THIRTEENTH ANNUAL

Celebration of Student Academic Excellence

THURSDAY, APRIL 20, 2017 | CENTER FOR THE ARTS

University at Buffalo
The State University of New York

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INDEX

KEY

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

S = Member of CSTEP
(Collegiate Science & Technology Entry Program)

H = Member of Honors College

L = Member of LSAMP
(Louis Stokes Alliance for Minority Participation)

M = Member of McNair Scholars Program

A = Study Abroad

S = Sustainable Project**

W = Women in Science and Engineering

**As you walk through the exhibition today you may notice that some research has been denoted with a blue Sustainability Badge. These research projects have been identified as contributing to the University's collective mission to address global challenges through sustainability research. It is a testament to the dynamic and forward-thinking students and faculty to see such a broad representation of research focused on preserving and advancing the healthy function of ecological, economic, and social systems now and in the future.

College of Arts & Sciences

Students C
Sundus Aziz, John Traversone

Major
Biomedical Sciences

Research Mentor
Mary Bisson

Title
Kinetics of Cadmium transport in Chara australis

Abstract
Cadmium (Cd); a toxic heavy metal; occurs in the environment from weathering of Cd-containing sediment as well as agricultural and industrial actions. The large fresh water alga; Chara australis have the ability to take up Cd from its wet environment; which can then be harvested; suggesting a potential for Chara in phytoremediation. Phytoremediation is the process of using living green plants for the containment or removal of pollutants such as Cd. Isolated Chara cells are exposed to different concentrations of Cd; including radioactive 109Cd; and accumulation of radioactivity is monitored with a gamma radiation counter after a brief incubation. This allows us to determine the mechanism of uptake. We propose that Cd enters the cells using zinc transporters. Thus; the experiments will be repeated in the presence of zinc; to see if it interferes with the uptake of Cd (competitive inhibition).

Students C H
Marla Beyer, Haemi Nam

Major
Biology and Psychology

Research Mentor
Rina Eiden

Title
Social Skills Predict Depression in a High Risk; Low Income Sample

Abstract
Family unpredictability is associated with poor social skills and higher depression in children. However; the developmental pathway from unpredictability to depression is unclear. A diverse group of children (N = 161) were recruited to assess if one pathway from family unpredictability to depression may be via poor social skills in Kindergarten. We measured unpredictability of nurturance and discipline using the Family Unpredictability Scale; and social skills and depression using the Behavior Assessment Scale Children (BASC). Hierarchical regression indicated that nurturance and discipline accounted for 4% of the variance in depression. Social skills in kindergarten accounted for 16% variance in depression; and unpredictability and social skills accounted for 20% variance in depression. These results highlight the importance of family routine for the development of social skills. Family unpredictability may be particularly prevalent in families living with poverty; and may lead to cascading risk processes for children's social-emotional development.

Student
Alexander Blum

Major
English and American Studies

Research Mentor
Dr. Kush Bhardwaj

Title
21st Century Slave

Abstract
"21st Century Slave is a literary novel based on the six-year incarceration of an innocent man whom I met in Buffalo; as told by a disaffected millennial narrator. The novel is based on my own experiences and the experiences of the falsely convicted. My presentation would cover facts regarding the justice system; the psychological hopelessness of the current generation; the history of existentialism; Christian Hermeticism; and other academic topics that are subtly woven throughout the narrative and each worthy of a speech in their own right. The novel was an independent product; published by myself while attending UB as an English major. Upon immediate glance; it is yours to judge whether or not the content is of literary quality.

A preview is available here: https://www.amazon.com/21st-Century-Slave-Alexander-Blum/dp/099765130X"

Students
Jamie, Brewster, Sandrine Duboscq, Roseline Hartz

Major
Geological Sciences

Research Mentor
Marcus Bursik

Title
Shear Strain Determination of the Orientation of Microlites in Volcano Conduits

Abstract
Microlites; acicular microscopic crystals found in glassy igneous rocks; have been used as an indicator of the shear strains which modify rhyolitic lava as it exits the volcano conduit durin lava flow effusion. The object of this study is to investigate how the preferred orientations of microlites in samples of obsidian from explosive eruptions may allow the assessment of shear strain during formation.
Although possible that extended exposure to simple shear in the conduit could eventually align microlites; we hypothesize that microlites are subjected to pure shear in the conduit of the volcano; instead; to explain the consistent microlitic alignment. To test our hypothesis; samples of obsidian from tephras of the Mono craters were cut into thin sections on X; Y; Z axes and observed under a microscope. The orientations and standard deviations of the microlites were recorded and compared and found to support the hypothesis of alignment by pure shear due to similar orientations within each sample.

Students C
Richard Burke, Randi Henricy

Major
Psychology Neuroscience

Research Mentor
Eduardo Mercado

Title
Methods of Artifact Detection and Removal in Electrodermal Activity Gathered from Wearable Bio-sensors

Abstract
Electrodermal activity (EDA) has long been a tool for psychologists

and psychophysiologists to monitor physiological measures of stress; cognition; physical arousal; and as a predictive tool for epileptic seizures. Wearable bio-sensor technology has recently allowed for long-term; ambulatory measurement of EDA with non-invasive devices. These measures; however; exhibit large amounts of individual variability and high sensitivity to data artifacts from common movements. In this study; we collect baseline skin conductance readings during controlled conditions while re-creating common; artifact-producing events including applying pressure to the device; disrupting electrode contact with skin; and arm movements. We then review and compare several methods of filtering and processing the data for these disruptions including manual removal of artifacts; low- and high-pass filtering; and algorithmic removal of inconsistencies. Compared to previous methods of EDA analysis; we hope these methods will allow for removal of particular artifacts regardless of variation in baseline and atypical sympathetic arousal.

Student
Nicole Caine

Major
Global Gender Studies

Research Mentor
Marla Segol

Title
Gender; Oppression; and Peace in the Home: A Study of the Application of Shalom Bayit in Contemporary Jewish Communities

Abstract
In multiple Jewish communities; there is a major issue of women feeling forced to stay within abusive marriages. I will explore how the Jewish concept of Shalom Bayit (peace in the home) has come to be gendered within these few communities; so that the responsibility for keeping the peace in the home involves women's submission. In the end; it shapes women's roles in marriage and society. In the course of my research; I examined key texts in forming gender roles within marriage and within the conception of peace in the home. I then devised and disseminated a survey assessing the concepts and implementations of Shalom Bayit in contemporary Jewish community. In this presentation; I will present my analysis of the results. The purpose of this research is to assist in thinking about educational initiatives and programs being created to end to the suppression of women's rights within sheltered Jewish communities.

Student
Hannah Calkins

Major
Biology

Research Mentor
Omer Gokcumen

Title
Evolutionary origin and functional impact of the GHR deletion

Abstract
Studies have shown hundreds of genetic variants among humans being associated with height; and overall body size. The common deletion of the third coding exon of the growth hormone receptor gene (GHR) is one of them. Though the evolutionary origins of this deletion and its exact functional impact are not known; it has been associated with increased response to growth hormone treatment and smaller birthweights. We created a transgenic mouse model to study the impact of the deletion to organismal-level phenotypes; transcription levels; and protein activity. Using polymerase chain reaction based approaches; we explored the variation of the growth hormone receptor at the transcriptional level. We observed that homozygous recessive growth hormone receptor mice grow more slowly early on as compared to their wildtype counterparts. Our results will be the first direct study of the functional and evolutionary impact of the deletion affecting growth hormone receptor in humans.

Student
McKenzie Cantlon

Major
Psychology, Legal Studies, Political Science

Research Mentor
Dr. Jamie M. Ostrov

Title
Relational and Physical Victimization and its Predictions on Peer Relationships

Abstract
There has been limited research into the effect of victimization on play partners and peer acceptance/rejection for children in early childhood. The objective of this study was to examine the relationship between the victimization subtypes and peer relation variables cross-sectionally using three hierarchical regressions. Results showed that physical victimization was positively associated with play partners and negatively associated with peer rejection and peer acceptance. Relational victimization was negatively associated with peer acceptance.

Student
Roy Cineus

Major
Chemistry

Research Mentor
Christopher Bond

Title
Potential CEST Contrast Agent for MRI Applications

Abstract
There's a new class of compounds being made for magnetic resonance imaging (MRI) contrast. The class is called transition-metal-ion-based paramagnetic chemical exchange saturation transfer (paraCEST). This new class of contrast agents is being pursued more heavily compared to previous contrast agents because they are deemed safer. MRI is a technique used to map water protons. Thus paraCEST agents are synthesized and used to enhance the mapping of water protons. The purpose of this project is to synthesize a paraCEST contrast agent that will be viable in enhancing MRI contrast.

The focus of my research is using 1-oxa-4;7-diazacyclononane; reacted with propylene as the ligand; and Fe2+ as the metal center. After the complex; DONNOH; is synthesized; CEST will be run to determine whether DONNOH is a contrast agent; and if so the studies will also determine how well of a contrast it is compared to others. Once DONNOH is classified as a contrast agent; further studies will be done to determine its behavior in biological conditions and whether toxicity will be an issue.

Student
Megan C. Corcoran

Major
Chemistry and Geology

Research Mentor
Dr. Elizabeth Thomas

Title
Seasonality of hydrogen isotopes of environmental water and sedimentary leaf waxes: implications for interpreting leaf wax paleoclimate proxies in temperate ecosystems

Abstract
Reconstructions of past climate provide a baseline in order to understand and predict future climate change. Past climate can be reconstructed using biomarker proxies such as hydrogen isotope ratios of leaf waxes; δ2H-wax. δ2H-wax preserved in sediment archives reflects plant source water δ2H; which reflects climatic changes; such as temperature and moisture transport history. There is uncertainty in details of the systematics δ2H-wax; such as the relationship between climate; environmental water δ2H and sedimentary δ2H-wax throughout the growing season. In order to determine this relationship; precipitation; lake water; and lake sediment samples were collected at regular intervals throughout the year in Central New York. A comparison of year round environmental water δ2H and δ2H-wax will elucidate the seasonal signal under current climate conditions. Once these current seasonality trends are fully determined; they can be used to provide more precise interpretations of δ2H-wax records of past climate in temperate ecosystems.

Student
Alexander D'Arpino

Major
Chemistry

Research Mentor
David Lacy

Title
Zinc- and Cobalt-Catalyzed Water Oxidation

Abstract
Water oxidation is one of the core processes of photosynthesis. This natural reaction has important implications for energy; and a synthetic structure was made to investigate this interaction. Specifically; a series of tris p-substituted carbamoyl methyl ligands were synthesized in order to explore the formation of dioxygen. The p-substitution electronically tunes the ligand; which is intended to directly influence properties of a ligated metal ion. Therefore; metal complexes will be prepared by metalation with zinc(II) acetate or cobalt(II) acetate. After characterization of the metal complexes; reactivity with various oxygen/superoxide species will be probed. The cobalt(II) species specifically will be oxidized to cobalt(III) to react with the superoxide and reduce the metal center to cobalt(II) and convert the superoxide into oxygen. The reduction will be monitored with various spectroscopic and physical methods (UV-Vis; GC; etc.) to evaluate rate with the electronically tuned ligands.

Student
Hui Duan

Major
Mathematics

Research Mentor
Jae-Hun Jung

Title
Finite difference approximations of fractional differential equation: A brief comparison for errors and oscillations

Abstract
Fractional differential equations have become an important modeling technique in describing various natural phenomena. A variety of numerical methods including finite difference methods for solving fractional differential equations has been developed over the last decades. In this paper; we compare three different types of fractional derivatives; namely Riemann-Liouville; Caputo and Gr\"{u}nwald-Letnikov fractional derivatives and their low order finite difference approximations. Particularly a numerical study for the fractional differential equation with the impulse source term is considered. Numerical results show that the Caputo and Gr\"{u}nwald-Letnikov derivatives with the finite difference approaches are better than the Riemann-Liouville derivative. The numerical results also show that the first order finite difference approximation of the Riemann-Liouville derivative to the fractional differential equation is oscillatory if the fractional order is small; particularly with the impulse function.

Student
Alejandro Corona Espinosa

Major
Psychology and Sociology

Research Mentor
Leonard Simms

Title
Exploring the Factor Structure of an Inclusive Set of Common Language Person Descriptors

Abstract
Critics of the Five Factor Model of personality (FFM) have argued that the model was developed based on a line of research that focused exclusively on personality trait terms. Previous research suggests that analyzing a wider range of terms results in solutions containing more than five factors. The present study explored the factor structure of the Common Language Word List (CL-519; Simms; Calabrese; & Rudick; 2009); an inclusive set of person descriptors. Participants provided self- and informant-ratings for the CL-519 and a few other established measures of the Big Five and the Big Seven factor models of personality. After factor analyzing the self- and informant-ratings on the CL-519; the best-fitting solution was retained. This solution included a range of psychological; physical and evaluative factors. The validity of the obtained

factors was assessed by comparing their self-other agreement levels with that of the Big Five and Big Seven measures.

Student
Antonio Figueiredo

Major
Biology and Chemistry

Research Mentor
Dr. Peter Thanos

Title
FABP5/7 Deficiency Decreases Ethanol Consumption in Mice

Abstract
The endocannabinoid (ECB) system is involved a wide range of diseases including alcoholism. ECBs are inhibitory retrograde messengers that bind to the cannabinoid type 1 (CB1) receptor. Recently ECB signaling has been investigated and inhibition of fatty acid amide hydrolase (FAAH); which degrades the ECB anandamide (AEA); has been shown to significantly increase ethanol consumption. Similarly; fatty acid binding proteins; which transport AEA for degradation; increase AEA levels. Our objective was to examine if inhibition (via the drug SBFI26) or deletion of FABP5/7 would potentiate alcohol intake. In one experiment; male mice received vehicle; 5; 20; or 40mg/kg SBFI26 throughout a restricted-access two-bottle choice paradigm. In a second experiment; male and female FABP5/7 /mice underwent the same drinking paradigm. In our last experiment; using the same paradigm; both male and female mice received 20mg/kg SBFI26. Based on our results; targeting of FABPs appears to play a role in alcohol consumption.

Student
Claudia Fletcher

Major
Geological Sciences

Research Mentor
Dr. Marcus Bursik

Title
Waterfall Plume Dynamics: Niagara Falls

Abstract
Waterfalls generate curtains or plumes of mist where descending water decelerates rapidly in the plunge pool or rocks at the base. The goal of this study is to investigate the factors that influence generation and changes of mist plumes and curtains at waterfalls; with a case study on Niagara Falls. The mist curtain at Niagara Falls shows great variation in characteristics; sometimes propagating down-gorge as a gravity flow; but other times rising nearly vertically; reaching heights up to 1km. We hypothesize that this change in plume and curtain geometry is due to temperature variation between mist and the surrounding air; resulting in either a buoyant plume when the mist is significantly warmer than the air; or sinking of the aerosolized water/air mixture; when the mist is colder than the air. To test this hypothesis; infrared imagery and detailed meteorological data were taken at both the Horseshoe and American Falls; at a range of temperature differences between the mist and the surrounding air. The data are consistent with the hypothesis; showing warmer water aerosol driving plume rise; and colder water aerosol driving downstream currents.

Students *H W*
Anne Fortman, Lauren Hay, Joseph Pusztay

Major
Physics

Research Mentor
Assistant Professor Salvatore Rappoccio

Title
Gluon Jet Mass Measurement

Abstract
We present a measurement using proton-proton collision data with a center-of-mass energy of 13 TeV from the Compact Muon Solenoid experiment at the Large Hadron Collider. We measured the differential jet production cross section as a function of the jet mass and transverse momentum in gluon jets produced in three-jet events for the purpose of studying the quantum chromodynamic evolution of gluons. A jet grooming algorithm known as Soft Drop is used to remove soft; nonperturbative portions of the jet. The ungroomed and groomed data is presented alongside simulated predictions from multiple Monte Carlo event generators. First-principles theoretical calculations of the groomed jet mass are also compared to the data for only the second time ever at a hadron collider; the first time being our previous measurement of the differential jet production cross section of dijet events.

Student *H*
William Fox

Major
History and Political Science

Research Mentor
Carole Emberton

Title
Neglecting our Urban Environments: How the Highways Reshaped our Cities

Abstract
Focused locally on the Kensington Expressway; my presentation hopes to illustrate how the urban highway has altered the landscape of our city. Specifically; I seek to address how the Kensington Expressway displaced hundreds of families; uprooted communities; and segregated our community more profoundly than ever before. Through the use of historic photographs; newspaper clippings; graphs and statistics; the effects of urban highway construction will be presented through quantitative data; as well as personal experiences and local opinions.

Student
Dennis Fricke

Major
Psychology

Research Mentor
Dr. Thanos

Title
Changes in brain glucose metabolism from chronic oral methylphenidate treatment in male rats

Abstract
Methylphenidate (MP) is a psychostimulant prescribed for the treatment of Attention Deficit Hyperactivity Disorder. Using an 8-hour-limited-access-drinking-paradigm; male Sprague-Dawley rats received MP diluted in drinking bottles to mimic clinical drug delivery at low and high doses. MicroPET scans using a glucose analog; [18F] fluorodeoxyglucose (FDG) were conducted following thirteen weeks of MP treatment to assess changes in brain glucose metabolism (BGluM). Results show that HD treated rats had increased BGluM in the areas associated with spatial learning and memory; motor control; reward; working memory and balance; compared with controls. LD treated rats had increased BGluM in areas associated with olfaction; breathing; spatial learning and memory; motor control; working memory and reward. HD treated rats also had decreased BGluM in the areas associated with reward expectancy; sensory perception; movement planning; preference learning; memory processing; anxiety; respiratory control and motor task control. Methylphenidate has a significant effect on BGluM after chronic treatment.

Student *H*
Lisa Gagnon

Major
English and Linguistics

Research Mentor
Barbara Bono

Title
Soothing Our Savage Inequalities: Nonprofit Arts Education in Buffalo

Abstract
Even as cutbacks in arts programming disproportionately impact low-income and minority students; research is just scratching the surface of the cognitive and social benefits of participating in the arts. Rather than focusing on the failings of the education system; however; this project tells the stories of three successful Buffalo arts nonprofits with whom I have worked. Just Buffalo Writing Center provides free writing workshops taught by local artists; Buffalo String Works teaches violin and cello to West Side refugees; and Shakespeare Comes to 716 trains underprivileged teenagers to perform theater. My project examines how creative writing; music and theater uniquely affect the brain and learning; as well as the benefits arts education has had on underserved populations in Buffalo: from LGBTQ to refugee to African-American students. Finally; based on interviews with program organizers; the project suggests how to fill in gaps of accessibility and representation in the Buffalo arts community.

Students
Patrick Gannon, Shane Porter, Victoria Rance

Major
Geological Sciences

Research Mentor
Marcus Bursik

Title
Extensional Volcanotectonics; Long Valley Volcanic Region; California

Abstract
The purpose of this study is to develop a better understanding about the geological setting on the eastern edge of the Sierra Nevada range. Since the May 25th & 27th; 1980; earthquakes; Long Valley Caldera and the surrounding area have been under intense investigation and monitoring. The young seismic and volcanic features within the region posses a significant hazard to the busy alpine communities that are located in Mono and Inyo County. By using sand table analogue experiments; remote sensing data; and previous geologic investigation; our research group was able to generate a model for the active volcanotectonic processes and features. The results of our studies of active faulting are consistent with a model of oblique slip extension on NW trending range front and basin crustal faults with magmatism occurring within the active system where more deep seated processes generate partial melt.

Student *C H*
Russell Guilbault

Major
Asian Studies and Philosophy

Research Mentor
Walter Hakala

Title
Translating Religion Across Asia

Abstract
My project analyzes the original works of Islamic scholarship written in Chinese by the scholar Liu Zhi (ca. 1670-1724) as a flashpoint for the theory of religious translations. I subject the Neo-Confucian Chinese terms used to analysis in the Chinese philosophical tradition and in comparison to the meanings of the corresponding Arabic terms.

Student *H W*
Xiaoyu Guo

Major
Applied Mathematics

Research Mentor
Brian Spencer

Title
Analysis of the Reduced Payne-Whitham Traffic Model with Driver's Anticipation Effect and its Case Study on California Highway

Abstract
We consider mathematical traffic flow modeling and apply it to real world data. In particular we consider the effect of driver behavior in a macroscopic traffic density model by analyzing the "anticipation effect" in the Payne-Whitham traffic equations. The equations are solved analytically to find how driver behavior affects traffic flow. Further; a case study on Interstate 5 in California is performed to compare the model prediction of traffic velocity and density with real data. An error analysis is applied to determine the accuracy of the simulation at different times of day and different numbers of lanes. The error analysis enables the determination of the estimated range of the anticipation rate in California Highway traffic under different conditions. These results provide a guideline for the practical values for the anticipation rate in simulations using the Payne-Whitham traffic model.

Students
Timothy Hansen, Claire Thant, Bhasirie Thuamsang;

Major
Biological Sciences

Research Mentor
Dr. Shermali Gunawardena

Title
The role of PI3K in stress mediated axonal transport defects and neuronal cell death

Abstract
Axonal transport defect is thought to play an early role in the progression of neurodegenerative diseases such as Alzheimer's and Huntington's disease. In both of these diseases axonal blockages and neuronal cell death in seen; suggesting that disruption of axonal transport may activate apoptotic pathways. We tested the hypothesis that axonal transport defects activate apoptotic pathways by an increase in cellular stress. We predict that expression of PI3K should rescue neuronal cell death and axonal transport defects. Using the TUNEL assay; we found that overexpression of constitutively active PI3K rescues Huntingtin induced neuronal cell death phenotypes; but has no effect on Huntington aggregates within larval brains. We also found that PI3K does not affect axonal transport defects induce by expression of HTT with expanded polyQ repeats. Taken together our observations suggests that the PI3k pathway plays an important role during neurodegeneration and that excess of PI3K could reduce cell death but has no effect on axonal transport defects.

Student
Madeline Harvey

Major
Biological Science/Dentistry

Research Mentor
Robert E. Baier

Title
Thinning Infected Mucus Of Cystic Fibrosis Sufferers

Abstract
Patients suffering from cystic fibrosis struggle to breathe because their lungs are riddled with bacteria that produces a mucus-like substance that is difficult to clear from the lungs. This study hopes to alleviate that challenge by analyzing a promising new treatment. Aspirating a coagulative mouthwash into the lungs could potentially shrink the mucus; allowing patients to breathe easier.

Students
Christopher Heimburger, Austin Quinn, Zoe Vaughn

Major
Chemistry

Research Mentor
Joseph Gardella

Title
The application of (2-Hydroxyethyl Methacrylate) HEMA hydrogel for wound healing

Abstract
Chronic wound care has been gaining momentum due to drug delivery with the use of growth factors. Proteins such as Keratinocyte Growth Factor; KGF; leads to wound healing in the epithelial cells; and also promotes wound closure. Hydrogels; water swollen structures composed mainly of hydrophilic polymers; serve as a vehicle that delivers the desired substance into the exact location needed for wound healing. Hydrogels aqueous nature allows the material to accommodate various therapeutic factors. 2-Hydroxythyl Methacrylate; HEMA; hydrogel is optimal because of its ability to achieve different characteristics without significant change to the polymer. Through swelling of HEMA and perfluoropolyether; PFPE; a cross linker; it was proven that HEMA holds up to 60% water by weight. HEMA also; has the ability to uptake KGF; proven through the results of the controlled release study. Knowledge that KGF is up taken was further proved by fluorescence and TOF SIMS.

Students
Hayley Hofmar-Glennon, Garlenys Quezada

Major
Biological Sciences

Research Mentor
Shermali Gunawardena

Title
Huntingtin (HTT) and Rab7 are present on autophagosomes and lysosomes but are not on phagsosomes during autophagy

Abstract
Autophagy is a multistep process. The phagophore wraps around cellular waste forming an autophagophore. Late endosomes fuse with the autophagosome forming an amphisome. Lysosomes fuse with the amphisome to form autolysosome. Previously; our lab found that HTT; the proteins involved in HD and Rab7 move together on the same vesicle within the axon. Reduction of HTT disrupted the retrograde motility of Rab7. While a role for HTT has been proposed in autophagy; which stage HTT is involved in is unknown. Rab7 is found on late endosomes and is involved in amphisomes. We hypothesize that HTT and Rab7 are functioning together during autophagy and during the axonal transport of autophagosomes. To test this we examined the localization of HTT and Rab7 during the different stages of autophagy using ATG5 (phagasome); syntaxin17 (autophagosomes); and LAMP (lysosomes/autolysosomes). We found that HTT and Rab7 are both on autophagosomes; but are not on phagophores. Both HTT and Rab7 co-localize with LAMP. Taken together our results suggests that perhaps HTT and Rab7 functioning together during the fusing of lysosomes with autophagosomes in order to create the autolysosome.

Student
Meagan Hopkins

Major
Biotechnology and Psychology

Research Mentors
Dr. Christopher Lowry, Dr. Richelle Allen-King

Title
Quantifying the Urban and Rural Nutrient Fluxes to Lake Erie Using a Paired Watershed Approach

Abstract
Excess nutrients have a detrimental impact on the water quality of Lake Eries; specifically nitrate and phosphate; which can lead to the growth of toxic algae blooms. Algae blooms have negatively impacted Lake Erie; which is the main sources of drinking water for many Great Lakes communities. The objective of this research is to quantify surface water nutrient fluxes to the eastern basin of Lake Erie using a paired watershed approach. Bi-weekly analysis of three local streams; one large rural; one small rural; and one small urban; were conducted during the 2015-2016 winter to summer transition. This allowed for the quantification of spring time snow melt and its effects on nutrient flux. This data was then compared to the previous years samples collected during the summer of 2015. Stream gaging was used to obtain flow measurements and establish a rating curve; which was incorporated to quantify seasonal nutrient fluxes. Spectrometric assays; as well as anion-exchange chromatography; were used to quantify nutrient levels. Patterns in the nutrient levels show higher level of nutrients in the rural watersheds and a decrease in the concentration over the winter to spring transition. However; nutrient patterns in the urban stream show relatively constant patterns of nutrient flux; which is independent of seasonal transition or stream discharge. A comparison of wet and dry seasons shows higher nutrient concentrations during summers with greater rainfall. By identifying the largest contributors of each nutrient into the Great Lakes; we can better allocate limited attenuation resources.

Student
Khadijatu Jalloh

Major
Cognitive Science and Psychology

Research Mentor
Panayotis Thanos

Title
The Effects of Chronic Methylphenidate on [3H] MK-801 Binding

Abstract
Attention deficit hyperactivity disorder (ADHD) is a common neurodevelopmental disorder affecting approximately 11% of children in the US. Methylphenidate (MP; Ritalin) is a widely used medication to treat children with ADHD. However; the long-term effects of MP treatment during adolescence is poorly characterized in the literature. The aim of this study is to determine the effects of chronic exposure to MP on the NMDA glutamate receptor. To do this; we employed a previous established drinking paradigm that has been shown to deliver MP doses similar to those seen in patients treated for ADHD (Thanos et al. 2015). Briefly; Sprague-Dawley rats were divided into three treatment groups with voluntary access to either water; low dose (LD) MP; or high dose (HD) MP. 4 mg/kg MP (LD) and 30 mg/kg (HD) were used during the first hour of access (09:00-10:00) and 10mg/kg (LD) or 60mg/kg (HD) were used for remaining seven hours (10:00-17:00). Immediately following a 3-month period of treatment; half of these rats were sacrificed and the remaining half went through an additional 4-week abstinence period before they were sacrificed. In vitro autoradiography was carried out with [3H] MK801 to examine NMDA receptor expression in the brain. Immediately following treatment; the HD MP group showed decreases in [3H] MK-801 binding compared to the water group in the Rhinal (39.5%); Piriform (30.4%); Auditory (34.6%); Visual (13.1%); Amygdala (34.1%) and Hippocampus (34.9%). In addition; differences between the LD and HD groups were found in various cortical and subcortical regions. These effects were short-lived; as no differences between treatment groups were seen following 4 weeks of abstinence. The results of the current study demonstrate the powerful; but reversible effects of long-term MP use on the glutamate system in the brain.

Student
Rylee Marie James

Major
International Studies and Sociology

Research Mentor
Dr. Maureen Jameson

Title
Public Health Anti-Smoking Campaigns in French-speaking countries: A comparison

Abstract
This research project aims to explore the background of the tobacco situation in three French-speaking countries: Switzerland; Tunisia; and Québec; look at the marketing strategies that are used in these countries to recruit smokers; and examine anti-smoking campaigns to see how or if they are tailored to correspond to the culture in question.

Student
Robby R. Johnson

Major
Geological Sciences

Research Mentor
Christopher Lowry

Title
Quantifying Root Distribution and Grain Size Analysis in Wetland Plant Communities with Implications for Root Water Uptake

Abstract
Exploring the relationship between root density distribution; grain size analysis and volumetric water content can help constrain root water uptake. These results support efforts to detail how climate change will affect certain plant communities. To investigate this relationship; we quantified root density distribution; grain size; and volumetric water content in six distinct plant communities throughout the growing season. Field sampling and monitoring was conducted within a 200 m2 plot at Iroquois National Wildlife Refuge near Basom; NY. This formally glaciated site was an ideal setting for this research because of the heterogeneous near-surface geology typically found within the Great Lakes Basin. In each plant community; soil cores were collected throughout the growing season down to a maximum rooting depth (60-90 cm) using a 15 cm interval soil auger. Roots were washed from the samples; then dried and weighed according to standard methods to determine root density by depth. Soil moisture probes were installed in these communities at depths of 15; 30; and 60 cm to continuously monitor volumetric water content. Of these six plant life communities; the grassland variety showed to have the greatest root density — specifically at the depth of 0-15 cm — and largest volumetric water content. The results presented here can help to

improve the root water uptake function in ecohydrology models that forecast how plant communities may be affected by a changing climate.

Student
Starr Johnson

Major
Pharmacology and Toxicology

Research Mentor
Scott Doyle

Title
Macroscopic Anatomy at Microscopic Scale: Registration of Serial Sections of Histopathology for 3D Analysis of Biological Structures

Abstract
In this research; we investigate the problem of reconstructing 3D models of anatomical structure using 2D serial cross sections of histopathology. Biological structures are inherently 3D; and analysis of 3D morphology yields valuable insight into both normal and diseased states. However; native 3D microscopy (e.g. confocal; multi-photon) is expensive and high-resolution images are only possible at a limited specimen depth. High resolution visualization is routinely done using 2D microscopic sections; which lose inherent 3D structure. To overcome these limitations; we aim to combine the resolution of 2D microscopy with the structure of 3D biology by registering stacks of serial histological sections to reconstruct the true architecture. We apply our methodology to the problem of modeling microvessels located between the vagina and bladder at the trigone region. Our goal is to understand the microvessel architecture to assist in developing treatments for recurrent urinary tract infections.

Student
Heeba Kariapper

Major
Computer Science & English

Research Mentor
Cristanne Miller

Title
Hierarchy and Freedom in Marianne Moore's "The Buffalo": An Interdisciplinary Analysis

Abstract
When reading the work of modernist poet Marianne Moore; the reader becomes an explorer. A natural interdisciplinary enquirer; Moore connects ephemera and mythology; art and science; allusions and the "random"; understanding her poetry often entails multiple readings; discussion; and research. This paper examines her poem "The Buffalo" through an interdisciplinary lens; taking into account historical-cultural context; scientific findings; as well as digital tools and natural language processing (NLP) algorithms. "The Buffalo" appears; at first glance; to be a treatise on race or perhaps; the different manifestations of buffalo. However; subsequent readings inform the reader of the poem's complexity residing just below the surface. Ultimately "The Buffalo"; through its symbolism and allusions to various types of hierarchies; provides commentary about freedom and identity. Although Moore does not necessarily equate all hierarchies to be inherently evil; she does laud those who do fight for their right to be "wild" and free.

Student
Brandon Koscinski

Major
Psychology

Research Mentor
John E. Roberts

Title
The Role of Negative Cognitive Content and Rumination in Autobiographical Memory Deficits: A Cognitive Catalyst Model

Abstract
The cognitive catalyst model suggests that the presence of low self-esteem (a proxy for negative cognitive content) strengthens the association between rumination and depressive symptomology (Ciesla & Roberts; 2002; Ciesla & Roberts; 2007; Robinson & Alloy; 2003). Rumination and negative cognitive content have also been implicated in overgeneral autobiographical memory (Williams; 2007); The present study tested the moderating effect of negative cognitive content on the association between rumination and autobiographical memory specificity. In addition to recall of specific memories; we examined the amount of detail within specific memories. We predict that self-esteem will moderate the relationship between rumination and: 1) depressive symptomatology; 2) memory specificity; and 3) memory detail. Participants completed a self-report battery before writing responses to an autobiographical cueing procedure (2 positive; 2 negative; 1 neutral). The present study will provide data investigating if the cognitive catalyst model generalizes to depressive correlates involving autobiographical memory specificity and detail.

Students
Quinn Lachler, Shane Murdock, Nate Noworyta, Waylon Wilson

Major
Media Study

Research Mentor
Dave Pape

Title
"Pirate's Code" Game

Abstract
Pirate's Code is a project focused on using both digital and analog components in order to create an immersive multiplayer experience. These two environments are designed to work off each other. The tabletop elements of the game board create a close quartered system between players that promotes interpersonal; face to face; communication as they navigate the game board and perform tasks. The development of the digital interface provides a multimedia experience using sound design and animation that would immerse the player into the game world similar to how a modern video game or film would. Thus; by combining both an analog game board with an interactive digital interface; what would be a simple board game is capable of utilizing a diverse set of media components from different fields which all come together in this project to create a traditional tabletop experience with an immersive cinematic flare.

Student
Idan Lavian

Major
Biological Sciences

Research Mentor
Dr. M. Garrick

Title
How does the regulator Hepcidin affect iron trafficking in a model cell system representing the kidney?

Abstract
This project's goal is to discover how both the metal importer Divalent Metal Transporter 1 (DMT1) and the opposite iron exporter; Ferroportin (FPN); respond to a regulator Hepcidin (Hepc); in the renal tubules of the kidneys. Hepc gets filtered out of the blood In the kidney along with other small molecules. It is either taken up and degraded in the proximal tubule or exits the body intact in the urine. If Hepc is absent or barely expressed; the kidney will experience an iron overload. The expected result is that both transporters are present in kidney cells and help recover filtered iron from the renal filtrate as they are responsive to Hepc. What I intend to try to gain from my experiments is understand iron regulation in more detail inside kidney cells. Hepc binds to FPN not DMT1 but induces FPN and DMT1 turnover within kidney cells.

Student
Phuong Q. Le

Major
Psychology & Social Sciences Interdisciplinary

Research Mentor
Dr. Mark D. Seery

Title
Testing the effects of awe on individual goal pursuit: A psychophysiological approach

Abstract
The emotion of awe occurs when one feels small relative to something vaster than the self. This has been shown to lead to benefits such as greater sense of connection to humanity and care for others; but it is unclear if this comes at the cost of feeling less capable in pursuing individual goals. The current study uses a psychophysiological approach to examine the effects of awe during subsequent individual goal pursuit. Drawing from the biopsychosocial model of challenge/threat; participants who are exposed to awe-inducing stimuli; relative to those who are exposed to neutral stimuli; should exhibit cardiovascular responses consistent with greater relative challenge (i.e.; evaluating high personal resources/low situational demands). The current study can offer insight into how awe might positively affect people's experiences during their own individual active goal pursuit; despite experiencing a "small self."

Students
Antara Majumdar, Cortney Ott

Major
Biomedical Sciences, Chemical Engineering

Research Mentor
Dr. Richard Salvi

Title
Effect of Chronic Stress on GABA-mediated inhibition in auditory cortex

Abstract
Chronic stress has been implicated in the phantom sound of tinnitus; a ringing; hissing or buzzing sensation. Tinnitus; a sometimes debilitating condition; is hypothesized to be caused by the loss of GABA (□-aminobutyric acid)-mediated inhibition leading to spontaneous hyperactivity within the central auditory system.

Since tinnitus is often linked to chronic stress; we hypothesized that chronic stress would reduce the expression of GAD67; which is involved in synthesizing GABA; in the auditory cortex.

We used immunohistochemistry and Western blot to evaluate the expression of GAD67 in the auditory cortex of 5 control rats and 5 chronically stressed rats. We compared weight gain for control and experimental groups to confirm chronic restraint was inducing stress.

Western blot analysis showed that GAD67 expression was significantly reduced in the auditory cortex of chronically stressed rats. Immunolabeling studies are currently underway to localize GAD67 expression in specific layers of the auditory cortex.

Students
Jose Kenneth D. Mapas, Alassane Mballo

Major
Biomedical Sciences

Research Mentor
Javid Rzayev

Title
Preparation of ultrahigh molecular weight linear block-copolymers via Cu-mediated Reversible-deactivation radical polymerization and reversible addition-fragmentation chain transfer polymerization.

Abstract
Block copolymers (BCPs) are an important class of macromolecules that has practical applications in various fields such as in drug delivery; desalination; or selective ion filtration. The production of mechanically robust BCP-based materials; which requires polymers with very high molecular weighs; presents a challenge due to dynamic and kinetic factors involved in the synthesis and processing of these BCPs. Herein; we present a novel and simple method for the synthesis of ultrahigh molecular weight linear poly(solketal methacrylate-b-styrene) (PSM-PS) via the combination of a Cu-mediated reversible-deactivation radical polymerization (RDRP) and reversible addition-fragmentation chain transfer (RAFT) polymerization . Self-assembly and Non-solvent Induced Phase Separation (SNIPS) of hydrolyzed PSM-PS affords access to nanoporous structures; which were characterized by scanning electron microscopy analysis.

Student
Matthew Marion

Major
Cognitive Science

Research Mentor
Dr. Peter Thanos

Title
Inhibition of by Fatty Acid Binding Protein 5 and 7 Blunts Locomotor Response to Cocaine In Female Mice

Abstract
The Endocannabinoid System (ECS) consists of cannabinoid receptors located throughout the central and peripheral nervous systems and their natural lipid ligands known as endocannabinoids. Genetic and pharmacological manipulation of ECB signaling has previously been shown to have effects on pain perception; inflammation; anxiety; depression and drug abuse. Fatty acid binding proteins (FABPs) are intracellular transporters of endocannabinoids and are involved in their breakdown via transport to their catabolic enzymes such as fatty acid amide hydrolase (FAAH). Recent research on endocannabinoids and the mechanisms of their transport has facilitated the development of SBFI26; an inhibitor of FABP 5 and 7. For this project; our goal was to determine the effect of genetic and pharmacological FABP5/7 inhibition on cocaine conditioned place preference (CPP) and cocaine locomotor sensitization. While FABP5/7 inhibition had no effect on CPP; females given SBFI26 during locomotor sensitization showed a blunted locomotor response to cocaine.

Student §
Amit Mehrotra

Major
Biological Sciences

Research Mentor
Paul Cullen

Title
Interfering with Aggregate formation in Saccharomyces cerevisiae

Abstract
How individuals cooperate is an important question in biology. Budding yeast are single-celled microbes that cooperate by undergoing filamentous growth; a developmental fungal foraging response to nutrient-starved conditions. We identified an aspect of filamentous growth where cells cooperate in groups called aggregates. Cells deficient in the adhesion molecule Flo11p; which is required for cells to stick together and form filaments; did not participate and interfered with aggregate formation. Aggregate interference was also observed in cells lacking other factors important for filamentous growth; Bud8 and Pea2. We are currently interested in discovering if cells deficient in the sucrose metabolic enzyme invertase (a metabolic enzyme that is secreted and shared by cells) are aggregate deficient. Understanding the mechanics of cooperation may provide evolutionary insights into this fundamental provess and may have benefits in industrial processes involving fungi; as well as in combating parasitic fungi.

Student
Rachel Mumm

Major
Psychology

Research Mentor
R. Lorraine Collins

Title
Gender differences in the relationship between norms; protective strategy use; and marijuana use.

Abstract
Marijuana use has more than doubled in the past decade (Hasin et al; 2015). The current study collected information from regular marijuana users (N=55) regarding marijuana protective strategy (MPS) use; perceptions about MPS use; and personal marijuana use. Building on work of Cialdini et al. (1990) we created measures of descriptive norms and injunctive norms about MPS use (DN-M; IN-M.) Descriptive norms assessed participants' beliefs about how common MPS use is among typical males and females. Injunctive norms assessed participants' beliefs about typical male or female acceptance of a friend using MPS. We hypothesized an indirect effect from DN-M/IN-M to marijuana use via MPS use. Using a multi-group path analysis; we also explored gender differences in our conceptual model (i.e.; DN-M/IN-M to MPS use to Marijuana use). Descriptive statistics showed that female participants reported more marijuana use and higher IN-M; while males reported greater MPS use and higher DN-M. For males; there was a significant indirect effect from DN-M to marijuana use via MPS use. In contrast; females had a significant indirect effect from IN-M to marijuana use via MPS use. Thus; the more commonly used a male believes MPS use is; the more likely he is to use these strategies. Whereas; female use of MPS is more influenced by how approving she determines her peers to be of using these strategies.

Student
Haemi Nam

Major
Psychology

Research Mentor
Lora Park

Title
You Have a Friend in Me: The Role of Social Connections in Improving Women's Math Outcomes

Abstract
Despite making advancements in society; women are still disproportionately outnumbered in traditionally male-dominated STEM fields. Forming social connections may be particularly beneficial in mitigating negative effects that women in STEM may experience. The present research examines how forming social connections in math may improve women's math outcomes; such as math sense of belonging. University at Buffalo students (N = 261; Mage = 19.75; 50% female) imagined making a "friend" or not in a math course. They then completed measures assessing feelings of belonging; self-efficacy; and attitudes in math. Results indicated that both men and women showed more positive outcomes after imagining making a friend versus not. Men; in particular; showed more positive attitudes toward math when they imagine making a friend (vs. not) in the math course. Thus; social connections affect a student's sense of belonging math; and in the case of men; may affect their intent to pursue math.

Student
Nicholas P. Nolan

Major
Psychology

Research Mentor
Peter Q. Pfordresher

Title
Singing Production and Musical Perception: a Closer Look

Abstract
A common mode of music making is singing; and the simplest form of singing is the vocal imitation of pitches. Despite the ubiquity of this behavior; many people fail to match imitated pitches most of the time. Because singing is a complex behavior; involving many processes; it is not clear how much perceptual or sensorimotor processes contribute to singing accuracy. We address the relative contributions of various factors using three leading online tests of musical processing: A measure of imitative singing accuracy from the Seattle Singing Accuracy Protocol (SSAP); a test of melody perception based on the Montreal Battery of the Evaluation of Amusia (MBEA); and a simple pitch discrimination task. A group of 100 college-age students were randomly sampled from students taking Introductory Psychology at the University at Buffalo; The State University of New York; the only constraints being the lack of any hearing deficits or vocal motor disorder.

Student
Yuting Pan

Major
Biology; Psychology

Research Mentor
Wolfgang Ellermeier

Title
Evaluation of Cross-Dimensional Commutativity: Duration and Visual Perception

Abstract
Theory of axiom of commutativity and multiplicity has been applied to aspects of psychophysics to explore the relationship between magnitude of physical stimulus and actual intensity of perception. Only axiom of commutativity was able to apply for the previous studies; which clarifies the assumption that subjects are able to estimate and produce ratio of magnitude. Attention has been paid to explore the applicability of commutativity axiom on one particular sense; cross-dimensional fitting was rarely investigated. Addition to validate applicability of commutativity on duration perception; present study also investigated whether axiom of commutativity would fit cross dimensional ratio scaled processing; duration perception and visual perception to be specific. As results have shown; the applicability of commutativity property on duration perception is not affected by visual perception interference; cross-dimensional commutativity still holds. Future work: generalizing the applicability of axiom of commutativity on duration perception by including more than one modality.

Student
Richard Patti

Major
Sociology; Anthropology; Political Science

Research Mentor
Dr. Mary Nell Trautner

Title
Labeling Theory

Abstract
A small sample of a large interview project; the data I collected shows how we as researchers have to be careful about falling into the traps that labeling theory may present. The preconceived notions that contribute to the prevalence of labeling theory in the criminology community could also bias the researcher when investigating the theory.

Student
Zoe Rudloff

Major
Biological Sciences and Dance

Research Mentor
Shermali Gunawardena

Title
Investigating the localization of presenilin (PSN) during glycogen synthase kinase 3β (GSK 3β) mediated axonal transport

Abstract
Transport of vital cellular components such as proteins; organelles and synaptic vesicles within axons are required for the growth and survival of neurons. Defects in axonal transport have been implicated as an early event in the progression of neurodegenerative diseases such as Alzheimer's disease (AD). Transport defects may arise due to improper regulation of motor proteins kinesin-1 and dynein. Two proteins; glycogen synthase kinase-3β (GSK-3β) and presenilin (PSN); have been shown to influence bidirectional transport of a class of synaptic vesicles; amyloid precursor protein (APP) vesicles in vivo. Furthermore; past work from our lab has shown that excess GSK-3β induces transport defects; while reduction of PSN reduced the amount of active GSK-3β present indicating PSN indicating PSN influences GSK-3β. To test the localization of PSN within axons; we expressed PSN-GFP within larval axons and found that it is present within the cell bodies and moving within axons; in vivo; suggesting that PSN is undergoing axonal transport. Further work will look at the localization of PSN in the context of GSK-3β expression to determine whether the two proteins co-localize within vesicles during axonal transport. Since previous work has shown that excess of GSK-3β induces transport defects; we will test if the GSK-3β-mediated axonal blockages contain PSN. Taken together; our observation will identify how PSN and GSK-3β are interacting with one another during axonal transport.

Student
Hanna Santanam

Major
English and Anthropology

Research Mentor
Walter Hakala

Title
The Next King of Action": The Globalization of Indian Masculinity

Abstract
This project explores changes in the Indian film magazine Stardust's representation of masculinity in the last 20 years. Founded in Bombay in 1971; Stardust focuses on the lead actors of Indian movies and depicts prominent cultural issues under

the guise of a gossip magazine with sexualized headlines. Rachel Dwyer has drawn attention to the importance of film magazines; arguing that; "these magazines deserve serious study" because their unique position allows them to serve as indicators of cultural patterns and shifting views in India (Dwyer 2001). The overall trend in Stardust indicates a nationwide move toward lighter skin tones; well-groomed body hair; and an overly muscular physique that directly corresponds with India's access to the internet and; therefore; global influences.
I find this research compelling because it occupies an overlooked niche in global studies: the globalization of male bodies; the visual representation of these changes; and the result of these portrayals. As observed in her study of Indian cinema; Shahnaz Kahn stated that the effects of the global projections of gender that arise from Bombay cinema are under-investigated; drawing attention to the need for research in this specific area (Khan 2011). The simultaneous rise of globalization and consumerism in India led to "masculinity itself [being] constructed as a product available for consumption if one merely chooses the appropriate brand names" (Alexander 2003). This project examines how the images published in Stardust indicate a new era for the male body with unforeseen consequences and suggests the rise of an empowered; consumerist class of women with disposable income to spend not on needs; but also wants. This project was assembled with materials drawn from the University of California Berkeley; Cambridge University; and the University at Buffalo.

Student
Julia Schoonover

Major
Political Science and Sociology

Research Mentor
Dr. Kristen Schultz Lee

Title
General Strain Theory; Islamophobia; Radicalization; and the Role of Social Media

Abstract
The objective of this paper is to identify the major strains that Muslims are subjected to in Western societies (specifically; in France and the United States). These strains are a result of Islamophobia; the negative perceptions of Muslims by host societies. To best understand Islamophobia I will be studying its social causes and personal effects. I will be analyzing Islamophobia in context and then applying Robert Agnew's General Strain Theory to best understand the ways in which certain social strains may increase ones likelihood of radicalization. I will also explore the role that social media plays in the mobilization and radicalization of strained/marginalized individuals.
I will be asking; what are the root causes of Islamophobia in Western societies? What social effects do certain strains have on Muslim individuals? And what are the ways in which individuals are mobilized and recruited to become foreign fighters? The purpose of this research is not to identify who becomes radicalized rather to answer how and why individuals become radicalized.

Student
Tomas Segura

Major
Geology

Research Mentor
Dr. Charles E. Mitchell

Title
What is the The Age of the Power Glen Rock Formation?

Abstract
. Bergström et al. (2011) recently conducted research on the Whirlpool Sandstone and the Manitoulin. The goal of Dr. Mitchell and I is to use fossils to refine the age of a set of ancient rock layers that are exposed in the Niagara Gorge and its lateral equivalents. In particular; I intend to test an alternate age assignment of the Power Glen Formation Formation in Ontario. Based on the geochemical properties of those rocks; Bergström et al. suggested that they belonged to the late Ordovician portion of the Earth's history. Supposedly; they were formed during an episode of major glaciation. Prior Melchin et al's work in 2013; these rocks and their local equivalents had long been considered to be somewhat younger; approximately 442 Ma; within the early Silurian (Brett et al.; 1995); after the glaciation had ended.

Student
Sonya Singh

Major
Biomedical Sciences

Research Mentor
Dr. Benjamin D. Auerbach; PhD

Title
Analysis of Ultrasonic Vocalizations in a Rat Model of Fragile X Syndrome

Abstract
Fragile x syndrome (FXS) is a leading known inherited form of autism and autism spectrum disorder (ASD) with deficiencies in social communication and sensory processing. It is caused by a mutation in the fragile x mental retardation gene (Fmr1). Analogous to human communication; rats engage in social communication in the form of ultrasonic vocalizations (USVs). The purpose of this research is to determine if the mutations associated with ASD recapitulate the core communicative deficit features of this disease in rat models. To address this; USVs were collected and analyzed from control and Fmr1 KO rats from different rearing environments and call-inducing social conditions. Analysis of these USVs suggests that a complex interplay between genes and rearing environment influence the manifestations of specific communicative deficit features of FXS.

Student
Roshaan Surendhran

Major
Chemistry and Chemical Engineering

Research Mentor
Dr. David C. Lacy

Title
Mechanism of molecular oxygen activation by non-heme Iron(II) complexes

Abstract
A prominent challenge in the field of synthetic inorganic and organometallic chemistry is understanding small molecule activation. It is known that enzymes such as Tau-D and Cytochrome P450 perform oxygen activation in nature but not much is known about the mechanistic pathway by which this happens. The focus of this project is the activation of molecular oxygen. In an attempt to probe this mechanism; a series of p-substituted carbamoyl methyl tripodal ligands were synthesized. These ligands were further reacted with iron(II)acetate and zinc(II)acetate to create functional models of molecular oxygen activating moieties. The iron (II) compounds were reacted with oxygen and the reaction was monitored using UV-Vis spectroscopy to gain some insight into the mechanism of the reaction. The zinc (II) complexes were used to study the equilibrium of ligand exchange that occurs at the axial position in trigonal bipyramidal complexes.

Student
Jacqueline Szabat

Major
Psychology

Research Mentor
Dr. Rina Das Eiden

Title
Paternal Psychopathology and Parenting Attitudes From Infancy to School Age

Abstract
The purpose of the present study was to investigate the relationship between paternal alcohol problems and comorbid psychopathology in predicting fathers' parenting attitudes in early childhood. Fathers play an important role in the rearing of their children; therefore; it is important to investigate negative parenting attitudes which may have an impact on child development. This study examined the role of fathers' alcohol problems and comorbid depression in predicting paternal warmth and aggravation. Assessments were conducted at 12; 18; 24; and 36 months and again at kindergarten age. Results from this study indicated that there is a significant main effect of child age on paternal aggravation; supporting the idea that different developmental time points are related to changes in parenting attitudes. Also; a significant main effect of fathers' depression on paternal aggravation was found; which supports the hypothesis that fathers who have depression will be more aggravated with their children.

Students
Team SexNerds

Research Mentor
Lance Rintamaki

Title
SexNerds.org: Development and Launch of an Online Educational Platform about Sex and Sexual Health

Abstract
Education about sex and sexual health remains lacking. In an effort to help address this need; we developed SexNerds.org; an online platform and clearing house for new science about sex; sexuality; and sexual health. This project brought together over 100 students from a variety of backgrounds; who work together daily to curate nearly 200 websites for news articles about sex-related studies. In addition; we create and publish novel content on our platforms; including blogs and scientific reviews of new science on sex and sexual health. SexNerds.org also incorporates a massive social marketing campaign to develop a vast community of interest on these topics; furthering dissemination of this important information to society at large. The inception; development; and launch are distilled and presented in our poster.

Student
Rachel Treiber

Major
Speech and Hearing Science

Research Mentors
Dr. Benjamin D. Auerbach, Dr. Richard Salvi

Title
Auditory Hypersensitivity in a Rat Model of Fragile X Syndrome

Abstract
Autism spectrum disorder (ASD) is a neurological disorder characterized by impaired social skills and sensory deficits. Fragile X syndrome (FX) is the leading known inherited cause of ASD and symptoms associated with FX are similar to those of ASD; particularly auditory hypersensitivity and impaired communication. The known genetic cause of FX allows for the creation of animal models and supports the investigation of the fundamental neurological impairments underlying ASD. We utilized a sound avoidance paradigm to assess loudness sensitivity in a rat model of FX (Fmr1 KO rat). In this paradigm; rats were free to move between a preferred (dark and enclosed space) and an innately unfavorable (bright and open) environment. Both Fmr1 KO and WT littermates remained in the preferred environment until an aversive sound was played. However; in comparison with WT animals; the Fmr1 KO rats left the preferred environment at lower loudness levels; indicating loudness intolerance in Fmr1 KO animals. Future studies will examine the neural mechanisms underlying loudness intolerance in these animals.

Student
Rebekah White

Major
English

Research Mentor
Dr. Barbara Bono

Title
The History of a Book: Arthur Rackham and Some British Ballads

Abstract
Published in New York in 1919 and in London in 1920; Arthur Rackham's collection and illustrations of specifically British ballads appeared at the end of the Great War. However contemporary; Rackham's own patriotic collection also follows the much older tradition of ballad collection; indeed; he prefaces his book: "Several of the Ballads in this book are based on the great work of Francis James Child; The English and Scottish Popular Ballads."

But why would a children's book illustrator explore this world of literary and oral tradition? This illustrated thesis takes a look at Rackham's particular talent—one which E. V. Lucas describes as a combination of "grace and grotesque"—successfully trying his hand at earlier historical and heroic characters in the adventurous ballad tradition. It also explores that tradition in general; the Child's collection; and the selections chosen for Some British Ballads as a post-Great War; patriotically-themed luxury Christmas book.

Student
Catherine Zhang

Major
Biological Sciences

Research Mentor
Dr. Laura Rusche

Title
A Role in Pathogenicity of a NAD+ Dependent Deacetylase; Hst1; in Candida albicans

Abstract
Candida albicans; the most common pathogen in the Candida clade; is an opportunistic yeast that is naturally part of the gut flora but in immunocompromised individuals becomes pathogenic. One factors that contribute to the pathogenicity of C. albicans is biofilm formation; which provide protection for microorganisms and are induced when they sense nutrient starvation conditions. One way cells sense nutrient availability and regulate metabolic pathways is through sirtuins; NAD+ dependent deacetylases that repress transcription. Our lab hypothesizes that changes in the environment alter the metabolic state of the cell which in turn fluctuates the metabolic cofactor NAD+ levels; affecting sirtuin activity and gene expression. The goal of my study is to assess the role of Hst1 in pathogenicity in C. albicans. To accomplish this goal; two independent isolate knockout strains hst1Δ/Δ were made to study changes in pathogenic response; NAD+ levels; RNA-seq; sensitivities and biofilm formation.

CSTEP

Student
Chris Gnam

Major
Mechanical and Aerospace Engineering

Research Mentor
Dr. Mostafa Nouh

Title
Vibration Control with Periodic Structures

Abstract
Spacecraft optical equipment often times needs to be held extremely still while taking long exposures and must be kept isolated from undesirable sources of vibration. Materials with good damping properties are typically soft with a low mechanical stiffness and are thus not always suitable. Another approach is to use periodic structures (utilizing both periodic geometries and materials) which are known to exhibit a unique structural response stemming from their ability to generate stop bands. Within these stop bands; vibration excitations of certain frequencies are incapable of producing elastic waves that propagate through the structure and are; therefore; effectively damped. We are studying theoretical periodic structures using the finite element method to model their filtering characteristics. We have also created mathematical models to predict wave dispersion patterns which allow us to identify geometries with potentially powerful vibrational suppression properties. This may allow for more precise data collection on spacecraft optical systems.

Student
Aaron Nimako

Major
Biomedical Sciences

Research Mentor
Dr. Jerome Yates

Title
Autopsy results for Cholangio and Bile Duct Carcinoma

Abstract
From 1950-1987; over 20;000 autopsies were done at Roswell Park Cancer Institute. Cholangiocarcinoma is a relatively rare cancer and usually results in death for the patient. It arises in the bile ducts in the liver or throughout the extra hepatic ducts. Using the autopsy files; demographic characteristics of patients with Cholangiocarcinoma were collected. Sex; age; survival; risk factors and other cancer diagnosis were collected. 20234 records were scanned and 11 Cholangio and 23 bile duct carcinomas were found. There were 17 males and 17 females ranging from ages 19 to 71. Survival ranged from three weeks to five years. This remains a very difficult cancer to control and etiologic factors contributing to its genesis are largely obscure. Early detection with curative surgery is necessary to improve patient survival.

Student
Ndidiamaka Okorozo

Major
Biomedical Sciences

Research Mentor
Shermali Gunawardena PhD

Title
The Effect of Huntingtin on Rab2 Transport in Drosophila Axons

Abstract
Huntington's disease (HD) is a neurodegenerative disease which causes loss of motor coordination and leads to premature death. Huntingtin (HTT); the protein which causes HD; is enriched in neurons and is thought to likely function in axonal transport. Recently; our lab showed that HTT regulates the transport of the protein Rab2 in Drosophila axons and that HTT and Rab2 move together during axonal transport. Rab2 is involved in moving vesicles between the endoplasmic reticulum (ER) and Golgi. Using markers for ER; we examined ER localization in Drosophila; how HTT affects this localization in Drosophila axons. We proposed that reduction in HTT levels or expression of mutant HTT perturbs the ER localization in axons.

Student
Diamile Tavarez

Major
Biological Sciences

Research Mentor
Dr. Zhen Yan

Title
Investigation of Potential Therapeutic Treatment for Autism Spectrum Disorders Using Histone Deacetylase Inhibitors

Abstract
Autism spectrum disorders (ASDs) are a group of developmental disabilities that cause difficulties in social interactions and other behaviors. Previously; Shank3 haploinsufficiency was identified as an autism risk factor that disturbs neuronal communication. Epigenetic studies have found the genes disrupted in autism to be histone modifying enzymes. In this present investigation; we intend to use Histone Deacetylases (HDACs) inhibitors to determine if it can serve as a potential form of treatment. We will apply HDACs inhibitors to Shank3-deficient mice and conduct various behavioral assays to determine if mice still exhibit autism-like behaviors. This research will not only further our understanding of autism- but also provide a possible treatment for autism.

Jacobs School of Medicine & Biomedical Sciences

Student
Natan Babek

Major
Biomedical Sciences

Research Mentor
Dr. Zivadinov

Title
Exosome-Mediated Contrast Agent Delivery Across The Blood Brain Barrier

Abstract
Magnetic resonance imaging (MRI) contrast agents (MCA) that are used for detecting tissue pathologies are largely incapable of crossing blood brain barrier (BBB). In comparison; the lipophilic and non-immunogenic nature of exosomes allows for drug delivery past the highly restrictive BBB. Exosomes have been shown to deliver pharmaceutical agents to specific tissue targets such as cancer tumor; heart muscles etc. Hence; we aimed to generate MCA loaded BBB permeable exosomes. To this end; we isolated exosomes from HEK293T cells which over-express rabies virus signaling peptide conjugated Lamp2b exosomal protein. Modified Lamp2b can now target the exosome to brain neuronal receptors. We will next use sonication to load the exosomes with a MCA (Gadovist). Following this; we aim to use experimental autoimmune encephalomyelitis mice model test our exosomes. Our objective is to demonstrate that exosomes are capable of delivering Gadovist into the brain and successfully map pathological developments using MRI scans.

Students
Ajay N. Baindur, Karie Chen

Major
Biomedical Sciences

Research Mentor
Caroline E. Bass

Title
Endocannabinoid regulation of incentive cues

Abstract
When previously neutral cues in the environment are repeatedly paired with a reward; they can develop powerful incentive properties which can strongly influence behavior; such as drug seeking and cravings in addicts. Understanding the mechanisms that contribute to incentive cues may reveal unique treatment targets. Recently it has been demonstrated that endocannabinoids enhance reward seeking. The endocannabinoid system consists of the cannabinoid receptors 1 and 2 (CB1; CB2; respectively); endogenous ligands including 2-arachidonyl glycerol (2-AG) and anandamide (AEA); and two degradatory enzymes; fatty acid amide hydrolase (FAAH) for AEA and monoacyl glycerol lipase (MAGL) for 2-AG which serve to dampen AEA and 2-AG signaling. Newly developed inhibitors of the endocannabinoid system now allow us to specifically determine which components influence physiology and behavior. In this study; we selectively blocked CB1 receptors using Rimonabant (SR-141716A); or inhibiting MAGL activity with MJN-110; which enhances the duration of 2-AG signaling; in a rat model of incentive cue responding. We predicted that blocking CB1 decrease responding to incentive cues; while MAGL inhibition will enhance responding. We found that rimonabant dose dependently decreased responding to incentive cue; while 5 mg/kg MJN-110; a dose that completely inhibits MAGL activity; increased responding to incentive. While there is ample evidence that endocannabinoids influence drug seeking; much less is known about their role in mediating incentive cues and cravings; therefore these results indicate that the endocannabinoid system may serve as a potential target for inhibiting cravings and relapse in drug addiction.

Students
Ajay Baindur, Karie Chen

Major
Pharmacology & Toxicology

Research Mentor
Caroline E. Bass

Title
GLP-1 agonist Exendin-4 potential of reducing reward-seeking behavior

Abstract
Exendin-4 (EX4) is a glucagon-like peptide-1 (GLP-1) agonist that has been prescribed to treat type-2 diabetes; and works primarily by increasing insulin in response to eating. EX4 has the additional benefit of promoting weight loss; partially through the effects of GLP-1 receptors in the brain that regulate appetite and motivation systems. We and others have shown that EX4 will decrease both the amount of food an animal will consume and the motivation to obtain palatable foods. EX4 and other GLP-1 agonists may also activate GLP-1 receptors in the mesolimbic dopamine pathway and decrease dopamine neurotransmission; which is critical for reward seeking and responding to reward associated cues. One interesting aspect of motivated behavior is how previously neutral cues (e.g. a tone or light) can take on the incentive properties of a reward when repeatedly paired with it. These incentive cues then promote reward seeking behaviors. In this study; we sought to determine if EX4 decreases reward seeking by reducing the response to incentive cues using an operant model of incentive cue responding for sucrose. These data will help define the behavioral mechanisms by which EX4 promotes weight loss; and could have implications for over-eating disorders and others that have a strong incentive cue component; such as substance use disorder.

Students
Jacob Bleasdale, Kaley Reardon

Major
Biomedical Sciences

Research Mentor
Dr. Stephanie Anzman-Frasca

Title
Describing young children's decision-making in the context of a board game designed to promote delay of gratification skills

Abstract
Young children's delay of gratification; or the extent to which they can resist the temptation of an immediate reward and wait for a later reward; predicts many positive outcomes from academic achievement to maintaining a healthy weight. The goal of this analysis is to describe children's decision-making in the context of a board game designed to promote delay of gratification. Twenty-seven 4-to-5-year-old children played the study game over four weeks (20 minutes per week). Game play involved periodically landing on spaces where children choose between an immediate reward or a delayed reward that can increase chances of winning later. Children's decisions at these spaces were recorded throughout game play. Children learned to select the delayed reward across game play sessions. Patterns of decision-making will be described. Developing innovative ways to promote delay of gratification can equip children with an essential skill for success in modern environments.

Students
Lindsey Carlsen, Alex Sikora

Major
Biotechnology

Research Mentor
Dr. Praveen Arany

Title
Synthetic Polymers to Generate Artificial Biofilms

Abstract
The microbiome is being appreciated as a major contributor to oral and general health. Much of the microbiome is made up of biofilms; which are diverse bacterial communities capable of communication and dispersion. Natural biofilms consist of an extracellular polymeric matrix that takes days to weeks to develop and mature. This has been a major limitation to their lab analyses.
Our objective is to utilize electrospun synthetic polymers to instantly generate naturally occurring biofilms. The polymers will serve as artificial scaffolds to facilitate growth and organization of microbes mimicking natural biofilms.
These synthetic biofilms will be used to study the role of six different bacteria in health and disease states. These bacteria; Streptococcus mutans; Streptococcus gordonii; Moraxella catarrhalis; Fusobacterium nucleatum; Porphyromonas gingivalis; and Escherichia coli; cause a host of problems in human health ranging from dental plaque to damaged heart valves.

Students
Keith Carolus, Sanjeevani Choudhery, Matthew Mallory

Research Mentor
Michael Dwyer

Title
Innovative Computational Study of Brains Affected by Multiple Sclerosis

Abstract
Multiple sclerosis (MS) is an autoimmune disease where inflammatory lesions disrupt structural and functional connections between brain regions. We investigate the impact of this disruption on cognition and personality with three methods: tractography; lesion based tract disruption; and functional MRI.

We use diffusion imaging to generate white matter tractography results; which quantify the structural connections between brain regions. In contrast; we also use maps of lesions; to quantify the proportion of white matter tracts disrupted between brain regions. Furthermore; we investigate the patterns of functional connectivity and dis-connectivity between brain regions using resting state fMRI analysis.
Each of these imaging techniques are analyzed using network-based statistics and machine learning algorithms in order to observe pathophysiologic associations with psychological outcomes.

Student
Kwang Jin Chung

Major
Biological Science

Research Mentor
Techung Lee

Title
Regulation of Matrix Metalloproteinases by sFRP2

Abstract
Secreted Frizzled-related protein 2 (sFRP2) plays a key role in chronic fibrosis after myocardial infarction in heart failure. The study was aimed at elucidating the mechanisms through which sFRP2 may regulate the extracellular matrix (ECM) remodeling of adult mouse cardiac fibroblasts. One way sFRP2 regulates remodeling of the ECM is through regulating Matrix Metalloproteinases (MMP); enzymes that degrade ECM. The regulation of MMP by sFRP2 is specific to cardiac fibroblasts; as the effect is not seen in other cell lines such as Hela; liver; and bone marrow cells. The specific effect sFRP2 has on cardiac fibroblasts may be used to develop a therapeutic treatment for patients suffering from cardiac fibrosis. Experimental data shows that deglycosylation using PNGase decreases the metabolic activity of MMPs; implying the significance of glycosylation for MMP activity. The study provides a molecular framework upon which sFRP2 mediated MMP activity may be better defined.

Students
Michael Danilov, Arsalan Haghdel

Research Mentor
Dr. Xiaozhong Wen

Title
Sleep and Health Among Pregnant Smokers

Abstract
We aimed to examine the trajectories; predictors; and health effects of sleep quality and duration among pregnant smokers.

We used data of 52 pregnant smokers enrolled in a smoking cessation intervention study conducted in Buffalo; NY during 2015-2016. Sleep quality and duration were measured with Pittsburgh Sleep Quality Index (PSQI) repeatedly at 3 study visits: pre-test; post-test; and end-of-pregnancy.

The sleep quality of pregnant smokers decreased during pregnancy while sleep duration did not changed substantially. At the pre-test; depression and heavy smoking were associated with lower sleep quality. Although not significantly; poor sleep (vs. good sleep) at pre-test seemed to predict a higher risk of failure in smoking cessation (27.8% vs. 16.7%) and insufficient gestational weight gain (25.0% vs. 14.3%).

Depression and heavy smoking negatively affect sleep quality among pregnant smokers; which could potentially lead to failure in smoking cessation and insufficient weight gain.

Students
Zoey Davis, Julian Saleh, Samie Syed

Major
Biomedical Sciences and Psychology

Research Mentor
Xiaozhong Wen

Title
Trajectories; Predictors; and Consequences of Depression Around Pregnancy Among Cigarette Smokers

Abstract
Depression often concurs with cigarette smoking. We examined trajectories; predictors; and consequences of depression around pregnancy among 58 daily smoking pregnant women in UB Pregnancy and Smoking Cessation Study. Depressive mood was assessed with self-reported depression diagnosis before pregnancy; Beck Depression Inventory during pregnancy; and Edinburgh Postnatal Depression Scale in postpartum. We found 38.8% of participants were diagnosed with depression before pregnancy and 20.9% had active depression during pregnancy. Mean postpartum depression scores were 7.29; 6.40; and 5.38 at two; three; and six months postpartum; respectively. Risk factors for depression included younger age (47.6% among those aged≤29 vs 24.0% among those aged≥30); white race (50.0% vs 25.6% among African Americans); and heavy smoking (51.9% among heavy smokers[10+ cigarettes/day] vs 30.0% among light or moderate smokers). In conclusion; depression is common among pregnant smokers (especially those with young age; white race; and heavy smoking) with depression severity peaking in early postpartum.

Student
Beverly DiCorso

Major
Medicinal Chemistry

Research Mentor
Dr. Fraser J. Sim

Title
Exploring the Effect of PI-88 on IFN-Gamma Induced Pathological Quiscence in OPCs

Abstract
In Multiple Sclerosis; failure to repair demyelinated lesions results in disease progression and permanent neurodegeneration. Oligodendrocyte precursor cells (OPCs) have the capacity to repair or remyelinate demyelinated axons and initially respond to demyelination by proliferation and migration. Pro-inflammatory cytokines; such as IFN-gamma; block OPC proliferation and likely contribute to remyelination failure. Sulfatase enzymes promote IFN-gamma signaling; by removing 6-O-sulfate from heparan sulfate proteoglycans. Treatment with PI-88; a sulfatase inhibitor; blocks the negative effects of IFN-gamma on OPC proliferation in vitro. In this study; we hypothesized that PI-88 would mitigate the effects of IFN-gamma following demyelination in adult mouse spinal cord. At 5 days post-lesion; PI-88 was able to ameliorate IFN-gamma induced pathological alterations in Iba1+ microglia and Olig2+ OPC recruitment and proliferation. Future experiments will assess the effects of PI-88 treatment on remyelination. This research is important in establishing sulfatase modulation as a therapeutic approach for IFN-gamma induced pathological quiescence.

Student
Priyanka Dongare

Major
Biomedical Sciences and Psychology

Research Mentor
Dr. Fraser Sim

Title
Investigating the Effect of M3R Conditional Knockout on OPC Proliferation following Demyelination

Abstract
Oligodendrocyte progenitor cells (OPCs); the precursors of oligodendrocytes; facilitate remyelination. OPCs express all five muscarinic acetylcholine receptor subtypes; though M3R expression is highest. Previously; we observed that genetic ablation of M3R in OPCs resulted in greater numbers of oligodendrocytes in demyelinated lesions. Therefore; we sought to determine if this effect was due to increased recruitment of OPCs. We induced spinal cord demyelination by direct injection of lysolecithin and

sacrificed at five days post lesion; during peak OPC recruitment. Preliminary data suggests no effect of M3R knockout (KO) on OLIG2+ OPC density in demyelinated lesions. This data suggests no effect of M3R knockout on proliferation; rather; M3R KO in OPCs promotes their differentiation.

Student
Nader Cody Elkhechen

Major
Biomedical Sciences

Research Mentor
Dr. Jeff Saucerman

Title
A Computational Model of Cannabinoid-1 Receptor Signaling in Cardiomyocytes

Abstract
Of the 6 million adults in the United States that develop heart failure; around half of those people die within 5 years of diagnosis. The reason for this occurrence can be linked to the well-accepted notion that cardiomyocytes lose their regenerative capacity as the body ages. While plenty of research has been conducted on why we lose this regenerative capacity; not much research has focused on how we can potentially regain this pivotal ability. In this study; we present a predictive computational model in order to better understand the cannabinoid-1 receptor signaling networks that is seen in regenerating/proliferating cardiomyocytes. Through the use of computational modeling and live-cell microscopy; results show our predictive model agreed with 17 of 17 experimentally measured data from literature. These results suggest that this specific approach can be used to eventually create an accurate large scale signaling network of cardiomyocyte regeneration.

Students
Priscilla Esadah, Jacob Perkins

Major
Biomedical Sciences

Research Mentor
Dr. Xiaozhong Wen

Title
A Study of the Relationship and Mechanisms between Maternal Smoking Cessation during Pregnancy and Infant Growth

Abstract
Childhood obesity is a public health issue. Our objective is to determine the relationship between maternal smoking cessation and infant growth; and their mediating mechanisms (sleep and appetite).

We used data of 20 mother-infant pairs from UB Pregnancy and Smoking Cessation Study. The relationship between maternal smoking cessation and infant anthropometrics (birth-12months) was analyzed in SAS. Infant sleep and appetite were measured with Sleep Habit and Routine and Baby Eating Behavior Questionnaires; respectively.

Results indicated that infants of quitters had higher mean birth weight and BMI (3.27kg [SD 0.41]; 13.27 [SD 0.87]) than infants of non-quitters (2.58kg [SD 0.40]; 11.70 [SD 1.21]). They had slower slope of BMI-Z-score (0.03 [SD 0.04] vs 0.21 [SD 0.07]) from Birth-12months. There was no significant differences in infant length.

In conclusion; maternal smoking during pregnancy is associated with lower birth weight and rapid infant weight gain. Smoking cessation can normalize birth and infant growth.

Students
Kelly Fellows, Esha Garg, Shruthi Mohan

Major
Biotechnology

Research Mentor
Dr. Richard W. Browne.

Title
HPLC analysis of Bodipy Cholesterol Efflux from RAW 264.7 Macrophages Reveals a Stimulation by Oxysterols.

Abstract
Background: High density lipoprotein (HDL) is the key element in cellular reverse cholesterol transport. The capacity of HDL to promote cholesterol efflux (“HDL functionality”) can be measured in a cell culture assay using RAW 264.7 macrophages loaded with bodipy cholesterol (Bodipy-Ch; a fluorescently tagged cholesterol analog). Here; we describe a high pressure liquid chromatography-fluorescent detection (HPLC-FL) assay developed and validated for analysis of Bodipy-Ch. Using this method we demonstrate that oxysterols stimulate cholesterol efflux capacity.

Method: RAW 264.7 macrophages were loaded with Bodipy-Ch and cultured in 5 mM MEM – HEPES containing 2.8% ApoB depleted human serum as the HDL source. Efflux of Bodipy-Ch into media was measured with and without treatment of cells with 1 uM of five different oxysterols; 24-hydroxycholesterol (24HC); 25-hydroxycholoesterl (25HC); 27-hydroxycholesterol (27HC); 7α-hydroxycholesterol (7αHC) and 7-ketocholesterol (7KC). Dibutryl cAMP was used as positive control. For HPLC-FL analysis; media sample protein was precipitated with isopropyl alcohol; centrifuged and the supernatant injected onto the HPLC-FL system with detection of Bodipy-Ch at Ex 482nm/ Em 515nm. Method validation was accomplished according to the FDA guidelines for bioanalytical method validation.

Results: The HPLC assay demonstrated linearity between 5 to 250 ng/mL of Bodipy-Ch in media and fully passed FDA guidelines for linearity; accuracy; precision and recovery. 24HC; 25HC and 7αHC significantly increased efflux of cholesterol while 27HC and 7KC did not.

Conclusion: The Bodipy-Ch HPLC assay described fulfills FDA guidelines for a valid bioanalytical method. Results indicate that only certain oxysterols stimulate cellular cholesterol efflux consistent with their demonstrated activity as nuclear transcription factor agonists.

Student
Karen Fernandez

Major
Biological Sciences

Research Mentor
M. Laura Feltri M.D.

Title
Krabbe Disease

Abstract
Krabbe disease (KD); affects the nervous system and is caused by loss of the enzyme galactocerebrosidase (GALC). KD occurs in infants and leads to death within two years of life. In KD; apoptosis of oligodendrocytes and Schwan cells (SC) leads to demyelination and neurodegeneration of the brain; spinal cord and nerves. However; GALC is also present in other cells; like neurons and macrophages; which suggests they may play an autonomous role in the disease. To further explore this hypothesis; mouse models were developed that can precisely remove Galc function in Schwan cells; neurons and macrophages. These mice were compared based on morphology; behavior and clinical progression. By doing so; a better understanding of the existing role and interaction among these cells will be defined. This work will help us to better understand the pathophysiology of KD in the PNS; which has implications for designing better therapies to treat KD.

Students
Gowthami Gengatharan; Emily Slominski

Major
Biomedical Sciences

Research Mentor
Kai Ling Kong; PhD; MS

Title
Repeatability of the Infant Food Reinforcement Paradigm: Implications of Individual and Developmental Differences

Abstract
Our laboratory recently developed a paradigm to measure the reinforcing value of food versus an alternative stimulus in infants; namely the food reinforcement ratio (FRR) paradigm. This measure may be important in obesity treatment and prevention. The primary purpose of this study was to examine the short-term repeatability of this measure. The secondary aim was to examine whether temperament dimensions related to novelty responsiveness and if infant age influenced the repeatability of the paradigm. Results showed significant correlation of the FRR across two time points (p=0.03). Infant age moderated the association between time points with greater repeatability among older infants (p=0.03). In addition; the temperament factor of high intensity pleasure significantly predicted the first measure of the alternative task (p=0.002). The overall conclusion of the study suggests that the measurement properties of this task can be improved further by allowing infants to acclimate to the laboratory environment.

Student
Gregory George

Major
Biochemistry, Chemistry

Research Mentor
Marc S. Halfon

Title
Computational prediction and subsequent validation of cis-regulatory modules in the Zika vector mosquito; Aedes aegypti

Abstract
Aedes aegypti is the mosquito species that transmits the Zika and Dengue viruses. The increasing prevalence of these viruses make understanding the development and life cycle of Aedes aegypti a high priority. Cis-regulatory modules (CRMs) are DNA sequences that regulate the expression of genes; a crucial component of development; but are poorly annotated in sequenced genomes. We predicted CRMs by using SCRMshaw; a machine learning algorithm. This predicts CRMs by identifying sequence “words”; or “k-mers”; from training sets of known Drosophila CRMs. These k-mers are then used to predict additional CRMs. We report the prediction of three CRMs in Aedes aegypti; and three CRMs in Drosophila melanogaster believed to be homologous to the Aedes aegypti CRMs; with activity in the central nervous system in late embryonic stages of development. We successfully validated 5/6 of the predictions using reporter gene analysis in vivo in transgenic flies.

Student
Adam Gulkarov

Major
Biology

Research Mentor
Mark Parker

Title
Rescuing a Mutant Membrane Protein

Abstract
NBCe1 is a bicarbonate transporter in the kidney that maintains a constant level of bicarbonate in the blood. A mutant NBCe1 protein ‘Q913R’; identified in a patient with low blood pH; is misfolded and accumulates inside the cell rather than in the plasma membrane. I introduced DNA for wild-type and mutant NBCe1 into a kidney cell-line (HEK) by transfection and cultured the cells either at 37°C or at 30°C; a low-temperature treatment that restores the appropriate trafficking of other mutant membrane protein (e.g.; CFTRΔ508 in cystic fibrosis). I studied the distribution of NBCe1 by immunofluorescence microscopy. At 30°C; Q913R showed a pattern of fluorescence around the rim of the cell; similar to the wild type protein. Thus low-temperature is an effective treatment and this system could be used to screen for chemical chaperones that mimic this effect.

Students
Sushmitha Gururaj, Garrett D. Sheehan

Research Mentor
Arin Bhattacharjee

Title
A de novo mutation in the Sodium-Activated Potassium channel KCNT2 changes channel function and causes epileptic encephalopathy

Abstract
Early onset epileptic encephalopathies (EOEE) are a debilitating spectrum of disorders associated with cognitive impairments. Here; we present the first clinical report of a KCNT2 mutation in an EOEE patient. The de novo heterozygous variant Phe240Leu SLICK was identified by exome sequencing and confirmed by Sanger Sequencing. Phe240Leu rSlick and hSlick channels were electrophysiologically characterized in CHO cells and Xenopus leaves oocytes; respectively; to reveal three significant alterations to channel function. First; Phe240Leu channels displayed constitutive activity; second; the sensitivity of WT channels to internal chloride was reversed in

Phe240Leu channels and third; K+ selective WT channels were made non-selective by Phe240Leu. Further rSlick channels induced membrane hyper excitability when expressed in primary neurons; resembling the cellular seizure phenotype. Taken together; our results confirm that Phe240Leu is a 'change-of-function' KCNT2 mutation; the first description of altered selectivity in Sodium-Activated potassium channels; and indeed K+ channels. These findings establish pathogenicity of the Phe240Leu KCNT2 mutation the reported EOEE patient.

Student
Allen J. Hoste

Major
Pharmacology and Toxicology

Research Mentor
Tracey A. Ignatowski; PhD

Title
Antidepressant Regulation of Macrophage-derived TNF Production

Abstract
The role of the cytokine tumor necrosis factor (TNF) has been well established in neuropathic pain and depression; two often comorbid conditions that are associated with chronic inflammation. Antidepressant drugs have been found to be effective in treating these conditions and in reducing brain-derived TNF; but the effect of these drugs elsewhere in the body is poorly characterized. This study seeks to determine the effects of antidepressant drugs on macrophage-derived TNF production and elucidate whether the macrophage inflammatory state influences these effects. This was studied using peritoneal macrophages isolated from Sprague-Dawley rats that were exposed to various concentrations of different classes of antidepressants; with inflammation simulated using lipopolysaccharide. It was found that antidepressants regulate macrophage-derived TNF production in a gender; inflammation; and dose dependent manner. These findings can have implications in elucidating an additional mechanism of antidepressant action and determining pharmacological differences between genders.

Students
Arsh Issany, Leah Novo

Research Mentor
Xiaozhong Wen

Title
Predictors and Consequences of Breastfeeding

Abstract
Our aim was to identify significant predictors and consequences of breastfeeding. We used data of 20 pairs of mother-infants from UB Pregnancy and Cessation Study (2015-2017; Buffalo; NY). In our sample 59% of mothers initiated breastfeeding after delivery. At discharge from hospital 24% exclusively breastfed and 29% mixed fed (breastfeeding and formula). Cigarette quitters during pregnancy had higher breastfeeding rate (75% vs. 20%) than continuous cigarette smokers. Higher breastfeeding initiation was also observed among women with older age (73% among 25+ years vs. 33% among aged <25); higher education (80% among those with education of some college or higher vs. 29% among those with high school or lower); or higher annual household income (75% among those with $12;000+ vs. 44% among those with <$12;000). Results on consequences of breastfeeding are pending. In conclusion smoking cessation; older age; higher education and income are associated with higher breastfeeding initiation rates.

Students
Chaitya Joshi, I'Yanna Scott, Aziz Shittu

Research Mentor
Dr. Xiaozhong Wen

Title
Characteristics, predictors, and consequences of infant growth trajectories

Abstract
Infant growth is important for short-term survival and long-term health. Valuable information contained in infant growth trajectories remains underexplored. Our aim was to characterize infant growth trajectories and examine their predictors and consequences. We analyzed data of 21 infants from UB Pregnancy and Smoking Cessation Study. Infants' weight; length; body mass index (BMI); 4 circumferences (head; chest; abdominal; mid-upper arm); and 6-site skinfold thickness (biceps; triceps; subscapular; flank; quadriceps; and suprailiac) were measured monthly until 12 months. Our preliminary results indicate weight-for-age and BMI-for-age z-scores followed normal growth patterns (z-scores around 0) among breastfed infants; but increased rapidly among non-breastfed infants. The length-for-age z-score growth slope did not differ between breastfed and non-breastfed infants. Several other factors; including infant gestational age; maternal BMI; gestational weight gain; and depression; were not associated with infant weight or length growth slope. In conclusion; breastfeeding substantially impacts infant growth trajectories in weight and BMI.

Student
Armond June

Major
Biological Sciences

Research Mentor
Michael Garrick; Ph.D.

Title
Does USP30 affect 1B DMT1 via a Parkin-mediated mechanism?

Abstract
Iron's dual nature as an essential nutrient and dangerous reactive oxygen species generator is central to its regulation via the transferrin cycle; a process still not completely understood. Intracellular iron management involves iron flux into heme biosynthesis in mitochondria; and ubiquitin E3 ligase parkin that targets defective mitochondria. Mitochondrial loss can lead to neuronal failure and subsequently; the neurodegenerative disorder Parkinson's disease. Since the mitochondrial-localized protein USP30 (ubiquitin specific peptidase 30) antagonizes parkin; the purpose of this study is to determine whether the overexpression of USP30 increases expression of the 1B isoform of DMT1 (divalent metal transporter); a known target of parkin. A wild-type USP30 clone has been obtained as well as two mutant strains to test 1B DMT1 turnover. The focus of this fundamental research is to improve the understanding of parkin interactions due to its strong association with Parkinson's disease and regulation of iron import into the cell.

Student
Jalisa Kelly

Major
Psychology

Research Mentor
Dr. Xiaozhong Wen

Title
Intent and Knowledge of Breastfeeding Among Pregnant Smokers Before and After Quitting

Abstract
Breastfeeding rates among pregnant women who smoked are significantly lower compared to pregnant women who did not smoke. Breastfeeding has consistently proven to be one of the best methods of feeding for infants. By getting pregnant smokers to quit we believe that we are not only improving the health of mothers; but we are also setting the stage for a healthier pregnancy; decreasing the risk of the negative effects of nicotine on fetal development. Our research employs data from the UB Pregnancy and Smoking Cessation study; which uses multiple component interventions to guide pregnant smokers on the journey to quit. Survey use before and after smoking cessation; showcases the change in intent to breastfeed in a sample size of 52 women. With our research it is proven that smoking cessation plays a role in increasing the intent of previously pregnant smokers to breastfeed.

Student
James Lee

Major
Biomedical Sciences

Research Mentor
Dr. Caroline Bass

Title
Combinatorial viral vector strategies for targeting genes to the liver

Abstract
The study of liver specific diseases is limited by our ability to model these disorders in animals. Transgenic mice are often used for this purpose; but they are often generated to over-express or knockout a protein from conception; even though many liver specific diseases occur in adults. To help overcome this issue; our laboratory developed a MUP-Cre-AAV8 (adeno-associated virus 8). AAV8 shows a natural tropism for hepatocytes and MUP is a hepatocyte specific major urinary protein promoter that is expressed exclusively in hepatocytes. When administered intravenously to adult transgenic mice containing flanking loxP around a gene of interest; the virus results in deletion at the time of virus delivery. We have also utilized a number of combinatorial systems in which the transgene is designed in a DIO (double inverted orientation) cassette; which requires Cre to reorient it to the proper configuration for expression. By combining a DIO-virus with a Cre virus we can control the location and cell type that produces the protein in the brain. In this study; we are attempting to port the combinatorial system over to the liver using our MUP-Cre-AAV8 virus. In this proof-of-principal experiment; we have intravenously co-injected MUP-Cre-AAV8 with Cre dependent-red fluorescent protein-AAV8. Since RFP expression is Cre dependent; and the MUP promoter will restrict Cre expression to hepatocytes; the resulting RFP expression should also be restricted to hepatocytes. This combinatorial liver targeting virus approach will allow us to conduct studies more quickly; resulting in faster and less expensive studies of liver diseases.

Student
Jiaxin Long

Major
Biomedical Sciences

Research Mentor
Laura Rusche

Title
Evolution of the AAA+ Like Domain of the Yeast Protein Sir3

Abstract
Sir3 protein is the nucleosome-binding protein in yeast; and evolved from the genome duplication of Orc1; which is a subunit of the origin recognition complex. One unresolved issue is the change of function in Sir3 after the genome duplication. The previous studies proved that the subneofunctionalization happened in Sir3 after the genome duplication and identified the AAA+ base subdomain plays a critical role in the silencing function. In this study; we will identify the critical functional group in this subdomain to understand the change of function. We picked eight species evolved after the genome duplication; to trace this over evolutionary time; and generated chimeric proteins by swapping the AAA+ base from each species into the Saccharomyces cerevisiae. We identified whether the AAA+ base subdomain is critical for Sir3 function in each species and found a 30 amino acids long conserved sequence in those Sir3-functioning species but not in Sir3-nonfunctioning species.

Students
Jonathan Luo, Lawrence Zhu

Research Mentor
Jack Tseng; Ph.D

Title
Assessing craniodental efficiency of seals via finite element analysis

Abstract
During the evolutionary transition from land to sea; the seal lineage underwent dramatic shifts in their skeletons. Evolving from ancestors with functionally differentiated tooth shapes seals adopted snapping bites using undifferentiated teeth. Here; we use CT-based 3D models and engineering simulations of masticatory behaviors of five seal species to analyze the relationship between cranial biomechanics and tooth morphology. We hypothesized that there would be a smaller difference in cranium efficiency and stiffness between bite positions in seals compared to terrestrial carnivorans because of undifferentiated tooth function in the former group. Results show that the maximum difference in mechanical efficiency between bite positions in seals falls within the carnivoran range; but cranium stiffness difference is higher in seals. Ancestral trait retention and non-feeding demands (e.g.; hydrodynamics) may explain these results; respectively. More detailed biomechanical and fluid dynamics analysis should provide further insight.

Student
Antara Majumdar

Major
Biomedical Sciences

Research Mentor
Dr. Heike Laman; Dr. Suzie Randle

Title
Deciphering the interactions between Fbxo7 and proteasome activity during spermatogenesis

Abstract
In a study investigating the causes of male sterility in Drosophila; Bader; et al; identified a protein necessary for sperm differentiation called Nutcracker; the partial homolog of which in mammals is the F-box protein Fbxo7. In mice with a 90% reduction in Fbxo7 expression; male sterility was found; suggesting a common evolutionary mechanism. F-box proteins have a canonical role as a component of the Skp1/Cul1/F-box protein (SCF) complex that ubiquitinates target substrates. Nutcracker; as an F-box protein also has a non-canonical role with stabilization of the proteasome regulator; DmPi31; thus promoting proteasome activity. We are interesting in investigating whether a similar mechanism of Fbxo7 and PI31 mediated proteasome activation is operating in mammalian systems to better understand the process of sperm development and causes of sterility. In order to study this; we carried out in vivo studies using fresh or frozen testes tissue from the Fbxo7 knockdown (KD) and wild-type mice.

Student
Alassane Mballo

Major
Biomedical Sciences

Research Mentor
Mark Parker

Title
The isoform-specific deletion of a bicarbonate-transporting membrane protein in mice

Abstract
Loss of the sodium/bicarbonate cotransporter NBCe1 results in low blood pH (acidosis) and poor dentition. NBCe1 encodes two isoforms: NBCe1-A and NBCe1-B. NBCe1-A loss directly causes acidosis. We generated a novel strain of mouse predicted to lack only NBCe1-B to investigate whether poor dentition follows acidosis or follows NBCe1-B loss from enamel-secreting cells.

The abundance of NBCe1-A (relative to actin) was probed by western blot of kidney lysates and quantified by densitometry. Blood pH and teeth of knockout mice were assessed by blood gas analysis and microscopy. The results showed that; compared to wild-type mice; knockout mice have [1] a normal abundance of NBCe1-A; [2] normal blood pH and [3] unusually eroded chalky-white teeth. Thus; knockout mice are suitable for this study and the brittle teeth are a direct result of NBCe1-B loss. Enamel defect cannot be treated by alkali therapy and alternative treatment is required.

Student
Melissa A. Meynadasy

Major
Psychology

Research Mentor
Dr. David W. Shucard

Title
Response Priming and Conflict Processing in Police Officers with PTSD Symptomatology: An Event-Related Potential Study

Abstract
In the current study we investigated electrophysiological differences in response priming and conflict processing between police officers with PTSD symptomatology and non-police controls with no prior trauma exposure. Participants performed a visual Go/NoGo Continuous Performance Task (CPT); the A-X CPT; while their electroencephalograms (EEGs) were recorded. They were instructed to respond by pressing a button to the letter “X” if it immediately followed the letter “A.” Event-Related Potentials (ERPs) were extracted from the EEG for “A”s and “X”-only trial types; which induce priming or preparation to respond (“A”- response priming) and conflict monitoring (“X”-only). Results reflected the hypervigilance seen in PTSD symptomatology and the increased saliency toward priming stimuli. Results were also suggestive of differences in conflict monitoring and executive control between groups. The findings provide insight into brain function associated with response priming and conflict monitoring in police officers; which may be related to training and or trauma exposure.

Students
Melissa A. Meynadasy, Megan A. Vik

Research Mentor
Dr. Jinwoo Park

Title
Characterization of Optically Evoked Catecholamine Regulation Using Genetically Targeted Approaches

Abstract
In the present study optogenetic stimulation of neurons coupled with fast-scan cyclic voltammetry (FSCV) were used to characterize nor-epinephrine (NE) regulation (release and clearance) in different brain regions. A genetically engineered adeno associated virus (AAV) was used to deliver genetically targeted channelrhodopsin-2; a light sensitive ion channel; to NE neurons in the locus coeruleus (LC); a major source of NE neurons projecting to the ventral bed nucleus of the stria terminalis (vBNST). Using blue light stimulation; we were able to measure and characterize optically evoked NE in the vBNST for the first time; and compared it to dopamine regulation in the ventral striatum. After the experiments; rats were euthanized and brains were processed using immunohistochemistry to verify co-localization of the virus with NE neurons. These experiments are key to understand the relationship between NE and DA regulation in substance abuse disorder and post-traumatic stress syndrome.

Student
Thy Ngoc Nha Nguyen

Major
Biomedical Engineering

Research Mentor
Ferdinand Schweser

Title
Development Of Specialized Radio-frequency (RF) Coils For Magnetic Resonance Imaging (MRI) At 9.4 Tesla

Abstract
Currently; a simultaneous PET-MRI scanner for small animal research at 9.4 Tesla is not commercially available. In order to conduct further research on technological aspects of simultaneous PET-MRI imaging; we are constructing and optimizing a Radio-frequency (RF) Coil for Magnetic Resonance Imaging. We currently have a functional PET detector ring and would like to integrate this PET system with a customizable RF Coil. This coil needs to fit into the PET detector; at the same time the usable space inside the coil needs to be maximized so that both the brain and body of mice and/or rats can be scanned if possible. So far; using a coil prototype we made; we were able to study the optimized configuration of the RF shield to avoid coupling between the coil and the PET ring.

Student
Aaron Novickis

Major
Biotechnology

Research Mentor
Wilma A. Hofmann PhD

Title
Myosin IC A expression in prostate cancer cells

Abstract
Myosins IC is member of a superfamily of cellular motor proteins that; together with the cytoskeletal element; actin filaments; facilitates many different types of cellular movement and intercellular transport. The myosin IC gene expresses three different isoforms including myosin IC isoform A; B; C. Expression of myosin IC isoform A was found to be elevated specifically in metastatic prostate cancer cells of both mouse and human origin when compared to non-cancer prostate cells and when compared to other (non-prostate cancer) cancer cells from other tissues. The addition of select hormones to a non-metastatic prostate cancer is able to induce an expression of myosin IC isoform A which is found is metastatic prostate cancer. LNCaP; prostate cancer cells; were exposed to hormones; glucocorticoid steroid dexamethasone (DMX) and dihydrotestosterone (DHT) specifically; and had their relative expression of myosin IC isoform A tested and compared to control cells.

Students
Millie Pal, Nicolas Thor

Research Mentor
Xiaozhong Wen

Title
Predictors and consequences of substance use among pregnant cigarette smokers

Abstract
We investigated predictors for substance use among pregnant cigarette smokers; and the effects of co-use on success in smoking cessation; and maternal and infant health. Data of 58 pregnant daily smokers enrolled in the UB Pregnancy and Smoking Cessation Study were analyzed. Marijuana was the most commonly used substance during pregnancy (47.5%); followed by cocaine (3.1%). Risk factors for co-use of marijuana among cigarette smokers included light cigarette smoking (64.3% among light smokers [1-4 cigarettes/day] vs. 28.6% among heavy smokers [10+/day]); some college education (73.7% vs 27.6% ≤high school); and having a partner with drug problems (100% vs. 31.3%). The co-use of marijuana did not predict the success in quitting smoking cigarettes; gestational weight gain; infant’s gestational age; weight; length; or body mass index at birth. In conclusion; cigarette frequency; education; and partner with drug problems are associated with co-use of marijuana; but marijuana does not predict major birth outcomes.

Student
Jae Whan Park

Major
Biomedical Science

Research Mentor
Dr.Todd Mclaughlin, Dr.Sarah Zhang

Title
Loss of Xbp1 in retinal cells accelerates age-related deterioration in the mouse visual system.

Abstract
X-box binding protein 1 (Xbp1) is an important factor in the Unfolded Protein Response. The Unfolded Protein Response decreases Endoplasmic reticulum (ER) stress. Conditional Knockout (cKO) of Xbp1 in retina was obtained by crossing mice with floxed alleles of Xbp1 with a retina-specific Cre line (Chx10-cre). Retinal morphology was examined by immunohistochemistry and visual function was analyzed by dark and light-adapted electroretinogram (ERG) in cKO and wild type (WT) mice (12-15 month old).

cKO mice have a significant increase in bipolar cell dendritic extensions and a corresponding increase in ectopic synapses. Additionally; cKO retina is thinner and has fewer ganglion cells than WT. Furthermore; cKO mice have a significant decline in visual function as measured by ERG. Therefore; absence of Xbp1 diminishes the ER stress response which; over time; results in accelerated age-related dysfunction.

Students
Rikin Patel, Emily Cho Kiu Au

Major
Biological Science

Research Mentor
Dr. Michelle B. Visser

Title
Lipid Metabolite Regulation and Impairment of Neutrophil Chemotaxis by Treponema Denticola

Abstract
Treponema denticola; an oral spirochete associated with periodontal disease; produces multiple virulence factors; including the major outer sheath protein (Msp). Neutrophils are key cells of the innate immune system; which protect the oral tissue. Neutrophils migrate (chemotaxis) in response to a variety of chemoattractants. It is known that Msp reduces neutrophil chemotaxis in response to the chemoattractant fMLP; through modulation of PTEN/PI3K lipid metabolism and the Akt signaling pathway; but the regulatory

mechanisms are not completely understood. Our objectives are to examine 1) PTEN regulatory mechanisms modulated by Msp; 2) the chemotaxis response to additional chemoattractants and 3) the impact of bacterial strains containing variation in the Msp protein on chemotaxis. Our results indicate that Msp affects PTEN phosphorylation levels; as well as response to the chemoattractants C5a and MIP-2 to impair neutrophil chemotaxis. Furthermore; bacteria possessing variation in their Msp protein sequence have differing abilities to impair chemotaxis.

Student
Elizabeth Quaye

Major
Pharmacology & Toxicology

Research Mentor
Supriya D. Mahajan

Title
Methamphetamine Mediated Mitochondrial Dysfunction and Mircoglial Apoptosis

Abstract
Meth induced damage of the nerve terminals of dopamine-producing neuronal cells triggers activation of apoptotic mechanisms resulting in the complete disintegration and death of neurons; astroglia and microglia. Meth mediated apoptosis is accompanied by nuclear damage and differential expression of pro- and antiapoptotic proteins. We hypothesized that increasing concentrations of Meth will cause microglial apoptosis which induces mitochondrial dysfunction leading to neurodegeneration. Gene expression of pro- and antiapoptotic genes were quantitated with QPCR using RNA extracted from cultured microglial cell line (HTHU). Our results showed a significant increase in the gene expression levels of apoptotic proteins like APAF-1; BAX and BCL-2 under Meth treatment. Analysis of Western Blot data showed a significant modulation of the expression level of the antiapoptotic protein BCL-2 with varying Meth concentrations. Using immunofluorescence analysis we examined the expression of mitochondrial proteins; Cytochrome C; COX 4 and MCL-1; which were significantly activated on Meth treatment indicating the activation of the mitochondrion-dependent (intrinsic) apoptotic pathway.

Student
Thomas J. Rush

Major
Biochemistry

Research Mentor
Dr. M. Laura Feltri

Title
A New Partner and Function for Integrin α6β4

Abstract
PMP22; whose under-expression causes Hereditary Neuropathy with Pressure Palsy (HNPP); interacts with integrin α6β4; a laminin receptor. Interestingly; animals haploinsufficient for PMP22 or ablated for integrin α6β4 develop myelin instabilities; though with different onset ages.

To better understand the interaction between integrin α6β4 and PMP22 and if integrin α6β4 and laminins contribute to HNPP pathogenesis; we used mass spectrometry to identify proteins interacting with the β4 subunit in sciatic nerve. Examination of GO-term enrichment shows an enrichment of integrin α6β4 interactors in calcium binding/transport GO categories. We confirmed that inositol 1;4;5-trisphosphate receptor type 3; ITPR3; interacts with integrin α6β4 and is localized at the nodal/paranodal region of Schwann cells. Also; we demonstrated that ablation of integrin α6β4 in a mouse model of HNPP worsens nerve conduction velocity.

The data presented here hints toward a new function for integrin α6β4 related to nodal organization and action potentials propagation in peripheral nerves.

Student
Christopher J. Russo

Major
Pharmacology & Toxicology

Research Mentor
Bruce A. Davidson

Title
Layer-by-Layer Coated Intralipid Nanoparticles for Treatment of Influenza

Abstract
Layer-by-layer coating is a technique used in development of nanomedicines to alter drug release; and biodistribution. Our ultimate goal is to demonstrate that using a layer-by-layer coating method for isoflurane loaded Intralipid® nanoparticles will increase isoflurane delivery to macrophages in the spleen; reduce flu pathology and its complications; and limit narcosis; an isoflurane side effect. We hypothesized that performing layer-by-layer coating on isoflurane loaded Intraipid® nanoparticles would result in decreased narcosis in mice. Isoflurane; an inhaled anesthetic; and a hydrophobic liquid at room temperature; readily partitions itself into nanoparticles upon vortexing for 15 seconds in a sealed container. After loading isoflurane; alternating layers of positively and negatively charged polysaccharides (chitosan and alginate; respectively) electrostatically bound to Intralipid® nanoparticles and excess reagents were removed via centrifugation (10˚C; 15 minutes @18;500 RCF). Zeta potential and size was measured both pre- and post-centrifugation and confirmed layer-by-layer coating with little change to nanoparticle size.

Students
Rebecca Simich, Phoebe Welch

Major
Biomedical Engineering

Research Mentor
Jinwoo Park

Title
A Comparison of Two Fabrication Methods of Carbon Fiber Microelectrodes and Their Ability to Detect Catecholamines

Abstract
Carbon fiber microelectrodes (CFMs) have been widely used as sensors to detect neurotransmitters; including catecholamines in animal models for the study of their role in brain function and behavior. A very common method of fabricating CFMs is by encasing a 7um-diameter carbon fiber in a glass tube and melting the glass to create a tight seal. While this method is simple and inexpensive; it is extremely easy to damage the CFMs. Also; when performing experiments in vivo; the electrode cannot be permanently implanted in the animal. We are interested in designing a new CFM composed of a broader material that can be permanently implanted. In this study; we fabricate a new CFM composed of fused silica and compare its catecholamine-detecting capabilities to the original glass-encased CFM.

Student
Rishminder Singh

Major
Biomedical Science

Research Mentor
Dr. Jinwoo Park

Title
Simultaneously monitoring behavior and neurotransmitter release in rats exposed to drugs of abuse

Abstract
Major-catecholamines such as dopamine and norepinephrine in the brain play a critical role in behavioral and physiological responses such as stress; reward; memory; and attention. In particular; when drugs of abuse such as methamphetamine are given to rats; extracellular catecholamine concentrations in the brain are increased causing invoked behavior. Utilizing Fast Scan Cyclic Voltammetry (FSCV); via carbon fiber microelectrodes that are implanted into the Nucleus Accumbens (NAc); a limbic brain region; we can measure changes of dopamine regulation (release and clearance) based on total the amount of Methamphetamine injected in real time. Then; using video cameras in the cage during FSCV recording; we can assess and rank the behavior and movement based on dosage of drug received. Finally; combining the two neurochemical and behavior recordings; gives us a clear representation of the effect of drugs of abuse; along with the long-term effects they have on dopamine system in the brain.

Student
Kevin Stone

Major
Biomedical Engineering

Research Mentor
Jack Tseng

Title
Variation in masticatory biomechanics and jaw shape in an elderly human population in Buffalo; New York

Abstract
Human gross anatomy is a foundational field of knowledge in the biomedical sciences. Despite recent advances in understanding individual variation as a key variable in structure-function relationships in comparative anatomy; much of the individual variation in human musculoskeletal anatomy has not been quantitatively analyzed. This project aims to analyze computed tomography (CT) scans of five skulls from the UB Anatomy Gifts Program to understand the relationship between craniodental structure and biomechanics; as well as the influence of individual variation on that relationship. Jaw movement and exerted pressure during mastication (chewing) is reconstructed and simulated by conducting a static force analysis on the mandible using MATLAB and finite element analysis program Strand7. The end goal of this study is to correlate the mechanical efficiency and overall stiffness as a function of both mandibular tooth position and variation in overall mandible shape. These mandibular models simulate unilateral bites by applying and analyzing forces on one side of each specimen's mandible at a time. Preliminary results suggests the relationship between the mechanical efficiency and overall stiffness to be linear. However; additional experiments are required to confirm results with increased statistical power.

Student
Luke Wilczek

Major
Biology and Chemistry

Research Mentor
Piero Bianco

Title
The role of the intrinsically disordered linker of SSB in DNA metabolism

Abstract
The Escherichia coli single stranded DNA binding protein (SSB) is critical to all aspects of DNA metabolism. The protein consists of an N-terminal core (which binds DNA); an IDL (previously unknown); an acidic tip (regulatory functions) and has two seemingly dissimilar but intimately linked roles. SSB binds cooperatively to single-stranded DNA (ssDNA) and it also binds to 12-14 partner proteins that constitute the SSB-interactome. The IDL contains several elements critical to its function – GGX motifs that impart flexibility and tensile strength as well as PXXP motifs that mediate binding to domains present in the partner proteins (and in SSB itself) Our current model is that when these PXXP motifs interact with OB-folds of SSB tetramers; cooperative binding of the tetramers onto ssDNA occurs. However; when the PXXP motifs encounter OB-folds of the interactome proteins; loading of the interactome protein onto DNA occurs.

Ronald E. McNair Scholars Program

Students $ H M W
Parveen Attai, Sarah Ehrenberg, Kaeyla Kerr

Research Mentor
Stephanie Anzman-Frasca; Ph.D.

Title
Coding Infant Behaviors at the End of a Food Reinforcement Task

Abstract
The reinforcing value of a stimulus is how hard an individual will work to obtain it. Research has shown that individuals with obesity have a higher reinforcing value for food vs. non-food stimuli (Saelens & Epstein; 1996). This project uses data from one of the first studies of infant food reinforcement which tested reinforcing values of 9-to-16-month-old infants' (n=23) favorite foods (Kong et al.; 2016). Coders identified certain behaviors exhibited by infants at the end of this task after being trained to >75% agreement on each behavior. On average; infants exhibited distraction during 58.6% of coded intervals and communication and avoidance during 6.2% and 10.5%; respectively. 100% of the infants used distraction at least once. There were few relationships between parent-reported infant temperament and these behaviors; with the exception of a trend-level relationship showing that infants with greater regulation were less likely to show avoidance (p<.10). Implications will be discussed.

Student S M
Andrea Gonzalez

Major
Architecture and Graphic Design

Research Mentor
Dennis Maher, Henry Taylor

Title
Preservation for Identity

Abstract
Preservation for Identity is an architectural historic preservation project that explores the causes behind the sudden disappearance of many churches in the city of Buffalo; NY. By taking a historic survey of buildings in Buffalo we have found that hundreds of churches have disappeared from our historic and architectural heritage (or 'landscape').

It is our hypothesis that the recent sharp decline in population caused a decrease in the number of churches in Buffalo. Currently this research is focused on an example of successful adaptive reuse of the former Our
Lady of Sorrows Church in Buffalo's East Side; now; King Urban Life Center.

The objective of this project and presentation is to learn how to develop community oriented centers from the inside out of our own neighborhoods without the need to demolish cultural heritage while creating symbols that its residents identify with.

School of Architecture & Planning

Students
Maria Bautista, Thomas Horvath

Major
Architecture

Research Mentor
Erkin Ozay

Title
LIVE PLAY GROW

Abstract
LIVE PLAY GROW is a design proposal for a mixed-use residential complex in the downtown area of Buffalo; NY. The design incorporates familial interactions and early childhood education and apartment type living. Public services include an onsite daycare facility; counseling services; as well as an Exploratorium/children's museum; all things that will attract families to downtown Buffalo. An analyzation of program and supporting demographics aided in the decision to bring this program typology to the downtown district; all conveniently paired with a variety of apartment types designed for multiple family sizes.

The overall design for LIVE PLAY GROW is of a simple slab construction and carefully laid out column grid. The residential levels are supported by; as well as support; the public entities via inhabitable roof scapes and a truss like bridge and circulation system; representative of the familial support system brought about by the intended program.

Student S
Madelaine Britt

Major
Environmental Design and Political Science

Research Mentor
Dr. Samina Raja

Title
Participatory Budgeting- Building Cities Through Inclusive Urban Planning Practices

Abstract
As rustbelt cities like Buffalo; NY continue to experience development and investment; community leaders are calling on urban planners and policymakers to create stronger opportunities for engagement and inclusivity. Participatory budgeting; introduced in South America; is an opportunity for residents to have a say in municipal budgeting decisions by creating a voting structure where citizens can choose projects for public funding. Participatory budgeting aims at increasing governmental accountability and addressing quality of life issues for residents. In the case of Porto Alegre; Brazil - the city that participatory budgeting was founded – research has shown improvements in infrastructure and health quality since its implementation. My research proposal will explore the participatory budgeting model as it relates to urban planning and its possible implementation in Western New York.

Students S
Dalia Garcia, Long Nguyen

Major
Environmental Design

Research Mentor
Harry Warren

Title
Wilson; NY Comprehensive Park Plan Proposal

Abstract
Krueger and Robert R. Martin; Sr. Village parks are located in Wilson NY. Krueger Park has a picturesque view of Lake Ontario; while the Sr. Village Park is situated around Wilson's residential neighborhood and close to its community. According to community members the two parks are heavily underuse. The purpose of this project is to develop a list of program requirements for the site development concepts. These concepts hope to analyze the best locations within the park for various park functions; maximizing park usage; while at the same time diversifying park activities.

Students
Ji Ling Hiew (Angeline) & Yunjeong Park (Jade)

Research Mentor
Harry Warren

Title
North Collins Town Parks Design Study

Abstract
Teams consisted of two students conducting research and providing data analysis of the cultural; social; and physical ingredients of The Town of North Collins. This involved working closely with the town's board members to; ultimately; provide a comprehensive plan that reflected North Collin's past; presence; and future. The process is divided into 5 categories: Precedent Study; Data Gathering; Site Analysis; Concept Development and Final Comprehensive Plan for the town parks: Marion Fricano and New Oregon parks. Sites were further documented and analyzed through GIS and tax property maps to present visual presentations of the transition from the park's existing structures to proposed concepts. The completion of this project resulted in designs that can be implemented over 20 years period for the town's parks. The design was inclusive to the towns need to emphasize its identity providing a greater sense of place in proposed activities for all ages.

Student
Shih Ting Huang

Major
Environmental Design

Research Mentor
Ashima Krishna

Title
The Disappearing Paradise

Abstract
The Tropical Rainforest Heritage of Sumatra is located in Indonesia; which includes three national parks: Gunung Leuser National Park; Kerinci Seblat National Park and Bukit Barisan Selatan National Park. This research consists of natural heritage; biodiversity and environmental conservation. The rainforest has many different kinds of species and it is home to unique animals. For example; Sumatra Orangutans and the world's largest flower. However; the rainforest has been described as "The Disappearing Paradise" because of the loss of forest cover each year.

The major reason of loss rainforest is expanding of palm trees industry. To grow palm trees; the original rainforest need to be chopped down. The threat of loss rainforest impacts the biodiversity and environment.

This is a global issue that we should all care about because we only have one Sumatra rainforest. If the forest disappears; we will lose important natural heritage from earth.

Student
Abdulrahman Ibrahim

Major
Environmental Design

Research Mentor
Dr. Samina Raja

Title
Civic Participation Among Undocumented Immigrants in the United States

Abstract
With 11.1 million undocumented immigrants in the United States; representing 25.5% of all immigrants in the country and concentrated in only six states; the inclusion of undocumented immigrants into the public sphere and allowing them to engage in civic activities is fundamental to the safety and well-being of the societies they reside in. Therefore; it is important to create an environment of trust that allows these communities to participate safely and effectively (Uslaner and Brown; 2005). However; considering the culture of mistrust and fear created and cultivated by the Department of Homeland Security (DHS) using Immigration & Customs Enforcement (ICE); this is often difficult. This project will be studying the differences between civic participation by undocumented immigrants in cities enforcing sanctuary ordinances versus cities that don't have such ordinances.

USLANER; E. M. & BROWN; M. 2005. Inequality; Trust; and Civic Engagement. American Politics Research; 33; 868-894.

Student
Daniela Leon

Major
Environmental Design

Research Mentor
Dr. Samina Raja; PhD

Title
Local Government Planning For The Informal Economy In The Global South: The Case Of Street Vendors In Srinagar; India

Abstract
Informal markets represent a growing share of the global economy and workforce today; especially in cities of the Global South. Street vendors have become increasingly visible as one of the most active and predominant contributors sustaining the global informal sector. However; local government policy and planning practice generally does not address the needs of street vendors. A key challenge is developing innovative; inclusive and supportive policies that recognize the value of the informal economy. In Srinagar; India; political turmoil and other conflicts offer both challenges and opportunities for street vendors that sell a variety of agricultural products and artisanal handicrafts. The project will analyze local government plan documents and secondary source data and use comparative case study research to understand where street

vendors and the informal sector more broadly fit within local government planning frameworks.

Student
Grace O'Connor

Major
Environmental Design

Research Mentor
Dr. Samina Raja

Title
Inclusivity through food retail: Why should neighborhood demographics play a role in goods carried by local food markets?

Abstract
The city of Buffalo is a diverse urban home to people from a variety of ethnic backgrounds. Food and culture are closely related and play an important role in everyday life. This research seeks to answer the question: "Why should neighborhood demographics play a role in goods carried by local food markets?" Throughout the city of Buffalo there are various zones of concentrated food insecurity—primarily in low-income areas redlined by supermarkets. Lack of access to healthy; affordable food makes maintaining a nutritious diet difficult.

To increase access to fresh produce the Massachusetts Avenue Project (MAP) created the Mobile Market Project which brings fresh produce from local farmers to food insecure areas. The market was evaluated by the Food Systems Planning and Healthy Communities Lab at the University at Buffalo. My research analyzes customer purchase behavior at Mobile Markets and provides recommendations to improve inclusivity through product supply.

Student
Matt Straub

Major
Architecture

Research Mentor
Adil Mansure

Title
Sandbox

Abstract
Sandbox is an exploration of geometric constraints; temporal resilience; and spatial transformation. Diocletian's Palace; now the core of Split; Croatia; was analyzed as an example of a project that has changed program over time. The most permanent pieces of the palace were analyzed and projected in a drawing which became the base of the design for Sandbox. Within the project; Lift; Support; Gravity; and Connection all battle with each other for attention; generating interesting conditions and a program-agnostic space.

School of Engineering & Applied Sciences

Student
Kaitlyn M. Alcazaren

Major
Environmental Engineering

Research Mentor
Dr. Donald McGuire

Title
Engineering Abroad and Why it's Possible: The Mixing of Two Worlds

Abstract
Studying abroad offers students of any discipline the opportunity to bring their majors to life and to view their discipline from a fresh prospective. 2000 years ago; the Ancient Romans build grand temples; political monuments; and public structures; many of which survive to this day. Like modern engineers; Roman builders had to understand the physics and relationships involved in constructing strong and intricate monuments that could withstand time. The influences of Roman innovation can still be seen around the world; not only in the lands they rules; but in places like the United States; where governmental buildings are designed on ancient models. Without the Romans; a golden age of engineering would never have transpired; and today's culture would be poorer. The cities of the Roman past serve as a living textbook for one; broad-minded engineering student; who had the good fortune to study overseas.

Student
James Allen

Major
Electrical Engineering

Research Mentor
Dr. Jennifer Zirnheld

Title
Ice Fracturing by Means of Pulsed Power

Abstract
Past research has been conducted to explore the feasibility of utilizing the exploding film phenomena to fracture ice in attempts to ease sea navigation in artic regions. This study enhances those past works by conducting experiments under conditions that more closely model the real-world application of the process. The exploding film phenomena was induced across an aluminum metallized polypropylene film while frozen in freshwater; and measurements were taken of the voltage and current waveforms. The experiments were then repeated replacing the freshwater with water containing salt at 35 parts per thousand. The work presents the setup and comparison of the two sets of experiments.

Student
Marcus Ashford

Major
Electrical Engineering

Research Mentor
Dr. Jennifer Zirnheld

Title
Characterization of Non-Thermal Plasma

Abstract
Non-thermal plasma is produced by sending a high voltage signal through a noble gas inside of a circuit which emits the plasma as a small plume. This study does not concern the application of non-thermal plasma but rather its features after it is applied. The characterization of non-thermal plasma is essential to plasma-based applications because all properties of the plasma must be recorded to ensure future usage is safe and accurate. The emission of non-thermal plasma will be researched to deduce vital information about how the plasma will react after being implemented into medical practices. The analysis of the emission process will be carried out with an optical spectrometer to report electric field; electron density; and rotational and vibrational temperatures. After reporting its characteristics; more conclusions about how non-thermal plasma can be implemented into a practical setting can be made.

Students
Evan Asklar, Ikechukwu Chima

Major
Mechanical Engineering

Research Mentor
Edward M Kasprzak PhD

Title
Data Acquisition System: For analyzing vibration and road noise in passenger vehicles

Abstract
The purpose of this project was to create an open-source hardware package that can be used to record and analyze data for improving ride quality in luxury vehicles. It originally used a project board and an SD card to track noise levels from different parts of the car. Our team soon realized that such a type of device is capable of recording all different types of data; and can be used in many applications. After doing testing with different vehicles; we were able to fine tune and perfect our software; such that now it can be used in many different ways; from recording accelerations on three axes to tracking GPS coordinates.

Students
Paul Babala, Othmane Brika, Asad Esa, Joe Jaracz, Jason Jordan, Connor Smith

Research Mentor
Dr. Jason Armstrong

Title
Myo-electric Hydraulic Exoskeletal Limbs

Abstract
his project aims to design and develop exoskeletal limbs that can be utilized to accommodate the needs of people who have muscular abnormalities such as multiple sclerosis; tendinitis; and myositis. It could also assist astronauts; who commonly suffer from muscle atrophy due to weightlessness; as well assist able-bodied individuals that are looking to perform strenuous tasks. The goal is to register a user input through the use of electrical impedance myography; which can then be used to assist human motor functions through the use of hydraulic actuation.

Student
Barituziga Banuna

Major
Chemical Engineering

Research Mentor
Dr. Marina Tsianou

Title
Investigation of Calcium Oxalate crystal morphology using additives in silica hydrogel

Abstract
Calcium oxalate is the major substituent of debilitating renal stones. Calcium oxalate crystals exist in three different forms: monohydrate (COM); dihydrate (COD); and tri-hydrate (COT). COM crystals are most closely associated with the kidney stones. Additives with anionic functional groups have shown inhibitory effects on COM crystal formation. However; more research must be done to understand the underlying mechanism behind these interactions. Hydrogels serve as an analog to the biological environment in which renal stones form. Using silica hydrogel matrices; we investigated the efficacy and effects of additives; Trisodium Citrate and PSS (Polystyrene Sulfonate) in the inhibition of COM formation and effects on COM crystal morphology.

Students
Jennifer Barker, Samantha Brennen, Abass Ibrahim, Jeremy Petrotto, Devon Rennoldson, Logan Robinson, Zachary Salim, Olivia Spellicy, Sriram Subramanian, Megan Yoerg

Research Mentor
Dr. Kris Schindler

Title
UB Talker

Abstract
As an interdisciplinary group spanning medical and technical disciplines; we are working to develop communication devices for individuals with Amyotrophic Lateral Sclerosis (ALS) who do not have the ability to speak. Alongside other technologies; we have been working with a Brain-Computer Interface (BCI) to use electrical signals from individuals' nerve impulses to make selections on a computerized device. In the past we have used the BCI to translate electrical activity generated in facial muscles by eye blinks into mouse clicks. Currently we are focused on isolating brain waves associated with speech; to create a brain-to-speech interface which would facilitate communication through a tablet. We also hope to use BCI technology to enable the user to control elements of their surroundings. The ultimate goal is to provide technology that expands the user's communication abilities and control over their environment in order to improve quality of life.

Student
Adam Behrendt

Major
Industrial and Systems Engineering
Operations Research

Research Mentor
Jun Zhuang

Title
Modeling the Cost Effectiveness of Fire Protection Resource Allocation in the United States: Models and a 1980-2011 Case Study

Abstract
Fire-related hazards and incidents are an everyday phenomenon; and firefighting in the United States owe to more than one million firefighters in

about 30;000 fire departments across the country. The estimated total cost of fire was $329 billion in 2011; and yet there is little work in the literature about risk assessment; cost-benefit analysis; and resource allocation in fire protection. Leveraging the data from the National Fire Protection Association (NFPA) reports; we conduct a data-driven study to propose empirical and theoretical models to assess risk levels; develop risk-reduction strategies and estimate the effectiveness of investment in fire protection. Our methods show high R-squared values; cost-effectiveness estimation and an optimal resource allocation model with equity considerations. This project provides some novel insights to policymakers and analysts in fire protection and safety; which would help in mitigating economic costs and saving civilian and firefighter lives.

Students
Andrew M Bodratti, Matthew R Chow, Nathaniel W Stephens

Major
Chemical Engineering

Research Mentor
Paschalis Alexandridis, Marina Tsianou

Title
Self-Assembly of Nonionic Surfactants and its Application in Solubilization

Abstract
We investigate non-ionic surfactants in terms of their ability to solubilize in aqueous solutions compounds that are sparingly water-soluble; including environmental contaminants and pharmaceutical actives. Fundamental information about the non-ionic surfactant self-assembly in aqueous solution can be used to assess the surfactant affinity to hydrophobic compounds; and its compatibility and potential synergism with other surfactants; polymers; and/or nanoparticles typically used in formulations. We consider here a homologous series of surfactants consisting of a single-branch C10-alcohol with varying degrees of ethoxylation; and report results on the onset of micellization (cmc); micellization thermodynamics; and micelle local environment in aqueous solutions. Structure-property relations are developed by examining the effects on self-assembly of placing propylene oxide segments between the polyoxyethylene headgroup and the alkyl tail of the surfactant; and comparing the behavior of low-molecular weight alkyl polyethylene glycol ether surfactants to that of high molecular weight polyoxyethylene-polyoxypropylene surfactants.

Students
Greg Bunyea, Isabelle Cañeda, Heeba Kariapper

Research Mentor
Geoffrey Challen

Title
Leveraging the Internet for Scalable Seminars via internet-class.org

Abstract
The internet is changing every aspect of our lives; including how we communicate; learn; navigate; organize; work; play; and love. The internet also represents a crowning achievement of computing: a single system uniting hardware and software; theory and implementation; standards and innovation; engineering and science; protests that topple governments and stupid cat videos. It only makes sense to start teaching computer scientists how the internet works . And what better way to educate about the internet than using the internet. The University at Buffalo computer science seminar How the Internet Works was exactly that – a chance to teach how the internet works; on the internet.

Student
Patatri Chakraborty

Major
Mechanical engineering

Research Mentor
Dr Deborah Chung.

Title
Capacitance-based molecular-level evaluation of three-dimensionally printed polymer.

Abstract
Three dimensional (3D) printing is an emerging technology that fabricates a physical object from a 3D digital model. Due to the layer-by-layer fabrication involved; 3D printing can build complex objects with a wide variety of materials and functions. For our research project; a novel capacitance method has been developed to probe the microstructure of the printed material within and between the layers. The capacitance is measured in the through-thickness and in-plane directions; using an impedance meter. The printing involves bottom-up stereolithography; using an acrylic ester UV-curable resin. This paper provides the first report of the effect of printing conditions on the molecular-level structure of a 3D printed polymer. The degree of in-plane preferred orientation of the polymer molecules is found in this work to increase with decreasing layer thickness in the layer-by-layer fabrication. The preferred orientation is also found to increase the electric permittivity (a material property); thereby increasing the capacitance. Preferred molecular orientation is known to affect the mechanical properties of polymers in general. The through-thickness permittivity of the printed material is higher than that of the bulk polymer; due to the preferred orientation.

Student
Kun Woo Cho

Major
Computer Engineering

Research Mentor
Wenyao Xu

Title
Gaze-Wasserstein: Exploring A Quantitative Screening Approach to Autism Spectrum Disorders

Abstract
Early detection of children with autism spectrum disorder (ASD) has been of great interest to researchers due to an increase in the rate of autism incidence around the world. However; a diagnosis of ASD is still challenging to receive in a timely manner for the large-scale population because the current diagnostic practice requires considerable cost and time. Additionally; the current diagnostic practices are often subjective and do not provide quantitative feedback. In this paper; we explore a new ASD screening method; namely Gaze-Wasserstein; that is objective; fast; and widely accessible. Specifically; GazeWasserstein implements the discrete gaze pattern distribution and utilizes a modified 1st Wasserstein distance for dissimilarity measure. To test the performance of Gaze-Wasserstein; we conduct a pilot study with 32 child participants where 16 children have ASD and 16 children are typically developing. Evaluation results demonstrate effectiveness and time-efficiency of our proposed method in the ASD screening; and indicate that Gaze-Wasserstein is a promising autism screening approach in the clinical practice.

Student
Fatou Cisse

Major
Chemical Engineering

Research Mentor
Arend van der Zande

Title
Growth Techniques to Synthesize Scalable Two-Dimensional Materials

Abstract
Since the discovery of graphene; research on 2D materials has attracted significant attention in the area of nanomaterial. Recently; more interest is being paid on heterostructure devices fabricated with multiple 2D materials. Different methods have been employed to synthesise 2D materials. Mechanical Exfoliation is one of the methods used but it does not produce sufficient results as CVD and MOCVD. This research mainly focuses on the process of synthesizing large area of monolayers 2D materials; especially molybdenum disulfide and tungsten disulfide; which will be used for different applications such as electronics. We focused on the effects caused by a seeding layer and the cleanliness of the substrates. Sapphire; fused silicon and silicon dioxide substrates were used to determine if the orientation and the growth of the materials will differ. The results were confirmed by measuring the optical properties of the materials using Raman; Photoluminescence; and Luminescence mapping.

Student
Alyssa D'Aloia

Major
Chemical and Biological Engineering

Research Mentor
Michel Dupuis

Title
Molecular Modeling Relevant to Energy Technologies: CO2 Interaction with Poly(ethylene oxide) for CO2 Separation

Abstract
Carbon dioxide is a species involved in many aspects of technological applications. Efficient removal of CO2 from gaseous mixtures is an important yet challenging goal [2]. In order to identify carbon dioxide-philic groups; we carried out molecular dynamics and ab initio studies of structures and interactions of poly(ethylene oxide) (PEO) oligomers with CO2. We used Hyperchem for simulated annealing of the oligomers from 300K to 600K to determine their stable conformations using the MM+ force field. We are characterizing the binding of CO2 to the stable structures using the Hartree-Fock (HF) with the 6-31G* and 6-311G** basis sets and Density Functional Theory (DFT/B3LYP) methods in GAMESS.

Student
Abdul-Malik Davies

Major
Chemical Engineering

Research Mentor
Mark Swihart

Title
Synthesis of Yolk-Shell Structured Silicon-Germanium Anode Materials for Lithium-ion Batteries

Abstract
The move towards a more sustainable world requires more efficient energy storage systems. New materials are needed to improve the storage capacity and other important properties of existing batteries. The lithium-ion battery (LIB) is an efficient energy storage system because of its relatively high energy density and low self-discharge rate (good charge retention). Silicon-germanium (SiGe) alloy nanoparticles can potentially be used to create anodes with much higher specific capacity than graphite; the most commonly used material in LIBs. However; these materials suffer from degradation due to volume expansion and contraction during the lithiation and delithiation process. To address this challenge; we are preparing carbon-coated SiGe-based anodes with a nanostructure that can accommodate volume changes. Starting with SiGe nanoparticles obtained using a laser reactor; we expect to achieve a SiGe@void@C yolk-shell structure utilizing mostly solution-phase techniques. Li-ion batteries incorporating SiGe@void@C as an anode material; will show improvement in key performance metrics.

Student
Emma DePiro

Major
Mechanical Engineering

Research Mentor
Tarunraj Singh

Title
Development of Activity Tracker for Diabetic Patients

Abstract
The research being explored is the variation in insulin-glucose dynamics across a set of patients to study blood glucose regulation in diabetic patients. A software called T1DMS is being utilized to form different controlled experiments in order to validate and understand these relationships. If a mathematical representation of the relationship can be established; then that can be used to predict the amount of insulin required on a daily basis; with more precision.

Student
Molly Dreyer

Major
Environmental engineering

Research Mentor
James N. Jensen

Title
Sustainable Plan for Restoration of Riparian Habitat on the North Shore of Lake LaSalle

Abstract
The vegetated area adjacent to a waterbody is an integral ecosystem component. This riparian zone provides habitat for aquatic and terrestrial animals; a control for storm water runoff; and a mechanism for shoreline stabilization. Development along the water's edge depletes this naturally dense; vegetated zone; impacting water quality and habitat availability and contributing to localized reduction in biodiversity. This project is the design for the restoration of riparian habitat on the north shore of Lake LaSalle. Analysis of soil type; water quality; and local undeveloped shorelines characteristics serve as parameters for the design of a sustainable shoreline environment. Planting native species in the riparian zone will encourage the reestablishment of a prosperous riparian environment.

Student
Matthew S. Falcone

Major
Environmental and Civil Engineering

Research Mentor
James N. Jensen

Title
Ray-Tracing Analysis of Parabolic Solar Troughs for Drinking Water Treatment

Abstract
The parabolic solar trough is a drinking water treatment device which utilizes the reflective geometric properties of a parabolic surface to magnify incoming solar radiation; exposing water to adequately high temperatures for human consumption. Intended for use in low-resource areas; it can sustainably disinfect water at no operating cost to the end user. The results of a previous computational mode demonstrate that a reasonably sized parabolic solar through has the potential to treat a household supply of water.

This presentation will discuss the construction modified parabolic solar trough and its associated ray-tracing analysis. A laser; mounted above the curve; will simulate solar radiation entering the trough. The final destination of the light ray on the axis of symmetry of the curve predicts its path of reflection off of the metal surface. These data will be used to refine the model prior to full-scale construction and field testing.

Students
Rita Groetz, Conor Martin

Major
Aerospace & Mechanical Engineering

Research Mentor
Jihyung Yoo

Title
Demonstration of swirl-controlled 3D-printed mesoscale burner array using gaseous hydrocarbon fuels

Abstract
The study of small length scale flames is of interest due to the potential for applications of to power small scale devices. This is difficult to achieve in practice due to a lack of understanding of small scale flame phenomena. Swirl flow has been shown to provide a strong stabilizing effect but there is little experimental work showing how multiple swirl flow regions interact to further this stabilizing effect. A 4x4 mesoscale burner array was designed to study the effects of swirl flow interactions. The effectiveness of this method in improving flame stability and extending the flammability limits of flames was evaluated via a measure of flame temperature. The results showed a reduction of the lean blow of equivalence ratio with increasing radial to axial air flow ratio. This expansion of the lean flammability limits shows the viability of swirl flow implementation in future mesoscale devices and mesoscale flame studies.

Students
Man Fai Guo, Shangmiao Hao, Muhammad Nasir

Major
Mechanical Engineering

Research Mentor
Deborah Chung

Title
Large throughput three-dimensional metal printing

Abstract
This research project is on a cost-effective method for large throughput three-dimensional (3D) metal printing; which involves layer-by-layer printing without a mold. This method involves the thixotropic (toothpaste-like) deposition of a metal-matrix composite that has its matrix being molten but its filler being solid. An example is aluminum as the metal and silicon carbide particles as the filler; with the composite in the form of an ingot. Professor Deborah D.L. Chung discovered the thixotropic properties of molten metal-matrix composites with 50 volume percent micrometer-sized ceramic particles. The focus of this project is to create and test a prototype printer head. The overall setup consists of the printer head; an actuator for directing the piston; nitrogen gas connections; a firebrick support structure; a wooden stand to hold the actuator; and a control device. In addition to testing the printing process; the project will evaluate the printed material.

Student
Akshay Gupta

Major
Mechanical Engineering

Research Mentor
John F. Hall

Title
An Investigation Of Electroactive Polymer Materials As A Mechanism Of Ice Removal

Abstract
Icing is a major problem on wing structures used in airplanes; wind turbines; helicopters; etc. Ice formation on airfoils changes the angle of attack of the wing and causes stalling of the wing; thus rendering it inefficient. Electroactive Polymers (EAPs) is a class of novel material that change shape under applied voltage. Unlike traditional mechanical systems; which can only cover parts of the surface; EAPs can be used to span the entire surface and provide protection against ice. They use less energy; are lightweight; have a faster response rate and are not fragile like pneumatic systems. The experiment consisted of building an ionic polymer metal composite; a type of an EAP; which was then attached to a metal surface in the shape of an airfoil. The deicing capabilities of the whole system were then tested by actuating the EAP and recording the observed effects over a number of cycles.

Students
Syed Ali Hasan, Nilanjan Kundu, Adres Nuri, Zhang Qu

Research Mentor
Somnath Chattopadhyay

Title
Torsion Tests to Study Plastic Deformation in Ductile Materials

Abstract
This project is an experimental study on plastic deformation in ductile materials. The object is to stimulate interest in engineering undergraduate students the importance of plasticity in structural design and metal forming. Torsion tests were performed on circular cylindrical bars to obtain torque-twist curves (the torsional shear stress vs torsional shear strain plots). The bars were twisted well into their plastic regions; and as the elastic/plastic torsion continued; the torques seemed to approach their limiting values. Experimental estimates for the limiting torques were in reasonable agreement with the values predicted by Nadai's Sand Heap Analogy. The specimens were twisted to a predetermined maximum value. The directions of twist were subsequently reversed. After unloading and reloading from the initial loading phase; the materials seemed to yield in the reverse direction with lesser yield strength values demonstrating the Bauschinger Effect in torsion.

Students
Ryan Jaquin, Eric Muth, Shane Nolan Alex Schwartz, Daniel Stuart

Major
Electrical Engineering

Research Mentor
Liesl Folks

Title
Reinventing the Guitar

Abstract
Now more than ever; modern electric string instruments are being designed and manufactured with modern technology in mind. Digital technology has come far enough that many musicians are now accepting guitars and amps that feature on board signal processing and modulation. These are recently being sold mainstream for the first time. Vintage style electric guitars require heavy manufacturing to achieve cavities used to store the necessary electronics and wire runs. Instrument designs that completely embrace extended use of electronics are the future of the music industry. The novelty of this device is the use of PCB as a way to compact the electronics of the instrument while creating infrastructure that facilitates easy inclusion of effects. In a market that now embraces innovation instead of reproducing the past; our design appeals to a brand new growing market.

Student
Seamus Lombardo

Major
Aerospace Engineering

Research Mentor
Dr. John Crassidis

Title
A Low-Cost Method for Reaction Wheel Torque Characterization in Small Satellites

Abstract
Characterization testing of reaction wheels is necessary for requirement verification and to verify manufacturer specifications. Torque accuracy verification techniques include wheel-speed based methods that require proprietary inertia specifications; or the use of expensive force tables. A low-cost optical torque characterization method is being developed to solve these issues. In the setup; the reaction wheels are placed on a frictionless spin table; commanded a torque; and then a Pixy-Cam optically tracks the angular position of the table. The data is curve-fitted to obtain angular acceleration and; in turn; the torque outputted by the wheels. In all trials; the acceleration curves have R2 values of >.97 indicating accurate torque characterization. Making the reaction wheel center of mass easier to locate and characterizing the error in the Pixy-Cam are areas for future improvement. Despite these issues; this method of torque characterization presents a promising; low-cost method for use in small satellite programs.

Students
Kevin McMahon, Tomasz Pietruszka

Major
Electrical Engineering

Research Mentor
Dr. Josep Jornet

Title
Engineering Abroad: Getting the Most out of the Experience

Abstract
Companies are becoming increasingly global and multicultural. The top companies are international in scope; with diverse operations and demands that call for international engineers. Today's globalized market requires engineers who can think outside of the box and borders; who have the ability to interact with fellow engineers from different countries and backgrounds. By studying abroad; engineers have the rare opportunity to interact with students from around the world; with different perspectives on life and learning. While studying abroad; you will get the chance to work alongside other international electrical engineers; all while enjoying the beautiful country of France. Choosing to study abroad will push you outside of your comfort zone; you will learn what it takes to communicate with non-English speakers and think on your feet in unfamiliar situations. Students that study abroad will learn skills to be an international engineer which will place them apart from their graduating peers.

Student
Sarah Reeves

Major
Chemical Engineering

Research Mentor
Bruce Davidson

Title
Chitosan coating on Intralipid® Nanoparticles for Influenza Treatment

Abstract
Influenza A virus infects 5-20% of the US population; resulting in over 200;000 hospitalizations and ~40;000 deaths annually. Much of influenza's pathophysiology results from an over-exuberant immune response. Volatile

anesthetics; such as isofluorane; are effective in suppressing the immune system. We hypothesize that a nanomedicine of Intralipid® nanoparticles loaded with isofluorane can modulate the immune system response and aid those infected with the influenza virus. When injected in its original formulation; the nanomedicine induces narcosis. To prevent narcosis; positively-charged chitosan is electrostatically bound to the negatively-charged Intralipid® nanoparticles. The coating allows for a controlled; localized release of isofluorane to the macrophages in the target organ (i.e.; spleen). Through dynamic light scattering measurements; the size of the particles and the surface charge are measured to confirm the presence of the chitosan coating. Current testing indicates attachment of chitosan with aggregation of nanoparticles. Syringe filters are being used to remove large aggregates.

Student
Ari Rubinsztejn

Major
Mechanical and Aerospace Engineering

Research Mentor
Dr. Tarunraj Singh

Title
Characterization of an Electronic Throttle Body

Abstract
This project performed system identification of an electronic throttle body (ETB) through analysis of unit step responses to determine its characteristic equation. Additionally; a PID controller was implemented on an Arduino for easy software based tuning and allowing for flexibility in implementing different controllers for different end use needs of the ETB.

Student
Maria Camila Lopez Ruiz

Major
Civil Engineering

Research Mentor
Dr. Pinar Okumus

Title
Strength; Ductility and Prestress Losses of Unbonded Post-tensioning Strands in Self-centering Structures

Abstract
"Unbonded post-tensioning strands have been employed in numerous research studies for precast concrete bridge piers to provide restoring force under seismic loading. When designing these systems; premature fracture of strands due to stress concentrations at anchorages and post-tensioning losses should be considered. Previous studies on unbonded strands between post-tensioning anchorages under cyclic loading are limited to 0.5 in. and 0.6 in. diameter strands and have been largely based on small-scale testing. Only a few of these studies reported post tensioning losses. This research assessed the behavior of post-tensioning strands under cyclic loading to fill these gaps. The experimental program included 0.5 in.; 0.6 in.; and 0.7 in. diameter; seven wire; 270 ksi ultimate strength; low-relaxation strands between standard anchorage chucks. Stress-strain relationships and the anchorage wedge-seating of post-tensioning strands under cyclic loading were obtained. Post-tension losses were predicted based on the small-scale results and compared to the loss of a large-scale case study."

Students
Lynn Sementilli, Jiaqi Xie

Major
Electrical Engineering

Research Mentor
Dr. Zhi Sun

Title
Physical Layer Implementation for Underground Wireless Sensor Networks (UWSN) using M2I Antennas

Abstract
Using metamaterial shells to enhance the magnetic field components of magnetic induction antennas (M2I communication method) has been proven in previous works to successfully increase the transmission range of MI antennas in the complex underground environment. However; since this technology has just recently been developed for use; practical communication methods have not yet been tested for digital transmission in this novel system. Thus; the research performed in this project consists of exploring various physical layer protocols for underground wireless sensor networks (UWSN) using M2I antennas. For this analysis; a testbed was created in GNU Radio Companion in order to evaluate the performance (bit error rate (BER); capacity; and power spectral density) of the different possible modulation types in the UWSN M2I system. From this analysis; it can be determined which modulation method would produce the most efficient and effective transmission within the UWSN M2I communication system.

Student
Lauren Shepard

Major
Biomedical Engineering

Research Mentor
Ciprian N. Ionita

Title
Benchtop investigation of FFR in patient-specific 3D printed coronary phantoms

Abstract
Purpose: Accurate patient-specific phantoms for device testing or endovascular treatment planning can be 3D printed. We expand this approach for CT-derived measurements of Fractional Flow Reserve; the standard for determining atherosclerotic lesions.

Materials and Methods: CT Angiography images were acquired during a single heartbeat. These images were used to create 4 patient-specific models with various grades of stenosis: severe; <75%; moderate; 50-70%; and mild; <50%. Images were segmented using a 3D workstation and processed to create 3D printable geometries for flow experiments. Models were connected to a pulsatile pump and the pressure was measured proximal and distal to the stenosis.

Results: FFR measurements correlated well with stenosis severity. Measurements for each stenosis grade were: 0.8 severe; 0.7 moderate and 0.88 mild.

Conclusions: 3D printed patient-specific coronary models allow for accurate benchtop diagnosis of FFR. This approach can be used as a future diagnostic tool or for testing CT-derived FFR methods.

Student
Kelsey Sommer

Major
Biomedical Engineering

Research Mentor
Dr. Ciprian N Ionita

Title
Design Optimization of Distal Coronary Flow in Patient Specific 3DP Models for Validation of a CT-FFR Software

Abstract
3D printing has been used to create complex arterial phantoms to advance device testing and physiological condition evaluation. We developed two new designs to manage the distal arterial flow resistance and pressure thus creating physiologically accurate phantoms. Patient specific CT data were imported into a Vital Imaging workstation; segmented; and exported as an STL. The STL was then imported into a mesh manipulation program where we manually sculpted the vasculature to prepare the file for 3D printing. The phantom was then printed using a Stratasys Connex3 multi-material printer. The model was connected to a programmable pump and pressure sensors measured flow characteristics through the phantoms. We were able to determine the Fractional Flow Reserve (FFR) through the vessels which were used to validate CT-FFR software.

Student
Matthew Stafford

Major
Computer Science

Research Mentor
Wenyao Xu

Title
Augmenting Smart Phones into Functional Tools for Home-Based Rehabilitation

Abstract
Stroke is a highly detrimental disease; it requires months of physical therapy to recover and a lifetime of exercise to prevent a reoccurrence of its degenerative muscular and neurological effects. Stroke Rehabilitation begins at the hospital with inpatient care. Patients are put through rigorous daily exercises to overcome paralysis and motor functions lost by the stroke. After the patient is stable; they begin outpatient care. Outpatient care typically occurs in nursing facilities or rehabilitation centers. To help the stroke survivor become independent; part of their rehab consists of learning at-home exercises. The problem; however; is stroke patients have a very low compliance rate to their exercises prescribed. Common reasons for low compliance are a belief that the workouts have negligible results or they are boring.

The standard rehabilitation tool given to stroke patients is resistance bands or resistance putty. Workouts consist of stretching bands or squeezing putty while using a variety of techniques. It is our belief that exercises can be more meaningful and enjoyable through a technological approach. We present a Smart Rehabilitation System that consists of a 3D printed exercise tool and a Smartphone. By inserting the Smartphone into the 3D printed exercise tool; workout features such as 'smoothness of movement' can be extracted using the Smartphones accelerometer and gyroscopic sensors. The system also provides acoustic and visual feedback while patients perform an exercise. In addition; the system displays historical data; showing a patient's progress. By presenting patient progress in a transparent manner and providing interactive feedback during workouts; increased compliance from Stroke patients is the projected outcome.

Student
Charles M. Steuerwald

Major
Chemical Engineering

Research Mentor
Janet R. Morrow

Title
Development of MRI Contrast Agents Based on Iron Complexes

Abstract
The rates of water exchange in Fe(III) complexes under development as Magnetic Resonance Imaging (MRI) contrast agents were studied using variable temperature data from 17O NMR measurements. Reduced transverse relaxation rates were determined by measuring the peak width at half height at varying temperatures and the resulting data were fit to Swift-Connick equations in order to determine the activation enthalpy and activation entropy of the water exchange from the complex. After determination of the activation enthalpy and entropy through a least squares fit of the data; the exchange rate constant of water at various temperatures was calculated. In addition; phantom MRI scans at 4.7 T were used to determine which Fe(III) agents had the best relaxivity altering effects. In vivo tests were then conducted with mice to determine if the agents provide suitable contrast in comparison to clinically used Gd(III) agents.

Students
Hoan Duc Tran, Tri Vu

Research Mentor
Wenyao Xu

Title
Effective and Efficient Visual Stimuli Design for Quantitative Autism Screening: an Exploratory Study

Abstract
Autism spectrum disorder (ASD) is one of the most common childhood developmental disorders. Early detection and intervention for ASD are critical for increasing child success. In the past decade; utilizing the abnormal eye gaze characteristics of children with autism in regard to certain visual stimuli is emerging as a screening approach due to its cost-efficiency and promising accuracy. However; the effect of visual stimulus on children with ASD has not been considered as a diagnostic consideration in the past. In this paper; we first create a visual stimuli database based on an extensive literature review; then we examine the impact of picture stimuli and exposure time on the quantitative accuracy of screenings for ASD. This is done by extracting gaze distribution in a 2D space and comparing children with ASD to

typical peers using the 1st Wasserstein distance. A group of 32 participants with ASD and typical development (TD) were recruited for the study. The f-score accuracy results demonstrate the impact of implementing visual stimulus on screening for ASD. Our study demonstrates that the parsing of "social scene" stimulus with 5-second exposure time has the best performance at 98.24%.

Student
Ellen Van

Major
Mechanical Engineering

Research Mentor
Olga Wodo

Title
Nanomorphology of Bulk Heterojunction Cells

Abstract
Research was conducted with Dr. Olga Wodo to help quantify the morphology of the organic solar cells. Organic solar cells (OSC) are photovoltaic (PV) cells that use organic electronics with polymers to charge transport and produce electricity. The research in this project is conducted to understand the characteristics of the morphology behind OSC. In doing so we better understand what makes organic cells and if there are better ways to manufacture these cells to produce a more feasible OSC. By using given data on morphology descriptors; results were able to be graphical represented. These descriptors included but were not limited to path length; connectivity; fraction of intermolecular hops; and tortuosity. Results show that morphology mixture and rotation can affect descriptors; but it is still unclear as to how to produce the most efficient morphology. Research for this topic is a continuous growing project with many new discoveries still being made.

Students
Jingyun Wang, Hanguang Zhang

Major
Chemical and Biological Engineering

Research Mentor
Gang Wu

Title
Atomic Iron-Dispersed Electrocatalysts Derived from Metal-Organic Framework for Oxygen Reduction in Proton Exchange Membrane Fuel Cells

Abstract
Low cost and high performance platinum group metal (PGM)-free cathode catalysts for oxygen reduction reaction (ORR) in acidic Nafion® based proton exchange membrane fuel cells still remain a grand challenge. We will report a new type of high-performance PGM-free catalyst with abundant atomic iron sites well dispersed into partially graphitized 3D carbon phases. The improved atomic iron catalysts demonstrated ORR performance for PGM-free formulation in challenging acidic media. The ORR activity reached to a half-wave potential of 0.84 V vs RHE of 0. 044 A/cm2 at 0.87 ViR-free. The atomic iron-rich carbon catalyst was derived from a metal-organic framework (e.g.; ZIF-8) precursor with ordered crystal structure through a single carbonization step in N2 atmosphere. Obtaining the optimal doping content of Fe into the ZIF-8 during the precursor synthesis played a key role in achieving the atomically dispersed iron morphology corresponding to the significant improvement of activity and stability.

Student
Zhuolin Yang

Major
Computer Science

Research Mentor
Zhuolin Yang

Title
Smart Insole TUG: An Innovative Wearable Sensing Device Based System for Timed-Up-and-Go in Complex Ecological Environments

Abstract
With the aging population in our society; it is critical to identify elderly at risk for falling; a leading cause of death in the older population. One balance assessment; Timed Up and Go (TUG); has been widely applied to estimate the fall risk. However; operations in the control clinical setting make the TUG falling short of representing challenges in home and community environments that many seniors navigate. Having information on the motor performance in more complex environments can better inform clinicians about an individual's risk of falling. To this end; we present Smart Insole TUG; an advanced system suitable for the complex environmental TUG. Consisting of an unobtrusive sensing insole and a fine-grained TUG data analysis module; our system educes four refined aspects in the gait feature and segments the TUG process by six detailed phases; providing accurate and advanced information for the fall risk estimation.

School of Management

Students
Valerie Andujar, Sean Tinschert

Research Mentor
Veljko Fotak

Title
What would 15 College students do with 300;000 Dollars?

Abstract
Our poster is about our experiences at Therese Kelly Investment group. We will be displaying a rundown of how the group picks investments; our returns; our holdings; and discussions we have about the market as well as out trips to NYC semester.

Student
Muris Avdic

Major
Psychology

Research Mentor
Dr. Prasad Balkundi

Title
American Suffrage: How the United States Votes

Abstract
At a time when social unrest and political turmoil have reached an apex in the global landscape; it has become more important than ever to elect leaders into the upper echelon of government whom we trust and revere. This paper juxtaposes four different theoretical perspectives in the context of the recent American presidential election to see which of them are best supported by the data. The first view is that people live in echo-chambers and possess voting behaviors akin to their friends and family. The second view is that people have a specific conception of what constitutes effective leadership and they use this heuristic to determine whether a political candidate is worthy of their support; or lack thereof. The third view is that the media is one such forum through which individuals are influenced by the information they are provided about certain candidates that could impact their political affiliations. A fourth and final perspective is the notion that past negative experiences with certain political sector segments has proven to be the impetus for a wave of disgruntlement and anti-establishment in constituents. I test these four competing predictors of voting behavior using data from three different samples. In doing so; I seek to determine the primary basis upon which voters make decisions in the context of social; cognitive; media; and discontent based theoretical perspectives and to deduce which one predominantly drove the voting behavior in the latest American election.

Student
Jake Cercone

Major
Business Administration

Research Mentor
Laura Amo, Diana Cichocki

Title
Measuring Quarterback Efficiency

Abstract
The objective of the project was to create a statistic that measures quarterback play. With the existing metrics; it is difficult to objectively measure the success of quarterback play. The most used stat to measure quarterback play is the passer rating. The passer-rating statistic is heavily flawed in that it scales every quarterback score to a maximum value of 158.3; giving the illusion that individual performances are close together when they are not. The statistic was made using research from The Hidden Game of Football; and developed using R and advanced Excel techniques. I analyze traditional numbers and statistics; and insert these numbers into my stat to calculate how efficient and productive a performance was.

Student
Anna Danner

Major
Business Administration

Research Mentor
Veljko Fotak

Title
Corporate Social Responsibility

Abstract
This project demonstrates the significance of corporate responsibility by presenting qualitative and quantitative data comparing several companies. Studies indicate that socially responsible compants have a comparative advantage to companies with poor reputations. The poster will display key findings about the impacts companies have on consumers; workplace environment; and society in graphs and brief descriptions. The take-home message is the corporate-level social responsibility improves public relations; sales and garners positive feedback from customers.

Student
Luuly Doan, Gyunbeom Park

Major
Accounting

Research Mentor
Jing Chen

Title
Review Research on Difference of GAAP and IFRS on Classification of Intangible Assets and Goodwill

Abstract
This research is a review research on differences and similarities of GAAP and IFRS on assessment; recording of intangible assets and goodwill. This research will also incorporate additional information / opinions from past research/opinion papers as well as a SWOT Analysis that analyzes both GAAP and IFRS methods of assessment and recording of intangible assets and goodwill.

Students
Daniel Emmons , Eric Yonda

Research Mentor
Paul Atkinson

Title
Who caused the Crash? Big Banks vs the Insurance Industry

Abstract
This poster covers three distinct phases of the 2008 financial crisis: the calm before the storm; the crash itself; and the lasting economic and regulatory impacts that continue to persist today. The analysis is done through a lens of AIG.

Student
Gabriel Gee, Megan Gramza, Pengbo Ma, Andrew Meyer, Anirudh Ojha

Research Mentor
Laura Amo, Diana Cichocki

Title
Data Jedi Analytic Creative Solutions: Shedding a Light on Olmstead's Center for the Blind Call Line

Abstract
The purpose of our project is to take raw data collected from the Olmstead Center for the Blind and transform it into user-friendly charts in order to provide useful insights for our client. Through our data analytics work; we hope that Olmstead is able to effectively improve the performance of its call service line. We analyzed the data for the Olmstead's various call teams; length of calls; length of after-call work; and the amount of time a caller spends waiting to talk to an agent. Using the advanced Excel skills we developed during our MGQ408 course; we created a dashboard and menu system that makes all of the graphs change dynamically in a user-friendly way.

Students
Izzy Khan, Deshawn Kunath, Sunny Sharma, Anthony Yeh

Title
Targeting the Products you need with Accuracy

Abstract
For the 2017 Target Case Competition; our team's analysis of Target's Flexible Fulfillment program; we discovered the key issues and trends introduced by guests using the program and the team members executing it. Guests seem to enjoy the benefits it provides but raised concerns about the process lacking convenience when compared to those of Target's Competitors. Our solutions provide strategies to make Flexible Fulfillment more efficient and increase guest utility to ultimately create a greater stream of revenue and a larger percentage of sales through this program leading to higher overall profitability for Target. We designed a brand new tracking process; which can serve as an engaging tool helping guests' accurately keep track of their orders. This tracking device will serve as a useful tool for people on the go and will further improve the overall guest experience.

Student
Robert Lanzalaco Jr.

Major
Business Administration

Title
Starting my own Business - Smooth Roll'n Food Truck

Abstract
They say the best ideas are the ones; which are the most well thought out; the ones that involve the most planning; and initial thought. Well maybe; some of the best ideas are the ones you do not over think; and rather just do. Using my knowledge acquired from outside resources and SOM classes such as Accounting; Marketing; MIS; and Finance; I have successfully been able to begin the process of creating my own business. Smooth Roll'n Food Truck is Buffalo's latest up-and-coming smoothie and juice truck! What started out as just an idea between my brother and I; is now becoming an actual reality. Smooth Roll'n intends to provide an alternative; healthier option for people than your traditional food trucks. My goal is to be able to share my passion for a healthier lifestyle with those around me.

Students
Spencer Li, Sonya Tarake

Major
Business Administration

Title
Club Member to Club Hero!

Abstract
Course Hero's vision is to be able to help any student or educator ask and answer any question in any course in the world. Their mission is to build the world's biggest and best library of course-specific questions and answers to help students and educators master their classes. By helping students and educators to share their knowledge; Course Hero empowers students to learn more effectively and succeed; both in and out of the classroom.
This ed-tech company based in Silicon Valley also hires interns from all across the nation to serve as the face of the brand off the computer screen. Through a mutual connection; I was fortunate enough to be remotely hired by this company and later brought on Spencer Li to our Buffalo Hero Team. For our project; we will cover our full range of experiences as Content Acquisition/ Business Development Interns to my becoming a Brand Ambassador and later Campus Lead. We will present on how this company has facilitated our collective growth as emerging leaders in the SOM.

Students
Andrew Mackey, Matthew Marzocchi, John Reese

Research Mentor
Paul Atkinson

Title
The Net Social Benefit of Large Bank Holding Companies

Abstract
A series of different factors play a role in determining the benefit provided to society by large Bank Holding Companies (BHC's). These benefits range from cost savings through low fees or competitive rates to the availability of branches nationwide (or internationally). These large BHC's can offer these services because of economies of scale and scope. As the institutions grow larger in size and diversification; cost savings could eventually be passed onto the consumer. This paper examined how large the value of this cost savings is (and how likely it is for it to be passed on to society) against the risk adjusted value of possible loss to the nation's economy in the event of disaster (tail-risk realization). We found that Dodd-Frank and Basel III; although improvements; do not mitigate this risk to the point where the size of these institutions provides a net benefit to society.

Students
Bailey Popovski, Samuel Soucy

Title
Why individual Social Responsibility is important in Business School

Abstract
Corporate and Social Responsibility is the initiatives companies make that effect themselves as well as society economically; socially; and environmentally. CSR can provide numerous benefits to a company. For example; when businesses start thinking consciously about ways they could help the environment; the consequence may be a decrease in maintenance costs. Companies don't need to be the only ones who reek these benefits though. This project is going to help depict how anyone can benefit from being socially responsible. We will mainly be focusing on how Individual Social Responsibility can be extremely helpful in business school. The poster gives a clear and precise definition of what being socially responsible actually means; the cause and effects of ISR activities; a comparison of two hypothetical business students to show what one misses when they aren't socially responsible; as well as local opportunities to help inspire people to be socially responsible.

Students
Alva Putra, Evan Sidarta

Title
Target Flexible Fulfillment

Abstract
As one of the biggest retail stores in the United States; Target is always looking for ways to improve their service quality for their customers. Through flexible fulfillment; Target's customers do not have to go to the stores to buy the products that they want. By simply ordering the products online; they can pick up the products after they place an order for that item. However; there are many rooms for improvement; and our group made three recommendations to improve that certain area. First; our group wants to fix Target's website layout to be more effective in online shopping. Second; we want to use advanced technology like drones to help employees pick up the products from the floor and the backroom. Finally; we recommend Target to use fast and easy pick up system by using pick up lockers.

Student
Nicholas Rooney

Major
Business Administration

Research Mentor
Krista Paszkowsky

Title
Study Abroad & Employability

Abstract
In today's globalized work environment; where undergraduate degrees have become commonplace; it is imperative that students find a competitive edge to set themselves apart. Studying abroad and experiencing life in a foreign culture is an effective way for students to differentiate themselves from their peers. Students gain a wide scope of knowledge and experience when taking classes at overseas institutions. They obtain a unique perspective on their chosen field of expertise; and learn to adapt to a new environment through escaping their comfort zones. The hard and soft skills that students who study abroad develop translate well into the workplace. Students leave this experience more well-rounded; which is what employers seek.

Student
Maxwell Savarino

Major
Business Administration

Research Mentor
Veljko Fotak

Title
Giving Back to the Community: A Legacy of Cheerful Service

Abstract
The objective that my group and I set out with was to give back to the community of my own hometown; as well as other western New York communities who supported our group over the years. Through many hours of organization and front line volunteer work; I witnessed multiple seasons of growth within the organization I helped revive. The poster project is simply a closer look at how I achieved these tasks; and how it fits in with the social responsibility that many groups and companies search to attain in current times.

Student
Giang Truong

Major
Business Administration

Research Mentor
Sue Furlani

Title
Innovative and novel tool to manage the physical aspects of patient care

Abstract
This project is about the marketing process for new lifting devices invention. Omantec takes the idea of how difficult family members and caregivers have during the period of taking care of non-mobile patients; especially the positioning; assisting patients with their hygiene needs without risking injury for either party. My main responsibilities in this project is to promote and bring the products to the eyes of various medical equipment suppliers. This is an exciting project because this type of products has never been in the healthcare market before. What I passionate about is if this product can be sold to customers; it will help caregivers/family members in a tremendous positive way. It is designed to be as intuitive and easy-to- use as possible so that caregivers of all skill levels feel confident in their ability to provide capable care.

School of Nursing

Students
Leann Balcerzak, Janelle Garcia

Major
Nursing

Research Mentor
Dr. Chang

Title
The relationship between pain catastrophizing; Pain Intensity; Stress; and mental health in chronic pain patients

Abstract
Pain catastrophizing is irrationally exaggerating negativity; which impacts how patients perceive pain; and is characterized by three components; rumination; magnification; and helplessness. This study is to examine associations between catastrophizing thinking; pain intensity; stress; and mental health in a sample of chronic pain patients enrolled in a behavioral intervention study. Theory of cognitive appraisal by Lazarus and Folkman was used to guide this study. Baseline data from the main study were used. Participants were recruited from primary care practices and a pain management clinic. Measures used include questionnaires. Inclusion criteria are patients taking opioids for chronic pain with a Depression score greater than 7 on the Patient Health Questionnaire. Preliminary findings indicate catastrophizing is associated with pain intensity and mental health. Information regarding associations between those variables would improve knowledge of mechanisms behind catastrophic thinking so specific treatment plans (e.g.; behavioral interventions) can be developed to improve treatment outcomes.

Students C S M
Marlene Morales, Terrika Pereira, Alexander Salinas

Major
Nursing

Research Mentor
Yu-Ping Chang

Title
Examining the Effectiveness of a Modified E-mailed Delivered CBT-I on Sleep Outcomes in College Students with Insomnia

Abstract
Cognitive Behavioral Therapy for Insomnia (CBT-I) has been established as an effective non-pharmacological treatment for adults with insomnia and is based on changing sleep-related behaviors and thoughts through patient education. There is limited research on CBT-I in college students. This study aims to examine the effectiveness of an e-mail delivered version of CBT-I on sleep outcomes in college students with insomnia. A two-group pre-and-post design was used. The intervention group receives a 6-week email-delivered CBT-I consisting of stimulus control; sleep restriction; sleep hygiene; relaxation training; cognitive restructuring; and relapse prevention. Preliminary findings indicate that participants in the intervention group demonstrated more positive attitudes toward sleep; better sleep quality; less daytime sleepiness; and better sleep hygiene; compared to the control group. This suggest that email-delivered CBT-I might have the ability to improve sleep outcomes and promote healthy sleep in college students.

Students C H M
Terrika Pereira, Alexander Salinas

Major
Nursing

Research Mentor
Yu-Ping Chang PhD RN FGSA

Title
The Association between Alcohol Use and Sleep in College Students

Abstract
Substance use and insomnia are common problems in college students primarily due to stress; lifestyle change; and peer influence in this age group. Substance use and insomnia can have negative impact on students' health and academic performance. The most common causes of sleep disturbances in college students are sleep deprivation (e.g. insufficient sleep because they go to bed late and wake up early) and inadequate sleep hygiene (e.g. eating before bed). Poor sleep practices coupled with stress; alcohol consumption; and technology use prior to bed can contribute to sleep deprivation and subsequently; daytime sleepiness. However; little is known about the association between alcohol use and sleep. This is an ongoing study aiming to describe the association between substance use; sleep hygiene; and daytime sleepiness in a sample of insomnia college students who have been enrolled in a sleep education study.

Student H
Meg Phillips

Major
Nursing

Research Mentor
Dr. Yu Ping Chang

Title
Factors Associated with Fatigue in Family Caregivers of People with Dementia

Abstract
Background: People with dementia are often cared for by family members. Caregivers of people with dementia are at risk for negative health outcomes related to fatigue. Little is known about factors associated with fatigue in these caregivers.

Methods: A cross-sectional design was used. 44 family caregivers participated in the study. Measures used included Lee Fatigue Scale (LFS); Pittsburgh Sleep Quality Index (PSQI); Actigraph; Center for Epidemiologic Studies Depression (CES-D); caregiver burden inventory (CBI); Social Support Survey Index (SSSI); and Physical Self-Maintenance Scale and Instrumental Activities of Daily Living Scale. Descriptive and correlational statistics were used for data analysis.

Results: Findings indicate fatigue was present and significantly associated with depression; sleep quality; caregiver burden; and care-recipient's functionality. Social support did not have a statistically significant relationship with fatigue.

Conclusion: Fatigue is a common symptom in family caregivers of people with dementia. Sleep disturbance and depression often co-occur with fatigue.

School of Pharmacy & Pharmaceutical Sciences

Students
Scott Ferguson, Jake Megna, Jinli Wang

Major
Pharmaceutical Sciences

Research Mentor
Juliane Nguyen

Title
Pegylated exosomes show enhanced accumulation in the infarcted myocardium

Abstract
Exosomes are lipid vesicles secreted from cells that carry a diverse set of cargo destined for delivery to neighboring cells and distant organs. Similar to synthetic lipid delivery vehicles known as liposomes; exosomes have been explored as an alternative carrier for novel therapeutic applications. One of the limitations of exosomes as drug carriers is their short circulation half-life. As Polyethylene glycol (PEG) has been well established as an effective polymer in extending the half-life of liposomes and numerous other nanoparticles; we have explored the use of PEG in enhancing the circulation half-life of exosomes to obtain higher accumulation in the infarcted myocardium. In vivo biodistribution studies showed enhanced accumulation of pegylated exosomes in the infarcted heart compared to unmodified exosomes. Further; pegylated exosomes showed lower non-specific deposition in the lung and thus could provide a safer and more efficient alternative to unmodified exosomes.

Student
Jie Hong

Major
Pharmaceutical Sciences

Research Mentor
Dhavalkumar K. Shah

Title
Design and Generation of Humanized Anti-Topotecan Single Chain Variable Fragment (scFv) for Inverse Targeting Strategy

Abstract
'Inverse Targeting' is a strategy designed to minimize the dose limiting systemic toxicity of intraperitoneal (IP) topotecan chemotherapy. This strategy employs systemic (IV) co-administration of anti-topotecan antibodies with IP administration of topotecan. It is hypothesized that the co-administration of anti-drug antibody IV and chemotherapy IP can effectively reduce peak plasma free drug concentrations and the cumulative systemic exposure to unbound drug. We have previously shown that a high affinity murine anti-topotecan antibody (i.e. 8C2) is capable of achieving Inverse Targeting in IP topotecan chemotherapy and reducing its systemic toxicity. In this poster; we present extension of our previous work towards the use of single-chain variable fragment (scFv) of 8C2 to increase the homology of framework region amino acid sequence to human antibodies. Our result demonstrates that it is possible to de novo design humanized scFv for a murine antibody and stably express it in mammalian cell line.

Student
Sydney Scatigno

Major
Pharmaceutical Sciences

Research Mentor
Juliane Nguyen

Title
A CCR2 Targeted scFv-Albumin Binding Fusion Protein and Its Effects on Chemotaxis in Breast Cancer Cells.

Abstract
Breast cancer affects a large number of women throughout the world. It has been shown that the chemokine receptor CCR2 is responsible for the chemotaxis of inflammatory cells seen in breast cancer. Inflammatory cells promote tumor growth; proliferation; and metastasis. Blocking of the CCR2 receptor by single-chain variable fragment (scFv) can hinder the migration of inflammatory monocytes to the tumor site. Inhibiting immune cell migration has the potential to increase treatment efficacy of the patients who are receiving chemotherapeutics. We screened a scFv phage library against CCR2 and discovered a scFv that bound to CCR2 with high affinity (KD=60 nM). Due to the short circulation half-life of scFv in vivo we genetically fused an albumin binding peptide to the scFv. We hypothesize that utilizing albumin as a carrier would increase the circulation time of the scFv and further decrease the migration of inflammatory monocytes to the tumor site.

Student
Benjamin Yee

Major
Pharmaceutical Sciences

Research Mentor
Dr. Marilyn E. Morris

Title
Effect of Type 2 Diabetes (T2D) on Renal Megalin; Cubilin; and Catabolic Lysozyme Expression in the Zucker Diabetic Fatty (ZDF) Rat Model

Abstract
Proteinuria is both a clinical marker and major contributor to the progression of diabetic nephropathy (DN). To explore mechanisms underlying this; we examined the impact T2D had on renal endocytosis and catabolism of proteins in Type 2 diabetic ZDF rats. Creatinine-normalized urine samples run on SDS-PAGE gels confirmed a worsening of proteinuria in ZDF rats. RT-PCR was performed on renal cortices at 12; 19; and 29 weeks to represent different stages of DN. ppia was validated as an appropriate housekeeping gene in DN kidneys. mRNA of the endocytic proteins megalin and cubilin showed a trend of an increase at 12 weeks; followed by subsequent decreases at 19 and 29 weeks. We measured significant increases ($p < 0.05$) in mRNA of the lysosomal enzymes cathepsin B at 12 weeks and cathepsin D at 19 weeks. This work suggests a significant impact on kidney protein endocytosis and catabolism in diabetes.

School of Public Health & Health Professions

Students C H
Dmitriy V. Belous, Sabrina M. Daniels, Courtney E. Miller, Katherine T. O'Donnell

Research Mentor
Peter Horvath; PhD

Title
Exergaming Intervention in Sedentary Middle-Aged Adults Improves Lower Extremity Functional Fitness and Exercise Self-Efficacy

Abstract
Interactive video game technology; known as exergaming; has been extensively utilized in rehabilitative settings. This technology may help increase self-efficacy; which could promote physical activity and functional fitness. The purpose of this study was to compare functional fitness and self-efficacy in relationship to exercise tests and self-reported questionnaires. Middle-aged sedentary men and women (n=12) completed functional fitness tests and self-efficacy questionnaires before and after engaging in self-selected; low to moderate-intensity exergaming for 20 min/3d/wk for eight weeks. Exercise using interactive video game technology increased functional fitness after exergaming as measured by 30-second Sit-To-Stand repetitions (14.2 - 16.8; $p < 0.05$). All participants reported with 100% confidence they would continue to exercise if an interactive video game system was available. Exergaming improved lower extremity functional strength and endurance in sedentary middle-aged adults as well as their confidence to continue exercising.

Students C
Sean M. Kishel, Katherine T. O'Donnell, Daniel M. Rosney, Mingmei Tian;

Research Mentor
Peter Horvath; PhD

Title
Exergaming by Sedentary Middle-Aged Adults Did Not Alter Self-Reported Dietary Intake and Physical Activity

Abstract
The purpose of this study was to investigate changes in diet and physical activity among sedentary middle-aged adults who consistently participated in interactive exercise-gaming (exergaming).

12 sedentary; middle-aged men/women (56±3.6 years) exergaming under monitored conditions at low-to-moderate intensity with self-selected exercises for 20 minutes/day; 3 days/week for 8 weeks. They were instructed to not change diet and physical activity. A three-day diet record was used to assess diet and the Yale Physical Activity Survey to estimate energy expenditure and physical activity.

No significant differences in diet were found due to being in the study. Total energy expenditure/day (p=0.10) and activity dimension index (p=0.12) did not change. The standing score increased (5.00-7.33; p<0.05).

Diet and physical activity did not change; indicating that they were not confounding variables which can impact results. The standing score increase suggests that exergaming participation can lead to more awareness for healthier lifestyle habits.

Students
Sean Kissel, Courtney E. Miller, Katherine T. O'Donnell, Daniel M. Rosney

Research Mentor
Peter Horvath

Title
Exergaming Intervention in Sedentary Individuals Improves Attitudes Toward Exercise and General Health

Abstract
Interactive video game technology has been utilized in rehabilitative settings. Research is limited in its possible role as a within-the-home exercise for those without access to a gym; or fitness center. The purpose of this study was to compare quality of life and emotional well being in sedentary community members. Middle aged men and women exercised using Wii Fit for 20 minutes; three days a week; for eight weeks. The SF-36 questionnaire and the Subjective Exercise Experience Scale (SEES) were administered before and after the intervention. Physical functioning scores approached significance after intervention (84.6 to 90.4; $p < 0.08$). The SEES showed that after exergaming subjects felt slightly tired; but not drained. They also reported feeling positive and not discouraged post exercise. Exergaming might improve physical functioning and have a positive effect on sedentary individuals attitudes toward exercise and general health.

Students
Morgan C O'Leary, James R Sackett

Major
Exercise Science

Research Mentor
Dr. Blair D. Johnson

Title
Heart Rate and Heart Rate Variability during the Cold Pressor Test in Recently Concussed Patients

Abstract
Autonomic function appears to be altered in concussed patients; especially when a physiological stressor is present. Heart rate variability (HRV) during whole body exercise is attenuated in concussed patients compared to healthy controls. However; HRV during isometric handgrip exercise has been shown to have a similar response between concussed patients and healthy controls. The cold pressor test (CPT) is an exercise independent test that could be used to identify shifts in autonomic function in concussed patients. We tested the hypothesis that heart rate and the root mean squared of successive differences (representing parasympathetic control) during the CPT in concussed patients is impaired versus healthy controls. We found that parasympathetic control of heart rate is not altered during the CPT in recently concussed patient. However; the blunted heart rate response does indicate that cardiac autonomic control is impaired in recently concussed patients.

The Academies

The Academies introduce students to links between classroom and practical learning through five interdisciplinary lenses: Civic Engagement, Entrepreneurship, Global Perspectives, Research Exploration, and Sustainability. Each Academy uses its themes as a means of focusing discussion, organizing experiential learning opportunities, and offering

Students
Susan Cao, Ruben Ocana, Elizabeth Roth, Kristen Saskowski

Research Mentor
Dr. Peter Horvath

Title
Using Food Labels to Make Healthy Decisions

Abstract
Consumers are making uninformed and unhealthy decisions based on false nutritional knowledge. These notions about health are derived from issues raised by the popular press and health enthusiasts. The lack of certain information provided on food labels further complicates decision making. Fear of GMOs; pesticides; added sugar; and trans fats combined with uncertain health consequences may lead to uninformed and costly food decisions. It is crucial that individuals understand the background knowledge required to interpret the dietary reference intakes (DRI's) as well as the ingredients. Accurate health claims and warnings regarding ingredients should be included on food labels. The public should be educated on how to read food labels properly; reading food labels is a multi step process that includes awareness and understanding of the health consequences of the ingredients.

Students
Zhaoying Chen, Fan Lin, Shaista Shabbir

Research Mentor
Dr. Peter Horvath

Title
Dietary Means of Reducing Metabolic Syndrome Across the Lifespan

Abstract
Metabolic syndrome is a grouping of several diseases such as diabetes; hypertension; and cardiovascular disease which alter biochemical processes; which make it difficult to perform simple everyday tasks; possibly even leading to premature death. One of the major factors that alter the prevalence of metabolic syndrome is one's diet. The effects of diet in different age groups range from developmental stages prior to birth to adulthood. A deficiency in several micronutrients (vitamin A; vitamin D; vitamin E) and maternal energy imbalance predisposes the offspring to metabolic syndrome. During adulthood dietary factors that influence metabolic syndrome are excess calories; excess sodium intake; and lack of antioxidants (micronutrients and phytonutrients). Possible interventions to prevent the occurrence of metabolic syndrome include an increase in fruits and vegetables and specific micronutrient supplementation as well as a return to traditional low sodium diets.

Students
Joseph Couche, Katherine Hall, Erin O'Brien, Tanner Wakefield

Research Mentor
Peter Horvath

Title
Global Prevalence and Etiology of Metabolic Syndrome

Abstract
Metabolic syndrome is a condition diagnosed based on a collection of symptoms that increase an individual's risk of cardiovascular disease and type 2 diabetes. The symptoms include large waist circumference; low HDL levels; high blood pressure; triglycerides and glucose. The United States has one of the highest prevalence of metabolic syndrome; along with China; Malaysia; India; and Turkey. This pattern is directly correlated to malnutrition causing obesity and with diets consisting of processed or sugary foods; sodium-rich and fast foods. Some people may be predisposed to metabolic syndrome based on genetics such as obesity; lipoprotein size and development of high blood pressure; increasing an individual's risk of developing metabolic syndrome. Lifestyle patterns; including physical activity; also influence the development of metabolic syndrome. By increasing daily physical activity; altering diet and taking steps to prevent obesity; the onset of metabolic syndrome can be prevented and reversed.

Student
Isabel M. Hall

Major
Environmental engineering

Research Mentor
James N. Jensen

Title
Evaluation of Natural Absorbent Materials for Menstrual Health Maintenance in Low-Resource Settings

Abstract
Lack of menstrual health maintenance (MHM) supplies in low-resource countries has profound effects on the lives of girls. For example; it is known that school attendance is low when MHM supplies are unavailable. The current effort at UB in using sustainable natural materials for water treatment (EmSWAT; Empowered Sustainable Water Treatment) has been extended to MHM supplies. This poster will present the results of an experimental study to evaluate sawdust as an absorbent material for sanitary pads. Larger particle diameter sawdust (between 297 and 841 um) absorbed about 3.1 g water/g sawdust; while smaller particle material (less than 297 um) absorbed about 2.3 g water/g sawdust. For both particle sizes; absorption of water by sawdust was nearly at equilibrium after 5 minutes. Implications for MHM will be discussed.

Students
Kayla Holland, Lydia Mack, Patrick Queiroz

Research Mentor
Dr. Peter Horvath

Title
Reading Between the Lines of Food Labels

Abstract
The ambiguity of food labels and packaging is a global issue because the design is more towards selling a product rather than informing a consumer. The deceptive nature has led to the exploitation of consumers which has resulted in exacerbating health issues such as obesity; heart disease; and diabetes. Dietary guidelines; artificial claims; and targeted packaging are all at fault. Exaggerated claims and hard to understand food labels harm consumers' trust towards the food industry. These manipulations target those who may not be well-informed in the subject of nutrition. It is imperative that specific and accurate modalities of universal labeling for food items be introduced globally. Packaging and labeling should include mandated warnings; as well as simplified laymen terms for complicated chemical terminology.

Student
Angie Quilla

Major
Geography and G.I.S.

Research Mentor
Dr. Carl Nightingale

Title
Peru: Urban Segregation History and Today

Abstract
Urban segregation is not a phenomenon; but rather a system created and kept by society's benefactors. Dr. Nightingale's 2012 book Segregation: A Global History of Divided Cities goes into the history of segregation from around the world; as well as it functions and the role it plays in societies today. This presentation is derived from Nightingale's work; and expanded on by Angie Quilla. Peru: Urban Segregations History and Today goes into depth on how and why segregation started; and its role today in the country of Peru. Peru's segregation started during it's early colonization; when sectors of the city were divided for people of each color. Although these acts were done hundreds of years in its past; Peru today still has visible separations of its people. This presentation hopes to show the acts of segregations that are being kept in place today; and the high price we pay for it.

Today's poster symposium is a microcosm of the diverse research

Today's poster symposium is a microcosm of the diverse research and creative projects on-going at The University at Buffalo. In limiting the number of student presentations from the various undergraduate schools, a wide variety of scholarly and creative works was able to be showcased. During this poster session we celebrate UB's undergraduate students and their faculty mentors who are engaged in innovative work and scholarly research. The nominated student works you are viewing are stellar examples of the undergraduate research opportunities available to UB students. Thank you for joining us today as we "Celebrate Excellence" in undergraduate research and creative works.

In Memoriam

Over the years, our UB students involved in research and discovery have benefitted from the advice and service of many passionate faculty and professional staff members. While there are many to thank for this extra service and commitment, we reflect today on a friend to research and discovery; the late Dr. Peter Nickerson.

Dr. Nickerson, a former professor in the Department of Pathology and Anatomical Sciences was a dedicated champion of undergraduate students involved in research and discovery. While Peter is greatly missed, we carry on his enthusiasm for solving the unsolved and making the world an even better place. Thank you Dr. Nickerson for having shared your passion with all of us.