin for the Eclipse IDE that helps profile the energy consumption of each app on the Android Phone. This will help developers produce more energy efficient apps which in turn lead to a longer lasting battery.

School of Medicine & Biomedical Sciences

Student  
Kansho Abiko

Major  
Biochemistry

Research Mentor  
Laura Feltri, MD

Title  
Expression of p38 MAPK isoforms during postnatal development in the nervous system

Abstract  
Myelin, a sheath structure surrounding large axons, has a role in protecting axons and enables faster nervous impulse conduction velocity in vertebrates. Myelin sheathes are produced by oligodendrocytes in the central nervous system (CNS) and Schwann cells in the peripheral nervous system (PNS). Oligodendrocytes (OLs) can myelinate several axons, whereas Schwann cells (SCs) myelinate only 1 axon. The p38 mitogen-activated protein kinase (MAPK) family is important in response to extracellular signals. It consists of four isoforms: p38α, p38β, p38γ, and p38δ. The goal of our studies is to understand the role of p38 MAPK in myelination. We have found that p38α is the most abundant isoforms in the nervous system and that p38γ is detected only in differentiating OLs, in contrast, p38δ is produced by OLs under proliferation condition. Interestingly, deletion of p38γ accelerates myelination in the CNS, suggesting that this isoform normally inhibits oligodendrocyte differentiation. My next goal is to determine by immunohistochemistry and Western blot analysis which cell in the brain express the various p38 isoforms, in particular p38γ, and at which developmental time. Through this research, we are identifying all isoforms'
specific locations chronographically and geographically to understand how p38γ regulates myelination.

**Student**  
Jay Amin

**Major**  
Biomedical Sciences

**Research Mentor**  
Kevin G. Eckles; Kathleen L. Krenzer, Ph.D.; Mary E. Richardson, Ph.D.

**Title**  
Investigation of Ocular Irritation Threshold of Leachables and Impurities in Pharmaceutical Products

**Abstract**  
Rationale: The qualification of low levels of impurities in topical ophthalmic products is often hampered by a lack of ocular safety data at levels relevant to the products; establishing a threshold would be valuable in safety assessments. Therefore, the goal of this study was to explore the possibility of a threshold level for ocular irritation from repeated topical exposure to agents in solution.

Methods: Ten compounds from 8 chemical families were identified which resulted in severe ocular irritation or corrosive effects when administered as a single drop on the rabbit eye at high concentrations. Each chemical was prepared in an appropriate vehicle to give concentrations of 20 and 100 ppm. Draize scoring was performed before the first daily dose and after the final daily dose and biomicroscopy was performed pre-dose and on Days 2 and 3.

Results: None of the 10 chemicals resulted in notable ocular irritation at either 20 or 100 ppm after repeated ocular administration.

Conclusion: Despite being severe irritants or corrosives when dosed as a single drop at high concentrations, the favorable ocular irritation results observed with up to 100 ppm concentrations of severe irritants or corrosives suggest that it may be possible to establish a threshold for ocular irritation.

**Student**  
Marissa Boniszewski

**Major**  
Biomedical Sciences

**Research Mentor**  
Dr. Ji Li, Ph.D.

**Title**  
The role of Sestrin2 in regulating cardiomyocyte contractility

**Abstract**  
The enzyme AMP-activated protein kinase (AMPK) has been shown to protect against myocardial infarction making it a promising therapeutic target for ischemic heart disease. However, the mechanism by which AMPK is activated during ischemia remains poorly understood. Previous studies have shown that the protein Sestrin2 can activate AMPK under stressful conditions. Moreover, the role of Sestrin2 in mammalian cardiomyocytes and its effect on AMPK has not yet been investigated. It is hypothesized that Sestrin2 plays an important role in maintaining cardiomyocyte contractility and integrity during hypoxic conditions. To test this hypothesis, cardiomyocytes were isolated from WT and Sestrin2 KO mice. The heart was perfused and digested in a Langendorff fashion and calcium was restored after the cardiomyocytes were isolated. The parameters measured included: baseline calcium signal, peak height of calcium signal, maximal velocity of shortening, peak height, peak shortening, relengthening, resting sarcomere length, and time to 90% peak shortening. During basal conditions, virtually no differences in cardiac contractility and calcium influx were detected between WT and Sestrin2 KO mice. Since Sestrin2 is a stress-inducible protein changes in the basal state of the cell were not expected. Future experiments will be performed to determine the importance of Sestrin2 during hypoxic conditions.

**Student**  
Andrew Cotronea

**Major**  
Biomedical Sciences

**Research Mentor**  
Dr. Joe Gardella & Dr. Satpal Singh

**Title**  
Fly Fishing for Prospective Students

**Abstract**  
Education is designed to prepare students with the power and tools they need to succeed in a competitive environment. The purpose of this project is to spark a genuine interest in any of the fields of Life Sciences by developing and facilitating creative experiments, intended for use in a public school and classroom setting. Such experiments include but are not limited to, demonstration of genetic manipulation of a model organism that is Drosophila melanogaster. This should serve as a supplement in order to provide better understandings of Mendelian genetics by means of illustrating subtle differences that emerge from the presence of dominant and recessive alleles. Through use of interactive and engaging lab exercises, the ideal outcome of the project is to hook the curious minds of students ready for them to develop a rational to further their own educations.

**Student**  
Emily Deutschman

**Major**  
Biochemistry

**Research Mentor**  
Marc S. Halfon

**Title**  
Deciphering the cis-trans regulatory circuit mediating RTK/RAS signaling in visceral muscle founder cell specification

**Abstract**  
In Drosophila embryonic muscle development undifferentiated myoblasts differentiate into “founder” cells (FCs) and “fusion competent” cells (FCMs).
FCMs fuse into FCs to form a syncytial muscle fiber, with the FCs serving to mandate the identity of the entire fiber. In all three Drosophila muscle types (somatic, cardiac, and visceral) founder cell specification requires inductive signaling via the Receptor Tyrosine Kinase/Ras/MAP Kinase signaling pathway. In visceral muscle, the ligand jellybelly (Jeb) binds to the Alk receptor to activate the signaling cascade, which in turn activates downstream FC specific genes. In both somatic and heart muscle, the Ets-domain transcription factors Pnt and Yan (Aop) have been shown to be the downstream transcription regulators of the RTK/Ras/MAPK signaling pathway. In the visceral mesoderm, however, we have demonstrated that these factors do not play a significant role in mediating the RTK response. In order to determine the transcriptional effectors of RTK/Ras signaling at work in visceral FC specification, we are investigating an enhancer region of the FC specific gene mb2. Site-specific mutagenesis of this enhancer has identified sequences which when mutated lead to an expansion in the visceral mesoderm FC population. Results from a yeast one-hybrid screen have identified potential transcription factors that bind to one or more of these sites. We are now attempting to validate these results. We have also cloned a number of additional enhancers of other FC specific genes so that we can look for commonalities among the various enhancers that might give us clues as to what the important functional motifs are.

**Abstract**

During DNA replication, DNA polymerases duplicate the cell's DNA prior to cell division. DNA polymerases synthesize a new strand of DNA by incorporating deoxyribonucleotides (dNTPs), the building blocks of DNA, opposite the parental strand. Completion of DNA replication requires adequate dNTP levels. However, when dNTP pools are elevated, there is an increase in the number of errors in DNA replication leading to increased mutation rates. Importantly, many human cancer cells exhibit elevated dNTP pools, which may contribute to tumorgenesis and/or cancer progression. We are interested in the way in which elevated dNTP pools affect both the error rate of DNA polymerases and the types of mutations that are generated under these conditions. Several reporters for different mutation types are available in Saccharomyces cerevisiae, making this an ideal model system. In S. cerevisiae, we have modulated the dNTP pools with mutations in ribonucleotide reductase, which catalyzes the rate-limiting step in dNTP synthesis, leading to elevated dNTP levels. In addition, these yeast strains lack the highly conserved mismatch repair system, which corrects errors in replication. This will provide us a more accurate picture of the extent and type of polymerase error under different dNTP concentrations.

**Student**

Kevin Espino

**Major**

Biochemistry and Chemistry

**Research Mentor**

Dr. Laura Feltri

**Title**

Role of Laminin211 in Neuregulin induced de-myelination in vitro

**Abstract**

Myelin is a multilamellar structure produced by glial cells around axons. In the peripheral nervous system, Schwann cells (SCs) are the glial cells that myelinate axons. Through axonal signals, such as Neuregulin1, SCs can recognize larger diameter axons and differentiate into pro-myelinating SCs. Laminins, basal membrane proteins, are also involved in SC development and differentiation into pro-myelinating SCs. After nerve injury, axons can degenerate causing SCs de-differentiation and myelin breakdown. Similarly, in many demyelinating diseases, SCs de-differentiate and myelin is destroyed. Thus, understanding the factors that trigger demyelination may reveal neuroprotective factors important in injury and disease. Interestingly, Neuregulin1 not only promotes myelination, but can also trigger demyelination. The reason for this is unknown. The goal of my project is to study the role that Laminins play in demyelination. Our hypothesis is that Laminin211 has a protective role in demyelination induced by Neuregulin1. Therefore, we will induce de-myelination with Neuregulin1 in cultures of SCs and dorsal root ganglion neurons collected from wild type or null for Laminin211 mouse embryos. We expect to see a stronger demyelination in absence of Laminin211. This study will help determine if Laminin211 has a protective role in demyelination and analyze possible pathways involved in this process.
axons by SCs are dependent on the small GTPase Rac1 after activation by integrin receptors on the SC membrane (Nodari et al. 2007). The effector molecules that Rac1 activates in SCs are unknown. In this project we sought Rac1-GTP effectors mediating Schwann cell-axon interactions. Candidate proteins interacting with Rac1-GTP were pooled from a pull-down assay of developing mouse nerves lysate and recognized by mass spectrometry. The most promising candidates are being characterized by mRNA and protein expression and localization in wild-type and Rac1-null nerves, primary rat SCs, and Dorsal Root Ganglion neurons (DRGN) co-cultured with SCs. One candidate, Borg5, was shown to be expressed in DRGN and SCs, and locate to the leading edge of the extension. The interaction of the candidates with activated Rac1 will be confirmed by co-immunoprecipitation with Rac1-GTP from SCs and nerves. Further work on the role of the candidates will be conducted by knockdown in SCs and, ultimately, analysis of mutant mice.

**Abstract**

It has been proposed that Oligodendrocytes (OL) and Schwann cells (SC) - the myelin forming cells - support neurons energetically by providing lactate and other metabolites to their axons. This unforeseen role of myelinating cells needs yet to be clarified, but its understanding is very promising in the generation of therapies to demyelinating diseases. Thus, we are studying the energetic relationships between neurons and myelinating cells through the examination of mice that carry a deletion of Pyruvate Dehydrogenase (PDH) gene selectively in myelinating glia. We predicted that OL and SC of those mice would rely in the anaerobic glycolysis to fulfill their energetic requirements, incurring lactate accumulation. Additionally, myelin formation can be impaired due to the reduced levels of acetyl-CoA, a product of PDH action that is essential for lipid synthesis. We confirmed the specificity of the recombination both by PCR and Western blot, and detected increased lactate in sciatric and optic nerves. Now, we intend to evaluate the energetic status by measuring the ATP concentration on those nerves. In preliminary histological observations, no drastic changes were found in myelination or axonal integrity at 1 month. Further investigations are ongoing, as well analysis at 3 and 6 months animals.

**Student**

Jesse Hanchett

**Major**

Biomedical Sciences

**Research Mentor**

Dr. Richard Ohrbach

**Title**

A state-specific assessment of jaw muscle activity in a laboratory setting

**Abstract**

Behavior, as mediated via muscle contraction, is easy to measure but complex to interpret. For the oral region, task-related behaviors are contrasted with so-called resting behavior, and clinical interpretations of jaw muscle electromyography (EMG) are based on assumptions about the resting behaviors. The goal of this study was to examine one of those assumptions about resting behavior involving the jaw. Specifically, we examined the EMG recordings of the bilateral masseter, temporalis and suprapyrus muscles in subjects with TMD (temporomandibular disorders) vs healthy controls as previously described (Markiewicz et al). In a task-oriented experimental design, the subjects were asked to perform select oral tasks (e.g. ‘clench’) as identified in the Oral Behaviors Checklist (OBC). The periods immediately prior to (pre-task) and immediately following (post-task) each of the requested tasks were recorded and used for present analyses in order to assess waking-state baseline muscle activity of the jaw muscles. The data quality was inspected across all subjects. EMG signals for pre and post-task recording epochs were documented as either good or bad for all subjects. Subjects with >70% good data as determined by single channel artifact inspection of EMG were included in the analysis. Similar statistics were done on all of the data and compared to the subset created by the data inspection.

**Student**

Li Sia Heng

**Major**

Biotechnology

**Research Mentor**

Richard Kollmar, Ph.D

**Title**

C1q Domain Interactions in Otolith Morphogenesis

**Abstract**

Otoliths (“ear stones”) in fish and its homologous otoconia (“ear dust”) in higher vertebrates are essential in detecting linear acceleration, as well as providing a sense of balance. They consist of mainly CaCO3 which interweaves with proteins to form a matrix. The investigation of otolith morphogenesis allows proteins forming the matrix to be identified and characterized. The recently identified precerebellin-like protein (Cblnl) in trout otolith has a C1q domain that is capable of interacting with the C1q domain of Otolin-1 (Otol1a) in zebrafish otolith. It is proposed that the C1q domain of Otol1a forms homotrimeric and heterotrimeric with that of Cblnl. By performing site-directed mutagenesis, we successfully deleted the two introns in trout Cblnl genomic clone to create a cDNA, which is now available for subcloning into a bacterial expression vector. We then expressed the recombinant Otol1a C1q section.
domain via pET system and carried out affinity purification under denaturing conditions. Isolated target proteins were then refolded by dialysis in urea step gradient buffers and a fractional matrix with various reagents at different concentrations.

**Student**  
Siti Ashirah Ibrahim

**Major**  
Biotechnology

**Research Mentor**  
Amanda Finbar

**Title**  
Detection of false positive results for Kastle-Meyer test from food samples.

**Abstract**  
Blood is essential evidence at the crime scene. Generally, dried blood can be seen as a reddish stain which causes stiffness on fabric. The bloodstain appears hard on non-porous surfaces and it can easily be scraped off. In the crime scene, the suspect may try to dispose of evidence. For example, the suspect may throw the cloth that contains some blood into the dustbin. The phenolphthalein test is a relatively specific presumptive test for blood. However, certain food samples can cause false positive reactions. The purpose of this project is to detect which food samples may cause a false positive reaction for blood. The reagents used are deionized water, phenolphthalein and hydrogen peroxide. A positive result is indicated by the formation of pink color within 1 to 20 seconds. Formation of other colors will be considered as negative results. Since these test are not human specific, any food containing blood will cause positive reactions. Forty-three samples of foods were tested, in the categories of fruits, vegetables, meats and condiments and only the meats were positive for blood. However, broccoli and horseradish caused a pink color changes after 45 seconds, but since this took longer than the test conditions this would not lead to a false positive in a properly run test. Thus, the phenolphthalein test is a very specific presumptive test for the blood.

**Student**  
Ryan Latulipe

**Major**  
Biochemistry & Mathematics

**Research Mentor**  
Dr. Michael Buck

**Title**  
Sequencing Human Intestinal Tract Bacteria Before and After Gastric Bypass Surgery

**Abstract**  
Roux-En-Y Gastric Bypass (RYGB) surgery has become a commonly used procedure in morbidly obese patients which results in extreme weight loss and alleviates other diseases such as Type 2 Diabetes Mellitus (T2DM). Recent evidence has shown the composition of the human intestinal microbial communities may contribute significantly to the acquisition and severity of disease, particularly obesity and T2DM. The composition of the intestinal flora has been shown to be different in obese and normal weight patients; however, we have found no study which looks at the progression of the human gut flora’s composition after a patient undergoes the procedure. The goal of this study was to examine how the microbial community changes in patients undergoing the RYGB procedure by performing 16S amplicon sequencing on the bacterial samples recovered from the stool of patients at various time points. A novel sequencing method was developed to perform sequencing on the recently released Ion Torrent Personal Genome Machine. We found significant changes in patient’s gut flora after the procedure was performed, particularly in the phyla Bacteroidetes and Firmicutes, two groups which make up the majority of the human gut flora.

**Student**  
David Hudson Lee

**Major**  
Pharmacology and Toxicology

**Research Mentor**  
Dr. Rajendram Rajnarayanan

**Title**  
S100B Induced Conformational Changes in the Estrogen Receptors: Implications for Drug Discovery.

**Abstract**  
Estrogen Receptor (ER) belongs to the nuclear receptor super family of ligand-triggered transcription factors. ER is present in about 70% of breast cancers. It has been shown that several proteins including calcium binding proteins with EF-hand motifs, which control cellular calcium and calcium mediated signaling pathways, including calmodulin (CaM) could bind to unliganded ER and activate ER. Both X-ray and NMR studies show that the alpha helices of the EF-hand motifs change their position relative to each other, forming an almost perpendicular conformation. This allows calmodulin to increase its binding affinity for a number of target proteins. S100, a soluble protein that is recently reported to interact with ER has only two EF-hand motifs. S100 protein is overexpressed in several cancers and shares a high degree of sequence homology with calmodulin. Using the fold information and contact regions obtained from the Mass spectrometry, 3D structures of ER-EF hand protein complexes were reconstructed. ER-S100 complex is distinct from CaM. We believe that the ensemble of ER-EF hand protein complexes generated by our integrated proteomics-assisted protein interaction profiling will shed light on the lingering issue of hormone independent activation of ER at the molecular level.

**Student**  
Lili Lin

**Major**  
Pre-pharmacy

**Research Mentor**  
Fraser J. Sim Ph.D.

**Title**  
Human oligodendrocyte fate is promoted by SOX10 overexpression
**Abstract**

Remyelination is the process of restoring myelin sheaths and neuronal functional deficits caused by myelin loss (Franklin et al., 2008, Nat. Rev. Neurosci). Differentiation of oligodendrocyte progenitors is considered a rate-limiting step in remyelination. Our genomic studies revealed that transcription factors (TFs) ASCL1, SOX10, NKX2-2, PRRX1, and POU2F1 were upregulated during human oligodendrocyte differentiation in vitro (Sim et al., 2011, Nat Biotech). We hypothesized that enforced expression of these TFs in human oligodendrocyte progenitors (OPCs) will induce oligodendrocyte differentiation. CD140a-sorted OPCs were isolated from human fetal brains and infected with individual lentivirus to express each TF. Four days after infection, O4+ oligodendrocyte and GFAP+ astrocyte differentiation was assessed by immunofluorescence. Among the TFs tested, only SOX10 significantly increased oligodendrocyte differentiation relative to the control (174±10%, n=4 fetal samples, p<0.05). However, oligodendrocyte maturation, assayed by oligodendrocyte morphology, revealed no differences. In addition, factors ASCL1, NKX2-2, PRRX1 and SOX10 significantly reduced astrocyte differentiation compared to the control (n=5, 1-way ANOVA, p<0.01). This suggested that they might function to maintain cells in the progenitor stage. In summary, while several transcription factors can influence OPC fate, only SOX10 was capable of inducing oligodendrocyte differentiation and might be a promising therapeutic target.

**Student**

Sanjana Mahapatra

**Major**

Biotechnology

**Research Mentor**

Dr. Margaret L. Dubocovich

**Title**

MT1 Melatonin Receptor Role in Methamphetamine-Induced Locomotor Sensitization in C57BL/6 Mice

---

**Abstract**

Methamphetamine (METH) and other abused drugs induce sensitization, which may underlie drug abuse related symptoms. Clues to molecular mechanisms between METH and melatonin signaling come from melatonin blocking the inhibitory effect of METH on the phosphorylation of the mammalian target of rapamycin (mTOR; Kongsuphol et al., 2008). We investigated the MT1 receptor in locomotor sensitization and regulation of mTOR after a single METH pretreatment in C57BL/6 mice. Wild-type (WT) and MT1KO mice were pretreated with a single vehicle or METH pretreatment (1.2 mg/kg, i.p.) on Day 1, then challenged with METH (1.2 mg/kg, i.p.) on Day 9. Another group of WT and MT1KO mice treated with vehicle or METH on Day 9. Another group of WT and MT1KO mice treated with vehicle or METH on Day 1 were decapitated 2½ hours or 8 days later for brain tissue harvest and Western blot analysis. Locomotor sensitization was expressed in METH pretreated WT mice but not in MT1KO mice. METH treated WT mice expressed p-mTOR levels greater than VEH treated WT mice in caudate putamen and nucleus accumbens (Day 9). MT1KO mice p-mTOR levels were not altered. MT1 receptors mediated the induction of locomotor sensitization to METH in C57BL/6 mice after a single pretreatment. Also, expression of METH-induced locomotor sensitization may involve MT1 receptor mediated mTOR phosphorylation.

**Student**

Andrew Y. Ng

**Major**

Biotechnology, B.S.

**Research Mentor**

Stephen T. Koury, Ph.D.

**Title**

Development of a western blot assay to confirm Xpo7 gene knockdown

**Abstract**

Exportin-7 (RanBP16 or Xpo7) is a protein that mediates the export of a wide array of proteins out of the nucleus into the cytosol; but more importantly, it was previously shown to be transiently upregulated during erythroid terminal differentiation (ETD), whose mechanism remains largely undefined. Consequently, current studies in Koury Lab aim to elucidate the mechanism...
of ETD by conducting Xpo7 gene knockdown via RNA interference and observing the resultant morphological and biochemical changes. The purpose of this project was to construct a recombinant vector that contains the full length clone of the Xpo7 gene, reliably express and isolate its protein product, use the purified protein to affinity purify crude anti-Xpo7 rabbit polyclonal antibody, and ultimately develop a western blot assay that accurately confirms Xpo7 gene knockdown.

**Student** 
Danielle M. Precourt

**Major** 
Biology and Chemistry

**Research Mentor** 
Margarita L. Dubocovich, PhD

**Title** 
Melatonin Modulation of Novel Object Recognition

**Abstract**
Melatonin is released from the pineal gland following a circadian rhythm, with higher levels at night than during the day. Melatonin exerts its effects through action on two G coupled-protein receptors, termed MT1 and MT2. Melatonin through action on the MT2 receptor has been linked to an inhibition of long-term potentiation (LTP). LTP is a critical part of the learning and memory process. Previous studies in our lab using C57/HeN mice in the Attentional Set Shift Task have demonstrated a deficit in the learning and memory in mice with only a functional MT2 receptor (MT1KO) compared to Wild-type (WT) controls. The goal of this study was to further characterize melatonin’s potential effects on learning and memory through use of a Novel Object Recognition Paradigm. This paradigm is based on the concept that rodents are naturally novelty preferring, therefore mice will interact more with a novel object than a familiar object. We hypothesize MT1KO mice will show a decreased interaction time with the novel over familiar object compared to their WT counterparts, therefore showing a decrease in learning and memory. Supported by DA 021870 to MLD

**Student** Andrea Schneider

**Major** Biochemistry

**Research Mentor** Dhyan Chandra Ph.D.

**Title**
Mechanisms of Neemoids Induced Apoptosis and Autophagy in Cancer Cells

**Abstract**
Growth of cancer cells is characterized by dysregulated proliferation and evasion of cell death including apoptosis. Cancer therapeutics induce apoptosis in cancer and normal cells. Therefore, finding effective therapy with minimal toxicity remains paramount. One promising agent is Azadirachta indica, commonly known as neem. We show that neem, which contains a majority of neem limonoids including azadirachtin, induced apoptotic and autophagic cell death. Gene silencing demonstrated that caspase cascade was initiated by the activation of caspase-9, whereas caspase-8 was also activated late during neem-induced apoptosis. Neem induced the release of cytochrome c and apoptosis-inducing factor (AIF) from mitochondria, suggesting the involvement of both caspase-dependent and AIF-mediated apoptosis. p21 deficiency caused an increase in caspase activities at lower doses of neem, whereas p53 deficiency did not modulate neem-induced caspase activation. Additionally, neem treatment resulted in the accumulation of LC3-II in cancer cells, suggesting the involvement of autophagy in neem-induced cancer cell death. Silencing of ATG5 or Beclin-1 further enhanced neem-induced cell death. Phosphoinositide 3-kinase (PI3K) and apoptosis inhibitors increased neem-induced caspase-3 activation and inhibition of caspases enhanced neem-induced autophagy. Together, for the first time, we demonstrate that neem induces caspase-dependent and AIF-mediated apoptosis, and autophagy in cancer cells.

**Student** Ryan Schwab

**Major** Biotechnology

**Research Mentor** Wilma A. Hofmann, Ph.D.

**Title**
Identification of SUMOylation Sites in Myosin IC

**Abstract**
Myosin IC (MyoIC) is a member of the myosin superfamily. It localizes to the nucleus where it plays important roles in transcription, intranuclear transport, and nuclear export. However, how the nuclear functions of MyoIC are regulated is not understood. We recently identified a novel, nucleus-specific posttranslational modification of MyoIC and showed that nuclear MyoIC is SUMOylated. SUMOylation of proteins is known to have a great number of consequences for the target protein such as changes in transcriptional activity, cellular translocations, and protein-protein interactions. Thus, SUMOylation could play an important role in the regulation of nuclear MyoIC functions. The goal of this project was to characterize this novel modification. Specifically, to identify the sites in MyoIC to which SUMO proteins are attached to and what SUMO protein is involved in this modification. Using in vivo SUMOylation assays, we showed that MyoIC is modified specifically by SUMO2. In addition, by using site directed mutagenesis in combination with in vivo SUMOylation assays, we identified the specific MyoIC amino acid sequence where SUMO is attached to, and created MyoIC mutant constructs that cannot get SUMOylated anymore. These data are an important first step in understanding the physiological consequences of this novel MyoIC modification.
Student  ĉ Christina M. Stanton  

Major  Biological Sciences  

Research Mentor  Leonard H. Epstein, Ph.D.  

Title  Reducing Delay Discounting with Associative Learning of Episodic Future Thinking  

Abstract  Thirty-eight percent of deaths in America are caused by modifiable health behaviors like smoking, overeating unhealthy foods and physical inactivity (Mokdad et al, 2004). While many people are aware of the adverse future consequences of their behaviors, they choose the immediate gratification of these unhealthy activities instead of avoiding them to be healthy later. This devaluation of future consequences in favor of smaller immediate rewards is known as delay discounting (DD) and is considered an index of impulsivity (Epstein et al, 2010). Higher levels of impulsivity have been associated with maladaptive behaviors like smoking, substance abuse and obesity (Bickel & Mueller, 2009; Epstein et al, 2010). Episodic future thinking (EFT) is a self-projection into the future to pre-experience an event and has been demonstrated to reduce DD (Peters & Buchel, 2010). One paradigm that can be used to implicitly cue participants to engage in EFT is associative learning. Associative learning (AL) is the learned association between two unrelated items as a result of repeated pairing (Suzuki, 2005). This study investigated the efficacy of associative learning of EFT in reducing DD when compared to a control episodic present thinking (EPT) task.

Participants attended one session, in which they were required to generate future or present events with vivid episodic imagery and then complete a repeated matching task in which they learned to associate either EFT or EPT with neutral stimuli. These neutral stimuli were then presented while completing a DD task. The DD task requires participants to make choices between immediate or delayed rewards. We hypothesize that individuals in the EFT AL group will show less delay discounting than those in the control EPT group.

Student  ĉ Aashutosh Vihani  

Major  Biochemistry  

Research Mentor  Dr. Piero Blanco  

Title  Single Molecule Force Analysis of RecBCD  

Abstract  Objective: The aim of this project is to understand the chemomechanical cycle of RecBCD, a helicase-nuclease enzyme in Escherichia coli. The chemomechanical cycle of this enzyme is linked to molecular mechanical motion and force generation. What we would like to understand is how the chemical energy present in ATP, is converted into mechanical energy required for the forward motion and DNA strand separation by this enzyme.

Methods: By using an optical trap, we are able to isolate DNA dumbbells consisting of a single molecule of biotinylated λ-DNA bound to a non-fluorescent, streptavidin bead on one end and a single molecule of RecB-(his-biotinC)-D bound to the opposite end. To enable visualization of the enzyme, it will also be attached to a fluorescent bead. Once optically trapped, we will ask the enzyme to unwind the DNA and simultaneously pull the fluorescent bead against an opposing fluid flow.

Results & Future Directions: I have successfully calibrated the single molecule instrument for force measurements and have purified large quantities of the active RecB(his-biotinC)-D enzyme to homogeneity. My remaining work includes further evaluations of enzyme activity in the presence of beads followed by analyses of the enzyme under single molecule conditions.

Student  ě Christopher K. Wang  

Major  Pharmacology & Toxicology  

Research Mentor  Richard A. Rabin  

Title  The Effects of Ethanol on Microglia Activation  

Abstract  Microglia, the primary innate immune cell in the brain, appear to play a significant role in the neurotoxic and behavioral effects of ethanol. The objective of this proposal is to address critical open issues regarding the acute effects of ethanol on microglia activation. Specifically, the murine BV-2 microglia cell line will be used to test the hypotheses that: 1. ethanol enhances M1 microglia activation resulting in an increased generation of pro-inflammatory cytokines and toxic intermediates; and 2. ethanol impairs the ability of anti-inflammatory cytokines to induce the M2 alternative microglia activation states. Effects of acute ethanol exposure on the M1 state will be determined in cells stimulated with bacterial endotoxin (lipopolysaccharide) and ATP receptor agonists (Bz-ATP). For these studies, nitrite levels in the medium measured by the Griess reagent will be used to assess nitric oxide production, apocynin-sensitive reduction of NADPH to NADP will be used for NADPH oxidase (NOX) activity. Effects of acute ethanol exposure on the M2 state will be determined in cells stimulated with interleukin-4, which induces the M2 state. The M2 state will be assessed using hydrolysis of thioarginine used to measure arginase activity.
Huntington's disease is a neurodegenerative disease caused by abnormal expansion of CAG (polyglutamine/Q) repeats in the N-terminus of the huntingtin (HTT) protein. This expansion often leads to protein misfolding, which influences many downstream effects. Self-aggregation of mutant HTT can lead to its accumulation and cause axonal transport defects. We recently demonstrated that Rab11, which functions in recycling endosomes, interacts with HTT. In vivo analysis of Rab11 transport shows robust movement in the axons, but reduction of HTT causes the vesicles to accumulate and perturb transport. There are many neuronal-specific Rab proteins, and we hypothesize that HTT would also influence their movement in the axonal transport pathway. These Rabs include Rab3, Rab19, Rab26, and Rab27. Using the model organism Drosophila and in vivo analysis, we examined the movement of Rab proteins in larval axons. Our results show robust movement of Rab3, Rab26, and Rab27. However, blockages were observed in larval axons expressing Rab19. To examine whether HTT influences the movement of these neuronal Rabs, we generated larvae expressing neuronal Rabs with 70% HTT reduction. Similar to HTT’s effect on Rab11, we expect HTT to affect the movement of recycling endosome Rabs. Disruptions in HTT-mediated Rab transport may contribute to Huntington’s disease.
are not able to differentiate nuanced, individualized, patient-centered care from incongruences or breaches in accepted safe and ethical practice (Nairn et al, 2012; Kitwood, 1997; McGarry et al, 2009). Moreover, because beginning nursing students do not yet have the self-confidence and professional judgment which comes from experience, they often do not raise these concerns for discussion with their clinical faculty or preceptors (Hunink et al, 2009). Thus, opportunities for learning, reflection and clarification of professional practices and values are lost (Comrie, 2012).

The purpose of this study is to identify potentially difficult or troubling situations encountered by beginning nursing students in their first clinical rotations. An anonymous, online questionnaire was sent to 700 registered nursing students from WNY who are in their first year of clinical experiences. What we learn from this study could be incorporated into future nursing courses for beginning students to better prepare them for the realities of the clinical setting and to provide them with strategies to deal with these difficult situations.

**School of Pharmacy & Pharmaceutical Sciences**

**Student**  
Yi Ting, Lien

**Major**  
Pharmaceutical Sciences

**Research Mentor**  
Dr. Joseeph P. Balthasar

**Title**  
Development of Anti-Rac 1b Antibodies

**Abstract**  
Introduction: Rac1b is a highly active splice variant of Rac1 (Ras-related C3 botulinum toxin substrate) that has been associated with breast and colorectal cancer. The primary sequence of Rac1b differs from that of Rac 1 due to the inclusion of a unique 19-amino acid insert VGETYGKDITSRGKDPIA. The objective of this project is to develop a panel of monoclonal anti-Rac1b antibodies, with specificity for the insert, for future evaluation in diagnostic and therapeutic applications.

Methods: The 19-amino acid insertion domain was custom synthesized by GenScript, and mice were immunized with emulsions of Freund’s Incomplete Adjuvant containing the peptide and conjugates of the peptide with keyhole limpet hemacyanin. Plasma was collected and screened for activity via enzyme-linked immunosorbent assay (ELISA) and via surface plasmon resonance. The highest responding mouse from the screening was sacrificed, and splenocytes were collected and then fused to SP2/0 myeloma cells. Resulting hybridomas were screened for anti-Rac1b activity, expanded, and cloned.

Results: Plasma samples collected from immunized mice showed ELISA responses of X+/-Y, whereas control samples showed responses of X +/Y, consistent with the development of a robust, polyclonal antibody response against the Rac1b insert. Hybridoma development and cloning is currently in progress.

Conclusions: Polyclonal antibodies have been developed with affinity for the Rac1b insert. Future work will attempt to develop and characterize monoclonal anti-Rac1b antibodies.

**Student**  
Sangwon Min

**Major**  
Pharmaceutical Sciences

**Research Mentor**  
Dr. Aiming Yu

**Title**  
Use of Cationic Polymers to Deliver Nucleic Acid Agents

**Abstract**  
Promising gene delivery strategies are being exploited and with the advance in technology, attention was brought to nanoparticles as a method of delivery vehicle. Amongst various nanoparticles, cationic polymers are unique by possessing biodegradability and “proton sponge” effect leading to an increase in transfection efficacy. Thus, this study investigates gene delivery efficiency of cationic polylactides (CPLA) and the subsequent change in its target gene expression with comparison to Lipofectamine™ 2000. To visually determine optimum delivery ratio and compare resulting efficacy, humanized recombinant green fluorescent protein II (hrGFP-II) vector was used primarily. Using various weight ratio of phrGFP II vector to CPLA, delivery ratio was optimized. Then, CPLA was employed to deliver a microRNA-1291 (miR-1291) expression plasmid to two pancreatic tumor cell lines, AsPC-1 and BxPC-3. Resultant miR-1291 expression level was quantified via qPCR and change in miR-1291 target gene was determined by Western blot. The overall findings provide closer insight of CPLA as potential gene delivery method.

**Student**  
Kelly Mroz

**Major**  
Pharmaceutical Science

**Research Mentor**  
Dr. Sathy Balu-Iyer

**Title**  
Effects of OPLS on the Immunogenicity of Rituximab

**Abstract**  
Subcutaneous administration is currently a highly sought after route of administration for protein therapeutics. It allows patients to self-administer, often results in increased compliance, and lowers medical costs. However, a rising problem with subcutaneous administration of these drugs is the development of neutralizing antibodies within patients. These antibodies alter the drugs’ pharmacokinetics and can also significantly lower their efficacy, often necessitating a change in therapy for patients. This can be particularly detrimental for disease states in which no alternate therapy exists. Previous
experiments in our lab have shown that the subcutaneous administration of O-phospho-L-serine (OPLS) with Factor VIII in hemophilia model mice results in a reduced immunogenicity of the protein. In this experiment, we extend the study of OPLS to Rituximab, a chimeric monoclonal antibody, to assess whether the addition of OPLS will reduce the incidence of neutralizing antibodies for this particular drug. We performed an in vivo study on Swiss Webster mice, who received multiple subcutaneous injections over a two-week period. Preliminary results show a lower incidence of responders in the OPLS group when compared to the Rituximab group. Further research will attempt to quantify the antibodies levels present in collected samples.

Student
Brittany Walker

Major
Pharmaceutical Sciences

Research Mentor
Dr. Joseph P. Balthasar

Title
Investigation of Rac1b in human colorectal cancer cell lines

Abstract
Purpose: Rac1b is a small intracellular GTPase differing from its parent Rac1 (Ras-related C3 botulinum toxin substrate 1) by a 19 amino acid insertion. Rac1b expression has been shown to up-regulate anti-apoptotic factors and to increase cell cycle progression. Rac1b is expressed in ≈80% of human colorectal cancers, and expression of Rac1b has been found to be necessary for the survival of some cancer cell lines in culture. The objective of this work is to examine Rac1b expression in cell lines that are commonly employed in mouse xenograft models of human colorectal cancer.

Methods: Human colorectal cancer cell lines, including LS174T and HT29, were grown in culture and harvested. RNA was isolated, and then reverse transcribed to complimentary DNA. The Polymerase Chain Reaction (PCR) was then applied to amplify and analyze the presence of Rac1b mRNA. Cellular homogenates were also analyzed for Rac1b expression via Western Blotting, with use of a specific polyclonal anti-Rac1b antibody.

Results: Preliminary Western Blot analyses showed expression of Rac1b in HT29 colorectal cancer cells. Evaluation of expression in additional cell lines, by Western Blotting and PCR, is currently underway.

Discussion: Rac1b expression has been verified in HT29 cells, via Western Blotting.

School of Public Health & Health Professions

Student
Andrea Fadel

Major
Exercise Science

Research Mentor
Rachel Darr M.S., RD, CSSD Peter Horvath, Ph.D.

Title
Vitamin D was related to VO2 but not Anthropometric or Quality of Life in Healthy Men

Abstract
Recent research examining relationships between Vitamin D and anthropometrics have correlated obesity with aerobic and anaerobic exercise, and quality of life measures.

PURPOSE: To determine any associations between serum 25(OH)-Vitamin D levels and exercise, anthropometric, and quality of life measures.

METHODS: Data were collected from 36 healthy men (45.8±9.7 years old); Serum 25(OH)-Vitamin D levels, percent body weight lifted for one-repetition maximum for bench press (%BP), Sub-Maximal Predicted VO2, Waist to Hip Ratio (WHR), BMI, and Percent Body Fat (%BF), Depression Scale (CES-D), General Health Survey (SF-36), and Yale Physical Activity Survey (YPAS).

RESULTS: Positive correlations were seen between Vitamin D and Predicted VO2; Predicted VO2 and %BP; CES-D and BMI; BMI and %BF. Negative Correlations were found between CES-D and the physical (PCS) and mental summaries of SF-36; %BP with WHR and BMI; PCS with BMI, WHR, and YPAS.

CONCLUSION: Individuals with higher BMI psychologically identify themselves as more depressed with a lower mental health status and having poor physical health status. Individuals who perceive themselves to be in good bodily shape present with healthier BMI, WHR, and %BP. Vitamin D was not correlated with any quality of life measure. Vitamin D may improve aerobic function.

Student
Alyssa Herman

Major
Exercise Science

Research Mentor
Scott C. White, PhD

Title
THE EFFECTS OF CHANGING STRIDE LENGTH ON VERTICAL GROUND REACTION FORCES IN RUNNING

Abstract
Barefoot running has been proposed as an alternative to shod running to diminish running injuries because it changes a runner’s foot strike to the fore foot (FFS) rather than a rear foot (RFS) landing. Vertical ground reaction forces are affected by foot landings and vertical ground reaction forces have been found to be predictive of injury. Stride length however, also influences vertical ground reaction forces and could be a factor in the development of injury. Over striding results in steeper rates of loading when compared with a shorter stride while running. This study explored...
the relationship between stride length and vertical ground reaction forces in both FFS and RFS runners. Volunteers ran at a constant speed on a treadmill but at 3 different cadences requiring subjects to change their stride length to maintain speed. Vertical ground reaction force, cadence, and stride length were measured. Peak impact (Imax) and active (Amax) force and their rates of rise (Imax and Amax) were compared across conditions. Greater stride lengths tend to increase rates of rise of force for both types of runners, suggesting that studies reporting less “potential” injury with barefoot running need to consider stride length a compounding factor affecting their results.

Subject Repeated Measures Analysis and Independent T tests were used for statistical comparisons.

Results & Conclusion: Preliminary analysis suggests no group differences, or after exercise improvements. The lack of change between groups may be attributed to the small sample size. The heterogeneity of each group included a wide range of ages and functional abilities that resulted in large variation within and across groups. The equivalent measures between baseline and post exercise for the treatment group may likely be attributable to ineffective exercise intensity which mediated insufficient strength gains.

Students
Lydia Kocher, Elisabeth Bierdeman, Margaret Messenger

Major
Exercise Science

Research Mentor
Dan K Ramsey, PhD; Machiko Tomita

Title
Outcomes of an Online Group Exercise Program in Elderly Persons at Risk for Falls

Abstract
Objective: This gait study examined whether elderly persons at risk for falls improved their gait and balance after following an internet-based group exercise program.

Methods: Two groups were recruited; an at risk for falls (treatment) group and a healthy (control) group matched for age and gender. The control group was provided an instructional exercise video to follow at home whereas the treatment group participated in an interactive videoconferencing exercise regimen monitored remotely. Temporal-spatial gait parameters and static posturography were analyzed at baseline and after 3 months post exercise. Temporal-spatial measures include velocity, bilateral stride and step length. Balance was assessed using the ellipse area of the center of pressure displacement trace. Within Subject Repeated Measures Analysis and Independent T tests were used for statistical comparisons.

Results & Conclusion: Preliminary analysis suggests no group differences, or after exercise improvements. The lack of change between groups may be attributed to the small sample size. The heterogeneity of each group included a wide range of ages and functional abilities that resulted in large variation within and across groups. The equivalent measures between baseline and post exercise for the treatment group may likely be attributable to ineffective exercise intensity which mediated insufficient strength gains.

Student
Allison Murray, Shirin Vartak

Major
Medical Technology

Research Mentor
Peter J. Horvath Ph.D.

Title
Effect of vitamin D rich mushrooms on functional performance and quality of life in older men and women

Abstract
Vitamin D, known for bone health, also has a role in the prevention of chronic diseases. Vitamin D status may also be important in functional fitness and quality of life measures in older individuals. In this ongoing study we supplemented older, vitamin D deficient men and women with either untreated Portabella mushrooms or UVB-treated high vitamin D Portabella mushrooms over a twelve week period. We predicted that vitamin D status will correlate to nutritional intake. We also expect consumption of these high D mushrooms should reverse vitamin D deficiency, increase functional fitness performance and quality of life measures. We found that dietary intake; not including nutritional supplements was not correlated to vitamin D status. Vitamin D status also did not correlate to 30 second arm curl tests or physical and mental health scores on a standard SF36v2 questionnaire. A twelve week supplementation of mushrooms was inversely proportional to body weight and body fat percent. Interestingly, measures of body composition and activity levels decreased over the twelve weeks with no overall dietary intake change. We conclude that vitamin D status is not predictable with dietary or physical measures. Increased mushroom intake may lead to reduced body weight and body fat.
**Undergraduate Academies**

UB’s Undergraduate Academies are communities of common interests that focus on three broad issues: Civic Engagement, Global Perspectives and Research Exploration. The Academies provide students with a distinctive and comprehensive undergraduate experience.

**Global Perspectives Academy**

The Global Perspectives Academy is a diverse community of students and faculty committed to exploring international affairs and enhancing campus awareness of the ways in which our global society is truly interdependent. Under the direction of Dr. David Fertig, Academic Director and Associate Professor, Department of Linguistics; students have selected their research topics on a broad range of issues that reflect the globalization of social problems and concerns.

**Students**

Ferihan Abdallah, Samuel Klemens, Jinxiang Li, Jaiwen Liu, Libing Wu

**Research Mentors**

Dr. David Fertig, Katharine Donelson, Rachel Stern

**Title**

The Effect of Competition within the Chinese Education System on Parenting

**Abstract**

We focus on competition within the Chinese education system and its effect on parenting. Grades, family recognition, college admission, pressure/stress, and standards of education all play a role in Chinese parenting. The sources we utilize include scholarly journals and personal recollection. We examine the rigorous standards of the Chinese educational system and the effect it has on parenting to demonstrate the correlation between the workload in school and the manner in which parents behave with their children.

**Students**

Naomi Asch, Daniel Loebell, Kerry McPhee, Neil Singh, Runzhi Wang

**Research Mentors**

Dr. David Fertig, Katharine Donelson, Rachel Stern

**Title**

Gay Refugees of Iran

**Abstract**

Our project looks at the reception of gay Iranian refugees between the United Kingdom and Turkey. We begin by examining the reasoning behind leaving Iran for a less hostile environment. We then look at the immigration procedures, experiences upon arrival, and country policies towards gays and towards immigration in both Turkey and the UK. Our data is taken from news articles, interviews, and resources provided by organizations dedicated to protecting the rights and safety of gay Iranian refugees. We hope that our research will bring about awareness of the struggles and lack of safety for LGBT people in Iran and the process they endure to find themselves in a country where they can experience a higher quality of life.

**Students**

Matthew Cato, Sarin Ghimire, Minahil Khan, Maribeth Ruiz, Jamar Careem Young

**Research Mentors**

Dr. David Fertig, Katharine Donelson, Rachel Stern

**Title**

A Comparison of Student Activism in the U.S. from 1968-1972 and in Egypt during the Arab Spring

**Abstract**

Our project highlights similarities and differences between student activism in the United States from 1968-1972 towards the end of the Vietnam War and student activism in Egypt during the recent Arab Spring movement. We compare the locations of several protests and speeches to determine how that played a role in the involvement, leadership, tactics, and effectiveness of the students’ goals. For this project we make use of scholarly articles, interviews, and video taken during each time period. Our goal is to develop a better understanding on the way in which different times and places affect student participation in social and political movements.

**Students**

Tyler Davis, Rebecca Johnstone, Mark Manganaro, Alex Noviasky, Coleman Thomas

**Research Mentors**

Dr. David Fertig, Katharine Donelson, Rachel Stern

**Title**

Inadequate Sanitation Conditions In Slums: Mumbai, India and Rio de Janeiro, Brazil

**Abstract**

Developing cities in the current state of the world have comparable problems
no matter their geographical distance. An example of this phenomenon can be seen by looking at the cities of Mumbai, India and Rio de Janeiro, Brazil. These cities are home to millions living in cramped areas bombarded with garbage and meager living conditions. Our study looks at similarities and differences between these two cities in the way lack of sufficient sanitation affects the quality of life for slum-dwellers. More specifically, this research will examine the need for clean water, waste disposal, and the prevalence of water-borne diseases in Mumbai and Rio de Janiero.

RESEARCH EXPLORATION ACADEMY

The Research Exploration Academy is an inclusive and diverse community of student and faculty scholars that fosters creativity, collaboration, and the development of research skills. Under the direction of Academic Director, Dr. James N. Jensen, Professor, Department of Civil, Structural and Environmental Engineering, students applied research skills to topics in biomedical engineering.

STUDENTS

Samar T. Adhami, Sung Jun Jang, Kevin Reuter, Brandon Lee Chin, Kevin A. Carpio

RESEARCH MENTOR

Dr. James N. Jensen

TITLE

Chitosan optimization for drinking water treatment in developing countries

ABSTRACT

Many developing countries do not have access to drinking. Natural polyelectrolytes, such as chitosan, are being tested for its effectiveness as coagulants in water treatment, since the particles in water are negatively charged. Chitosan is a polye N-acetylglucosamine biopolymer that is a natural cationic polyelectrolyte, non-toxic, and biodegradable. Chitosan is produced from chitin, a structural element in the exoskeleton of crustaceans, and is estimated to be produced annually almost as much as cellulose. The purpose of this research is to test its ability as a coagulant in water since. We identified the optimal concentration of chitosan in turbid water to coagulate the particles and separate easily the precipitate from water.

STUDENTS

Leah E. Baum, Tryceena M. Gordon, Nkemakolam Okorozo

RESEARCH MENTORS

Dr. James N. Jensen and Dr. Troy Wood

TITLE

Polybrominated diphenyl ethers: The toxic world of dust

ABSTRACT

Polybrominated diphenyl ethers (PBDEs) are a class of molecules belonging to a group of brominated flame retardants, BFRs. There are 209 PBDE congeners, many of which are used in buildings and furniture. Because these molecules are added to the products, and not chemically bonded to them, they tend to flake off and can accumulate in dust as the product under goes everyday use,. Due to their toxicity, the European Union has banned the penta, octa, and deca-PBDE congeners. Several U.S. states followed with local bans due to their mutagenic effects. In this work, we collected typical household dust around the University at Buffalo. We analyzed the dust samples using the novel analytical technique for PBDEs using an electrospray LC/MS. We determined whether a quantitative difference exists between dust samples collected in hallways, 3-walled rooms, or isolated hallway-like bridges.

STUDENTS

Megan N. Fulmer, Stephen T. Richmond, Amrita D. Mohip, Jiayin Wu, Nabila M. Faridi, Jose Alagin Jr, Jose A. Barajas

RESEARCH MENTOR

Dr. James N. Jensen

TITLE

The Effect of Sawdust Size on Ceramic Filters and its Efficiency in Water Filtration

ABSTRACT

In the developing countries, the lack of access to clean water is a significant problem. It is of great importance to find a method of purifying water using available resources. One solution is to use a filter that could be easily made using traditional methods and abundant materials such as clay and sawdust. An experiment was designed to test the purification of water with regard to porosity size in the filter using clay and sawdust obtained from local sources. The sawdust was manually sieved into separate portions of varying size. The sawdust was mixed into the clay with a 1:1 ratio by volume to simulate standard methods to be used in developing countries. The clay was formed into circular disks and then fired to burn the sawdust from the clay and create pores in the disks. Raw water was obtained from a nearby river and filtered through the disk in an apparatus. The turbidity of the water was tested with each disk. The results will be interpreted to recommend the optimum sawdust size to use in ceramic filters with respect to the filtration rate.

STUDENTS

Kelly Boamah, Jeremy Caldwell, Megan E. Cheney, Victoria N. Cranwell, Kristen A. Mallow, Alexander Modica, April K. Park

RESEARCH MENTOR

Dr. James N. Jensen

TITLE

Effects of Moringa Oleifera Concentrations on Turbidity Removal

ABSTRACT

Across the globe, people are struggling to purify water enough to utilize it. Many natural solutions have been brought to the forefront of the scientific community. Moringa oleifera has been shown to be one of the most promising natural coagulants. To aid in water purification in developing countries, we tested various concentrations of powder made...
from M. oleifera. The ground seeds help coagulate particulates so they can settle out. The optimal dose of M. oleifera seed powder will be determined.

Civic Engagement Academy
The Civic Engagement Academy’s mission is to create a campus community linked by our interest in being informed, active, and skilled citizens committed to serving the public good. Academies students fulfill this mission through curricular and co-curricular activities that create opportunities for students to find an influential role in their university, local, national, and global communities. As citizens of an urban public university, we support UB’s commitment to be an active and contributing community partner. Under the direction of Academic Director, Barbara Bono, Associate Professor of English, students explored how individuals and communities make change, and empower themselves to do so.

STUDENTS
Doaa Ahmed, Kyle Davis, Jennifer Helfer, Jasmin Jackson, Smantha Pangrazio, Gabriella Quartuccia, Victoria Robbins, Spencer Schultz

Research Mentor
Dr. Barbara Bono, Dr. Nathan Daun-Barnett, Chelsie Hinkley

Title
Saying “YES” to “Say ‘Yes’ to Education” in Buffalo

Abstract
“Say ‘Yes’ to Education” is a national non-profit organization dedicated to dramatically increasing high school graduation rates and college access for inner-city youth. In the City of Buffalo—for the first time this year—“Say ‘Yes’” offers full-tuition post-secondary education scholarships to students who meet residency, graduation, and admission requirements.

However, “Say ‘Yes’” is a last-dollar program: to claim the award students must be able to fill out and submit their Free Application for Federal Student Aid (FAFSA) form for all other available grants. Therefore the first step in saying “yes” to “Say ‘Yes’” is successful completion of the FAFSA, often a daunting prospect for these students and their parents.

A portion of the Spring 2013 Undergraduate Academies Civic Engagement class is participating in a larger volunteer effort by UB to help these students successfully complete their FAFSA forms. We have trained extensively for the special circumstances of the job, and between March and April will spend 40 hours each in fourteen out of sixteen of Buffalo’s public high schools. In the process we hope in some small way to model the benefits of college education to these students, and we anticipate learning much from them as well. We expect to help literally hundreds of Buffalo city students to “Say ‘Yes’ to Education.”

In addition, other Academies students are working on projects for the renewal of green space and establishment of public art and cultural installations, and on the physical preparation of the storefront adjacent to the Tool Library as a small business incubator. Another campus group, the Buffalo Undergraduate Consulting Club (BUCC), is drafting a branding strategy and a business plan for the neighborhood. Taken collectively, these are the PULL Projects—the multi-year Pop-Up Living Laboratory projects for PULLing up the Heights!

STUDENTS
Brandon Alexander, Mario Ayoub, James Battle, Rebecca Bititman, Saina Guo, Mustafa Hussain, Shawn McMullen, Mark Wagner

Research Mentor
Dr. Barbara Bono, Darren Cotton, Aaron Krolikowski

Title
PULLing up the Heights

Abstract
The University Heights is a socio-economically, ethnically, and racially diverse Buffalo city neighborhood extending from the UB South Campus down to LaSalle Avenue. It and the adjacent University District neighborhood also include the commercial corridors of upper Main Street and Bailey Avenue.

In cooperation with their neighborhood association, The University Heights Collaborative, and as a outgrowth of the neighborhood development efforts of the University Heights Tool Library, a portion of the Spring 2013 Undergraduate Academies Civic Engagement class is collecting data—including a community and commercial needs survey—and assembling a proposal for a $500,00 New York State Homes and Community Renewal Agency grant for building renovation and streetscape improvements similar to that recently awarded to the nearby Parkside neighborhood.

Another campus group, the Buffalo Undergraduate Consulting Club (BUCC), is drafting a branding strategy and a business plan for the neighborhood. Taken collectively, these are the PULL Projects—the multi-year Pop-Up Living Laboratory projects for PULLing up the Heights!