FOURTEENTH ANNUAL
Celebration of Student Academic Excellence

THURSDAY, APRIL 26, 2018 | CENTER FOR THE ARTS

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KEY

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

Member of CSTEP
(Collegiate Science & Technology Entry Program)

Member of LSAMP
(Louis Stokes Alliance for Minority Participation)

Member of McNair Scholars Program

Sustainable Project*

Member of University Honors College

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.
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KEY

∑ = Sigma Xi**

♀ = Sustainable Project*

W = Women in Science and Engineering

**Sigma Xi is an international science and engineering honor society designed to reward excellence in scientific research and to encourage a sense of companionship and cooperation among scientists across all fields. Sigma Xi has had 200 Nobel laureates as members and currently has over 60,000 members in over 100 countries. As part of this Celebration of Excellence, Sigma Xi is pleased to recognize the top three posters from UB’s graduate program for its "Spoudon Xynones" - Companions in Zealous Research" award.
The study of the dynamics of the Fermi-Pasta-Ulam-Tsingou (FPUT) chain remains a challenging problem.

Inspired by the recent work of Onorato et al. (PNAS 112, 4208 (2015)) on thermalization in the FPUT system, we report a study of relaxation processes in a 2-body FPUT system in the canonical ensemble, with comments on 3- and 4-body systems as well. The purpose of the study is to demonstrate a novel application of the Recurrence Relations Method (RRM) introduced by Zwanzig, Mori, Lee and others to weakly nonlinear FPUT systems. We have obtained the first 200 levels of the continued fraction representation of the Laplace transformed momentum autocorrelation function (ACF) for the 2-body system. The ACF resulting from RRM techniques is shown for several system configurations and compared against numerical simulation in order to evaluate the efficacy of the RRM in these regimes, showing good agreement for short time scales.

Student  James Biondo
Major  Communication
Title  Visualizing the Allure of Rock Climbing
Abstract  Rock climbing is a restorative sport to enjoy your entire life. It strengthens your body while increasing flexibility and stamina. People can start climbing at any age. I started at age 22. My father, a 58 year old heart attack survivor, has taken up the sport with me. We appreciate the sport's proactive health benefits. To capture the timeless magnetism of this sport, I am constructing a website to collect and interpret a range of archival imagery, contemporary photographs, case studies, personal stories, and digital resources that will help us understand why people climb mountains. The website explores the rich language of how and why mountains are portrayed by artists, photographers, poets, and people today. My poster encapsulates the website. I am using Photoshop to create an original, multi-layered digital image to visualize the mountain’s allure. The project is my Benchmark Assignment for the course, COM 447, Communications Graphics.
be even higher as many cases go untreated or misdiagnosed. The present narrative inquiry study examined self-identified conservative Christian women's experiences with dyspareunia in the Southern U.S. Our sample consisted of eight 21-34 year-old Euro-American women medically diagnosed with and currently receiving treatment for dyspareunia. Participants completed a brief survey, followed by a semi-structured life-history interview. Interviews were recorded and transcribed. Using thematic analysis, four recurring themes emerged, including (1) participants' descriptions of pain and discomfort during sex, (2) challenges in intimacy with their partner(s), (3) dismissive treatment from medical professionals, and (4) struggles of finding accurate information and resources. Our study demonstrates the lack of education and concealed sexual issues for women, and highlights the real-world implications this has on women's overall wellness.

Student
Corrine Cardinale

Major
History and Communication

Research Mentor
Dr. Tamara Thornton

Title
A Penny for Your Rags: Rag Pickers and the Paper Industry in the Late 19th Century

Abstract
This paper focuses on the economic structure and labor history of the paper industry from the mid-1800s to the end of the century as it pertains to a key input—rags. It examines the transformation of rags into paper and the turnover of rags from a rag picker to the manufacturer, a process that could take a number of forms and involve a variety of workers and rag collectors and middlemen. In addition to these economic factors, this paper also focuses on the social history, specifically the work and lives of rag pickers. This paper analyzes the relationships between rags, paper and rag pickers. My main sources are newspapers and magazines, paper trade journals, books on the manufacturing of paper, and images. Based on my research, I argue that rag pickers, living in poverty and working under terrible conditions, made significant economic contributions to the 19th century paper industry.

Student
Alfred Chan

Major
Communication

Research Mentor
Debra Kolodczak

Title
Highlighting the "Human" in the Age of Digital Resumes

Abstract
Forbes published a recent (Jan. 18, 2018) article that resonates with my work in showing the human side of the digital resume. The article, Social Recruiting Is Growing. Are You Prepared? underscores the power of using social media particularly since 'Facebook Jobs' launched last year. Given the fact that "Facebook has 1.86 billion users compared to LinkedIn's 467 million" the article includes helpful tips for recruiters and job applicants.

As a college student with various internship experiences, I've observed that many of my peers seem unaware of how to prepare their resume, and become discouraged in searching for the job of their dreams. To solve this problem, I am creating a visual interpretation of the big picture of what is involved in landing a job. The objective of this creative project is to show how to highlight ourselves as people with unique thoughts, personalities, ideas, and interests.

https://www.forbes.com/sites/gradsforlife/2018/01/18/social-recruiting-is-growing-are-you-prepared/
#3dfcf79e9cae

Student
Rachel Charette

Major
History

Research Mentor
Dr. Tamara P. Thornton

Title
1940's Social Activism of Women on College Campuses

Abstract
This research examines the prevalence of social activism among women in higher education institutions during the 1940’s. As men left campuses to fight in World War II, women gained leadership roles and shifted the social climate of their campuses. They led discussions and spoke out against anti-Semitism, segregation, and social injustices within the United States. The goal of the CURCA research grant was to gain the perspectives of women from Howard University such as Pauli Murray who led sit-ins in Washington D.C. In combination with archival research from the University at Buffalo's archives, this research discusses the impact of these women and how their intersecting identities impacted their activism.

Student
Ashley Cohen

Major
Classics/Sociology

Research Mentor
Dr. Livingston V. Watrous

Title
Religiosity Concerning the Sea Following the Eruption at Thera: A Case Study in Minoan Marine Style

Abstract
The volcanic eruption at Thera, now known as Santorini in the Mediterranean Sea, which occurred sometime between 1663 and 1559 BCE, had devastating impacts on the surrounding areas. Because of this natural disaster, the Minoan peoples on the Greek island of Crete turned to religion to explain the after-effects of the eruption, such as earthquakes and tsunamis. Following the end of Late Minoan IA (~1580-1510 BCE), an abundance of objects with marine styles, motifs and designs were produced. Using case studies of these objects; both in addition to these economic factors, this paper also focuses on the social history, specifically the work and lives of rag pickers. This paper analyzes the relationships between rags, paper and rag pickers. My main sources are newspapers and magazines, paper trade journals, books on the manufacturing of paper, and images. Based on my research, I argue that rag pickers, living in poverty and working under terrible conditions, made significant economic contributions to the 19th century paper industry.

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#3dfcf79e9cae

Student
Rachel Charette

Major
History

Research Mentor
Dr. Tamara P. Thornton

Title
1940's Social Activism of Women on College Campuses
Undergraduate Presenters

Dr. Peter Thanos

Title
Search for New Physics in ZH Production at the LHC and e+e- colliders

Abstract
Since the discovery of the Higgs boson at the LHC in 2012 the effort has shifted in precision studies of the new particle. The production of the Higgs boson in association with a Z boson is an important process at the LHC and a possible future electron-positron collider for precision studies of the properties of the Higgs boson. New physics could emerge in virtual contributions to this process and more precise measurements may reveal these signals of new physics. I will present the state of the art of predictions for ZH production and the implications of a possible new physics scenario.

Dr. Robert E. Baier

Title
Potential Arrest and Attenuation of Catheter Infections by cpTi Portals and Delmopinol Treatment

Abstract
A suspension of living Staphylococcus epidermis (common skin bacteria) will be prepared and wiped over the external portion of a Hydrocephalus Shunt catheter placed through a human skull via a commercially pure Titanium (cpTi) portal (similar to Dental Implant). Subsequent “wipe samples (swabs)” will be made of the shunt at both skull-exterior and skull-interior locations, and standard microbiological “smears” made from these swabs onto standard agar-containing dishes to be placed into a 37°C incubator for generation of subsequent bacterial growth and recording of the results. After determination of the differential catheter section (exterior vs. interior) growth characteristics, the exterior catheter segment will be secondarily wiped with a delmopinol (biofilm-fighting reagent)-wetted swab, and again re-sampled sequentially for bacterial reduction and re-growth. All shunt catheter work will take place within an isolation cabinet.

Dr. Elizabeth K. Thomas

Title
Holocene hydroclimate in high Arctic Svalbard using the hydrogen isotope composition of leaf waxes

Abstract
The Arctic hydrological cycle will likely intensify in the future, with implications for ice sheets and sea level rise. To understand these changes, it is necessary to study the hydroclimate of the Arctic during previous warm
times. We use the hydrogen isotopic composition of leaf waxes preserved in lake sediments to infer hydroclimate of the past 10,000 years in High Arctic Svalbard. Leaf waxes are produced by terrestrial and aquatic plants as a protective coating on leaves and record the hydrogen isotopic composition of plant source water, which in turn is controlled by moisture source, temperature, and evaporative enrichment. Our record shows terrestrial and aquatic plant waxes decrease rapidly in the early Holocene. 2H-enrichment follows in the middle Holocene and remains stable, until the middle-late Holocene when plant waxes become extremely 2H-depleted, followed by 2H-enrichment, and, then, another span of 2H-enrichment following rapid 2H-depletion approaching current day.

Student -uppercase Katherine Eaton
Major Biological Sciences
Research Mentor Dr. Mary Alice Cofroth
Title Genetic diversity of Plexaurella dichotoma symbionts throughout a bleaching event
Abstract Many corals exist in obligate mutualistic symbioses with microalgae in the genus Symbiodinium. With environmental stress, corals may lose their symbionts in a process known as bleaching. This study examined the effect of the 2015 bleaching event on symbiont density and type in the Caribbean octocoral, Plexaurella dichotoma. Bleaching and recovery of tagged colonies were monitored in the Florida Keys from May 2015-August 2017. Bleaching severity was estimated with cell counts, and genetic identification of Symbiodinium type was done via standard molecular analyses. Bleaching was widespread in September 2015, but cell densities had returned to pre-bleaching levels by March 2016. In the following year, typical small-scale non-bleaching changes in symbiont density were observed. Genetic analyses revealed three distinct symbiont genotypes in our samples, although none of the host colonies of P. dichotoma changed symbiont type throughout the study, and symbiont genotype had no effect on bleaching severity.

Student uppercase Anthony Ebron
Major Geological Sciences
Research Mentor Elizabeth Thomas
Title Using Water Isotopes in Streams to Understand the Hydrologic Cycle in Western New York
Abstract Water isotopes are a tool that can help us understand snowmelt and the hydrologic cycle in Western New York. Water samples were collected during March and April 2017 from Ellicott Creek on UB North Campus and a spring-fed stream in Williamsville. Results show that δ18O and deuterium-excess vary in step with changes in the hydrologic cycle. When rain events occur, δ18O becomes depleted while deuterium-excess becomes enriched. Since the spring-fed stream flows into the creek, they display similar trends. Dry days are represented by enriched δ18O and depleted deuterium-excess. On warm days, snow melts causing 18O-depleted water to flow into streams, which is also represented as cold water temperatures, derived from melting snow. In conclusion, the isotope ratios mirror many different factors that control snowmelt and the hydrologic cycle. These water isotopes prove to be a powerful and useful tool to reconstruct the interactions of weather and the hydrologic cycle.

Students uppercase Anne Fortman, Lauren Hay
Major Physics
Research Mentor Dr. Salvatore Rappoccio
Title Differential Cross Section of Jet Mass at the Large Hadron Collider
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 two-jet events for the purpose of studying background due to quantum chromodynamic (QCD) radiation. A grooming algorithm known as Soft Drop is used to remove this background. The elimination of QCD background will allow for higher precision measurements at high energies to be conducted at the Large Hadron Collider, paving the way for future discoveries.

Student uppercase Steven Gothan
Major Communication
Research Mentor Debra Kolodczak
Title Understanding the Hydrologic Cycle in Western New York
Abstract Water isotopes are a tool that can help us understand snowmelt and the hydrologic cycle in Western New York. Water samples were collected during March and April 2017 from Ellicott Creek on UB North Campus and a spring-fed stream in Williamsville. Results show that δ18O and deuterium-excess vary in step with changes in the hydrologic cycle. When rain events occur, δ18O becomes depleted while deuterium-excess becomes enriched. Since the spring-fed stream flows into the creek, they display similar trends. Dry days are represented by enriched δ18O and depleted deuterium-excess. On warm days, snow melts causing 18O-depleted water to flow into streams, which is also represented as cold water temperatures, derived from melting snow. In conclusion, the isotope ratios mirror many different factors that control snowmelt and the hydrologic cycle. These water isotopes prove to be a powerful and useful tool to reconstruct the interactions of weather and the hydrologic cycle.

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**Student**

Jacob A. Graca

**Major**

Biological Sciences/Dentistry

**Research Mentor**

Dr. Praveen R. Arany

**Title**

Functionalized Prostheses for Dentistry

**Abstract**

Candida-associated denture stomatitis (CADS) is a highly prevalent fungal infection in denture-wearers. Our objective was to repurpose the dental thermopolymer, polymethylmethacrylate (PMMA) as a filament to rapidly and inexpensively 3D-print patient-customized dentures, and functionalize the denture tissue interface using controlled-release polycaprolactone (PCL) microspheres loaded with Amphotericin-B (AmB) for anti-fungal therapy. Custom filaments were fabricated from PMMA resin and powder using a syringe-extrusion technique and functionalized by adding AmB-loaded PCL microspheres at 0.2% w/v. Using a fused-filament 3D-printer, polymeric discs were printed with either PMMA alone (control) or various layers of AmB-loaded PMMA. FTIR indicated the presence of AmB in the loaded PMMA discs. Control-release studies indicated AmB release over protracted time, at adequate doses, in 1-layer AmB-loaded PMMA. Results demonstrated the functionality of 3D-printing dental prostheses with a functionalized tissue interface to reduce the effects of CADS and the feasibility of incorporating this novel interface technology into other clinical therapies.

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**Student**

Joshua Hazelnis

**Major**

Chemical Engineering

**Research Mentor**

Timothy Cook

**Title**

The Molecular Chemistry Of Redox Flow Batteries

**Abstract**

Redox Flow Batteries (RFBs), which are identified as efficient large scale electrochemical energy storage devices can be a solution for the unpredictable nature associated with renewable energy sources. In a flow battery there are electrolyte solutions pumped out of external reservoirs to go over the cell phase of electrodes, which are in the main cell component. In the main cell, there are two components separating the positive and negative solutions. In order to avoid mixing of the two solution sides, there is an ion exchange membrane. The resistance of the ion exchange membrane plays a critical role in the overall cell voltage that can be obtained by the device. Usually the membrane can display different resistance after being pre-treated under various conditions. In light of determining the range of commonly used membranes, we have used electrochemical impedance spectroscopy to map out and determine resistance values over time.

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**Student**

Kayla Hollister

**Major**

Geology

**Research Mentor**

Elizabeth Thomas, Owen Cowling

**Title**

Tracking freshwater isotopes through changes in season and precipitation amounts in Western New York

**Abstract**

Understanding the hydrological cycle is imperative to civilization. Studying everything from disastrous floods to extreme droughts can offer insight to different factors of the water cycle, and can aid in predicting future changes. Tracking stable water isotopes through changes in season and precipitation amounts gives more knowledge on Western New York hydrological processes. Beginning in June 2016, water samples have been collected once a month from three separate streams in Williamsville, New York. These stream samples, along with a record of precipitation samples taken on the roof of Cooke Hall, have been analyzed for their amount of 6O-18 on a Cavity Ringdown Laser Spectrometer. Results show that the 6O-18 value from the streams is most depleted during winter months, most enriched during summer months, and decreases after major precipitation events.

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**Student**

Amanda Levy

**Major**

Psychology

**Research Mentor**

Dr. Jamie Ostrov, Ph.D

**Title**

Examining Respiratory Sinus Arrhythmia and Prosocial Behavior in Early Childhood: A Concurrent and Longitudinal Study

**Abstract**

Previous research has suggested that prosocial behavior is related to Respiratory Sinus Arrhythmia (RSA), a measure of vagus nerve activity theorized to be related to behavior regulation. Past research has not focused on RSA reactivity, early childhood, and assessments within classrooms. The present study investigated the relation between prosocial behavior and RSA concurrently and 6-months later in early childhood using a community sample of 34 children (12 female, M=43.27 months old, SD=4.48 months) in Western New York. At time one, RSA data were collected within the laboratory. The Preschool Social Behavior Scale–Teacher Form was used to rate prosocial behaviors at two time points. A hierarchical linear regression model was used to examine associations. Preliminary results showed that RSA reactivity accounted for a nonsignificant 19% of the variance in prosocial behavior; importantly, more participants will be used for final analyses increasing the overall statistical power for testing the hypothesis.

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**Students**

Jian Qiao Huang, Rupkatha Banerjee

**Major**

Biomedical Sciences

**Research Mentor**

Shermali Gunawardena
Title: Investigating the role of Alpha-synuclein in mitochondrial fission and fusion in Drosophila melanogaster

Abstract: Parkinson’s disease (PD) is a neurodegenerative disease characterized by the presence of abnormal intracellular inclusions termed Lewy bodies. Alpha-synuclein, a protein involved in PD, is a major component of such inclusions. While mitochondrial defects are observed during PD, how alpha-synuclein contributes to these defects is unknown. We hypothesized that alpha-synuclein influences mitochondrial fission and fusion. To test this hypothesis, we used dynamin-related protein 1 (Drp1) which causes mitochondria fragmentation and human mitofusin 2 (hMfn2) which induces mitochondria elongation with alpha-synuclein in Drosophila. We found that excess of wild type (WT) alpha-synuclein caused elongated mitochondria similar to excess hMfn2. Excess of three-times alpha-synuclein (LP3) also showed elongated mitochondria, indicating that alpha-synuclein affects mitochondria fission and fusion. Further studies will determine how alpha-synuclein influences normal mitochondrial fission and fusion mechanisms and how these defects affect PD pathology.

Student: Lilibeth Javier
Major: Dance
Research Mentor: Trebien Pollard

Title: Arrhythmia

Abstract: This semester I was invited to choreograph for the Zodiacue Dance Ensemble, a company consisting of dance majors that requires an audition to be a part of. I based my modern dance piece entitled Arrhythmia off of the anatomy of the heart. Through abstraction of literal anatomical function, the dancers represent the movement of blood through the organ itself, as well as the valves, the lungs, and ultimately the entire body. While I investigated the above, I was also interested in performance quality and chose to have the dancers represent empathy and what it would feel like to have an arrhythmia. This concert premiered March 9-11 and I had the opportunity to see my work performed each night. The choreography, lighting, and costuming came together wonderfully to properly represent the heart.

Student: Lauren Kacherski
Major: History and Spanish
Research Mentor: Gail Radford

Title: An Up-“Hill” Battle: The Introduction of the Australian Ballot in New York State 1888-1890

Abstract: Political parties presided over printing and distributing ballots to their voter bases until 1890, which allowed bribery and corruption to flourish. The Australian Ballot reform required the government to accept nominations, print and distribute official ballots to voters, create protocols for poll workers, and create a voter registration base. Opposition to the Australian Ballot defined David Hill’s term as governor of New York State. His voter base consisted of many illiterate immigrants and political machines in New York City, both of whom would have been negatively impacted by this reform. The arguments and motive of Hill and the rest of the Democratic Party show that their motivation to remain in opposition of the ballot change was due to the potential of it to limit their voting base.

Student: Momo Kobayashi
Major: Communication
Research Mentor: Debra Kolodczak, PhD, Fulbright Canada

Title: Learning by Doing: A video story about UB for students in Japan

Abstract: The purpose of this multimedia production project is to convey the efects of diferent facets of mindfulness on people’s intuitive moral judgments, manipulated through guided meditations.

Students: Alexa Kluepfel, Michael Page, Harrison Watkins

Research Mentor: Dr. Mary A. Bisson

Title: Cadmium toxicity in the macrophytic alga Chara: Role of reactive oxygen species and effect of zinc

Abstract: Reactive Oxygen Species (ROS), such as peroxides, superoxides, and hydroxyl radicals, arise in organisms as a response to stress, such as chemical pollutants or physical damage. We investigate the role ROS in responses to heavy metal stress in Chara australis. In Chara, cadmium is toxic and serves no biological purpose. We measure ROS using the modified fluorescein compound, dichlorodihydrofluorescein diacetate (DCHF-DA). DCHF-DA loses its acetyl groups upon encountering cytoplasmic esterases, and is oxidized by ROS, generating the fluorescent form, DCF. Our results reveal that when C. australis is exposed to a 2 ppm Cd solution, the production/accumulation of ROS increases. Preliminary results show that plants exposed to cadmium have higher values of ROS than controls. We will be testing whether Zn, which protects against Cd toxicity, has an efect on ROS production.

Student: Gail Radford
Major: History and Spanish
Research Mentor: Trebien Pollard

Title: Cadmium toxicity in the macrophytic alga Chara: Role of reactive oxygen species and effect of zinc

Abstract: This project looks at the impact of different facets of mindfulness on people’s intuitive moral judgments, manipulated through guided meditations.

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the importance of my year abroad experience while gaining skills in multimedia production and digital imaging. From my perspective as a Japanese exchange student, I see value in creating a short video story, specifically for an audience of my fellow students in Japan, to portray what it’s like to be enrolled in the UB Study Abroad Program. I am capturing and editing video footage of various campus activities. I am utilizing the UB Libraries multimedia production equipment, including cameras and video editing software. As I develop technical skills, I am learning about pre-production, on-location videography, post-production, and how to develop a story that conveys a specific message to a particular audience. My poster, created in PhotoShop, uses freeze frames and other visual elements relating to the video story. The overall project fulfills my Benchmark Assignment for COM 447, Communications Graphics.

Student
Krystal Alexis Lim

Major
Communication

Research Mentor
Debra Kolodczak, PhD, Fulbright Scholar

Title
Curating a digital collection of archival imagery to understand U.S. perceptions of law and social policy

Abstract
Being an international student living in America, I find it interesting to see how law and social policy are evolving in the past few years. During a visual literacy lab exercise, we surveyed and collected archival imagery the U.S. Library of Congress website. This initial exercise peaked my interest in curating a collection of 19th Century illustration sheds light on people’s perception of social order. I am collecting images that are funny and light, yet convey a deeper meaning about basic justice and human rights during the period, 1877 to 1917. Specifically, I am curating a collection of illustrations first published in Puck Magazine, and now in the public domain. I am compiling a selection of these images in a poster montage using PhotoShop.

Student
Jonathan Luo

Major
Biological Sciences

Research Mentor
Michelle Visser

Title
Comparison of the function of C-terminal Msp regions in neutrophil impairment

Abstract
Treponema denticola is the most understood species of oral spirochetes; a group of bacteria associated with periodontal disease. T. denticola causes tissue damage and the membrane outer sheath protein (Msp) impairs the movement of neutrophils (chemotaxis), which are key immune cells in the gingival tissue. Msp has 3 regions: an N-terminal, C-terminal, and central variable region. The Msp C-terminal region of strain 35405 shows the strongest inhibition of chemotaxis. We hypothesize that the C-terminal Msp region of T. denticola strains OTK and 33520, containing varying Msp sequence from 35405, will also be more effective than their whole protein at impairing chemotaxis. We have used molecular biology and recombinant protein expression techniques to isolate these Msps followed by chemotaxis assays with mouse neutrophils. The C-terminal region of Msp-OTK does impair neutrophil chemotaxis more strongly than complete OTK protein. Our results will provide insight into differing pathogenic potential of T. denticola strains.

Student
Nathan Marshall

Major
Geological Sciences

Research Mentor
Elizabeth K. Thomas, Charles Mitchell

Title
Testing proximate cause hypotheses for the End-Ordovician Mass Extinction: Do patterns of change in biomarker signature support a linkage between graptolite and phytoplankton community changes?

Abstract
The Late Ordovician, Hirnantian Age (444.7-443.4 Ma) was a glacial period with varying climate and sea level changes that are marked by geochemical signatures indicating a mass extinction. Climate change drove changes in deep-ocean circulation during the mass extinction and it appears that the graptolites were the most vulnerable. Previous work at lower resolution in this period specifically showed a decrease in denitrification and increase in abundance of green algae relative to bacteria within the Hirnantian, roughly synchronously with the mass extinction. Biomarkers, therefore, provide an opportunity to interpret changing ocean conditions and test these relations. We quantified steranes, which are produced by eukaryotic organisms (e.g., green algae), hopanes, which are specific to bacteria, and the methyl-hopanes that are biomarkers for cyanobacteria and methanotrophic bacteria. Our analyses are based upon samples that were analyzed for graptolite community structure, allowing us to directly track biomarker signatures with graptolite community structure.

Student
Amit Mehrotra

Major
Biological Sciences

Research Mentor
Paul Cullen

Title
Invertase is Required for Aggregate Filamentous Growth in Yeast

Abstract
An important question in biology is cooperation; specifically, how individuals cooperate in order to gather resources. Microbes like yeast can also cooperate. When in nutrient-limited environments, individuals of the budding yeast Saccharomyces cerevisiae are able to cooperate to a large degree through a process called filamentous growth. We studied an aspect of this activity called aggregation, where large groups of cells clump together to form complex, wedge-shaped structures that “dig” into surfaces. We identified an enzyme that produces a shared metabolite—Suc2— as being important in forming aggregates. Cells lacking Suc2— even when

Undergraduate Presenters
overcompensating for other factors important in aggregation—were not able to form aggregates. CRISPR-Cas9 is a new technology with great potential. It can be used to create point mutations in genes of interest to manipulate their activity. We are currently using this technique in yeast to explore the roles of other genes in social cooperation responses.

Student
Evan P. Murphy
Major
Psychology
Research Mentor
Leonard J. Simms
Title
Does the Five Factor Form Provide Evidence of Trait Bipolarity
Abstract
A basic question in personality disorder research is that of trait polarity, which is the question of whether personality pathology occurs at both the extremely high and the extremely low levels of personality traits, or at only one of them. The Five Factor Form (FFF) is one of the few measures of personality designed to operationalize trait bipolarity; this study aims to investigate the larger, basic question of trait polarity by assessing the construct validity of this measure. The responses of an already-collected undergraduate sample (N=339) to a variety of measures of personality and general functioning, including the FFF, will be assessed for trait bipolarity. Specifically, bivariate correlations will be calculated for scale scores on the FFF and the scale scores of a subset of the measures of general functioning participants also completed. This first round of analyses will then be followed by factor analysis of the FFF.

Student
Hemapriya Navaindran
Major
Psychology
Research Mentor
Julie Bowker

Title
Shyness, Friendship Quality and Depression: The Moderating Role of Friend Shyness
Abstract
Shyness is a well-known risk factor for psychosocial maladjustment. Not all shy youth experience difficulties, but little research has considered sources of this heterogeneity. This study examined whether the degree to which adolescents’ friends are shy or friend shyness moderates the associations between shyness and friendship quality and depressive symptoms. Participants were 271 adolescents (Mage = 11.79 years) who reported on their friends and completed peer nominations of shyness and self-report measures of friendship quality and depressive symptoms at two-time points (T1, T2). Regression analyses revealed interaction effects involving adolescent shyness, friend shyness, and gender when predicting T1 depressive symptoms ($\beta = 1.23, p = .05$), and friend shyness and gender when predicting T2 depressive symptoms ($\beta = 0.37, p = .03$). Follow-up analyses suggested that highly shy friends may lessen depressive symptoms for shy and non-shy boys, but not girls, perhaps because highly shy boys are sensitive/caring friends.

Student
Maria Ng
Major
Psychology
Research Mentor
Dr Alexis Thompson

Title
Developing an Assay to Compare the Opioid-Enhancing Effect of Different Components of Amniotic Fluid
Abstract
A notable consequence of ingesting placenta and amniotic fluid during delivery is that it may relieve pain by enhancing endogenous opioid regulation of pain. Previous research suggests that there is a compound present in placenta and AF that enhances the analgesic action of endogenous or exogenously-administered opioids in both female and male rats. Identifying the molecular structure of this compound may lead to the development of useful adjunctive treatments for opioid therapy. This study evaluates the validity of a newer pain test, the Cold Water Tail Flick (CWT F) Test, for use in a repeated measures design. If the first study supports a repeated measures design, a second study will compare the effectiveness of 3 components of AF that differs in molecular weight to enhance DPDPE-induced hypoalgesia. The latter results will replicate and extend previous data using a between-subjects design.

Student
Jessie Pelosi
Major
Biological Sciences and Environmental Geosciences
Research Mentor
Mary Alice Coffroth, Howard Lasker

Title
Morphological and genetic variation in the Caribbean octocoral Plexaura homomalla
Abstract
Authors: Jessie Pelosi, Howard Lasker, and Mary Alice Coffroth Systematics that accurately reflect phylogenetic relationships between octocorals is crucial in estimating species distributions and abundances and in developing appropriate conservation strategies. The Caribbean octocoral Plexaura homomalla has two recognized forms, forma kukenthali and forma homomalla, which may be distinct species. Morphologic analysis of internal skeletal components, sclerites, is traditionally used to distinguish octocoral species, and can be supplemented with molecular genetics. Elliptical Fourier analysis of sclerite form revealed a high level of intra-morph variation, but little differentiation between the morphotypes. Several mitochondrial and nuclear gene regions were compared to clarify the relationship between these two morphotypes. Phylogenetic reconstructions of these regions produced no support for differentiation. These initial data suggest that the morphotypes are a single species. However, recently observed reproductive differences between the morphs suggest otherwise and require further investigation.

Undergraduate Presenters
tracked the aggregate total of disruptive teacher choice of fex seating. Observers in three conditions: entirely standard seating, entirely fex seating, and on-task behaviors among children in a western New York elementary school. This study investigated the implementation of “fex seating,” and its effects on disruptive behaviors in classrooms. This study synthesizes cross-sectional studies, case law, and current policy related to drug addiction in order to ascertain the faults in the current system. Based on these faults, ways ways for improvement in terms of successful treatment outcomes, cooperation between the medical and law professions, and the upholding of basic human rights will be proposed. Such an irrational emotion manifests into adulthood as an all-pervasive fear of failure. For some people, fear is debilitating. David Darbyshire’s simple poem, Monsters Under the Bed, is a story about a child who learns that extreme fear is irrational. In a similar way, but using visuals rather than words, I am creating a digital image that shows the progression of fear throughout a person’s lifetime. In developing this concept, Google’s Art & Culture website is the primary tool that allows me to explore world-class art collections which expand my understanding of work by classic artists and contemporary painters whose artwork evokes the emotion of fear. Ultimately, my creative work aims to echo the immortal words of Franklin D. Roosevelt, “The only thing we have to fear is fear itself.”

Flex seating, which includes yoga balls or wobble stools, is an intervention method that has been hypothesized to facilitate improved attention, self-regulation, and sensory stimulation for students who exhibit disruptive behaviors in classrooms. This study investigated the implementation of “flex seating;” and its effects on disruptive and on-task behaviors among children in two special education classrooms in a western New York elementary school. Each group of students was observed in three conditions: entirely standard seating, entirely flex seating, and teacher choice of flex seating. Observers tracked the aggregate total of disruptive and on-task behaviors of all present students in the various classroom environments for 30-minute intervals multiple times throughout each week of the data collection period. The results suggest that an entire classroom with flex seating shows no advantage over a classroom with all standard seating. However, when the teacher chose specific students to have flex seating, overall disruptive behaviors in the classroom decreased.

Flex Seating and Its Relationship to On-Task and Disruptive Behaviors

Abstract

I choreographed a tap piece for Emerging Choreographers Showcase for the Fall of 2017. This project involved a semester long process of casting, rehearsing, costume and lighting design, and technical elements. My choreography is centered around the tap boards, which provide visual and auditory changes to the landscape of the stage. Here is a link to a video recording: https://www.youtube.com/watch?v=h7rg0mNufAI&feature=youtu.be

Student

Alyssa Reese

Major

Biomedical Sciences and Legal Studies

Research Mentor

Mr. Michael Cimasi

Title

The Influence of the Medicalization of Addiction on the United States Legal System

Abstract

This project involves determining the way that the medicalization of addiction has played a role in the development of drug addiction policy and treatment courts. This research synthesizes cross-sectional studies, case law, and current policy related to drug addiction in order to ascertain the faults in the current system. Based on these faults, ways ways for improvement in terms of successful treatment outcomes, cooperation between the medical and law professions, and the upholding of basic human rights will be proposed. Such an irrational emotion manifests into adulthood as an all-pervasive fear of failure. For some people, fear is debilitating. David Darbyshire’s simple poem, Monsters Under the Bed, is a story about a child who learns that extreme fear is irrational. In a similar way, but using visuals rather than words, I am creating a digital image that shows the progression of fear throughout a person’s lifetime. In developing this concept, Google’s Art & Culture website is the primary tool that allows me to explore world-class art collections which expand my understanding of work by classic artists and contemporary painters whose artwork evokes the emotion of fear. Ultimately, my creative work aims to echo the immortal words of Franklin D. Roosevelt, “The only thing we have to fear is fear itself.”

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Student

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Research Mentor

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Celebration of Student Academic Excellence 2018

Student 🧘‍♂️ Bao Sciscent

Major Biomedical Sciences and Chemistry

Research Mentor Dr. David C. Lacy

Title A Hands-on Approach to Teaching Photochemistry to High School Students

Abstract Meaningful and effective teaching involves a combination of show and tell. Students who perform hands-on chemistry experiments directly investigate scientific phenomena and learn how to utilize laboratory instruments. A study conducted by Thomas et al. demonstrated how lab activities increase students’ academic performance. However, many high school students do not have the opportunity to participate in lab research because of a part-time job or a lack well designed programs.

Therefore, we choose a photochemistry experiment with the goal to stimulate Science Technology Education and Mathematics (STEM) enthusiasm and teach photochemistry concepts with the hope that students will pursue STEM in college. This project was done in collaboration with a high school chemistry teacher, Dr. English, at Sweet Home High School.

Student 🧘‍♀️ Jaqueline Suddaby

Major Mathematics

Research Mentor Sarah F. Muldoon

Title Mathematical Modeling of Sports Injury Networks

Abstract Injuries are a common occurrence across collegiate sports and how to best prevent sports injuries remains an open question. In order to develop methods for injury prevention, it is first useful to understand how similar injuries occur across different types of sports. Here, we use methods from network theory to model relationships between different sports and types of injuries. We model sports and injuries as a bipartite network, and apply community detection to identify clusters of sports that share similar injuries. We find that different sports that involve the use of similar body parts are indicated in similar types of injuries. Further, these findings were independent of gender. Our results can potentially influence future collaborations across sports to develop common methods to prevent future injuries.

Students 🧘‍♂️ Anthony Taboni, Avery Weissman

Research Mentor Dr. Rachael Hinkle

Title Anatomy of a Norm: How Publication Decisions Shape Issue Distribution in the U.S. Courts of Appeals

Abstract The U.S. Courts of Appeals formulate federal legal policy on a variety of topics left unaddressed by the U.S. Supreme Court. In order to deal with increasing workloads, circuit courts developed the practice of designating some opinions as unpublished. Unpublished opinions resolve the dispute in question for the litigants but do not become binding precedent. We theorize that publication norms across the circuits reflect judges’ preferences about which issue areas they prefer to be active in shaping. Judges have limited resources, and we expect that they will act strategically in maximizing their policy formation efforts in some issue areas more than others. We examine the difference in the probability of publication across issue areas and circuits. The issue area for this large number of cases was coded using a custom theoretically-motivated supervised classifier that leverages the issue area coding in the Songer database.

Students 🧘‍♂️ Layne Thurston, Thomas Krzystek

Major Biological Sciences

Research Mentor Dr. Shermali Gunawardena

Title Testing the prediction that Rip11, Nuf, and/or Nmo influence axonal motility of Rab7 and HTT

Abstract Huntington (HTT) is the protein involved in Huntington’s disease and is enriched in neurons. HTT acts as a scaffolding protein that associates with various proteins vital to neuron function and viability. Recently, our lab demonstrated that reduction of Drosophila HTT selectively influenced the retrograde axonal motility of Rab7 containing vesicles. HTT and Rab7 also co-migrated together within axons (White et. al., 2015). HTT and Rab7 have been shown to interact with molecular motors via associations with HTT or Rab associated proteins. Here we test the hypothesis that specific Rab associated proteins, Rip11, Nuf, and Nmo, are involved in the motility of HTT and/or Rab7. Findings from our experiment will be presented.

Student 🧘‍♀️ Kristin Tymchak

Major Psychology

Research Mentor Dr. Micheal L. Dent

Title The Effects of Social Experience on Ultrasonic Vocalization (USV) Production in CBA/CaJ Mice (Mus musculus)

Abstract Mice produce ultrasonic vocalizations (USVs) while engaging in social behaviors. The present study investigated whether prior social experience, separation time, and sex have an effect on USV production in mice. Twenty-four CBA/CaJ mice, 12 socially housed and 12 singly housed, were recorded in pairs after 0, 1, 6, or 24 hours of isolation. The results demonstrated that female mice emitted significantly more USVs than male mice. Additionally, there was an effect of housing condition on the number of calls produced, with individually housed females calling more than socially housed females. There was no effect of housing condition on male mice. Furthermore, it was found that separation time does not have a significant effect on the number of call
types produced. The results suggest that
the housing environment influences
the number of vocalizations CBA/CaJ
mice produce, and that females vocalize
significantly more than males when
paired with a same-sex conspecific.

**Research has been concluded but I am
still analyzing the data**

**Research has been concluded but I am
still analyzing the data**

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 KGF has proven to
promote wound closure. Hydrogels,
water swollen structures composed
mainly of hydrophilic homopolymers
or copolymers, 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-
Hydroxyethyl Methacrylate, HEMA,
hydrogel is used because of its ability
to achieve different characteristics
without much change to the polymer.

**Research has been concluded but I am
still analyzing the data**

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still analyzing the data**

Abstract

There are many great coaches in history,
both in major land college leagues. Most
coches did not take the same path as
others, some coaches were very unique
from others such as great coaches like
Phil Jackson, Kevin McHale, and Jeff
Van Gundy. These coaches were some of
the best coaches the NBA has ever
seen. All three of these coaches have
done years in college and the wisdom
and knowledge that they learned and
have translated that into their coaching
styles and it has given great success
to their career. We want interview
different players here at UB on different
teams such as the basketball to see how
they feel about their coaches and how
their coaches impact the team and their
lives. This will allow us to great a true
prospective that of just how much a
great coach can impact a team and guide
them into success.

**Research has been concluded but I am
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still analyzing the data**

Abstract

Neutrophils are cells of the innate
immune system that protect the oral
tissue from bacterial infection. The major outer sheath protein (Msp) of Treponema denticola, a bacterium associated with periodontal disease, reduces neutrophil chemotaxis. Msp impairs neutrophil signaling through dysregulation of the PTEN/PI3K pathway, leading to an imbalance in important cellular signaling lipid metabolites. PTEN is regulated by a variety of mechanisms including phosphorylation, oxidation, acetylation and cellular localization. To study how T. denticola affects PTEN/PI3K regulation, mouse neutrophils were exposed to Msp protein or different strains of T. denticola followed by assessment of PTEN phosphorylation and PI3K levels using western blot. These treatments decreased the phosphorylation of PTEN, which may lead to increased PTEN activity. Furthermore, PI3K delta levels were reduced, thus inhibiting chemotaxis. Knowledge of how T. denticola manipulates these pathways will give insights into how this pathogen impairs the protective neutrophil response in the oral cavity.

CSTEP
Student
Leon Butcher IV
Major
Psychology
Research Mentor
Dr. Praveen Arany
Title
Enhanced Cell Adhesion following Radiofrequency Glow discharge treatments: Impact on Regenerative Dental Pulp Cell therapies
Abstract
Clinical dentistry is a field is continuously evolving to provide solutions to microbial invasion, trauma and dental disease leading to tooth loss. The major topics of interest are to prevent dental pulp cell necrosis and replace lost tooth structure. Besides restorative biomaterials for replacement of decayed or lost tooth structure, newer biomaterials promote regeneration of natural tooth structure. This project examines the ability of Radio Frequency Glow Discharge Treatments (RFGDT) on six different biomaterial surfaces namely Polysytrene, Glass, Titanium, Polymethyl methacrylate (PMMA), Polyactic acid (PLA) and Polycaprolactone (PCL). A differential centrifugation cell adhesion assays was utilized with pre-odontoblasts (MDPC-23) cells. We observed RFGDT was able to maximally improve cell adhesion on PCL while minimal changes were noted on PMMA. These observations provide insight into the ability of RFGDT improved cell adhesion for future regenerative studies.

Jacobs School of Medicine & Biomedical Sciences
Students
Arsalan Haghdel, Cody Manzanero, Anthony Malloni, Michael Danilov, Nicole Jasinski
Research Mentor
Xiaozhong Wen, MD, PhD
Title
Trajectories of Sleep from Early Pregnancy to 12 months Postpartum among Smokers
Abstract
We examined trajectories, predictors, and health effects of sleep quality of smokers during pregnancy and postpartum. Pregnant smokers enrolled in our smoking cessation intervention study in Buffalo were followed from early pregnancy to 12 months postpartum. Sleep quality was repeatedly measured using the Pittsburgh Sleep Quality Index (PSQI) at 5 time-points during pregnancy and monthly at postpartum. The percentage of pregnant smokers with poor sleep quality (PSQI >5) increased from pre-test to post-test (63.8% vs 66.7%), but decreased at end-of-pregnancy (57.9%). Poor sleep quality continued through postpartum with the percentage of mothers with poor sleep quality being 70%, 66.7%, and 60% at 1-month, 6-months, and 12-months, respectively. High baseline depressive score was associated with poor sleep quality during pregnancy and postpartum. Poor sleep quality predicted lower adherence to our smoking cessation intervention. High prevalence of poor sleep during pregnancy and postpartum needs to be targeted in future smoking cessation interventions.

Student
Coral Lopez-Jimenez
Major
Chemistry & Political Science
Research Mentor
Dr. Piero R. Bianco; Mr. Wenfei Ding
Title
Analyzing the intrinsically disordered linker of E. coli SSB protein
Abstract
The Escherichia coli single stranded DNA binding protein (SSB) is critical to DNA metabolism. The intrinsically disordered linker (IDL) is critical to all protein-protein interactions of SSB. Truncating and/or mutating the IDL sequence impairs binding to ssDNA2. SSB binds to RecO in vivo with high affinity. We will determine the key components of IDL that bind to RecO and will express the relevant proteins in vivo in the same cell, purifying potential complexes using nickel column chromatography. SSB+RecO; his-GFP-linker+RecO and various linker mutants will be tested. This research will help further our understanding of the interaction between the IDL and a key partner protein.

Student
Paul C. Inzerillo
Major
Biological Sciences
Research Mentor
Dr. Richard A. Rabin, PhD

Undergraduate Presenters
Title:
The Effect of ATP on Ethanol-Induced Microglial Phagocytosis

Abstract:
Of the estimated 1.7 million individuals who suffer a traumatic brain injury (TBI) annually, 30-60% were intoxicated at the time of their injury. Microglia, the innate macrophages of the central nervous system, play a key role in response to TBI and corresponding neuroinflammation in part through their uptake of extracellular debris (i.e., phagocytosis). While it is clear that ethanol increases phagocytosis through a scavenger pathway, the mechanism for this process is still uncertain. Nevertheless, many of the purinergic P2X receptors, some of which function as receptors in macrophage activation, are expressed in microglia. This suggests a possible pathway for ethanol’s effects. To reveal the role of purinergic receptors in ethanol-induced phagocytosis, the uptake of fluorescent beads in the presence of ATP and ethanol was measured using flow cytometry. Elucidation of the effects of ethanol on the phagocytosis pathway will allow for further development of rational therapeutic interventions in TBI.

Student: Parveen Attai
Major: Biomedical Sciences & Psychology
Research Mentor: Kai Ling Kong, PhD
Title: Relationship between screen use and relative reinforcing value of food in preschoolers

Abstract:
Many factors contribute to the childhood obesity epidemic in the United States. This study explores a possible link between two: screen use and relative reinforcing value of food (i.e. motivation to earn a food versus a non-food reward). Twenty 3-4-year-old children were recruited. Parents reported on screen use and reinforcing values were measured using a task developed in this lab. Children played two versions: one in which they pressed a computer mouse button to earn a piece of food, and one to hear ten seconds of song play. There is a risk for childhood obesity if screen use surpasses the American Academy of Pediatrics’ recommendation of less than one hour/day and/or if the reinforcing value of food is greater than music (i.e the child plays longer to earn food). Findings are expected to show a positive correlation between these two factors. Implications will be discussed.

Student: Brenden Bratton
Major: Biomedical Sciences
Research Mentor: Wilma A. Hofmann
Title: Effect of Fatty Acids on Prostate Cancer Cell Proliferation and Metabolism

Abstract:
The most common cancer in men is prostate cancer. Multiple correlation studies demonstrated that obese men have a significantly higher incident of aggressive prostate cancer than men of healthy weight. To understand the processes involved in this relationship, we are analyzing effects of fatty acids that are common in diet on various cellular functions of normal prostate and prostate cancer cells. The objective of my project was to understand how fatty acids act on prostate cells by testing the hypothesis that certain fatty acids in the microenvironment of cells have varied effects on cellular metabolic activity. To test this hypothesis, prostate cells (non-cancer and cancer with varying degrees of invasive ability) were subjected to increasing concentrations of fatty acids followed by measurement of metabolic activity. The results show distinct effects of specific fatty acids on each cell line. This suggests that dietary fatty acids could influence prostate cancer progression.

Student: Michaela Cornaire
Major: Biology, philosophy
Research Mentor: Dr. Jennifer Surtees

Title: Influence of MSH3 Concentration and the ATP Binding Pocket in MSH3 on 5' Flap Processing

Abstract:
MSH3, found in the MSH2/MSH3 heterodimer, has been shown to promote genomic stability by recruiting repair factors in several repair mechanisms. However, it has also been shown to potentially cause instability by interfering in normal base-excision repair (BER) by competing for binding to 5' flap DNA intermediates. This study sought to identify the contributions of MSH3 concentration and of the ATP binding pocket in MSH3 in 5' flap processing, as ATP is a major regulator of MSH3. Methyl Methanesulfonate (MMS) was used to induce BER in modified alleles of Saccharomyces cerevisiae, with modifications in the ATP binding pocket or in concentration of MSH3. When compared to control conditions, it was found that none of the modifications promoted 5' flap binding. However, evidence was obtained that the modification that led to ATP binding dysregulation increased survival in MMS conditions, and therefore may have decreased 5' flap binding that interfered with BER.

Student: Beverly DiCorso
Major: Biomedical Sciences
Research Mentor: Dr. Fraser J. Sim
Title: Exploring the Effect of PI-88 on IFN-Gamma Induced Pathological Quiescence 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 proliferate and migrate to lesions in response to injury-associated signals and differentiate into oligodendrocytes capable of remyelinating demyelinated axons. However, pro-inflammatory cytokine IFN-Gamma blocks OPC proliferation by inducing pathological quiescence and likely contributes to remyelination failure. Sulfatase
Abstract

Introduction: Few US children meet national fruit and vegetable intake recommendations, highlighting a need for interventions. Children generally do not like fruits and vegetables, which acts as a barrier to their consumption. Research has demonstrated that repeated taste exposures can increase children’s acceptance and liking of target foods.

Methods: Seventeen 6-to-8-year-old children participated in nine hands-on cooking sessions during summer camp. Preferences for nine fruits and vegetables were measured at baseline and post-test. Four disliked/unfamiliar foods were chosen as target foods for children to be repeatedly exposed to in recipes, based on baseline assessments.

Results: Overall there was a trend-level (p<.10) increase in preferences for target foods from baseline to post-test and a trend-level decrease in preference for comparison foods not included in recipes.

Discussion: Results fit with hypotheses, demonstrating the potential of applying repeated exposure techniques via hands-on cooking. Future directions will be discussed.

Students

Hannah Ferrari, Zhishan Yang

Research Mentor

Dr. Xiaozhong Wen, MD, PhD

Title

Maternal physical activity during pregnancy: trajectories and determinants

Abstract

Purpose: To examine gestational physical activity (PA) trajectories throughout pregnancy and identify predictors and health impacts of PA.

Method: Participants in the UB Pregnancy and Smoking Cessation Study reported their PA in the past 7 days using the International Physical Activity Questionnaire, and its predictors (employment status, season, and number of children) during pre-test, post-test, and end-of-pregnancy. PA was quantified in Metabolic-Equivalent (MET)-minutes/week.

Results: Mean PA decreased from the pre-test (6648 MET-minutes/week) at the post-test (5701), but increased at the end-of-pregnancy (7407). Employed mothers (7813) had higher mean PA than unemployed mothers (3556). The mean PA level was highest in summer (6893), followed by winter (6584) and autumn (6403), and lowest in spring (2710). Mothers without a live birth (9636) had higher mean PA than those with (5546).

Conclusion: High PA level during pregnancy was related to end-of-pregnancy, summertime, being employed, and being a first-time mother.

Student

Benjamin Gutsin

Major

Business Administration/Pre-Medicine

Research Mentor

Dr. Leonard Epstein, PhD.

Title

Episodic Future Thinking and Delay Discounting in Person’s with Prediabetes

Abstract

Many U.S. adults are living with prediabetes, a condition which places them at high-risk for developing Type 2 Diabetes. One of the many factors that increase risk is impulsive decision making with respect to health behaviors. Delay discounting, the bias for the smaller immediate rewards, is used as a measure. Research has shown that episodic future thinking (EFT), which is the mental simulation of future events, reduces delay discounting by reframing time perspective to value delayed outcomes. In this study, 67 participants were recruited from the local Buffalo and Virginia communities. Participants were randomly assigned to one of two groups: an episodic recent thinking (ERT) control group along with an EFT group. All participants completed baseline measures of delay discounting and at subsequent visits with their created EFT or ERT cues present. Results showed that in the presence of EFT cues, delay discounting was significantly reduced when compared to controls.

Student

Geto Head

Major

Biomedical Sciences

Research Mentor

Stephanie Anzman-Frasca

Title

Testing repeated exposure to target fruits and vegetables through hands-on cooking as a way to increase children’s preferences for less liked foods

Abstract

enzymes promote IFN-Gamma signaling, the removal of 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. This study investigates the ability of PI-88 to partially rescue OPCs from their induced quiescent state in vivo, resulting in increased proliferation and migration of OPCs to lesions. Using a lysolecithin-induced model of focal demyelination in the mouse spinal cord, we demonstrated that IFN-Gamma significantly reduced the number of Olig2+ migratory OPCs as well as the number of BrdU+ proliferative OPCs in the lesion site at 5 days post lesion, while PI-88 restored OPC cell density in a lesion almost to that of baseline and partially restored the number of OPCs that underwent cell division. Moreover, our data indicated an increase in microglial migration to lesion sites in response to IFN-Gamma, which was ameliorated by PI-88. This result suggests that PI-88 reduces the inflammatory effect caused by pro-inflammatory cytokine IFN-Gamma, which could potentially reduce the autoimmune inflammatory effect experienced in MS exacerbations. Our data suggests that the IFN-Gamma-induced quiescent state does in fact compromise OPC proliferation and migration to lesions, while PI-88 rescues OPCs from their quiescent state, promoting proliferation and migration. Future work will determine the capacity of PI-88 to block the negative effects of IFN-Gamma on subsequent oligodendrocyte generation and remyelination. This research is important in establishing sulfatase modulation as a therapeutic approach for IFN-Gamma-induced pathological quiescence.

Student

Sarah Ehrenberg

Major

Biomedical Sciences

Research Mentor

Stephanie Anzman-Frasca

Title

Testing repeated exposure to target fruits and vegetables through hands-on cooking as a way to increase children’s preferences for less liked foods

Abstract

Introduction: Few US children meet national fruit and vegetable intake recommendations, highlighting a need for interventions. Children generally do not like fruits and vegetables, which acts as a barrier towards their consumption. Research has demonstrated that repeated taste exposures can increase children’s acceptance and liking of target foods.

Methods: Seventeen 6-to-8-year-old children participated in nine hands-on cooking sessions during summer camp. Preferences for nine fruits and vegetables were measured at baseline and post-test. Four disliked/unfamiliar foods were chosen as target foods for children to be repeatedly exposed to in recipes, based on baseline assessments.

Results: Overall there was a trend-level (p<.10) increase in preferences for target foods from baseline to post-test and a trend-level decrease in preference for comparison foods not included in recipes.

Discussion: Results fit with hypotheses, demonstrating the potential of applying repeated exposure techniques via hands-on cooking. Future directions will be discussed.

Students

Hannah Ferrari, Zhishan Yang

Research Mentor

Dr. Xiaozhong Wen, MD, PhD

Title

Maternal physical activity during pregnancy: trajectories and determinants

Abstract

Purpose: To examine gestational physical activity (PA) trajectories throughout pregnancy and identify predictors and health impacts of PA.

Method: Participants in the UB Pregnancy and Smoking Cessation Study reported their PA in the past 7 days using the International Physical Activity Questionnaire, and its predictors (employment status, season, and number of children) during pre-test, post-test, and end-of-pregnancy. PA was quantified in Metabolic-Equivalent (MET)-minutes/week.

Results: Mean PA decreased from the pre-test (6648 MET-minutes/week) at the post-test (5701), but increased at the end-of-pregnancy (7407). Employed mothers (7813) had higher mean PA than unemployed mothers (3556). The mean PA level was highest in summer (6893), followed by winter (6584) and autumn (6403), and lowest in spring (2710). Mothers without a live birth (9636) had higher mean PA than those with (5546).

Conclusion: High PA level during pregnancy was related to end-of-pregnancy, summertime, being employed, and being a first-time mother.

Student

Benjamin Gutsin

Major

Business Administration/Pre-Medicine

Research Mentor

Dr. Leonard Epstein, PhD.

Title

Episodic Future Thinking and Delay Discounting in Person’s with Prediabetes

Abstract

Many U.S. adults are living with prediabetes, a condition which places them at high-risk for developing Type 2 Diabetes. One of the many factors that increase risk is impulsive decision making with respect to health behaviors. Delay discounting, the bias for the smaller immediate rewards, is used as a measure. Research has shown that episodic future thinking (EFT), which is the mental simulation of future events, reduces delay discounting by reframing time perspective to value delayed outcomes. In this study, 67 participants were recruited from the local Buffalo and Virginia communities. Participants were randomly assigned to one of two groups: an episodic recent thinking (ERT) control group along with an EFT group. All participants completed baseline measures of delay discounting and at subsequent visits with their created EFT or ERT cues present. Results showed that in the presence of EFT cues, delay discounting was significantly reduced when compared to controls.

Student

Geto Head

Major

Biomedical Sciences

Research Mentor

Stephanie Anzman-Frasca

Title

Testing repeated exposure to target fruits and vegetables through hands-on cooking as a way to increase children’s preferences for less liked foods

Abstract

enzymes promote IFN-Gamma signaling, the removal of 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. This study investigates the ability of PI-88 to partially rescue OPCs from their induced quiescent state in vivo, resulting in increased proliferation and migration of OPCs to lesions. Using a lysolecithin-induced model of focal demyelination in the mouse spinal cord, we demonstrated that IFN-Gamma significantly reduced the number of Olig2+ migratory OPCs as well as the number of BrdU+ proliferative OPCs in the lesion site at 5 days post lesion, while PI-88 restored OPC cell density in a lesion almost to that of baseline and partially restored the number of OPCs that underwent cell division. Moreover, our data indicated an increase in microglial migration to lesion sites in response to IFN-Gamma, which was ameliorated by PI-88. This result suggests that PI-88 reduces the inflammatory effect caused by pro-inflammatory cytokine IFN-Gamma, which could potentially reduce the autoimmune inflammatory effect experienced in MS exacerbations. Our data suggests that the IFN-Gamma-induced quiescent state does in fact compromise OPC proliferation and migration to lesions, while PI-88 rescues OPCs from their quiescent state, promoting proliferation and migration. Future work will determine the capacity of PI-88 to block the negative effects of IFN-Gamma on subsequent oligodendrocyte generation and remyelination. This research is important in establishing sulfatase modulation as a therapeutic approach for IFN-Gamma-induced pathological quiescence.

Student

Sarah Ehrenberg

Major

Biomedical Sciences

Research Mentor

Stephanie Anzman-Frasca

Title

Testing repeated exposure to target fruits and vegetables through hands-on cooking as a way to increase children’s preferences for less liked foods

Abstract

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Student
Erin Hong

Major
Biomedical Sciences

Research Mentor
Katerina Gurova

Title
Effect of Panobinostat on the FACT Complex

Abstract
Panobinostat is an HDAC (Histone Deacetylase) inhibitor which was developed to treat neuroblastoma. Previous studies reveal that continuous treatment of Panobinostat in N-Myc upregulated transgenic mouse has improved overall survival. HDAC (Histone Deacetylase) inhibitor suppresses the removal of acetyl functional group histone proteins, further loosening the interaction between the histone and the DNA. Previous research suggest that further loosening the interaction between histone and DNA increases cytotoxicity and induce apoptosis. FACT (Facilitates Chromatin Transcription) complex is highly expressed in cancer cells and play a role in loosening the interaction between the histone and DNA, facilitating transcription. We are interested in the changes of level FACT complex in response to the HDAC inhibitor. To test this, I treated two different types of neuroblastoma cells lines with different doses of Panobinostat and measured the protein level as well as the amount of DNA expression of FACT.

Students
Andrulisa Jones, Carleara Weiss, Grant Glatfeller

Major
Biochemistry and Psychology

Research Mentor
Dr. Margarita Dubocovich

Title
The effects of methamphetamine and exercise on circadian entrainment and behavior in mice.

Abstract
The suprachiasmatic nucleus (SCN) controls circadian rhythms. SCN lesions result in circadian disruptions and anxiety and depression-like behavior in SCN-lesioned (SNCX) mice. Previous studies demonstrated that combined treatment with methamphetamine (M) and exercise (running-wheel-RW) entrain circadian rhythms in SNCX mice. Here we assessed the effects of combined treatment (M+RW) on circadian disruption induced by an 11/11 L/D cycle in C57-WT mice and its effects on anxiety and depression-like behaviors. Results will indicate the effectiveness of the combined treatment on entrainment and anxiety and depression-like behaviors induced by an 11/11 circadian disruption.

Students
Alassane Mballo, Aniko Marshall

Major
Biomedical Sciences

Research Mentor
Dr. Mark Parker

Title
Caffeine-mediated regulation of NBCe1 protein in mouse kidneys

Abstract
Caffeine is a worldwide consumed psychoactive drug, which has attracted considerable attention in the field of molecular physiology. Previous research has shown that caffeine consumption induces diuresis and natriuresis. Surprisingly, the mechanisms by which caffeine acts on the kidneys to cause diuresis and natriuresis are still not fully understood.
Previous results concerning the effects of caffeine have led us to believe that the sodium-bicarbonate NBCe1 is involved to some extent in the mechanisms of caffeine-induced diuresis. We hypothesize that caffeine affects the phosphorylation of NBCe1 without affecting its expression.

In this study, we investigated [1] the effect of acute/chronic caffeine consumption on NBCe1, and [2] the effect of caffeine on renal acid-base balance to determine whether metabolic acidosis due to disturbed NBCe1 protein follows long term caffeine consumption. We envision that this study will reveal the clear physiological role of NBCe1 in the regulation of caffeine-induced diuresis and natriuresis.

**Students**
Katherine T. O’Donnell, Itai Bezerano

**Research Mentors**
Barry S. Willer, Ph.D., John J. Leddy, M.D., FASCM; Peter J. Horvath, Ph.D., Mohammad N. Haider, M.D.

**Title**
Nutrition and Energy Expenditure of Retired Professional Contact Sport Athletes and Non Contact Sport Controls

**Abstract**
Little is known about the dietary patterns and lifestyle of retired athletes. To compare the physical health, diet, and estimated energy expenditure (EEE) of retired professional contact sport athletes with healthy, age-matched, non-contact athlete controls, subjects completed the Yale Physical Activity Survey and the Food Frequency Questionnaire. Contact Athletes (n=21, 56±11 yrs, 29.7±3.6 kg/m²) were significantly more overweight (n=21, 57±9 yrs, 24.5±2.6 kg/m², p<0.001). Calculated kilocalorie intake was not significantly different; however, the total time spent doing common types of physical activities was significantly lower in Contact Athletes (22.5±18.7 hrs/wk vs 51.1±15.0 hrs/wk, p<0.001). Intake of many brain healthy micronutrients, including copper (p<0.01), selenium (p=0.037), folate (p=0.02), manganese (p=0.002), and riboflavin (p=0.047) was significantly lower in Contact Athletes (n=12) when compared to controls (n=21).

**Student**
Sonu Patel

**Major**
Biological Sciences

**Research Mentor**
Xiaohong Wen

**Title**
Systematic literature review on Breastfeeding and Postpartum Smoking Cessation

**Abstract**
Postpartum smoking relapse is a common challenge for ex-smoking women. We aimed to systematically review the existing literature to quantify the association between breastfeeding and postpartum smoking relapse. We conducted a comprehensive search in PubMed using the search strategy “(breastfeeding OR breast OR breast feeding) AND (smoke OR smoking OR cigarettes OR tobacco OR nicotine OR cigarette AND (relapse OR recurrence))”. This resulted in 143 records and 19 articles were eligible. Most studies consistently showed a moderate or strong inverse association between breastfeeding duration and risk of postpartum smoking relapse. For example, in a study, 65.1% of the women relapsed to daily smoking weaned before 26 weeks compared to 33.8%. We conclude that breastfeeding can protect against postpartum relapse, which has been supported by fairly consistent evidence. Thus it is worthwhile to test breastfeeding as an intervention strategy to reduce postpartum smoking relapse.

**Students**
Bailey Pollock, Shirley Xu, Brenden Curran, William Collins

**Research Mentor**
Xiaohong Wen, Ph.D.

**Title**
Preparing for the Journey to Smoking Cessation during Pregnancy: Common Motivations and Plans

**Abstract**
The aim of this qualitative research study was to determine common themes for pregnant patient’s preparation before smoking cessation. We transcribed 30 audio-taped initial intervention visits in the UB Pregnancy and Smoking Cessation Study. We extracted themes from the patient-counselor conversations guided by the booklet, “Need Help Putting Out that Cigarette,” including patient’s smoking situations, quitting motivations, and smoking cessation plans (habitual changes, coping mechanisms, rewarding options). Patients had similar situations for smoking during pregnancy: after waking up, after meals, when bored, and when feeling negative emotions. Common motivations were: own health, baby’s health, and financial stability. Habitual changes (keeping mouth/hands occupied) include eating and hands-on activities. Coping mechanisms include going for walks, snacking, and cleaning. Rewarding themes include pampering self, buying baby items, and dining out. Motives to quit smoking and ways to alter their daily smoking habits varied amongst pregnant smokers, with several common themes for each category.

**Student**
Elizabeth Quaye

**Major**
Pharmacology & Toxicology

**Research Mentor**
Supriya D. Mahajan

**Title**
Mitochondrial Alterations in Methamphetamine (Meth) Induced Microglial Apoptosis

**Abstract**
The recreational drug Methamphetamine (Meth) induces neurotoxic responses in the human brain via initiating cellular apoptosis resulting in neurodegeneration and neurocognitive impairment. We have previously non-invasively monitored microglial cell apoptosis in real time using digital holographic imaging (DHM) and acquiring Raman spectral information during various stages of cell apoptosis. Primary signatures of apoptosis include nuclear condensation, fragmentation in internucleosomal DNA, and formation of apoptotic bodies. DHM provides three-dimensional cell imaging in real-time, enabling monitoring of cell morphological changes during apoptosis and Raman spectroscopic measurements provide complementary information about cellular chemical content, such as...
protein and nucleic acid content, and spectral signatures associated with structural changes in DNA. These methods allowed monitoring the chemical changes within the microglial that signal mitochondrial involvement in reactive oxygen species production associated with Meth–induced neurotoxicity. Further investigating mechanisms involving mitochondrial dysfunction and identifying specific changes in mitochondrial proteins could help identify key mitochondrial injury biomarkers. The potential mitochondria-targeted antioxidant strategies may help alleviate neurotoxicity by counteracting mitochondrial dysfunctions induced by Meth.

Student
Kaley Reardon

Major
Biomedical Sciences

Research Mentor
Stephanie Anzman-Frasca

Title
Examining young children's delay of gratification behavior via a board game played in a naturalistic setting

Abstract
Introduction: Young children's delay of gratification, or resisting the temptation of an immediate reward and waiting for a later reward, predicts many positive outcomes from academic achievement to healthy weight maintenance. We aimed to describe children's decision-making when playing a board game designed to promote delay of gratification in a naturalistic setting.

Methods: Ten 3-to-5-year-old children played the study game in their Head Start classroom in Buffalo, NY. Game play involved choosing between an immediate reward or a delayed reward that increases chances of winning later. Children's decisions were recorded.

Results: Children learned to select the delayed reward over time. 10% chose the delayed reward initially during their first round of game play while 40% chose the delayed reward in the second round.

Discussion: These increases in selection of the delayed reward parallel previous laboratory findings and highlight the potential of this game to bolster an important developmental skill.

Student
Julian Saleh

Major
Biomedical Sciences

Research Mentor
Xiaozhong Wen

Title
Socio-economic status among cigarette smoking pregnant women and its associations with smoking cessation outcomes

Abstract
We aimed to examine the distribution of socio-economic status (SES) among smoking pregnant women; and the role of SES in predicting smoking cessation outcomes (intervention adherence and abstinence). We included 73 participants from our UB Pregnancy and Smoking Cessation Study. Based off the methodological article "Four Factor Index of Social Status" by August Hollingshead, we calculated SES index score using education and occupation of the women and their partner (if applicable) by marital status. The SES score ranged from 11 to 58 with a mean of 27.04 (SD, 1.24). Most mothers had education of some college or vocational training (37.0%), received annual family income <$5,000 (41.1%), and received WIC welfare (56.2%). Smoking cessation rates were similarly high across education attainment: 50.0% for <high school, 66.7% for high school, and 60.0% for college. We concluded most of pregnant smokers had low SES but quit smoking successfully with our intervention regardless SES.

Students
Jennifer Seidman, Juman Aref, Iryna Hrynyk

Research Mentor
Kelseanna Hollis-Hansen

Title
Improvements in episodic future thinking methodology: Identifying a better control

Abstract
Background: Episodic future thinking (EFT), the ability to project oneself into the future has been shown to decrease future discounting. Episodic recent thinking (ERT), recalling past events, is a common control in EFT studies. ERT could lead participants to future projection as some of the brain regions are involved in retrospection and prospection. We tested a new episodic thinking control (ET) to eliminate potential projection during ERT and improve EFT studies.

Methods: Participants (n = 30, 18-45) were randomized to one of three conditions - EFT, ERT, and ET. Participants completed games, cues, delay discounting (DD), and a questionnaire.

Results: There was a significant difference between groups if (1, 27) = 3.25, p = 0.05. The EFT group performed better on the DD task than the ERT or ET group. The ERT and ET groups did not differ.

Conclusions: This study established the validity of using ET cues as a control in EFT studies.

Students
Aziz Shittu, Jacob Perkins, Taylor Mautner
Conclusion: Smoking cessation during pregnancy normalizes infant growth trajectories. Smoking during pregnancy is associated with rapid gain in BMI z-score. SGA infants have increased risk of catch-up growth in BMI-for-age z-score.

Students
Aziz Shittu, Jacob Perkins, Taylor Mautner

Research Mentor
Xiaozhong Wen, MD, PhD

Title
Meta-Analysis and Systematic review of the effect and mechanisms of maternal smoking or smoking cessation during pregnancy on childhood obesity or overweight

Abstract
Objective: To update reviews on effects of maternal smoking during pregnancy on childhood obesity or overweight by adding recent studies; review studies on possible mechanisms and benefits of maternal smoking cessation during pregnancy.

Methods: We conducted a systematic review and meta-analysis of eligible studies published between 1/1/2015 and 1/1/2018 to determine the pooled effects of maternal smoking or smoking cessation during pregnancy on childhood obesity or overweight. Another systematic review of literature was conducted on possible mechanisms.

Results: 566 articles were identified in PubMed using search criteria for maternal smoking during pregnancy on childhood obesity or overweight. Based on title and abstract screening, 40 were eligible for the effects of maternal smoking during pregnancy and 2 were eligible for smoking cessation during pregnancy. More results are pending.

Conclusion: This review is important to better understand harms of maternal smoking during pregnancy on child growth, its possible mechanisms, and benefits of smoking cessation during pregnancy.

Student
Brandon Smith

Major
Biomedical Sciences and Pharmacology/Toxicology

Research Mentor
Dr. Wilma A. Hofmann

Title
Identification of a SUMOylation Site in Myosin Isoform C

Abstract
Myosin IC is a motor protein that is known to localize to the nucleus where it plays important roles in transcription, intranuclear transport, and nuclear export. In the nucleus, Myosin IC is modified by SUMO proteins (SUMOylation). The goal of this project was to identify the site of SUMOylation on Myosin IC. Analysis of the Myosin IC amino acid sequence revealed several possible SUMO binding sites in the neck region. I then used site directed mutagenesis to alter critical amino acids at these sites that are known to prevent SUMOylation. The resulting mutant proteins were expressed in mammalian cells and analyzed for their ability to be modified by SUMO. The results ruled out all sites within the neck region as possible SUMOylation sites. Therefore, future studies will have to analyze other regions for the sites of SUMOylation.

Student
Kevin Stone

Major
Biomedical Engineering

Research Mentor
Jack Tseng, PhD

Title
Variation in Masticatory Biomechanics & Jaw Shape in an Elderly Human Population

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 linear static analysis on the mandible using 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.

Student
Samie Syed, Zoey Davis, Julian Saleh

Major
Biomedical Sciences; Psychology

Research Mentor
Xiaozhong Wen

Title
Roles of Infant Sleep and Crying in Maternal Postpartum Depression and Sleep

Abstract
We examined trajectories and infant-related determinants of maternal postpartum depression among 25 smoking pregnant mothers in the UB Pregnancy and Smoking Cessation Study. At study enrollment (early pregnancy), mothers reported depression diagnosis and current depressive mood through Patient Health Questionnaire. After delivery, maternal depressive mood (Edinburgh), sleep (Pittsburgh) and infant 24-hour sleep and crying were measured monthly up to 12 months and then quarterly up to 24 months. Both infant sleep and crying duration decreased with age, except for a spike of infant crying duration at 12 months. We found 38.7% of participants had been diagnosed with depression and 19.4% had active depression during pregnancy. Postpartum mother’s depressive mood varied with time with several spikes at 1, 5-6, 12, and 24 months. Infant crying might contribute to the spike of depression score at 12 months. Other spikes of depression score could not be explained by infant sleep or crying duration.
Results: An average intra-class ICC for all segmented slices was 0.935 (0.872-0.967), p<0.001. The highest intra-class ICC was measured at the C6/C7 level 0.972 (0.944-0.986) p<0.001. Similarly, the inter-class ICC for all segmented slices was 0.972 (0.944-0.986) p<0.001. The highest inter-class ICC was measured at the C4/C5 level 0.998 (0.982-1.00) p<0.001 and the lowest ICC was measured at C4 0.884 (0.497-0.984) p=0.050.

Conclusion: The ICC analysis showed highly reliable intra- and inter-class results. Previous anatomical knowledge, software training, and familiarization with image contrast are warranted for ensuring reliable and accurate MRV-derived vessel segmentation.

Student: Matthew Topolski
Major: Biomedical Sciences and Psychology
Research Mentor: Dr. Robert Zivadinov
Title: Reproducibility of Secondary Vessel Segmentation on Magnetic Resonance Venography
Abstract: Background: Magnetic resonance venography (MRV) is a non-invasive tool for imaging the vasculature, however, obtaining absolute cross-sectional area (CSA) measurements remain technically challenging. Previous study has shown that patients with multiple sclerosis (MS) have been shown to display higher numbers of secondary vessels in the neck, while simultaneously displaying a lower cross-sectional area (CSA) of the main arterial vasculature when compared to healthy controls (HC).

Objective: To assess and validate the intra- and inter-rater accuracy of MRV-derived vessel CSA quantification. Materials and methods: The reproducibility examination was performed on a subset of 10 ICs which were part of a larger cardiovascular, environmental, and genetic effects in MS (CEG-MS) study. In addition to the conventional images, the ST MRI protocol also included MRV of the neck. The secondary vessels of predetermined MRV slices at each cervical level (C1/C2, C2/C3, C4, C4/C5, C5/C6, C6/C7, and C7/T1) were segmented by two trained operators using the Java Image Manipulator (JIM) software. All vessels except the internal jugular vein, common carotid, and vertebral artery were classified as secondary vessels. Intra- and inter-rater intraclass correlation coefficients (ICC) with a 95% confidence interval (CI) were calculated.

Abstract: An average intra-class ICC for all segmented slices was 0.935 (0.872-0.967), p<0.001. The highest intra-class ICC was measured at the C6/C7 level 0.972 (0.934-0.999), p=0.002 and the lowest ICC was measured at the C1/C2 level 0.843 (0.509-0.984) p=0.050. Similarly, the inter-class ICC for all segmented slices was 0.972 (0.944-0.986) p<0.001. The highest inter-class ICC was measured at the C2/C3 level 0.998 (0.982-1.00) p<0.001 and the lowest ICC was measured at C4 0.884 (0.497-0.984) p=0.050.

Conclusion: The ICC analysis showed highly reliable intra- and inter-class results. Previous anatomical knowledge, software training, and familiarization with image contrast are warranted for ensuring reliable and accurate MRV-derived vessel segmentation.

Student: Megan Vik, Pheobe Welch
Research Mentor: Jinwoo Park
Title: Characterization of Chemogenetically Modulated Catecholamine Regulation Using Genetically Targeted Approaches
Abstract: Selectively controlling specific neurons in the brain provides a better understanding of their roles in a variety of neurological diseases. One such way of doing this is with chemogenetics, wherein a modified G-protein-coupled receptor (GPCR) is activated by a pharmacologically inert ligand. In this study, we transfected catecholamine neurons in the nucleus of the solitary tract and ventral tegmental area of the rat brain with a modified GPCR that reacts with the effector molecule clozapine-n-oxide to alter activity of these neurons. Compared to other methods, chemogenetics is a less invasive method of selective brain region control and allows for short-term (minutes to hours) neural manipulation reproducibly. However, little is known regarding the effects of chemogenetics on neurotransmission and chemogenetic parameters vary from lab to lab. This study aims to elucidate the effects of chemogenetic modulation of catecholamine neurotransmission and optimize chemogenetic parameters for use in future behavioral studies.

Student: Zilin Wang
Major: Biomedical Science
Research Mentor: Piero Bianco
Title: Visualization of fluorescent-tagged DNA repair proteins (FP) by Fluorescence microscopy
Abstract: In this project, my job is to integrate the fluorescent tagged constructs into the chromosome of E.coli cells. In my previous grant, I established the technique to do this and I successfully integrated the SSB-GFP gene into the flagellar E (flgE) gene of E. coli. This produced a strain with a tagged SSB that enabled me to track the protein in vivo in live cells. I continued to integrate other fusions include mcherry-RecG, mVenus-PriA and mNeptune tagged replication proteins into the E.coli chromosome at sites distinct from flgE. I examine protein localization in healthy cells. Then, I exposed cells to DNA damaging agents and determine if localization changes using Fluorescence Microscopy. Using my strains I will provide very useful information on how the E.coli genome is repaired. This project is very useful for giving us another opportunity to observe bacterial plasmid functions.

Student: William Ye
Major: Pharmacy
Research Mentor: Xiaozhong Wen, MD, Ph.D
Title: Associations between Maternal Diet during Pregnancy and Newborn Body Mass Index
Abstract: We aimed to examine associations between maternal diet during pregnancy and newborn body mass index (BMI). We included data of 25 pregnant smoker from UB Pregnancy and Smoking Cessation Study. Mothers reported frequencies of consuming 6 food groups (dairy, vegetables, fruits, fish, red meat, and white meat) in early pregnancy. We scored dietary quality using the Mediterranean Diet Score (MDS). Birth weight and length were obtained from delivery records and used to calculate newborn BMI-for-age z-score. High maternal dietary quality (≥5 vs ≤4 points of MDS score) during pregnancy was significantly associated with higher newborn BMI z-score (1.00
Experiment on the Role of Trace Amine Associated Receptor-1 (TAAR-1) on the Modulation of Circadian Rhythms in Mice

Abstract
Dysfunction or absence of the trace amine associated receptor-1 (TAAR-1) has been shown to increase methamphetamine (METH) consumption in mice. Utilizing C57BL/6J mice (functional TAAR-1) and exhibit low levels of METH consumption) crossed with DBA/2J mice (lack a functional TAAR-1 and exhibit high levels of METH consumption) with collaborators, we hypothesized that the MAHDR mice will show a distinct circadian phenotype in the 11:11 LD cycle compared to the MALDR mice. Mice were given access to a running wheel in DD for at least 3 weeks to establish a baseline before being transferred to a 11:11 LD cycle for about 4-6 weeks to induce a desynchronized running rhythm. Lastly, mice were treated with melatonin in order to consolidate the desynchronized running pattern. Running wheel data was collected from both DD and 11:11 LD cycle via magnetic micro-switches, and analyzed using the ClockLab software. Furthermore, statistical analysis was conducted using GraphPad Prisim 8.

Ronald E. McNair Scholars Program

Student: Ashwaq Asfour
Major: Global Gender Studies
Research Mentor: Dr. Gwynn Thomas and Ph.D Student Gabriella Nassif
Title: Forced, Early, Child Marriage of Syrian Refugee Populations in Lebanon; Beyond Culture, a form of Gender Based Violence
Abstract: An increasing amount of young Syrian girls in the refugee camp of Al Marj are marrying before the age of eighteen. Prevalence of conflict increases economic disparity and an influx in multiple forms of violence such as sexual harassment. Devaluation of girls in society can be seen as an economic burden and potential bearers of social stigma. Young girls are thus married off, and in circumstances without consent. This ultimately hinders on girl’s self reliance, causing gender based violence. This project analyzes specific factors causing FEC (forced, early, child) marriage beyond cultural and individual accounts of young Syrian brides.
Conducting semi-structured, open-ended interviews with community leaders, residents, city officials, and developers; and creating three case studies of neighborhoods experiencing different levels of community health impact as a result of the V2V program. Park Heights is one of the three targeted neighborhoods of the V2V program and will be the focus of this presentation. Preliminary findings show vacant properties and restoration of them may impact neighborhood safety, exposures to mold, violence and illegal dumping. Findings from this work can inform more health-conscious community development in the future.

**Students**
Michael Parasyczak, Elizabeth Gilman

**Major**
Architecture

**Research Mentor**
Laura Garofalo-Khan

**Title**
Oasis

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School of Architecture & Planning

**Student**
Camile Brown

**Major**
Environmental Design

**Research Mentor**
Dr. Yeeli Mui

**Title**
Community Health Impacts of Neighborhood Redevelopment: An Exploration of the Vacants to Value (V2V) Program in Park Heights, Baltimore, MD

**Abstract**
Launched in 2010, the Vacants to Value program (V2V) focuses on vacant and abandoned buildings for restoration in hopes of attracting new residents and businesses. Redevelopment programs, such as V2V, tend to focus on the physical beautification of neighborhoods and pay limited attention to the human impacts. This pilot study attempts to characterize different dimensions of the health impacts of the Baltimore V2V program by: conducting semi-structured, open-ended interviews with community leaders, residents, city officials, and developers; and creating three case studies of neighborhoods experiencing different levels of community health impact as a result of the V2V program. Park Heights is one of the three targeted neighborhoods of the V2V program and will be the focus of this presentation. Preliminary findings show vacant properties and restoration of them may impact neighborhood safety, exposures to mold, violence and illegal dumping. Findings from this work can inform more health-conscious community development in the future.

**Students**
Michael Parasyczak, Elizabeth Gilman

**Major**
Architecture

**Research Mentor**
Laura Garofalo-Khan

**Title**
Oasis

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School of Engineering & Applied Sciences

**Student**
Fatak Borhani, Anton Fischer, Emmanuel Gil Torres

**Research Mentor**
Amin Karami, PhD.

**Title**
Moving Surface Boundary Layer via Piezoelectric Actuators to Prevent Flow Separation

**Abstract**
The motivation behind this project is to increase the aerodynamic performance of a wing by using two-mode excitation.
to prevent boundary layer separation, without increasing drag. Although current methods such as vortex generators tackle the problem by changing the laminar flow to turbulent in order to increase the momentum and prevent flow separation, they also lead to significant amounts of drag increase. The goal is achieved by inducing a traveling wave in the top surface of the airfoil, so the fluid will have sufficient momentum to stay attached to it. Old models were fabricated and tested with two piezocomposite actuators at the leading edge and two at the trailing edge. We are currently studying the scaling and dimensional effects on aerodynamic properties, especially the drag, by testing our largest prototype, equipped with a total of eight piezoelectric actuators.

**Students**
Emmanuel Canales, Samhitha Kancharla

**Major**
Chemical Engineering

**Research Mentor**
Marina Tsianou, Paschalis Alexandridis

**Title**
Surfactant association in aqueous solution to mitigate environment impacts

**Abstract**
This work is motivated by the environmental impact of fluorinated surfactants such as perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) which are extremely resistant to degradation, bioaccumulate, and have long half-lives in humans. Our research addresses association properties of fluorinated surfactants in aqueous solutions, with a focus on how such surfactants interact with (bind to) other molecules or particles/surfaces, and an aim to facilitate the removal of fluorinated surfactants from the aquatic environment. The present study reports on interactions of a common hydrocarbon surfactant with water-soluble polymers, and an analogue system for binding fluorinated surfactants in aqueous solutions.

**Students**
Vincenzo Carr, Jonatan Meza, John Soto, Amanda Alexander, Abeda Alam

**Major**
Mechanical and Aerospace Engineering

**Research Mentor**
Aaron Estes

**Title**
Feedback Control Of Treadmill For Virtual Reality Applications

**Abstract**
This project aims to re-outfit a standard treadmill for virtual reality (VR) applications. By adding a feedback control system, the treadmill reacts to the user’s walking/running speed to keep her or him at the middle of the treadmill. If the user speeds up, the treadmill automatically speeds up. If the user slows their pace, the treadmill automatically slows its pace. This allows a person to explore a huge virtual territory while never leaving their original position in the real world.

**Students**
Lakshay Chopra, Jungkuk Lee

**Major**
Chemical and Biological Engineering

**Research Mentor**
Eleni Kyriakidou

**Title**
Development of Silver (Ag) and Palladium(Pd) catalyst-using ZSM-5 Beta and SSZ-13 zeolites for Hydrocarbons (HC) and NOx trapping at low vehicle’s exhaust temperature.

**Abstract**
As a vehicle is started, within 60-90 seconds from start 80% of Hydrocarbons(HC) and Nitrogen Oxides(NOx) are released in the atmosphere, when the exhaust temperature is about 80 Degree Celsius. Due to strict pollution emission laws like SULEV-III, it becomes imperative to come up with promising catalyst that can trap the gases in specified conditions. Zeolites ion-exchanged with transition metal ions such as Ag and Pd have shown decent efficiency in trapping these gases. This project deals with synthesizing and evaluating the trapping ability of different zeolites such as ZSM-5, SSZ-13 and Beta ion exchanged with metal ions to reach a satisfactory level of adsorption (trapping).

**Students**
Liam Christie, Phil Schneider, Tyler Siskar, Nicholas Eadie

**Research Mentor**
Dr. Kwang Oh

**Title**
An Innovative Wax Based Approach to Low Cost, Rapid Prototyping of Microfluidic Devices
Abstract
Microfluidic research is a recently developed interdisciplinary field that has applications including micropropulsion, inkjet printing, and DNA chips or biochips, but is typically very high cost. This research outlines the process of creation, optimization, and testing of a new wax based microfluidic fabrication system. This method presents a new pathway to produce microfluidic devices allowing for rapid and cost effective device prototyping eliminating the use of expensive micromachining equipment/chemicals. This wax-based printing technique uses a printing style similar to that of FDM 3D printing in which a wax extruder tip filled with molten beeswax is translated across a printing substrate using precise computer-based motion control to create various fluidic circuit components at the micro scale. Through both Taguchi and software based techniques this system was optimized to print in a controlled manner to fit multiple applications. In this poster a series of microfluidic mixers and dilutors were created and tested.

Students
Ian DesJardin, Seamus Lombardo

Research Mentor
Dr. John Crassidis

Title
The System Level Testing of the GLADOS Cubesat Using Low Cost and COTS Components

Abstract
System level testing is essential to ensuring spacecraft mission success. However, the costly test support equipment and lengthy timelines traditionally utilized in industry can make this important testing infeasible for small programs, increasing risk levels for these projects. It is therefore important to reconcile the low cost benefits of CubeSats with the rigorous system level testing that will lead to a successful mission. GLADOS (Glint Analyzing Data Observation Satellite) is a 6U CubeSat for Space Situational Awareness under development by the University at Buffalo Nanosatellite Lab. In order to lower risk on this complex mission, thorough system level testing of the GLADOS engineering unit was conducted with an emphasis on utilizing inexpensive method/s and test equipment to retain the low-cost benefits of a CubeSat project. Four system level tests: the Command Execution Test, the Complete Charge Test, the Simulated Communications Test, and the Day in the Life Test, have been run to validate the electrical, command and data handling, communications, software, and attitude determination and control (ADC) subsystems in scenarios that simulate on-orbit conditions. Auxiliary tests have also been run to validate the satellite structure, optical payload, and image processing algorithms. These tests have all been run by students on a condensed schedule relative to similar testing efforts in industry and purposely made use of novel and low cost methods such as an ADC simulation server, wifi enabled flatsat, and software defined radios. Results indicate that a successful system integration is underway with all critical satellite subsystems and functions similar success criteria to those found in industry missions, and doing so at a reduced cost. The promising results of this engineering unit testing will enable the GLADOS project to progress into flight integration and on-orbit operation phases of the project while still maintaining a low project cost.

Students
Suting Huang

Major
Chemical Engineering

Research Mentor
Haiqing Lin

Title
Holey Graphene Oxide Membranes for Water Desalination

Abstract
We add a layer of holey graphene oxide coating with various thicknesses on to various commercial membrane. Then, we apply various methods to examine physical properties of the coated membrane. Among these methods, the water filtration experiment is the most essential one. In the experiment, we assert pressure onto the solution to force water pass through. We analyze the water flux and the compositions of permeate and retentate to determine how well the coating enhances the desalination process.

Students
Kyle Hunt, Bairong Wang, Elyse Levine, Zonghao Wang

Research Mentor
Dr. Jun Zhuang

Title
Comparative Analysis of Rumor Spreading and Debunking during Hurricanes Harvey and Irma

Abstract
This study investigates the dissemination features of rumor spreading and rumor debunking information across Twitter’s network during natural disasters; including, rumor life span, debunking effectiveness, and information networks within Twitter. The rumor “immigration status is being checked at shelters’ spread in both Hurricane
Harvey and Hurricane Irma in 2017, and was chosen for analysis in this paper. Results show that major debunkers, such as government accounts, are very successful in combating the spreading population. It is important to note that these accounts can also have a major impact in rumor spreading. In the case of Hurricane Harvey, the debunking post by @HoustonTX was successfully retweeted by their network in order the increase the Debunkers’ presence, and overtake the Spreaders. The case of Hurricane Irma was a bit different, as we witnessed a government account, @PolkCoSheriff, spread the misinformation. We create inter-Twitter networks to visualize and understand the dissemination features and behaviors in both rumor spreading and rumor debunking users.

Student \textit{\& W}
Mourin Jarin

Major
Chemical Engineering

Research Mentor
Nirupam Aich

Title
Environmental Applications of rGO-TiO\textsubscript{2} (nanohybrid)

Abstract
Metal oxide nanohybrids are currently used by the EPA to test environmental applications. This project aimed to develop the process of synthesizing metal oxide nanohybrids, rGO-TiO\textsubscript{2}, reduced Graphene Oxide-Titanium Oxide samples for the EPA and for this specific project’s environmental applications. Graduate student Arvid Masud collaborated to develop a protocol to produce specified ratios of TiO\textsubscript{2} : rGO for efficient dispersability and effective environmental testing. The results of this project go through the process of synthesis and characterization, as well as determining effective measures of application through the amount of TiO\textsubscript{2} bonded to the Graphene sheets. Characterization Materials used include Raman, TGA, HRTEM, XRD and DLS. The long term goal is to develop better environmental applications with further research for metal oxide nanohybrids while continuing the discussion of safety for these materials.

Student \textit{\& L}\textsubscript{8}
Mohamed T. Kawy, Cesar Lubongo, Emmanuel Nsengiyumva

Major
Chemical and Biological Engineering

Research Mentor
Marina Tsianou, Paschalis Alexandridis

Title
Viscosity of Water-Soluble Polymers in Brines

Abstract
The growth of unconventional oil and gas extraction has been enabled by hydraulic fracturing which involves the injection into shales of aqueous suspensions of particles (propellant) that prop fractures open and increase hydrocarbon permeability. Polymers are essential ingredients of hydraulic fracturing fluids to modify viscosity and suspend particles. Unconventional oil and gas extraction uses large amounts of fresh water and produces equally large amounts of saline water (brines). This study addresses the viscosity of water-soluble polymers in aqueous solutions of high salinity. The knowledge generated will facilitate the utilization of brines, thus easing freshwater scarcity and waste-water disposal.

Student \textit{\& L}
Maria Camila Lopez Ruiz

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 \textit{\& L}
Erin Maloney

Major
Biomedical Engineering

Research Mentor
Aram Chung (Rensselaer Polytechnic Institute)

Title
Inertial Microfluidic Intracellular Macromolecule Delivery

Abstract
Intracellular delivery of macromolecules such as proteins, nucleic acids and antibodies is a key step in investigating cell-based therapies and research applications. One of the main approaches to intracellular delivery is membrane disruption and it is commonly achieved via electroporation, cell squeezing, and microinjection. While effective at delivering macromolecules to a variety of cells, these techniques lack consistent delivery, are low-throughput, and can be costly and time consuming. Here, we demonstrate an inertial microfluidic platform that deforms and opens cell membrane transiently which allows effective, user friendly (a single-step delivery), and high-throughput delivery (~10,000 cells/sec) with high viability.

Student \textit{\& L}
Yashvardhan Mandhana

Major
Mechanical Engineering

Research Mentor
Deborah Chung

Undergraduate Presenters
Abstract
This project will be focused on generating electrical power from a 3D printed polymer, when the surrounding temperature of the 3D printed polymer is raised above room temperature. This phenomenon, known as pyroelectric effect, converts thermal energy to electrical energy. This effect has been reported in certain polymers, such as polyvinylidene fluoride (PVDF). However, it has never been reported in polymers that are prepared by 3D printing. In particular, it has never been reported in polyacrylate ester, which is a common polymer used for 3D printing due to its ability to polymerize under ultraviolet light provided by the 3D printer. The pyroelectric behavior of 3D printed polymers that do not involve known pyroelectric polymers such as PVDF is attractive, because this will broaden the choice of polymers for providing pyroelectricity, thereby lowering the material cost and widening the applications.

Student
Yashvardhan Mandhana

Major
Mechanical Engineering

Research Mentor
Deborah Chung

Title
First Observation of Pyroelectric Behavior in 3D-Printed Material

Abstract
Pyroelectric behavior is a type of dielectric behavior that converts thermal energy to electrical energy, due to the electric polarization changing upon a temperature change, as used for motion detectors. Pyroelectric behavior has been discovered in this work in layer-by-layer 3D-printed polymer without filler or poling. The polymer is acrylate ester, which is not one that is known to be pyroelectric. The printing involves bottom-up stereolithography, with layer thickness 35 µm and 25 layers. The printing-process-induced shear stress on the resin causes in-plane molecular alignment, which causes out-of-plane polarization and hence out-of-plane pyroelectric effect. The testing involves attaching electrodes (aluminum foil) to the two opposite in-plane surfaces of the specimen using silver paint and measuring the out-of-plane capacitance using an LCR meter at 2 kHz. The capacitance increases reversibly from 34 to 39 pF upon increase in temperature from 23 to 33°C. The pyroelectric coefficient is 3 x 10^-9 C/(m2.K).

Student
Anandharam Mourougassamy, Bhaskar Kote Vivek

Major
Civil Engineering

Research Mentor
Dr. Mettupalayam Sivaselvan

Title
Model-in-the-loop testing of interconnected substation equipment

Abstract
Dynamic interaction between electrical substation equipment under earthquakes, and hence the stresses they experience, depend critically on the highly nonlinear, even chaotic, dynamics of the conductor cables that interconnect them. The goal of this project is to employ model-in-the-loop testing (MIL) to validate computational models of conductor dynamics. MIL approaches complex systems by combining physical and virtual elements that interact in real-time through actuators and sensors. Since the equipment dynamics are relatively simple, they are represented virtually by computer models, and the conductor, whose dynamics are complex, is tested physically. A 2-DOF actuator system represents the equipment. The work presented here is using Lagrangian mechanics to develop a mathematical model of the actuator system, necessary for MIL. Experiments were carried out simultaneously to obtain physical properties such as mass matrix of the system. Full MIL testing and validation of the conductor model are ongoing work.

Student
Thy Nguyen

Major
Biomedical Engineering
of perfect communication between nodes in the network. Loss of mission critical information necessary for accurate solutions due to a realistic network may result in a deviation from the desired behavior of the algorithm. This deviation in performance may result in redundantly completed tasks as well as failure to assign certain tasks. Our investigation focuses on the effect of an increase in the number of agents participating in the network on algorithm performance.

Students
Parham Rohani, Adam Raszewski, Mayuresh Keskar

Major
Chemical Engineering

Research Mentor
Professor Mark T. Swihart

Title
Silicon-Carbon Nanocomposite Anode Material for Lithium-Ion Batteries.

Abstract
Silicon-carbon nanocomposite anodes could dramatically increase energy density in lithium-ion batteries. We have synthesized such nanocomposites using silicon nanoparticles (~30 nm) produced in our lab. We prepared the nanocomposite in three steps: (1) solution-phase growth of a silica shell on the silicon core; (2) chemical vapor deposition of a thin carbon layer; and (3) acid etching to remove the silica. This produces silicon nanoparticles protected by a thin conductive carbon shell. Using nanoparticles prevents pulverization of silicon due to volume changes during cycling. Void space within the shell allows expansion of silicon without disrupting the solid electrolyte interphase (SEI) layer that forms outside the shell. Our nanocomposite using ~30 nm silicon particles outperformed one using 100 nm silicon nanoparticles, with excellent capacity (~2300 mAh/g at C/10 after 50 cycles) and cycle life (~1200 mAh/g at C/1.2 after 1000 cycles) that exceed nearly all published values for silicon-based anodes.

Student 🧑
Ari Rubinsztejn

Major
Aerospace Engineering

Research Mentor
Dr. Tarunraj Singh

Title
Development of a Phone Based Oxygen Monitor

Abstract
Diabetes, a disease where the body cannot properly regulate its blood sugar levels, affects over 30 million Americans. It’s the 7th leading cause of death in America. Diabetes requires careful monitoring of insulin in the body in order to artificially regulate its blood sugar levels. By modeling insulin, we can better regulate the blood sugar levels. One key component to modeling insulin levels is the percentage oxygen present in the blood. Current technology requires a specialized device to measure percentage oxygen. This work covers the design and development of a phone based oxygen monitor (PBOM). This PBOM does not require any specialized hardware be attached to the phone so its barriers to use is only whether someone has a capable smartphone or not. This lack of dedicated hardware can increase the ease of adoption with both logistically and financially challenging populations.

Students 🧑
Sarah Schwartz, Kathryn Lukasiewicz

Research Mentor
Jun Zhuang

Title
Surveying the Vulnerability of the Maritime Cargo Pathway to Nuclear Smuggling

Abstract
In terms of both geographic range of impact and severity of impact, one of the greatest threats to United States security is radiological or nuclear attacks. About 95% of cargo entering the United States enters through containerized maritime cargo pathways. While various legislation has passed on the issue of improving security for these vital pathways, such as the SAFE Port Act of 2006 and the Trade Act of 2002, the regulations entailed in these laws have not been completely successful in eliminating the potential for smuggled nuclear material. This paper presents current practices and legislation aimed at the reduction of smuggled nuclear material entering the country and examines some tradeoffs of such practices and programs. Based on publicly available data, this paper presents the main phases of smuggling pathways, based on the vulnerability in the maritime containerized cargo systems and the accessibility of nuclear materials. Through a comprehensive analysis of historical orphan source incident data and current practices, points of vulnerability in the containerized shipping pathway can be identified.

Student 🧑
Mohammad Mahdi Shiraz Bhurwani

Major
Biomedical Engineering

Research Mentor
Ciprian N. Ionita PhD

Title
Segmentation of Aneurysms using Deep Neural Network

Abstract
This project represents the initial phase of developing deep neural networks at the Canon Stroke and Vascular Research Center at the University at Buffalo. We used a pre-trained VGG-16 convolutional neural network as our base network, it has 41 layers, of which, 16 are with learnable weights, 13 are convolutional layers and 3 are fully connected layers. We developed MATLAB code to perform transfer learning on this pre-trained network and re-train it on our own image data. We first developed code to re-train the network on a ready-made database of street images and masks highlighting the cars. Upon receiving high accuracy of segmentation of cars, we began hand segmenting aneurysms in CT data from patients at the Buffalo General Hospital. New code was then written to re-train the VGG 16 network on this data and a deep neural net for the segmentation of aneurysms was developed.
Diagnostic Software

Validation of a CT-derived FFR

Specific Phantoms Used for Clinical

Abstract

This paper details an innovative application of the fused deposition modeling (FDM) technique in wax printing of microfluidic structures. Preliminary experimental fabrication and analysis of wax lines and thermos-fluidic computational fluid dynamic (CFD) modeling of the printing process are presented. The CFD model solves the Navier-Stokes and the heat transfer equations in 3D with appropriate boundary conditions. The CFD modeling provides fundamental understanding to enable tuning of process parameters toward optimization of the printing process, in which a wax extruder tip, filled with molten beeswax is translated across a substrate. Advantages of this technique as compared to traditional microfluidic fabrication include low cost, rapid prototyping, and a broad range of printable shapes. Adjustable system parameters include extruder tip velocity, substrate temperature, and angle of the extruder tip with respect to the substrate. Here, the characterization of this wax-based printing system is described in terms of resolution, uniformity, and functionality.

Student

Tyler Siskar

Major

Computational Physics B.S.

Research Mentor

Dr. Kwang Oh

Title

Additive Manufacturing of Microfluidic Components via Wax Extrusion

Abstract

This paper details an innovative application of the fused deposition modeling (FDM) technique in wax printing of microfluidic structures. Preliminary experimental fabrication and analysis of wax lines and thermos-fluidic computational fluid dynamic (CFD) modeling of the printing process are presented. The CFD model solves the Navier-Stokes and the heat transfer equations in 3D with appropriate boundary conditions. The CFD modeling provides fundamental understanding to enable tuning of process parameters toward optimization of the printing process, in which a wax extruder tip, filled with molten beeswax is translated across a substrate. Advantages of this technique as compared to traditional microfluidic fabrication include low cost, rapid prototyping, and a broad range of printable shapes. Adjustable system parameters include extruder tip velocity, substrate temperature, and angle of the extruder tip with respect to the substrate. Here, the characterization of this wax-based printing system is described in terms of resolution, uniformity, and functionality.

Student

Kelsey Sommer

Major

Biomedical Engineering

Research Mentor

Dr. Ciprian Ionita

Title

3D Printed Cardiovascular Patient Specific Phantoms Used for Clinical Validation of a CT-derived FFR Diagnostic Software

Abstract

3D printed patient specific vascular models provide the ability to validate diagnostic software through benchtop flow simulations. This approach is being applied to CT-derived patient geometries to determine Fractional Flow Reserve (FFR) within benchtop 3D printed cardiovascular models. These results are then compared with a non-invasive CT-derived FFR software based on a computational fluid dynamics algorithm detecting hemodynamically significant coronary lesions and catheter based FFR measurements. Invasive-FFR was recorded during invasive coronary angiography (ICA) procedures and was used as a third parameter for comparison. 3D printed patient specific cardiovascular models successfully simulated hyperemic blood flow conditions matching invasive angio-FFR measurements.

Students

Matthew Stafford, Zhuolin Yang

Major

Computer Science

Research Mentor

Wenyao Xu

Title

Smartphone + 3D-Printing = Software-Defined Stroke Rehabilitation

Abstract

Stroke rehabilitation is of great importance to help the stroke patients regain motor functions and achieve independence in daily activities. However, the existing practice suffers from limited motivation and low adherence due to the tedious protocol and insufficient feedback. To facilitate the in-home stroke rehabilitation, we propose a novel hardware-software system, called Software Defined Stroke Rehabilitation (SDSR), which features in cost efficiency, high customization and timely assessment. Specifically, SDSR exposes a design panel to collect the patient’s physiology profile as well as the doctor’s clinical knowledge. Based on these information, SDSR constructs the targeted exercise and customizes the rehabilitation tool through the effective 3D printing. Implemented as a smartphone application, SDSR is able to monitor the patient’s movement during the exercise, and provide assessment feedback in real-time to better support the self-enforcing in-home rehabilitation. Our experiment results prove that SDSR can provide the accurate analysis for different exercise performance in terms of multiple quantitative metrics. Moreover, our comprehensive user study shows that the recruited stroke patients are more satisfied with SDSR during the in-home usage when compared to the traditional practice.

Students

Alexander Stone, Dennis Fedorishin, Nicholas Eadie, Phil Schneider

Research Mentor

Dr. Kwang Oh

Title

Post-Process Effects on Dynamic System Models Created from Additive Manufacturing

Abstract

Recent advancements in 3D printing have made it a more viable option for quickly and cheaply modeling dynamic systems. However, this shift in modeling techniques has come with some issues. The rough finish of raw 3D printed parts can cause dynamic models to stick and bind due to excess friction. This friction can also result in heat related fatigue of the printed parts. Traditional methods of finishing printed parts are labor intensive and involve coating the parts in acrylic or another type of coating. We propose using the technique of post-processing 3D printed parts to remove the rough edges with minimal change in the dimensions of the parts. To test our theory, we 3D printed a 1/3 scale replica of an internal combustion engine to prove viability. We are also working with control scenarios to quantify our findings. Focused testing includes: friction, surface roughness, thermal properties, stress and strain analysis.

Student

Hoan Duc Tran, Tri Vu

Research Mentor

Wenyao Xu

Title

BiGra: The bilateral hand grip rehabilitation system

Abstract

Motor impairment is common following stroke. Diminished strength and coordination contribute to reduced ability to perform activities of daily living. The existing healthcare models
In-vivo Wireless Nanosensor Networks (IWNSNs) consist of communicating nano-devices with the capability of operating inside the human body, allowing for real-time monitoring, diagnosis and operation. Through the use of IWNSNs new opportunities to monitor human biology become available on a cellular and subcellular level. To fully grasp and execute the capabilities of such technology in the human body, the propagation of electromagnetic (EM) waves need to be modeled by taking into consideration the dynamics of the cells at the nanoscale. Previous simulations have been done but on a platform that lacks modularity, dynamism, and velocity. Using results from past research and simulations on EM propagation through multi-layered cells, a new platform has been developed. This involves the Python coding language to provide an improved optofluiddic communication channel model, specialized to simulate the light propagation inside the human blood vessel, that takes into account various cell geometries and movements.

**Students**
Ziming Wang, Jiazhan Li, Zhi Qiao

**Major**
Chemical and Biological Engineering

**Research Mentor**
Gang Wu

**Title**
Single Atomic Manganese Catalysts for Proton Exchange Membrane Fuel Cells

**Abstract**
Suffered from the Fenton reaction, Fe-containing catalysts will react with peroxide and produce free radicals that causing ionomer and membrane degradation. Platinum group metal (PGM)-free and also Fe-free catalysts for oxygen reduction cathode is highly demanded for future low-cost PEMFC technologies. Motivated by predictions from the first principles density functional theory (DFT) calculations, we have successfully developed a new type of atomic Mn catalyst derived from 3D metal-organic framework (MOF) through a continuous two-step doping/adsorption method. Atomic dispersed Mn-N coordinate structure was directly observed by aberration-corrected electron microscopy at atomic level and further confirmed by X-ray absorption spectroscopy for the first time. DFT calculation and electrocatalytic activity result indicate that the MnN4 structure was the origin of ORR activity. This high-performance atomic Mn catalysts will completely address the Fenton reagent issue stemming from currently studied Fe-N-C catalysts and make PGM-free cathode catalyst more feasible for PEMFCs.

**Undergraduate Presenters**

**Students**
Peter Wilkins, Connor Conway, Thomas Pink, Harrison Lofredo, Adam Carroll

**Research Mentor**
Dr. Paul DesJardin

**Title**
Crawford Burner

**Abstract**
St. Roberts Law predicts that at different pressures the burn rate of a material can be predicted by the relation \( R = aP^n \). To examine this relationship, strands of solid rocket propellant were burned in a device called a Crawford Burner at various pressures. While the
propellant is burning, the burn rate of the solid propellant is measured using a high speed camera and embedded thermocouples. During this process the pressure inside the chamber is monitored and a spectrometer is being used to measure the emitted wavelengths of the reaction.

School of Management

Student
Zhuolin Yang

Major
Computer Science

Research Mentor
Wenyao Xu

Title
SITUG: An Unobtrusive Gait Analysis System Based on Sensor-Equipped Insoles

Abstract
Smart Insole TUG (SITUG), a cost-efficient and real-time system suitable for gait analysis under complex conditions (e.g., obstacles and inclines involved). Specifically, it is developed upon an unobtrusive sensor-equipped insole and a comprehensive gait analysis module. The sensing insole can collect rich data related to movements during walking. The collected data are transferred to the gait analysis module in real time for operating data pre-processing and analysis. Based on the human stride mechanism, the gait analysis module elucidates four refined aspects in the gait feature and segment the walking process by six detailed phases, providing accurate and advanced gait information.

Student
Jianelle Fore

Major
Business Administration

Title
The REALM Experience

Abstract
The REALM program provides undergrad students with the opportunity to be paired with a professional related to their major or career interest. Throughout the full day you work side by side with your mentor and observe their leadership qualities, skills and their typical day at work. The goal of the REALM program is for students to gain experience in the field they wish to pursue as well as develop relationships with others in the organization or company they shadow. With the REALM program you receive first hand experience of how professionals succeed and how they overcome problems.

Students
Allison Grimaldi, Carli Shelton

Major
Business Administration

Research Mentor
Dorothy Siaw-Asamoah

Title
Ghana Cultural Comparisons

Abstract
During our trip abroad, we recognized various similarities and differences between the Indigenous U.S. and Ghanaian cultures. Our goal is to share our research on the comparison of the culturally rich ceremonial events and the role of native chiefs between the two societies. We plan to expand upon the detailed traditions that occur in both cultures during wedding ceremonies. Once we introduce the wedding traditions that take place in each culture, we will emphasize the similarities and differences between the two regions. We then plan to expand upon the detailed traditions that occur in both cultures during funeral ceremonies. We will compare and contrast the funeral traditions between the two regions. Presenting both the wedding and funeral ceremonies will provide the audience a well-rounded and diverse case on the variation of ceremonies that occur in each culture. We then plan to talk about the similarities and differences between how the native chief in both regions play a role in ceremonial events and society as a whole.

Students
Roddy Hughes, Wesley Mark, Shaun Teidemann, Christopher Morel

Title
Fundamental Analysis? Use Technical Analysis Instead

Abstract
We always use fundamental analysis for evaluating stocks and picking the correct ones. As a group we will be looking at the technical analysis where we will be using the use of statistics in predicting stock/cryptocurrency movements. We have been studying the movements and have found a good pattern and strategy in making the correct calls in buying and shorting the market. The strategies will include how to correctly use support and resistance lines on charts. We will also be using indicators that help gauge the market momentum and also potential breakouts.

Students
Dong Hwan Lim, Sangrok Lee

Major
Accounting

Research Mentor
Alex Ampadu

Title
Advisory on Country’s Best

Abstract
Upon the detailed traditions that occur in both cultures during wedding ceremonies. Once we introduce the wedding traditions that take place in each culture, we will emphasize the similarities and differences between the two regions. We then plan to expand upon the detailed traditions that occur in both cultures during funeral ceremonies. We will compare and contrast the funeral traditions between the two regions. Presenting both the wedding and funeral ceremonies will provide the audience a well-rounded and diverse case on the variation of ceremonies that occur in each culture. We then plan to talk about the similarities and differences between how the native chief in both regions play a role in ceremonial events and society as a whole.

Students
Javier Yu, Anand Balakrishnan, Gitanjali Nandi

Research Mentor
Karthik Dantu

Title
Crazy Swarm

Abstract
Multi-robot systems composed of aerial robots have numerous useful applications like search-and-rescue, mobile sensing, etc. The goal of this project was to setup a multi-robot coordination framework in the VICON motion tracking system located in 126 Bonner Hall using existing software developed by researchers at the University of Southern California. Now implemented, this system will ultimately serve as a testing platform for multi-robot coordination algorithms research.
The objective of the project was to come up with a recommendation for a fictitious company named “Best Country” and give a group presentation. The company is in a convenience store industry that runs gas station as well. The company wants to expand its stores to new locations and automate their stores with self-checkout machine. It was concerned how it will lose respect from communities by replacing employees with an automated system. Brief version of financial statement and other notes were provided. Our team researched information about convenience store industry and compared the company to its competitors using gross profit ratios and debt-equity ratio. Also, we created a specific strategy for automation and expansion. In order to support our strategy, we also performed cost-benefit analysis.

**Students**
Farhana Rashid, Hira Kashif, Samuel Ignaczak

**Research Mentor**
Dorothy Siaw-Asamoah and Emily Campion

**Title**
Women in Leadership: Western Africa vs. Western World

**Abstract**
What really stood out from our recent study abroad trip to Ghana were the leadership roles and positions women occupied, specifically in the open-air markets. The top position that oversees a market is called the “Queen Mother”, which is a role filled by a woman. We also took notice of the many women who independently ran businesses and balanced the caretaking responsibilities of motherhood. Although there may be many misconceptions about developing countries in western societies, we were witnesses to strong women who dominated in a patriarchal culture. In addition, we plan to compare and contrast the roles women play in American and Ghanaian society. Our goal is to enhance awareness of the women empowerment we observed in the Ghanaian culture and the rise of their involvement in nontraditional spaces within the business world.

**Student**
Anna Turova, Olivia Miller

**Major**
Accounting

**Research Mentor**
Emily Campion and Dorothy Siaw-Asamoah

**Title**
Global Perspectives: Social Innovation and entrepreneurial Leadership, Ghana

**Abstract**
During our study abroad trip in Ghana, Africa, we visited a Food Systems Planning facility called the Innovation Village. The Innovation Village is a multi-collaborative space where community members in the rural outskirts of the capital Accra, can learn, develop, and grow their own produce to sustain their families while making an income. We will share what we learned from our visit there, and how we can potentially apply that knowledge to food planning facilities in the US. For this project, we plan to describe the background of the Innovation Village; talk about what they produce, how they produce it, and how they foster community involvement. We will then compare the Innovation Village’s practices to those that are used by US food systems facilities. Specifically, we are hoping to identify the differences between the reasons why these facilities exist and their purpose. We will address the issues that they are trying to solve and discuss how they are approaching them. Overall, we hope to share our experiences at the Innovation Village and identify ways on how we can implement strategies to combat food disparities in Western New York.

**Student**
Duy Vo

**Major**
Business Administration

**Research Mentor**
Dr. Jiang Feng

**Title**
An OTG Experience

**Abstract**
The project will be about my marketing internship experience with OTG Management (an airport hospitality company). I will introduce the company and show what I have learned from this internship.

**Student**
Qihua Zhu, Ming Jiang

**Major**
Business Administration

**Research Mentor**
Dr. Pianpian Kong

**Title**
Process Automation in the Healthcare Industry

**Abstract**
As an Univera intern, I was a part of a multiple-step project to automate previously manual work. Originally these projects required human input and proved costly for time and labor. Using in-house automation, the organization was able to become more efficient and take tentative steps towards future use of Robotics Process Automation.

One part of the project required an employee to assign files to a folder; use a program to choose that folder for data parsing, and export. This had to be for every file. I worked to convert this human manipulated program into an automated system that allowed the user to simply enter a few prompts and have the data parsed, outputted, and sent to relevant parties. Another component of the project involved generating a database schema for previously manually done reports. Ultimately, these were some components of an extensive project to streamline the work process and human involvement.

**Student**
Shuyi Wang

**Major**
Business Administration

**Research Mentor**
Dr. Jiang Feng

**Title**
Why are we being asked to apply for store credit?

**Abstract**
The goal of this project is to show the reasons behind the massively published co-branded credit cards and how should consumers decide when businesses try to tempt us by offering enormous discount and stores credits.
School of Nursing

Students
Leann Balcerzak, Lisa Wawrzynk

Major
Nursing

Research Mentor
Dr. Yu-Ping Chang

Title
The Relationship Between Pain Catastrophizing and Sleep; A Systematic Review

Abstract
Background: Pain catastrophizing refers to the tendency of exaggerating the negative experience of pain, leading to rumination and feeling helplessness. Pain catastrophizing alters how individuals perceive pain which might lead to disturbances in functionality, especially in sleep. The purpose of this systematic review is to determine the current understanding of the relationship between pain catastrophizing and sleep.

Method: Database searches of CINAHL, Medline, PsychInfo, and Google Scholar were conducted using keywords including ‘sleep’, ‘catastrophize’, ‘catastrophizing’, and ‘catastrophization’. Inclusion criteria included; key words in the title, full text, published within last 20 years, and in English. Duplicates, abstracts, and non-pain catastrophizing variables were excluded.

Results: In total, 59 articles were retrieved and 5 met the inclusion criteria. Findings indicated a distinct association between pain catastrophizing and sleep. However, this relationship is not the focus of these studies. In order to understand the direct relationship between these variables, additional research is needed.

Conclusion: Information regarding catastrophic thinking’s impact on sleep in chronic pain patients.

Undergraduate Presenters

Ariana Roman

Major
Psychology

Title
Maximizing Long-Term Weight Control: Self-Determination Theory and Weight Self-Management Interventions

Abstract
A large portion of individuals who are or were overweight, struggle with adjusting and implementing weight-related behaviors in order to maintain weight loss. Tailored self-management programming has been demonstrated to increase the likelihood of long-term adoption of behaviors and weight loss maintenance. The incorporation of Self-Determination Theory (SDT) into weight self-management intervention programs for overweight and obese individuals may contribute to higher levels of adherence, exercise activity, and overall positive weight outcomes. This study will review literature examining how the SDT principles of autonomy, competence, and relatedness may moderate the association between weight intervention programming, adoption of long-term behaviors, and healthy outcomes (i.e., including weight loss). Ultimately, this research increases our understanding of the value of SDT-based interventions within individualized self-management programs for weight loss. Self-determination theory and self-
management are organic partners that, together, can maximize the effectiveness of interventions for long-term weight management.

Student
Syed Adnan Uddin

Major
Biotechnology

Research Mentor
Carla Jungquist

Title
The Placebo Effect in Pain Management

Abstract
Today, over-prescription of drugs has given rise to drug-resistant pathogens. The Placebo effect has played a great role in this. Minor study has been done on whether placebo effect plays a role in the level of pain felt by the person. Four human subjects, with chronic pain, were studied for two months. This experiment was divided into two phases. During phase I, only active doses was given to subjects. Once found stable, phase II began with randomization of active drug and placebo. Physical activity of the subjects was recorded using PRO-Diary. Results showed that there appears to be a placebo effect as subjects were not able to consistently identify if they were under the influence of an active drug, and pain ratings didn’t change at a clinically relevant rate. Patients were unwilling to change their opioid medication if they received some level of comfort from their current medicine.

Student
Hiu Ying Or

Major
Nursing

Research Mentor
Yu-Ping Chang

Title
Effects of an E-mailed Delivered Cognitive Behavioral Therapy for Insomnia in College Students with Insomnia

Abstract
Background/Purpose: Cognitive Behavioral Therapy for Insomnia (CBT-I) is found an effective non-pharmacological intervention for adults with insomnia. It provides education on modifying sleep-related behaviors and dysfunctional thoughts. This study aims to examine the effect of an e-mail delivered CBT-I in college students with insomnia.

Methods: The study used a two-group pre-and-post design. Intervention group received six weekly, email-delivered CBT-I sessions consisting of stimulus control, sleep restriction, sleep hygiene, relaxation training, cognitive restructuring, and relapse prevention. Comparison group goes on University student wellness website. Outcome measures included DBAS, PSQI, ESS, SHI, and AUDIT. Assessments were administered before, after, and 4-week following intervention. Descriptive statistics and repeated measured ANOVA were used of data analyses.

Results: Results demonstrated intervention group’s positive changes in sleep attitudes, sleep quality, sleep hygiene, daytime sleepiness, and alcohol use from pretest to post-test.

Conclusion: Our findings suggest that email-delivered CBT-I might provide sleep benefit to college students. Clinicians can use this simple and cost-effective tool to promote healthy sleep in college students.

We used students’ baseline data to examine the association between sleep variables and alcohol use. Measures used in the study include AUDIT, ISI, SHI, ESS, PSQI, and DBAS. Descriptive and correlational statistics were used to analyze data.

Eighty-six college students participated in the study. Findings indicate that 54% of our sample reported alcohol use. Students who reported alcohol use were more likely to experience daytime sleepiness. The amount of alcohol use was significantly associated with more daytime sleepiness and poor sleep hygiene.

School of Pharmacy & Pharmaceutical Sciences

Student
Mahmud Bhuiyan

Major
Pharmaceutical Sciences

Research Mentor
Dhavalkumar Shah

Title
Angiopep-2-VC-MMAE Conjugate For Treatment Of Glioblastoma

Abstract
Glioblastoma is the most common form of brain cancer. It is hard to treat due to the highly impermeable nature of the blood brain barrier (BBB). A protein-drug conjugate can be permeable to the BBB and bind to glioblastoma cancer cells. The proposed conjugate involves linking a 20 amino acid peptide with a highly toxic drug. Angiopep-2 is a 2.4kDa molecule consisting of a cysteine moiety, which binds to the malemide group on the VC-MMAE (monomethyl aurostatin E) chemotherapeutic agent.

Students
Jaqueline Gonya, Michael Deci, Maixian Liu

Major
Pharmaceutical Sciences

Research Mentor
Juliane Nguyen
Abstract

CXR4 is a chemokine receptor that is highly expressed in a variety of cancers and has been shown to be involved in tumor metastasis towards tissues expressing the CCL2 ligand. Blocking of the CXR4 receptor by single-chain variable fragment (scFv) hinders metastasis of the cancer and also allows for internalization of any cancer therapeutics it is delivering. Here, we cloned a CXR4-scFv protein and demonstrated its affinity for the CXR4 receptor. We then cloned a CXR4-scFv-protamine fusion protein. We hypothesize that this fusion protein would then be able to use the positively charged protamine to bind to and deliver therapeutic siRNA into cancer cells expressing CXR4, providing therapeutic gene knockdown that is both effective and specific.

Student Grace K. Shashaty

Major Biomedical Sciences

Research Mentor Alice Ceacareanu

Title The synergistic benefit of metformin-statin combination in patients diagnosed with diabetes and solid tumors

Abstract

This study evaluates the benefits derived by users of metformin-statin combination if diagnosed with cancer. With preliminary evidence indicating a synergistic benefit provided by this therapeutic combination in cases with gastrointestinal cancer and type 2 diabetes (T2DM), this study explored similar therapeutic advantages in T2DM cases with incident cancer of the breast, prostate, kidney, ovary, lung, and skin. Our data indicates that metformin-statin combo users derived significant survival and recurrence benefits (HROS=0.76, HRDFS=0.76, POS=0.018, PDFS=0.016) as compared to users of metformin (POS=0.510, PDFS=0.530), or statin (POS=0.488, PDFS=0.450) monotherapy. Statin type also influenced cancer outcomes. While metformin and hydrophilic statin combination exhibited improved survival (HROS=0.694, POS=0.028) and less recurrence (HRDFS=0.714, PDFS=0.024), lipophilic statins and metformin provided no benefit. Utilization of metformin combined with hydrophilic statins in patients with T2DM and cancer is expected to translate into improved overall cancer outcomes. However, these findings should be first replicated by prospective clinical studies.

Student Nicole Jarvi

Major Pharmaceutical Sciences

Research Mentor Sathy V. Balu-Iyer

Title Biophysical Characterization of Tolerogenic Nanoparticles Containing Lysosomal Acid Alpha-Glucosidase

Abstract

Deficiency of the enzyme lysosomal acid alpha-glucosidase (GAA) causes Pompe disease. Replacement therapy using recombinant GAA is the first line of therapy; however, development of anti-GAA antibodies in approximately 80% of patients compromises treatment efficacy with no other clinical options. To prevent unwanted immune response, our approach utilizes lipidic nanoparticles containing tolerogenic phosphatidylserine. In this project, biophysical characterization of GAA encapsulated in lysophosphatidylserine-containing liposomes was carried out to investigate the GAA-lipid interaction and the structure and stability of GAA when encapsulated. Results for circular dichroism studies indicated that GAA secondary structure was not significantly altered by nanoparticle encapsulation. GAA tertiary structure was examined using fluorescence spectroscopy and encapsulated GAA showed slight blue shift, suggesting partial insertion of GAA into the nanoparticle hydrophobic acyl chain region. The melting profile of GAA in the presence and absence of nanoparticles showed a small increase in transition temperature for encapsulated GAA, indicating improved stability.

Student Qaraghuli X. XiaoYing Yu, WanYing Zhang, Farah Al Qaraghuli

Major Pharmaceutical Science

Research Mentor Dhavalkumar Shah

Title Absolute Quantification of Endogenous T cell Distribution in C57BL/6 Mice

Abstract

Introduction: Unlike the traditional cancer treatments which directly targets cancer cells, immune-oncology (I-O) treatments stimulate the immune system against cancer cells. Previous studies indicated immunotherapy can lead to alternation in T cells dynamic and distribution in different types of tissue. Therefore, T cells distribution before and after immunotherapy is pivotal in the understanding of the therapeutic and toxic effect of the drugs.

Method: Due to the lack of absolute counts of T cell subsets in the literature, the aim of this study was to quantify T-cell subsets distribution in primary, secondary lymphoid, and peripheral tissues pre-and-post immuno-therapy following flow cytometry analysis. Single cell suspensions for lungs and liver were obtained using miltenyi mouse dissociation kits, where the rest followed mechanical dissociation.

Results: Our present data indicates that CD4+ cells were predominant among all tissues. However, T cell subsets (Central and effector memory specifically) varies among primary, secondary, and peripheral tissues. Since we are interested in getting reliable counts for these T cell subsets, we have compared popular quantification methods: Hemocytometer, CountBright™, and MACS Quant Analyzer 10. Our data shows that CountBright™ is the most reliable method among all.

Conclusion: Single cells suspension was successfully obtained following mechanical and enzymatic dissociation where absolute counts were obtained with CountBright™.

Students XiaoYing Yu, WanYing Zhang, Farah Al Qaraghuli

Major Pharmaceutical Sciences

Research Mentor Dhavalkumar Shah
Abstract
Passive heat stress increases renal vascular resistance (RVR), which is exacerbated during exercise, a sympathetic stimulus. We hypothesized that the renal vascular response to the CPT, a non-exercise sympathoexcitatory maneuver, during heat stress would be augmented.

Eight healthy adults completed a 2-min CPT before (Normothermia) and after core temperature increased by 1.3°C evoked by passive heating (Heated). Mean arterial pressure (MAP) and renal blood velocity (RBV) were measured at 1 min pre-CPT, and at 1 and 2 min into the CPT (T1 and T2). RVR was calculated as MAP/RBV. Changes in RBV during the CPT did not differ between Heated and Normothermia at T1 or T2. Changes in RVR did not differ between Heated (0.4±0.6 mmHg/cm/s) and Normothermia (1.1±1.0 mmHg/cm/s, P=0.10) at T1, but were lower in Heated at T2 (0.0±0.4 vs 1.1±1.0 mmHg/cm/s, P=0.02). We conclude that passive heat stress attenuates renal vascular responsiveness to sympathetic stimulation.

Students
Carol Cruz, James R. Sackett

Major
Exercise Science

Research Mentor
Dr. Blair Johnson

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Abstract
Carbon dioxide (CO2) retention occurs during head out water immersion (HOWI) despite an augmented central chemosensitivity. It is unclear if an augmented central chemosensitivity during HOWI is due to CO2 retention alone or the combined effects of HOWI. Therefore, we hypothesized that central chemosensitivity is augmented during dry conditions while breathing hypercapnic gas to match the CO2 retention that occurs during HOWI.

Twelve healthy subjects completed two experimental visits: a thermoneutral HOWI visit (HOWI) and a dry mild hypercapnia visit (Control+CO2) to match PETCO2 values that were obtained during HOWI. During both visits, we evaluated central chemosensitivity and measured ventilation and expired CO2 tension, as an index of CO2 retention.

The data indicate that central chemosensitivity does not augment during Control+CO2 as it does during HOWI. Thus, it appears that an augmented central chemosensitivity during HOWI is a function of the combined effects of HOWI and not solely CO2 retention.

Students
Marja Lauren Dela Rosa, Avery Hum, Madeline Norton

Major
Biomedical Sciences

Research Mentor
Dr. Elizabeth Mietlicki- Baase

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Abstract
Peripheral administration of amylin, an insulin analogue used to combat diabetes, also promotes negative energy balance. Our experiment tested the effects of varying doses of amylin and pramlintide, administered intraperitoneally into adult male rats, on food choice and feeding patterns when a free choice diet (sucrose, vegetable shortening, and chow) was available. Results indicated amylin (5 or 50µg/kg) and pramlintide (5µg/kg) significantly reduced total energy intake in the first hour after injection. Chow intake was decreased by amylin (5µg/kg) at 24h (p<0.05) with a trend for suppression at 1h (p=0.08). All doses of amylin and pramlintide tested significantly suppressed 1h sucrose intake (p<0.05). Meal pattern analyses suggested that amylin and pramlintide primarily suppress sucrose intake by decreasing meal size and promoting satiation, without affecting meal number.

Students
Elizabeth A. Gideon, Molly M. Ploof, Yi Zhang, James R. Sackett

Research Mentor
Blair D. Johnson
Students
Marissa Kawyn, Seth Frndak
Research Mentor
Katarzyna Kordas

Title
Household chemical use and neighborhood characteristics reporting among families from the Salud Ambiental Montevideo research study

Abstract
Children experience rapid developmental changes within the early stages of life and exposures to unfavorable environments can affect development. The purpose of this study was to describe the neighborhood and household environments of school children participating in the Salud Ambiental Montevideo (SAM) study to investigate these unfavorable environments that contribute to child development. Parents or guardians of the children answered questions regarding pet ownership, housing, neighborhood, and usage frequency of household chemicals. The analysis of the surveys showed families have low mobility and report no major safety concerns in their neighborhood, although 67% rated their neighborhood as “fair” or “poor” for raising children. Exploratory factor analysis revealed four distinct neighborhood features: community spirit, safety, infrastructure, and overall satisfaction. Although fairly small, the survey reveals interesting patterns of family and neighborhood characteristics, with potential overlap in unfavorable exposures, including mobility, poor community spirit, and exposure to household chemicals.

Student
Julia R. Slyer
Major
Biology & Psychology
Research Mentor
Dr. Zachary J. Schlader

Title
Quantification of the Motivation to Behaviorally Thermoregulate during Passive Heat Exposure in Humans

Abstract
Behavioral thermoregulation is driven by the extent of changes in skin and/or core body temperatures. However, motivation to behaviorally thermoregulate has not been quantified in humans. Therefore, we tested the hypothesis that the motivation to behaviorally thermoregulate in humans is dependent on the magnitude of changes in body temperature. Following 10 min of seated rest, ten healthy subjects underwent 60 min of seated rest in 32.2 ± 0.6 °C (T32) or 42.3 ± 0.7 °C (T42) environment. The motivation to behaviorally thermoregulate was measured using operant responding on a fixed ratio schedule, in which subjects received cooling stimulus after clicking a button 100 times. The increase in mean skin temperature was greater in T42 vs. T32, and cumulative responding (clicks) was greater in T42 compared to T32. These data indicate that the motivation to receive thermal reinforcement during heat exposure is dependent on the magnitude of changes in mean skin temperature.
FOURTEENTH ANNUAL

Celebration of Student Academic Excellence

THURSDAY, APRIL 26, 2018 | CENTER FOR THE ARTS

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KEY

Σ = Sigma Xi*

S = Sustainable Project**

W = Women in Science and Engineering

*Sigma Xi is an international science and engineering honor society designed to reward excellence in scientific research and to encourage a sense of companionship and cooperation among scientists across all fields. Sigma Xi has had 200 Nobel laureates as members and currently has over 60,000 members in over 100 countries. As part of this Celebration of Excellence, Sigma Xi is pleased to recognize the top three posters from UB’s graduate program for its "Spoudon Xynones - Companions in Zealous Research" award.

**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

**Student**  
Luisa Angeles

**Academic Program**  
Medicinal Chemistry PhD

**Research Advisor**  
Diana Aga

**Title**  
Global Reconnaissance of Antimicrobial Residues in Wastewater and Surface Waters

**Abstract**  
Antimicrobial resistance is a global threat because it is continuously reducing the efficacy of antibiotics to treat infection. Resistant microorganisms are able to cross national borders due to international trade, travel, and environmental contamination. The release of antibiotics into the environment through effluents from wastewater treatment plants (WWTP) has been known to drive the spread of antimicrobial resistance genes and bacteria in non-clinical settings. In order to contribute to an improved understanding of antimicrobial resistance spread, the levels of 30 antibiotics in WWTPs from five countries were determined using Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS). Results showed that the levels and composition of antimicrobials differ per country, with greater concentrations detected in Hong Kong and the Philippines, and lower levels in Sweden, Switzerland, and the United States. Ciprofloxacin and clarithromycin were the most detected antibiotics with concentrations from 23 to 2641 ng/L and 4 to 877 ng/L, respectively.

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**Student**  
Debarghya Dutta Banik

**Academic Program**  
Biological Sciences PhD

**Research Advisor**  
Kathryn Medler

**Title**  
TRPM4 and TRPM5 are both required for normal signaling in taste receptor cells

**Abstract**  
Taste receptor cells use multiple signaling pathways to transduce taste stimuli into output signals. Until recently it was thought that the transduction of all bitter, sweet, and umami stimuli depends on the transient receptor potential melastatin 5 (TRPM5). However, some studies have suggested that both channels are required for normal taste-evoked responses. Our research shows that both TRPM4 and TRPM5 are necessary and sufficient for the detection of bitter, sweet, and umami stimuli.

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Graduate Presenters
Celebration of Student Academic Excellence 2018

**Student**
Bella Poynton

**Academic Program**
Theatre Performance PhD

**Research Advisor**
Ariel Nereson

**Title**

**Abstract**
Karel Čapek’s revolutionary play R.U.R. is commonly referred to as the first piece of science fiction theatre as well as the first text in which the word “robot” appeared. This paper argues that Čapek’s R.U.R. is the earliest piece of media to establish consistent visual and design elements for varying, yet aesthetically connected representations of robots within visual culture. The paper considers two early productions of R.U.R and one film (London 1923, New York Touring 1928-29, and Metropolis 1927), and tracks how the evolution of costume design and actor physicality worked to solidify design and gestural behaviors associated with robots. I further posit that these production choices inadvertently contradicted Čapek’s original concept of the synthetically made, yet still organic robot, thus posing contemporary questions regarding how outdated 20th century stereotypes may now be impeding on the success of potentially beneficial robotic devices in the fields of elder care and medicine.

**Student**
Chenyang Wei

**Academic Program**
Geographic Information Sci MS / Geography PhD

**Research Advisor**
Adam Wilson

**Title**
Are Forests Climbing Mountains in the Western U.S. under Climate Change?

**Abstract**
Changing climatic conditions over last century have significantly affected global biological systems, especially in high-elevation areas. As a sensitive monitor of the recent climate change, the upper limits of forests in mountain areas, the so-called “alpine treelines”, are expected to be driven upslope worldwide, which has negative impacts on local biodiversity and ecosystem function. Moreover, these effects are very likely to increase in the future as the global climate system continues to change. In this study, alpine treelines were identified in the western U.S. over the past three decades using satellite images. Additionally, I observed both temporal and spatial variability in treeline elevation. This research fills key gaps in our knowledge of how climate has affected alpine forests in the western U.S. The concepts and methodologies are broadly applicable and transferrable to understanding vegetation responses and associated ecological effects in other systems elsewhere with a changing climate.

**Student**
Heather Williams

**Academic Program**
Evol, Ecology & Behavior PhD

**Research Advisor**
Katharina Dittmar

**Title**
“A change is as good as a nest”. Testing the efficacy of a conservation intervention in a wild migratory bird, the Purple Martin.

**Abstract**
While many anthropogenic environmental changes are negative for wildlife, some modifications are well-intentioned such as providing supplementary food and nesting opportunities for wildlife, and have ambiguous consequences.

The purple martin (Progne subis) is a migratory bird which has become reliant on humans to provide them with nest boxes in the Eastern part of its range. These nests are thought to harbor an unusually high load of blood-sucking parasites. This has led conservation organizations to suggest that purple martin nest materials should be artificially replaced throughout the nesting season to reduce parasite load - a further human intervention with a wild species.

This study tests the efficacy of this approach, considering whether this additional intervention truly reduces parasite load and whether it has measurable positive effects for the purple martin. Early results imply a potential weather dependent effect, whereby removing parasites is only beneficial when food is scarce during wet/cool summers.

**Student**
Xiaowen Zhuang

**Academic Program**
Biological Sciences PhD

**Research Advisor**
Matthew Xu-Friedman

**Title**
Activity-dependent changes at auditory synapses

**Abstract**
Normal hearing is important to everyday life, but abnormal auditory experience during development can lead to processing disorders. Loud noise can lead to tinnitus, ringing in the ears, and conductive hearing loss (CHL), for example from ear infections, which can cause long-lasting deficits in language skills and verbal production. To treat these disorders, it is critical to understand how the brain changes when the sound first arrives at the ears. Here, we showed that CHL in mice caused synapses at the very first stage of the auditory pathway to change their properties, by decreasing in size and causing synapses to deplete faster, which may undermine subsequent processing. We also found mature synapses are subject to the same changes as immature ones when exposed to noisy environments or CHL. This suggested early synapses adjust their properties in response to different sounds from ears throughout life.

Furthermore, it is critical to understand the cellular mechanisms underlying these changes, and it will lead to new ideas for treating dysregulating synapses. We found that changes in the amount of presynaptic calcium influx play an important role in regulating this activity-dependent changes. Finally, the reliability of information transmission decreased after CHL and increased after noise exposure. These consequences of presynaptic activity-dependent changes will help us learn critical information about the susceptibility of adults and children to noisy environments or CHL.
Graduate School of Education

Student  ♂
Evette Addai

Academic Program
Counseling/School Psych PhD

Research Advisor
Wendy Guyker

Title
Mindful Self-care among Medical Residents: Associations with Wellness, Depression, and Distress

Abstract
Burnout, depression, and low well-being for medical residents can lead to poor patient care and higher mental health symptoms. Self-care behavior engagement is related with positive physical and emotional wellness. Mindful self-care is a specific form of self-care that integrates mindful awareness and presence into the practice of self-care. This study explored the types of mindful self-care behaviors residents engage in, while examining associations between mindful self-care, wellness, burnout, mental distress, and depression. 104 medical residents at the University at Buffalo completed the survey. Of the six mindful self-care subscales, residents had the lowest scores on physical care and mindful relaxation. They scored highest on the supportive relationships and supportive structure subscales. Mindful self-care was significantly related to resident wellness (r=.623, P<.001), and inversely related to resident depression (r=-.56, P<.001) and distress (r=-.495, P<.001). Self-care was worse (F (1,97) = 15.69, P<.001) among residents with burnout compared to residents without.

Students
Ebtssam Alqhtani, Majed Altamimi

Academic Program
Nursing PhD

Research Advisor
Kim Sunha

Title
Factors Improving English Language Learners’ Performance on a Reading Achievement Test

Abstract
This study explored obtaining the reading proficiency for non-English Language Learners and English Language Learners and examined if parental education and family income could mediate the effects of language status on the reading proficiency. Moreover, we examined if attending pre-school education had a positive impact on obtaining the reading proficiency after controlling language status, parental education, and family income. Our motivation was to identify the patterns of students who did not reach the reading proficiency before finishing second grade to suggest policies that promote obtaining reading proficiency. We employed a survival analysis using the data of the Early Childhood Longitudinal Study ECLS-K:2011 from the National Center for Education Statistics. The results showed that the non-English Language Learners had an 81% higher chance of being proficient than English Language Learners. In addition, controlling for parental education and family income, the effect of language status on reading proficiency was statistical significant.

Students
Nichole Barrett

Academic Program
Curr Inst & Sci of Lrning PhD

Research Advisor
David Bruce

Title
“Past the Point of Messing with it”: Exploring Rural Identities Through Digital Video Composition

Abstract
Missing from educational research exploring the impact of DV in classrooms is an emphasis on students’ developing voices and identities, and social positions. This research adds to the scholarship but highlighting the relationship between students complex literacy practices, their identities, and the use of DV in both an in-school elective film class and after school film club. Using ethnographic case study methods, data in the form of video, audio, interviews, and student/teacher artifacts was collected once a week for the duration of 9 months at Rolling Hills High School. This poster presentation will highlight the ways that one teacher, with the help of DV composition, provided students with opportunities to create meaning on their own terms. In addition, this poster will highlight the value of DV as a compositional tool that provides students with opportunities to (re)present who they are both in an out-of-school.

Student
Monica J. Johnson

Academic Program
Counseling/School Psych PhD

Research Advisor
Amy Reynolds

Title
Factors that influence academic success among African American college women: The impact of African American acculturation and religiosity

Abstract
Academic success research has primarily focused on white students; thus, creating questions as to the appropriateness of generalizing results to students of color. This study explored factors that influence academic success in African American college women, specifically examining the impact of African American acculturation and religiosity. One hundred and twenty-nine self-identified Black/African American college women completed an online survey assessing level of acculturation, religious commitment, and academic success; as determined by GPA and a college student academic success inventory. Though the simple regression analysis revealed that the relationships between acculturation and GPA, and religiosity and GPA were found to be statistically indiscernible, significant relationships were found between the independent variables and certain domains of the academic college success inventory. The results of this study add to the current and contradictory research involving factors that influence African American women college success. This study provides suggestions for future research on this topic.

Student
Christopher Kohler

Academic Program
Applied Statistical Analysis, Advanced Certificate
students decreases gradually because of adaptation in Indian international students and a higher level of adjustment staying in the U.S increases, the gap associated with English proficiency.

sociocultural adjustment is primarily associated with English proficiency. However, as the length of time spent in the U.S increases, the gap between a lower level of adjustment in Chinese students and a higher level of adaptation in Indian international students decreases gradually because of the advantages of English proficiency decline. After an initial period, international students’ adaptation in social and cultural contexts becomes more likely to be impacted by cultural knowledge and cross-cultural contact regardless of their language ability and backgrounds. The difference in the sociocultural adjustment of these two major groups of international students is found to be dependent on personality, workload and acculturation stressors instead of English proficiency. This paper suggests that schools of higher education should provide different levels of English language instruction, increased access to student services, and training in cultural knowledge to help acculturate international students of all backgrounds.

Jacobs School of Medicine & Biomedical Sciences

Title Targeting aerobactin biosynthesis in hypervirulent Klebsiella pneumoniae

Abstract Since it was initially described in the mid-1980s, a hypervirulent pathotype of Klebsiella pneumoniae (hvKP) has since disseminated throughout the globe. In contrast to classical opportunistic strains of Klebsiella pneumoniae, hvKP is able to cause serious life-threatening infections in previously healthy individuals in the community. Recent investigations toward understanding the enhanced virulence of hvKP strains has highlighted the importance of the biosynthesis of the siderophore aerobactin. To better understand the production of this critical virulence factor, we structurally and functionally characterized the aerobactin biosynthetic pathway, with specific emphasis on the synthetases IucA and IucC. Furthermore, we developed a high-throughput biochemical assay, and employed it to screen small-molecule libraries for inhibitors of aerobactin biosynthesis.
intellectual disability (ID). In a transgenic 16p11.2 deletion mouse model (16p11.2+/-), we observed deficient NMDA receptor function in the medial prefrontal cortex (mPFC), a brain region associated with high level “executive” functions. Using the chemogenetic tool, Designer Receptors Exclusively Activated by Designer Drugs (DREADDs), we restored NMDAR activity in 16p11.2+/- PFC, thereby ameliorating cognitive and social impairments in these mice. While these findings offer translational value for 16p11.2 deletion patients, little translational data has been generated for 16p11.2 duplication carriers due to the lack of a verified 16p11.2 duplication model. We have thus characterized the behavioral profile of 16p11.2dup/+ mice, and plan to investigate novel intervention strategies.

**Student**
Alexandria Trujillo  
**Academic Program**  
Pharmacology and Toxicology PhD  
**Research Advisor**
Jack Sullivan  
**Title**
Should Genomic Expression Constructs be Employed when Developing Post-Transcriptional Silencing Agents for Gene Therapies?  
**Abstract**  
Computational structural modelling is used to identify mRNA target sites for Post-Transcriptional Gene Silencing (PTGS) agents such as shRNAs and ribozymes. This approach streamlines later screening and optimization. Experimental steps focus on mature mRNA sequence transcribed from cDNA, without consideration of pre-mRNA structure, wherein the presence of an intron and history of splicing could modify target site accessibility. This study analyzed predicted exon structural differences in Human Rhodopsin mature and pre-mRNA using three popular RNA secondary structure algorithms. The product of these vectors determines the Multiparameter Prediction of RNA accessibility and annealing sites were compared for 12 RHO targeting agents developed as potential treatments for Autosomal Dominant Retinitis Pigmentosa. Generally, PTGS agents that have targets in exons 2-4 (n=6) were more susceptible to alterations than those in exon 1 and 5 (n=6) if the history of splicing imparts accessibility changes in mature target sites, then cDNA experimental outcomes may not be maximally predicted of in vivo performance.

**Student**
Zhenyu Xiong  
**Academic Program**  
Medical Physics PhD  
**Research Advisor**
Daniel Bednarek  
**Title**
Real-time estimation of x-ray dose to the lens of the patient’s eyes during fluoroscopically-guided neuro-interventional procedures  
**Abstract**  
The aim of this work is to develop a method to estimate the x-ray dose to the lens of the patient’s eyes in real-time during fluoroscopically-guided neuro-interventional procedures for feedback to the physician. EGSnrc Monte-Carlo software was used to precalculate the dose to the lens of the eye for a series of projection geometries and exposure parameters typically used in a procedure. Using the software developed for our skin-dose tracking system (DTS), the parameters of each exposure pulse are obtained in real-time and used to estimate the corresponding lens dose using precalculated normalized lens-dose values from look-up tables and formulas. The agreement of the total procedure real-time estimated lens dose with the lens dose calculated post-procedure with Monte-Carlo software is better than 20%. Real-time estimation of lens dose and its display by the DTS provides guidance for the interventionalist during a procedure to avoid exceeding the threshold for cataractogenesis.

**Student**
Spencer Rosario  
**Academic Program**  
Pharmacology PhD (Roswell Park)  
**Research Advisor**
Dominic Smiraglia  
**Title**
Pan-cancer analysis of transcriptional metabolic dysregulation using The Cancer Genome Atlas  
**Abstract**  
Despite waning interest in cancer metabolism in the 1970s, a renewed
awareness of cancer as a metabolic disorder has led to its inclusion as an emerging hallmark of cancer. The extent to which metabolic genes and pathways are expressed by cancers of different origins and how these pathways differ from non-malignant tissues has yet to be determined. Transcriptomic data, like that in The Cancer Genome Atlas (TCGA), exists for a large number of patients and disease sites, providing the opportunity to investigate mechanisms used to control metabolic enzyme expression and metabolic reprogramming. We have created a novel bioinformatics pipeline to elucidate metabolic pathways that are highly transcriptionally dysregulated in different cancer types. Further, we address the challenge of understanding genetic changes that underlie different metabolic phenotypes in cancer by identifying Master Metabolic Transcriptional Regulators (MMTRs). MMTRs may provide novel understanding of why metabolism differs and provide new targets for treatment.

School of Architecture & Planning

Student
Laura Carless

Academic Program
Architecture 3.5 MArch

Research Advisor
Brian Carter

Title
Emanate

Abstract
Emanate proposes a new school of music for the University at Buffalo's South Campus. Currently there is an excess of inaccessible and underutilized green space. With a growing interest in the arts programs at the school, this project proposes two buildings: one that houses classrooms, practice rooms, lecture halls, recording studios, departmental offices, and guest apartments, and a separate performance hall for small university performances and visiting musicians. In between the two buildings is a proposed plaza and below-grade fountain that also illuminates the space. This area connects the two buildings while emphasizing a major pedestrian entryway into the university. The paved central space creates an opportunity to preserve a deliberate moment of emptiness, which is something lacking in the future university plan.

Student
Frank Kraemer

Academic Program
Architecture 3.5 MArch

Research Advisor
Brian Carter

Title
CHORALE: UB School of Music

Abstract
CHO-RALE
1. a musical composition (or part of one) consisting of or resembling a harmonized version of a simple, stately hymn tune.

The design of the new University at Buffalo School of Music is centered around three objectives: create an environment conducive to the institutional needs of a school; bridge the gap between the school and its students, faculty, and the surrounding community; and finally, to create a landmark on campus. Through an interdependent relationship between these university and community factors, the buildings act as an institution of music open to its surroundings, providing a liveliness to campus and unity amongst students.

School of Dental Medicine

Student
Jeremy Kiripolsky

Academic Program
Oral Biology PhD

Research Advisor
Jill Kramer

Title
Identification of dysregulated immune-related gene networks in primary Sjögren’s syndrome

Abstract
Primary Sjögren’s Syndrome (pSS) is an autoimmune disease. While pSS is clearly mediated by immune dysfunction, the disease etiology is incompletely understood. Our objective was to characterize the genetic landscape in splenic tissue from pSS mice in order to identify novel immune-related pathways that may be targeted therapeutically. We harvested spleens from pSS mice with clinical disease and age and gender-matched controls (n = 3 each), isolated RNA and performed RNA-sequencing (RNA-seq). Differential gene expression (DEG) analysis was carried out and DEGs were analyzed by GO and KEGG pathway enrichment analysis to determine the gene networks that were altered in pSS. We identified numerous pathways and networks that were differently expressed in spleens from pSS animals as compared to controls, many of which are related to immune dysfunction. These data provide a foundation for future studies to establish the therapeutic relevance of these networks to human disease.

Student
Sangwon Min

Academic Program
Oral Biology PhD

Research Advisor
Rose-Anne Romano

Title
Contribution of p63+ Cells During Salivary Gland Development and Adult Gland Maintenance

Abstract
The transcription factor p63 marks the stem and progenitor cell populations of epithelial tissues including the salivary gland (SG) where it might drive stem/progenitor cell lineage commitment and differentiation. The critical role of p63 in the SG is highlighted by the phenotype of p63-null mice, which display a complete block in SG morphogenesis. Although the importance of p63 in SG development is clear, our understanding of how p63 functions in directing stem/progenitor cell fate trajectories is limited. Here we have utilized genetic lineage-tracing technologies to trace the progeny of p63+ cells and we demonstrate that p63+ cells function as multipotent stem/progenitor cells that maintain all the SG cell lineages. Our studies have identified p63 as a new player in the SG stem/progenitor cell hierarchy. Long-term, these studies can offer new insights into p63-driven signaling networks/pathways important for stem cell based
regenerative therapy approaches to treat SG dysfunction.

Student
Hannah Norris

Abstract
The impact of nutrient metal availability on oral health, including carriage and pathogenicity of Candida species, is an emerging focus in oral microbiology. We detected five metals in human whole saliva (WS): iron, zinc, copper, manganese, and nickel; and examined the relationship between these metals and commensal Candida albicans carriage. Correlated metals differed between individuals with and without detectable carriage, suggesting the oral environment differs when Candida is present or absent. Manganese, iron, and copper significantly predicted fungal carriage: a unit increase in log(ng/mL) metal resulted in an 89, 134 and 220% increase in expected carriage count, respectively; suggesting that these metals are important for fitness of commensal Candida. Principle component analysis revealed that input variables cluster individuals separately by low, middle and high carriage count, respectively; suggesting that input variables cluster individuals separately by low, middle and high carriage count. Thus, salivary metal levels may be a valuable predictive metric for the risk of C. albicans overgrowth.

School of Engineering & Applied Sciences

Student
Mohammad Ali Attarzadeh

Academic Program
Mechanical Engineering PhD

Research Advisor
Mira Edgerton

Title
Salivary Metals Predict Commensal Candida albicans Levels in Healthy Adults

Abstract
In nature, waves tend to travel symmetrically in every spatial direction, owing to the Reciprocity principle. Phononic structures with properties that vary simultaneously in space and time have been shown to break mechanical reciprocity, culminating in intriguing asymmetric wave propagation patterns. In this work, we investigate wave propagation in a 2D spatiotemporally modulated thin membrane excited at the center with an omnidirectional source. Such systems exhibit non-reciprocal phononic band gaps, i.e. frequency ranges within which incident waves can only propagate through the medium in one-way. Upon forcing material properties to be time-variant, assumptions governing the reciprocity principle are no longer valid. Consequently, waves traveling from point A to B do not necessarily follow the same pattern from B to A. The results of this work open up possibilities toward acoustic filters, tunable mechanical switches and back-scattering immune devices for ultrasonic health assessment purposes that operate analogously to their electrical counterparts.

Student
Fenglong Ma

Academic Program
Computer Science and Engineering PhD

Research Advisor
Jing Gao

Title
FaitCrowd: Fine Grained Truth Discovery for Crowdsourced Data Aggregation

Abstract
In crowdsourced data aggregation task, there exist conflicts in the answers provided by large numbers of sources on the same set of questions. The most important challenge for this task is to estimate source reliability and select answers that are provided by high quality sources. Existing work assumes that a source has the same reliability degree on all the questions, but ignore the fact that sources' reliability may vary significantly among different topics. To address this issue, we propose FaitCrowd, a fine grained truth discovery model for the task of aggregating conflicting data collected from multiple users/sources. FaitCrowd jointly models the process of generating question content and sources' provided answers in a probabilistic model to estimate both topical expertise and true answers simultaneously. This leads to a more precise estimation of source reliability. Therefore, FaitCrowd demonstrates better ability to obtain true answers for the questions compared with existing approaches.

Student
Vineet Madasserpayappalli

Academic Program
Industrial Engineering PhD

Research Advisor
Jun Zhuang

Title
Fire Risk Assessment and Resource Allocation: Predictive and Prescriptive Analytics for Fire Protection

Abstract
The total cost (sum of expenditures and losses) of structural fires for the entire U. S. in 2014 was $328.5 billion, which was 1.9% of the U.S. GDP. Advancements in data collection and analysis techniques have enabled an increased interest in data-driven approaches to mitigate fire losses, yet there is inadequate literature in the area of predictive and prescriptive analytics for fire protection. This poster summarizes a collection of related works that address some challenges in the area of fire protection. The key aspects investigated are: (i) estimating the effectiveness of investment in fire protection, (ii) optimal allocation of fire protection resources, and (iii) fire risk scores and prediction modeling. Collectively, this research would provide
Structural Fire Testing
Active Boundary Conditions for Negar Elhami-Khorasani
Research Advisor
Civil Engineering PhD
Ramia Qureshi
Student

Abstract
Fire safety engineering relies on experimental results from standard fire resistance tests, where a singular structural member is tested using passive boundary conditions at the end supports, and therefore neglect continuity and restraining effects between different structural members during fire. One solution is introduction of active boundary conditions by providing actuators at the specimen boundaries to replicate the contributions of adjacent elements in the form of a varying force-displacement response in real time. This method is termed Hybrid Fire Testing (HFT). This study presents a compensation scheme for mitigating instabilities experienced in calculating structural stiffness of a steel member, as it gradually degrades during the fire. Loss of equilibrium can be corrected by updating the applied force in actuator, which depends on stiffness of the specimen. A Broyden update is applied to determine instantaneous secant stiffness based on specimen fire-performance history, incorporating real time active contribution of the boundary structure.

Student
Souransu Nandi

Academic Program
Mechanical Engineering PhD

Research Advisor
Tarunraj Singh

Title
Regulation of Type 1 Diabetes: Sensing and Control

Abstract
In 2009, the American Diabetes Association estimated that 9.3% of the US population had Diabetes, of which 1.25 million were diagnosed with Type-1. This provides a strong motivation to develop an artificial pancreas that can help in its treatment. The artificial pancreas endeavors to determine optimal dosage of insulin such that their blood glucose level remains within accepted thresholds. Integrating blood glucose sensing with an insulin control algorithms form the core of this biomedical system. This poster highlights some of my contributions to this field. The first question addressed is: ‘What is the optimal time following an insulin bolus at which a Type-1 Diabetic patient should consume a meal?’ The second result presents an insulin control algorithm that allows the blood glucose levels to remain within certain specified bounds in the presence of meal uncertainties and patient variability. A non-invasive multi-modal approach for sensing of blood glucose is also presented.

Student
W Souransu Nandi

Academic Program
Civil Engineering PhD

Research Advisor
Negar Elhami-Khorasani

Title
Active Boundary Conditions for Structural Fire Testing

Abstract
Skeletal muscle loss due to aging, sarcopenia, is a major medical problem facing elderlies. Adult skeletal muscle repair relies on the activity of resident stem cells in skeletal muscle. However, the differentiation potential of these stem cells declines with age to the point that they cannot repair and regenerate the skeletal muscle efficiently. To combat skeletal muscle loss, we seek help from the first stages of life when the embryonic gene called NANOG can restore the differentiation potential of skeletal muscle stem cells to repair the frail muscle again. This way an elderly can gain the muscle mass and strength to perform daily activities. We prove the anti-aging effects of NANOG at the functional and molecular levels.

Graduate Presenters
Puerto Rico: The Role of Law and Policy in Recovery and Resiliency

Abstract
In January 2018, the UB Law School Puerto Rico Recovery Assistance Clinic prepared with five weeks of full time study, and subsequently, traveled to Puerto Rico to give direct legal and humanitarian aid, in addition to meeting leading Puerto Rican figures and community stakeholders. The reality of mixed political status, economic recession, large out-migration, environmental degradation, with the lack of a robust federal response leaves the island with few choices but to become more self-sufficient. Expanding on what we learned while on the islands, this paper argues that Puerto Rican law should be changed to facilitate community-based economic development with the intent of localizing necessary economic goods. This localization produces an increase in individual economic wealth and helps retain that wealth within the local Puerto Rican economy. The focus on necessary economic goods ensures that the island is resilient, self-sufficient, and responsive in the face of economic, environmental, and political shocks by reducing dependence on imports. After explaining a model for community economic development, this paper then presents two applications of that model to Puerto Rico’s agriculture and energy sectors.

Adoption of Health Information Exchanges and Physicians’ Referral Patterns: Are they Mutually Reinforcing?

Abstract
This research studies how Health Information Exchanges (HIE) implemented in the U.S. healthcare system impact physicians’ referral patterns. Referrals are an important function of healthcare services, and HIE can significantly impact healthcare outcomes due to referrals. We contend that primary care physicians who are HIE members tend to refer their patients to specialists who are also members. Further, referrals between a member and a non-member influence the non-member to adopt HIE. To investigate this reciprocal association, we develop a novel methodology comprising of a Mechanism View and a Trajectory View of this association. While the mechanism view models causal and reverse-causal associations between HIE adoption and referral patterns using panel data, the trajectory view models the transformation process in which referrals and HIE adoption co-evolve between instances of panel observations. We establish that HIE adoption and referral patterns evolve concomitantly. This study has significant implications for healthcare policy-making.

To Seek or to Contribute: Evidence of Socioemotional Selectivity in Older Adults’ Satisfaction from Knowledge-Sharing Virtual Communities

Abstract
There is lack of research on how older adults derive satisfaction from their knowledge seeking (KS) and knowledge contribution (KC) activities in knowledge-sharing virtual communities (KSVCs). Rooted in socioemotional selectivity theory, we develop hypotheses about the extent to which older adults derive satisfaction from their KS and KC activities based on their prioritization of emotion- and knowledge-related goals, and how their socioemotional states based on their reactions to perceptions of remaining time in life moderate the effects of KS and KC activities on satisfaction. We test our hypotheses using data from three KSVCs that are hosted by www.baidu.com.
Sexually Transmitted Diseases (STDs) are defined as infections that are passed from one person to another through sexual activity. More than 1 million STDs are acquired every day worldwide. In India, there has been a 400% increase in STD cases since 1990’s. STDs can have life-threatening consequences beyond the immediate impact of the infection. Lack of awareness and proper sex education have resulted in rise of STDs. Young adults between 16-24 form the high risk segment in acquiring such infections & more than 50% of them receive no sex education.

We have developed a web-based IT system based on Information-Motivation-Behavioral Skills (IMB) Model for educating young adults about STD’s. Our IT system provides a safe and anonymized means to facilitate interaction with the medical practitioners, emotional support through peer interaction & access to self-help and educational resources.

We test the efficacy of our application through multiple field studies.

Student
Pavankumar Mulgund

Academic Program
Management Science and Systems PhD

Research Advisor
Raj Sharman

Title
NO TABOO - A sex education platform for young adults in India

Abstract
Sexually Transmitted Diseases (STDs) are defined as infections that are passed from one person to another through sexual activity. More than 1 million STDs are acquired every day worldwide. In India, there has been a 400% increase in STD cases since 1990’s. STDs can have life-threatening consequences beyond the immediate impact of the infection. Lack of awareness and proper sex education have resulted in rise of STDs. Young adults between 16-24 form the high risk segment in acquiring such infections & more than 50% of them receive no sex education.

We have developed a web-based IT system based on Information-Motivation-Behavioral Skills (IMB) Model for educating young adults about STD’s. Our IT system provides a safe and anonymized means to facilitate interaction with the medical practitioners, emotional support through peer interaction & access to self-help and educational resources.

We test the efficacy of our application through multiple field studies.

Student
Srikanth Parameswaran

Academic Program
Management Science and Systems PhD

Research Advisor
Rajiv Kishore

Title
A “Networked Minds” Model of User-Generated Content in Online Health Communities: An Empirical Investigation Using an Integrated Social Presence-Social Network Perspective

Abstract
We develop a social network based model of user-generated content (social support) in online health communities. Grounded in the social presence and the social network theories, we hypothesize the differential impacts of an online health community member’s brokerage and influence in the web-of-support on a) extent of social support, and two self-absorption linguistic features namely b) self-focused and c) socially-focused words in social support text. Variables were operationalized using text mining and social network analyses. We empirically tested our model using panel-data collected from an online health community for diabetics. Higher brokerage results in more support from the member; however, the marginal effect is decreasing. Higher brokerage and influence in the web-of-support on the member; however, the marginal effect is decreasing. Higher brokerage and influence results in reduced support; however, the effect is increasing at higher levels. Higher brokerage and influence results in less self-focused support; however, the marginal effect is increasing.
Abstract
Prescription opioid abuse is increasing in older adults and poses a challenging problem to healthcare providers. Motivational interviewing (MI) can effectively reduce substance abuse, but MI training has not been well incorporated into Doctor of Nursing Practice (DNP) education. This study aimed to determine whether an MI training with a standardized patient simulation improved DNP students' knowledge, confidence, and skills in MI. A one group pretest-posttest repeated measures design was used. Study participants included 21 DNP students. Quantitative data was analyzed using descriptive statistics and repeated measures ANOVA, and qualitative data was analyzed using content analysis. Results indicated that the MI training showed some promising impact on students' knowledge, confidence and skills in using MI to manage prescription opioid abuse, and it was valued by students. An MI training can be successfully incorporated into a DNP curriculum and would prepare students to effectively encourage behavior change and improve patient outcomes.

School of Pharmacy & Pharmaceutical Sciences

Student
Vivaswath Ayyar

Academic Program
Pharmaceutical Sciences PhD

Research Advisor
William Jusko

Title
Receptor/gene/protein-mediated signaling connects methylprednisolone exposure to pharmacodynamic responses in liver: a multiscale model to predict corticosteroid actions

Abstract
Corticosteroid action involves binding to glucocorticoid receptors within cells, which upon activation and translocation, regulates transcription. Consequently, myriad signaling transduction mechanisms at the mRNA and protein levels, and resultant physiologic processes are altered. In this study, pharmacokinetics, hepatic receptor dynamics, temporal changes of critical mRNA and proteins, and clinically-relevant responses (e.g. insulin, glucose, lymphocytes) were measured in rats given methylprednisolone. A model linking receptor and biomarker dynamics to systemic responses was developed that captured steroid effects arising from three modes of signal transduction. The platform model structure and parameters successfully predicted methylprednisolone responses in vivo across a range of doses and regimens. The model offers a mechanism-based platform to explore and optimize dosing schedules. This study paradigm provides a biomarker driven molecular-to-whole body translational approach to predict drug actions and for exploring mechanistic hypotheses.

Student
Peter Bloomingdale

Academic Program
Pharmaceutical Sciences PhD

Research Advisor
Donald Mager

Title
Systems Pharmacology Modeling of Intracellular Signaling in Peripheral Neurons: Target Identification for Chemotherapy-Induced Peripheral Neuropathy

Abstract
Chemotherapy-induced peripheral neuropathy (CIPN) is nerve damage caused by cancer chemotherapy that results in weakness, discomfort, and pain in approximately 30-40% of patients. To date there are no clinically available treatment options to prevent the pathophysiology of CIPN. Therefore, a systems pharmacology model of neuronal signal transduction and gene regulatory processes was constructed and utilized to identify therapeutic interventions for CIPN. Our systems pharmacology modeling results identified that the combinatorial inhibition of TNFa, N-methyl-D-aspartate (NMDA) receptor, and reactive oxygen species (ROS) could prevent the neurotoxicity associated with bortezomib therapy. Therefore, we hypothesize that dexanabinol, a synthetic THC analog that promiscuously inhibits all three of these targets, could potentially prevent bortezomib-induced peripheral neuropathy. We have assessed the neuroprotective effects of dexanabinol in stem cell derived neurons and a novel peripheral nerve-on-a-chip experimental model.

Student
Darren Chan

Academic Program
Pharmaceutical Sciences PhD

Research Advisor
Robert Straubinger

Title
Sequential tumor priming regimens enhance tumor deposition and distribution of nanoparticle drug carriers in pancreatic cancer models

Abstract
Pancreatic cancer is a deadly disease with a 5-year survival of 5%. Poor prognosis results from tumor drug delivery barriers, as well as advanced disease at diagnosis. The barrier results from the combination of tumor cell proliferation, a lack of lymphatic draining, and the desmoplastic reaction (increased tumor stromal cell proliferation and exaggerated extracellular matrix production), which together increase intra-tumor tumor pressures, resulting in vascular compression and low functional microvessel density. We have developed “tumor priming” regimens, consisting of a sequential treatment regimen utilizes a barrier-compromising agent sequenced prior to a chemotherapeutic treatment that consists of macromolecular drugs or nanoparticle drug carriers. These sequential regimens increase delivery of therapeutic agents to model pancreatic cancers, as well as their intra-tumor distribution, and treatment efficacy increases in parallel. Clinically-approved agents such as paclitaxel and SMO inhibitors of sonic hedgehog signaling exert ‘tumor priming’ effects, suggesting the potential clinical viability of this strategy to increase treatment responses in pancreatic cancer.
Renal Injury is Worsened when Consuming a Caffeinated Soft-Drink during and after Exercise in the Heat

Student
Christopher Chapman

Academic Program
Exercise & Nutrition Sciences PhD

Research Advisor
Zachary Schlader

Title
Renal Injury is Worsened when Consuming a Caffeinated Soft-Drink during and after Exercise in the Heat

Abstract
Consuming a soft drink-like beverage following heat stress exacerbates acute kidney injury (AKI) in rats.

Purpose: Test the hypothesis that consuming a caffeinated soft-drink during exercise in the heat worsens AKI in humans.

Methods: Twelve healthy adults drank 2 L during 4 hours of exercise heat stress (35°C, 65% RH) in randomized soft-drink (Mtn Dew, Soda) and water-control (Water) trials, and 1 L post-exercise. Data are reported as a change from pre-exercise (mean SD).

Results: The incidence of Stage 1 AKI (increased serum creatinine 0.3 mg/dL) was greater in Soda (75 vs. 8%, p<0.01). Increases in neutrophil gelatinase associated-lipocalin (NGAL) in plasma (Soda: 13±10, Water: 16±10 ng/mL, p=0.43) and urine (Soda: 11±3, Water: 8±17 ng/mL, p=0.99) were not different between trials. Urine-NGAL in an overnight collection was elevated in Soda (9±11 vs. 7±7 ng/mL, p=0.04).

Conclusion: Consuming a caffeinated soft-drink during and following exercise in the heat exacerbates AKI in humans.

Cross-sectional Study on Low-level Arsenic Exposure and Academic Achievement among First Graders in Montevideo, Effect Modification by Arsenic Methylation Capacity

Student
Gauri Desai

Academic Program
Epidemiology PhD

Research Advisor
Katarzyna Kordas

Title
Cross-sectional Study on Low-level Arsenic Exposure and Academic Achievement among First Graders in Montevideo, Effect Modification by Arsenic Methylation Capacity

Abstract
Objectives: We assessed the cross-sectional association between low-level arsenic (As) exposure and academic achievement among ~7 year-olds in Montevideo, and tested interaction by As methylation capacity.

Methods: Total urinary As (UAs) concentrations and the proportion of monomethylarsonic acid (MMA) was measured in 328 children. Six subtests of the standardized Woodcock-Muñoz achievement battery were used as outcomes. Ordinal logistic regression analyses were performed. Interaction was assessed between As methylation capacity, i.e. %MMA, and UAs. Sensitivity analyses adjusted for children’s school.

Results: Each unit of UAs was associated with higher odds of having lower scores on reading fluency (OR=1.05; 95%CI: 1.03, 1.06), math facts fluency (OR=1.04; 95%CI: 1.01, 1.06), and passage comprehension (OR=1.05; 95%CI: 1.03, 1.07). There was no interaction by %MMA. Sensitivity analyses did not change results.

Conclusion: This is the first study of the association between low-level As exposure and achievement among schoolchildren, and we find no consistent adverse effects.

The subgingival microbiome and incident hypertension among postmenopausal women in the Buffalo OsteoPerio Microbiome Study

Student
Joshua Gordon

Academic Program
Epidemiology PhD

Research Advisor
Jean Wactawski-Wende

Title
The subgingival microbiome and incident hypertension among postmenopausal women in the Buffalo OsteoPerio Microbiome Study

Abstract
Hypertension is a common disease among postmenopausal women and is associated with high burden of morbidity and mortality. Previous studies suggest a connection between oral health and hypertension. In our study we assessed the association between the oral microbiome and hypertension risk in 278 postmenopausal women enrolled in the Buffalo OsteoPerio Study, over an average of 9.7 years follow-up. Cases of hypertension and non-cases had similar baseline species richness and evenness and did not cluster based on unweighted or weighted UniFrac distance. After adjustment for multiple comparisons, we did not observe statistically significant differences in relative abundance of specific bacterial taxa between hypertension cases and non-cases. These exploratory results generate hypotheses for future studies. Our ongoing analyses seek to target mechanistic hypotheses to further develop our understanding of the oral microbiome and hypertension. Better understanding of these associations may allow for development of novel treatment or prevention modalities for hypertension.
As a premier research-intensive university, UB places a strong emphasis on research and creative activities as a significant part of student learning. Research and creative projects give students the opportunity to work closely with distinguished faculty in pursuit of discovery.

Today's research poster symposium is a microcosm of the diverse research and creative projects being carried out by students at the University at Buffalo. The scholarly and creative works presented today celebrate UB's undergraduate, graduate, and professional students and their faculty mentors who are engaged in innovative work and scholarly research aimed at helping to advance and inform society.

Thank you for joining us today as we “Celebrate Excellence” in student research and creative works.

Cover: Abbott Hall, South Campus, University at Buffalo. Photograph provided by the Office of University Communications.