



15TH ANNUAL

# Undergraduate Research & Scholarship Symposium

Wednesday, April 19, 2023

## Hybrid Event

**In-Person:** Wednesday, April 19, 2023: 8:30 am to 3:00 pm  
Featuring Posters & Podium Presentations

**Online:** Monday, April 17 – Friday, April 21  
Virtual Posters & Videos via [Symposium](#) by Forager One

Sponsored by Office of  
Research & Innovation

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## ACKNOWLEDGEMENTS

The organizers would like to **thank** all of the *faculty mentors* for their service and support of our undergraduate scholars.

Thank You!

**We would like to thank the following for their generous time and support of this event:**

- ❖ Bayer School of Natural & Environmental Sciences
- ❖ Center for African Studies
- ❖ Center for the Catholic Faith & Culture
- ❖ Center for Community-Engaged Teaching & Research
- ❖ Center for Excellence in Diversity & Student Inclusion
- ❖ Center for Global Health Ethics
- ❖ Center for Migration, Displacement & Community Studies
- ❖ Center for Teaching Excellence
- ❖ Center for Women's & Gender Studies
- ❖ Chief Diversity Officer
- ❖ Department of Biomedical Engineering
- ❖ Department of Counselor Education
- ❖ Department of History
- ❖ Department of Peace, Justice, and Conflict Resolution
- ❖ Department of Physician Assistant Studies
- ❖ Gumberg Library
- ❖ Honors College
- ❖ Institute for Ethics & Integrity in Journalism
- ❖ Mary Pappert School of Music
- ❖ McAnulty College and Graduate School of Liberal Arts
- ❖ School of Education
- ❖ School of Nursing
- ❖ School of Pharmacy
- ❖ Office of Disability Services
- ❖ Office of the Provost
- ❖ Office of Research & Innovation
- ❖ Palumbo-Donahue School of Business
- ❖ Rangos School of Health Sciences
- ❖ University Sustainability Committee



15TH ANNUAL

# Undergraduate Research & Scholarship Symposium

## Monday, April 17

All Day

Welcome - [Symposium](#) Site Launch!

Browse through posters and accompanying videos all week long!  
Comment and ask questions.

## Tuesday, April 18

9:30 am to 2:30 pm

**In-Person Set-Up**

URSS Participants are required to stop by the Charles Dougherty Ballroom in the Power Center to set up their poster.

Virtual [Symposium](#)

## Wednesday, April 19

8:30 am to 3:00 pm

**URSS In-Person Event – Location: Charles Dougherty Ballroom, Power Center**  
**Poster Session and Oral Podium Presentations**

Stop by to view posters in-person and ask students questions about their work!

**\*Detailed schedule on the next page\***

## Thursday, April 20

All Day

Virtual [Symposium](#)

Browse through posters and accompanying videos all week long!  
Comment and ask questions

## Friday, April 21

All Day

Virtual [Symposium](#)

Browse through posters and accompanying videos all week long!  
Comment and ask questions

# SCHEDULE FOR IN-PERSON EVENT

## Wednesday, April 19, 2023 | Power Center @ Duquesne University

8:00 a.m. – 8:30 a.m.	<b>Student Participant Check In</b> Continental Breakfast provided for participants.
8:30 a.m. - 9:00 a.m.	<b>OPEN POSTER SESSION</b> Guests are invited to walk around, peruse student projects, and engage with students.
9:00 a.m. - 10:00 a.m.	<b>ORAL PRESENTATION SESSION 1</b> Students participating in the poster sessions <b>should attend</b> the formal presentations. <b>Poster Session is closed at this time. Please respect the formal presenters.</b>
10:00 a.m. - 11:00 a.m.	<b>OPEN POSTER SESSION</b> Guests are invited to walk around, peruse student projects, and engage with students.
11:00 a.m. - 12:00 p.m.	<b>ORAL PRESENTATION SESSION 2</b> Students participating in the poster sessions should attend the formal presentations. <b>Poster Session is closed at this time. Please respect the formal presenters.</b>
12:00 p.m. - 1:00 p.m.	<b>OPEN POSTER SESSION</b> Boxed lunches provided for participants and judges. We encourage you to eat your lunch while viewing posters.
1:00 p.m. - 2:00 p.m.	<b>ORAL PRESENTATION SESSION 3</b> Students participating in the poster sessions should attend the formal presentations. <b>Poster Session is closed at this time. Please respect the formal presenters.</b>
2:00 p.m. to 3:00 p.m.	<b>OPEN POSTER SESSION</b> Guests are invited to walk around, peruse student projects, and engage with students.
<b>ALL AWARD WINNERS WILL BE ANNOUNCED THE WEEK FOLLOWING THE EVENT VIA EMAIL &amp; ON OUR WEBSITE!</b>	



## Oral Presentations – Detailed Schedule

### SESSION 1

#### Section A – Charles Dougherty Ballroom

Moderator: Samuel Henson

<b>9:00 am – 9:15 am</b>	<p><b>Daniel Oldak</b> Supply Chain Management; Information Systems and Technology   A.J. Palumbo School of Business Administration Faculty Advisor: Matthew Drake, Ph.D. Abstract: 111 <i>Collaborative Supply Chain Management through a Christian Business Ethics Lens</i></p>
<b>9:15 am – 9:30 am</b>	<p><b>Carley Reith</b> Applied Math &amp; Computer Science   McAnulty College and Graduate School of Liberal Arts</p> <p><b>Kayla Kraeuter</b> Biomedical Engineering/Applied Mathematics   Rangos School of Health Sciences Faculty Advisor: Rachael Neilan, Ph.D. Abstract: 75 <i>Developing a 3-D Computational Model of Neurons in the Central Amygdala To Understand Pharmacological Targets for Pain</i></p>
<b>9:30 am – 9:45 am</b>	<p><b>Shawn Bliss</b> Biomedical Engineering, Mathematics   Rangos School of Health Sciences Faculty Advisor: Melikhan Tanyeri, Ph.D. Abstract: 23 <i>Application of Supervised Machine Learning for Bacteria Analysis in Droplet Microfluidics</i></p>
<b>9:45 am to 10:00 am</b>	<p><b>Rachel Pardee</b> Biomedical Engineering   Rangos School of Health Sciences</p> <p><b>Caitlin Greene</b> Biomedical Engineering   Rangos School of Health Sciences</p> <p><b>Nicole Bohatch</b> Biomedical Engineering   Rangos School of Health Sciences</p> <p><b>Ethan Radeschi</b> Biomedical Engineering   Rangos School of Health Sciences</p> <p><b>Cody Rougeux</b></p> <p><b>Burton Carbino</b> Biomedical Engineering   Rangos School of Health Sciences Faculty Advisor: Leda Kloudas, Ph.D. Abstract: 140 <i>PURmap: A Comprehensive Pressure Ulcer Reduction Technology</i></p>

## Oral Presentations – Detailed Schedule

### SESSION 2

#### Section A – Charles Dougherty Ballroom

Moderator: Kandarp Dave

<b>11:00 am – 11:15 am</b>	<b>Rio Scarcelli</b> Psychology and Music   McAnulty College and Graduate School of Liberal Arts <b>Nicole Sitarik</b> Psychology   McAnulty College and Graduate School of Liberal Arts Faculty Advisor: Alexander Kranjec, Ph.D. Abstract: 38 <i>Mental Health Perceptions Across Generations</i>
<b>11:15 am – 11:30 am</b>	<b>Emily McCarty</b> Biomedical Engineering   Rangos School of Health Sciences <b>Jacob McKinley</b> Biomedical Engineering   Rangos School of Health Sciences <b>Mitchell Fox</b> Biomedical Engineering   Rangos School of Health Sciences Faculty Advisor: Melikhan Tanyeri, Ph.D. Abstract: 120 <i>A Multielectrode Array (MEA) for Electrophysiological Measurements from Neural Spheroids</i>
<b>11:30 am – 11:45 am</b>	<b>Valerie Koester</b> Data Science   McAnulty College and Graduate School of Liberal Arts Faculty Advisor: Lauren Sugden, Ph.D. Abstract: 66 <i>Integrating Data to Recognize Community Need Across Pennsylvania</i>
<b>11:45 am to 12:00 am</b>	<b>Burton Carbino</b> Biomedical Engineering   Rangos School of Health Sciences Faculty Advisor: Sarah Wright, Ph.D. Abstract: 136 <i>The Cor Unum Garden: Using Hydroponics and Community Engagement to Address Food Disparity in Pittsburgh</i>

## Oral Presentations – Detailed Schedule

### SESSION 3

#### Section A – Charles Dougherty Ballroom

Moderator: TBA

<b>1:00 pm – 1:15 pm</b>	<b>McKenna Carroll</b> Biology   Bayer School of Natural and Environmental Sciences Faculty Advisor: Wook Kim, Ph.D. Abstract: 125 <i>Tagging Natural Derived RsmE Mutants with Antibiotic Resistance and Fluorescent Markers To Analyze the Functional Role of RsmE's C-Terminus Tail in Pseudomonas Fluorescens</i>
<b>1:15 pm – 1:30 pm</b>	<b>Kathryn Leash</b> Speech-Language Pathology   Rangos School of Health Sciences <b>Megan Mathias</b> Speech-Language Pathology   Rangos School of Health Sciences Faculty Advisor: David S. Ford, Ph.D. Abstract: 117 <i>Now Screening...Teachers: Developing a Community-Engaged Voice Screening</i>
<b>1:30 pm – 1:45 pm</b>	<b>Lucia Secaida Del Cid</b> Biomedical Engineering   Rangos School of Health Sciences <b>Maria Luiza Hermann</b> Biomedical Engineering   Rangos School of Health Sciences Faculty Advisor: Bin Yang, Ph.D. Abstract: 137 <i>Developing an Inexpensive and Moisture Resistant 3D Printed Microscope for Imaging Cardiomyocytes in a Cell Culture Incubator</i>
<b>1:45 pm to 2:00 pm</b>	<b>Raegan Gouker</b> Biomedical Engineering   Rangos School of Health Sciences <b>Katherine Flannery</b> Biomedical Engineering   Rangos School of Health Sciences Faculty Advisor: Melikhan Tanyeri, Ph.D. Abstract: 127 <i>An Assay for Measuring Water Permeability of Mammalian Cells</i>



## CREATIVE VIDEO COMPETITION

*Creative videos will be featured during the poster session and played on a loop in no particular order during the poster sessions on April 19. Videos are also available on our [Symposium site](#). Although every poster session participant was required to submit a video explanation or voiceover of their poster, the Video Competition aims to allow flexibility, various locations, creativity, and thinking “outside the box”.*

### **145: Goodwill Aspire: Supporting Adults with IDD in the Community**

Alicia Colossi | Occupational Therapy | Rangos School of Health Sciences | Senior  
Brooke Foundas | Occupational Therapy | Rangos School of Health Sciences | Senior  
Faculty Advisor: Ann Stuart, OTD, OTR/L

**ABSTRACT:** Adults with Intellectual and Developmental Disabilities (IDD) face numerous health disparities and inequities daily due to stigmatization and marginalization in the community. The role of occupational therapy for adults with IDD focuses on various occupations that are meaningful and unique to each individual such as community and social participation, instrumental activities of daily living (IADLs), and vocational training. The goal of interventions in these areas is to increase the individual’s independence in completion and participation, while providing them with an abundance of opportunities. Our fieldwork experience occurred at a day program for adults with IDD aged 18+: Goodwill Aspire in Lawrenceville. There is a unique need for occupational therapy at this site due to the members working towards the goal of participating in vocational training to eventually work for the Goodwill company. In order to achieve this overall goal, there are many things that individuals with IDD must overcome. Our focus at Aspire included client centered approaches such as developing sensory modulation techniques, creating/researching age appropriate educational media, and working on desired IADLs. In relation to implementing occupational therapy interventions, our aim was to develop activities that matched each client's cognitive functioning, while also providing them the opportunity to increase their independence in communication and IADL performance.

### **146: EECM: Intersection of Addiction Recovery and OT**

Shannon Russell | Occupational Therapy | Rangos School of Health Sciences | Senior  
Grace deVille | Occupational Therapy | Rangos School of Health Sciences | Senior  
Faculty Advisor: Ann Stuart, OTD, OTR/L

**ABSTRACT:** East End Cooperative Ministry (EECM) Recovery House is a 90 day transitional living facility for adults who are actively recovering from Substance Use Disorders (SUD). The facility provides resources for housing and employment opportunities, but could further develop in providing resources for promoting a healthy life balance. Occupational therapy (OT) is not traditionally provided at this site, however OT serves a large role in promotion of increased quality of life for individuals who are homeless and living with SUDs. The purpose of the weekly sessions led by OT students aims to engage members in various individual and group-based activities addressing well-being and independent living skills as they apply to the ongoing recovery process. This video highlights examples of OT intervention strategies and the overall impact of using a holistic approach to SUD recovery. The Transtheoretical Model of practice is applicable to clients at EECM Recovery House because it recognizes where an individual is within the recovery process and provides structured interventions to promote healthy long-term recovery based on which phase they are in. As outlined in the video, clients are in the “action” phase and preparing to enter the “maintenance” phase of behavior change, where OT can help clients to build self-efficacy, prevent relapse, and sustain recovery.

#### **147: Occupational Therapy Community Engaged Learning at the St. Anthony's Apartment**

Abigail Kilkelly | Occupational Therapy | Rangos School of Health Sciences | Senior  
Hannah Thornton | Occupational Therapy | Rangos School of Health Sciences | Senior  
Emily Burk | Occupational Therapy | Rangos School of Health Sciences | Senior  
Nathan Pearson | Occupational Therapy | Rangos School of Health Sciences | Senior  
Faculty Advisor: Ann Stuart, OTD, OTR/L

**ABSTRACT:** The St. Anthony's program at Duquesne University provides education and life skills training for young adults ages 18–21 with Intellectual and Developmental Disabilities (IDD). Students within the program attend group sessions at a fully furnished apartment in the Squirrel Hill neighborhood of Pittsburgh Pennsylvania once a week. Within the apartment, there is a fully functional kitchen, laundry room, bathroom, living room, and bedroom. At the apartment the students work on life skills such as cooking, grocery shopping, home management, money management, community mobility, and employment preparation skills. Within the field of Occupational Therapy (OT), these skills are known as Instrumental Activities of Daily Living (IADLs). Occupational therapists frequently play a key role in development of life skills for individuals with IDD. Occupational Therapy students work with those at St. Anthony's to empower them to incorporate these skills into their daily occupations, to promote independent decision making, to choose activities that are meaningful to them, to increase social engagement, and to advocate for their own wants and needs. This video will highlight the scope of occupational therapy within the St. Anthony's apartment program.

#### **148: Vincentian Home: Optimization of Sensory Arousal Levels and Social Participation in Extended Care**

Madeline Stevens | Occupational Therapy | Rangos School of Health Sciences | Senior  
Emma Fitzgerald | Occupational Therapy | Rangos School of Health Sciences | Senior  
Morgan Fashion | Occupational Therapy | Rangos School of Health Sciences | Senior  
Faculty Advisor: Ann Stuart, OTD, OTR/L

**ABSTRACT:** In this video, we discuss the unique value that Occupational Therapy (OT) holds for individuals residing at long term care nursing homes, specifically, Vincentian Home. The residents at Vincentian Home require end of life care, meaning that due to increased dependence while participating in activities, and low numbers of available staff, the residents are often not involved in direct care and are frequently idle. As OT students, our goal during sessions is to facilitate interactions between and among the residents, and to optimize their sensory engagement support so that they are able to maintain the appropriate arousal levels to optimize social participation. The residents have a wide range of cognitive and physical abilities, so each group activity must be adaptable and modifiable to varying levels of ability. Occupational Therapists have the skill set necessary to implement engaging activities that residents with any physical or psychosocial challenge can participate in and benefit from, overall increasing their quality of life and sense of wellbeing.

#### **149: Against All Odds: Psychosocial Intervention for Homeless Youth**

Hannah Davis | Occupational Therapy | Rangos School of Health Sciences | Senior  
Lauren Rose | Occupational Therapy | Rangos School of Health Sciences | Senior  
Sara Foster | Occupational Therapy | Rangos School of Health Sciences | Senior  
Faculty Advisor: Ann Stuart, OTD, OTR/L

**ABSTRACT:** The following video evaluates the role of occupational therapy (OT) in working with young adults experiencing houselessness between the ages of 18 and 24 years old. Three occupational therapy

students have been going to the Downtown Outreach Center and Shelter (DOCS) in Uptown Pittsburgh for 20 sessions, over 2 semesters. Occupational Therapists' expertise lies in the holistic treatment of a person; evaluating one's overall well-being through meaningful engagement in occupations. Through this unique perspective, these three students have been addressing the vital areas of occupation that DOCS residents struggle with: leisure, social participation, and health management. A majority of the residents experience mental health issues, substance use disorders, and social isolation. These act as a significant barrier to meaningful participation in occupation. Overall, the quality of life at DOCS diminishes one's mental and physical well-being. While situational circumstances cannot be changed, occupational therapy interventions related to mindfulness aim to support residents in building skills to best manage the impacts of their environment. In this video, the OT students examine which factors are most impactful to those at DOCS and reflect upon the unique role that occupational therapy interventions play in improving quality of life.

### **150: Shepherd's Heart**

Katelyn Kovalsky | Occupational Therapy | Rangos School of Health Sciences | Senior  
Kaitlyn Waros | Occupational Therapy | Rangos School of Health Sciences | Senior  
Colin Poe | Occupational Therapy | Rangos School of Health Sciences | Senior  
Faculty Advisor: Ann Stuart, OTD, OTR/L

**ABSTRACT:** This video exhibits the experiences of 4<sup>th</sup>-year occupational therapy students working with veterans experiencing homelessness at Shepherd's Heart House of Hope in the Pittsburgh area. While residing at Shepherd's Heart, the residents' primary goals consist of achieving residential stability, increasing skill levels and/or income, establishing better habits for healthy living, and creating a greater level of self determination within the veterans. While the homeless population is considered to be a nontraditional area for occupational therapy, these students have contributed a unique role to supporting this population in combating occupational injustices in their daily lives. Occupational injustices refer to settings or situations that restrict people from participating in activities that are necessary and/or meaningful to their lives. Through the occupational therapy lens, the OT students have worked alongside these veterans to restore a sense of occupational balance as well as promote engagement and a sense of belonging in the Pittsburgh community. The students incorporate therapeutic use of self to establish rapport and build upon the interests of the individuals to design, develop, and implement a variety of interventions that address the unique needs of this vulnerable population. The occupational therapy students aim to improve the occupational injustices by implementing interventions to address independent living skills, community reintegration, mindfulness and stress reduction techniques, social participation, and leisure activities.

### **151: The Impact of Occupational Therapy at Gwen's Girls**

Emma Stumm | Occupational Therapy | Rangos School of Health Sciences | Senior  
Isabella Tate | Occupational Therapy | Rangos School of Health Sciences | Senior  
Melissa Wolf | Occupational Therapy | Rangos School of Health Sciences | Senior  
Faculty Advisor: Ann Stuart, OTD, OTR/L

**ABSTRACT:** This video outlines the role of occupational therapy students working with young girls who attend Gwen's Girls, an after school program for females ages 8–13 in the Wilksburg area. Based on the social and emotional needs of the population, occupational therapy students created and provided unique and meaningful interventions to increase social participation and overall well being. Examples of interventions include teamwork games, role playing social skits, physical activity, verbal affirmations with each other and self, and self-regulation. Using the Model of Human Occupation (MOHO) model of

practice, occupational therapy students are able to gather information about group members interests, motivations, personal causation, and roles and incorporate them into activities and discussion. Throughout the program, occupational therapy students are hopeful that skills learned by the group will carry over into all aspects of their lives.

# AWARDS

## [Bayer School of Natural and Environmental Sciences](#)

### **2 for Excellence in Research in the Basic Sciences**

#### **4 Honorable Mentions**

Students participating in the Undergraduate Research & Scholarship Symposium whose project fall within the realm of the basic sciences will be considered for this award.

## [Biomedical Engineering](#)

### **Duquesne Award for Excellence in Biomedical Engineering**

## [Center for the Catholic Faith and Culture](#)

### **Common Good Research Award**

The Center will recognize and reward research from any discipline that aligns with Duquesne's Catholic, Spiritan mission, particularly our commitments to:

- the dignity and equality of all persons
- working with vulnerable populations for systemic change
- preserving justice, peace, and integrity of creation

## [Center for African Studies](#)

### **Award for Undergraduate Research in African Studies**

The award is intended to encourage and reward undergraduate research in African Studies and related areas that engage Duquesne's ongoing commitment to Africa.

### **Award for Undergraduate Research in Global Health**

The award is intended to encourage and reward undergraduate research in Global Studies.

## [Center for Community-Engaged Teaching and Research](#)

### **CETR Award for Undergraduate Research**

## [The Center for Excellence in Diversity and Student Inclusion](#)

### **Undergraduate Research Award**

The aim of this award is to recognize and celebrate research that contributes to creating, and maintaining an inclusive campus community here at Duquesne University.

## [Center for Migration, Displacement and Community Studies](#)

### **Outstanding Research Award**

This award aims to support original research related to migration, displacement, and community through original research. Eligible projects focus on creating awareness about these issues in our communities from any disciplinary perspective.

Judges will assess the following elements of the research: 1) Connection to themes of migration, displacement, and community studies; 2) Scholarly merit including: originality of

research and contribution to the field; clear articulation of the research question, existing literature, methods, and contributions to the field.

#### [Center for Teaching Excellence](#)

##### **Award for Undergraduate Research**

Eligible projects focus on the study of human learning in any of its many contexts, including but not limited to K-12 education, college, community, and clinical settings. Projects will explore topics such as how and where learning happens or what empowers or hinders people in their learning.

#### [Center for Global Health Ethics](#)

##### **Award for Undergraduate Research in Ethics**

This award aims to promote the interest of students for issues in healthcare ethics within contemporary society and culture. It also intends to encourage undergraduate research in the area of healthcare ethics. The HCE prize is for the presentation that best highlights ethical issues in healthcare and ethical dimensions of developments in science and technology for human health and wellbeing.

#### [Center for Women's and Gender Studies](#)

##### **Award for Undergraduate Research**

#### [Chief Diversity Officer/ Palumbo- Donahue School of Business](#)

##### **DEI Award for Undergraduate Research**

##### **Honorable Mention**

The awards recognize excellence in research addressing issues or questions relating to diversity, equity and inclusion (DEI).

Criteria: Judges will assess the following elements of research: 1) Connection to themes of diversity, equity and inclusion and 2) Clear articulation of the research question, existing literature, methods, and contributions to the field.

#### [Counselor Education Program](#)

##### **2 Awards for Undergraduate Research**

#### [Department of Physician Assistant Studies](#)

##### **Award for initiative and potential for future research as a physician assistant**

#### [Grefenstette Center for Ethics in Science, Technology, and Law](#)

##### **Top Undergraduate Research Project**

##### **Honorable Mention**

The Grefenstette Center for Ethics in Science, Technology, and Law will present its inaugural award to the top undergraduate research symposium projects that tackle current issues in technological ethics, including but not limited to issues of AI, automation, policy, health care, labor, extremism, social media, and bias. The winning entries will not only analyze an ethical



issue in modern technology but create avenues for discourse while offering possible solutions in a rigorously researched and presented project.

#### [Gumberg Library](#)

##### **Gumberg Library Award for Undergraduate Research**

###### **Honorable Mention**

The Gumberg Library Award judges posters based on their intellectual merits and demonstration that the research presented meets the standard of its field.

#### [Honors College](#)

##### **Outstanding Poster and Outstanding Video**

Symposia posters are at their best when they optimally combine intellectual sophistication with legibility to the non-specialist. Therefore, criteria for this award include: scholarly rigor; visual appeal; organization; professional polish.

#### [Institute for Ethics and Integrity in Journalism](#)

##### **Top Undergraduate Research Paper**

The DU Institute for Ethics and Integrity in Journalism will be presenting its inaugural award to the top undergraduate research symposium paper that tackles a current issue in local or national journalism ethics. The winning entry will not only identify and elaborate on an ethical issue in journalism today but also create an avenue for discourse about journalism ethics and offer possible solutions.

#### [Mary Pappert School of Music](#)

##### **Mary Pappert School of Music Undergraduate Award**

The Mary Pappert School of Music Undergraduate Award is open to all music students who participate in the URSS.

#### [McAnulty College and Graduate School of Liberal Arts](#)

##### **Outstanding Research Merit**

The McAnulty College and Graduate School of Liberal Arts Outstanding Merit Award is open to undergraduate participants in the liberal arts. A committee of Liberal Arts faculty and administrators will evaluate the posters' intellectual merits and demonstration that the research presented meets the standard of its field.

#### [School of Pharmacy](#)

##### **Award for Undergraduate Research**

The School of Pharmacy Award for Undergraduate Research serves to recognize projects in the field of pharmacy which demonstrate a high level of scholarly merit.

#### [Office of the Provost](#)

##### **Provost Award for Outstanding Research**

##### **Office of Research and Innovation Award for Outstanding Research**

##### **Provost Award for Best Presentation**

This award serves to recognize outstanding scholarship within the university across all of the fields of study. The awards will be given to a student demonstrating exceptional scholarship through either poster or oral presentation.

#### [Office of Disability Services](#)

##### **Outstanding Undergraduate Research, 2 Awards**

.The aim of this award is to recognize and celebrate research that contributes to the field disability research through direct services, policy development, community service, research, or organizational leadership.

#### [Peace Justice and Conflict Resolution](#)

##### **The Peace, Justice and Conflict Resolution (PJCR) Minor Program Award**

The Peace, Justice and Conflict Resolution (PJCR) Minor Program offers an undergraduate research/scholarship award for research related to peace or conflict studies. The reward hopes to stimulate undergraduate awareness of factors for a sustainable social and political stability, the obstacles to peace, and the building blocks of a just global society.

#### [Rangos School of Health Sciences](#)

##### **Rangos School of Health Sciences Award for Undergraduate Research: 2 awards**

Students of the Health Sciences who are participating in the URSS will be eligible for these awards.

#### [School of Nursing](#)

##### **School of Nursing Undergraduate Research Award**

The School of Nursing Undergraduate Award is available to students participating in the URSS whose research is applicable to the nursing field.

#### [University Sustainability Committee](#)

##### **2 Awards for Excellence in Sustainability & the Environment**

#### [Office of Research and Innovation](#)

##### **Video Competition Award**

The URSS Video Competition allows DU undergraduates a creative opportunity to convey their research or scholarship via a video platform. Students must create a video under 3 minutes, which will be viewed by a panel of judges, and featured during the annual Undergraduate Research and Scholarship Symposium. The top two videos will win cash awards.

# ABSTRACTS

**Note:** The number in front of each title corresponds with the physical place the student's poster will be located at the in-person event on April 19.

\*Indicates live in-person oral presentation on April 19.

\*\*Indicates virtual-only presentation (please view and engage via our [Symposium site](#)).

**\*\*1: The Extraction and Subsequent Analysis of Gel Pen Ink**

Elizabeth Knittle | Biochemistry | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Stephanie Wetzel, Ph.D.

**ABSTRACT:** Document examination is often an overlooked discipline of forensic science, but an even more forgotten topic is ink analysis. Gel ink, specifically, is a very secure and complex medium that makes it difficult to wipe from important documents. It is important to make sure that gel ink cannot be wiped to ensure the integrity of the important document. Therefore, the ability to extract gel pen ink using similar methods to ballpoint ink extraction will be studied. Once a method of analysis is developed the extracted ink can be used to further analyze questioned documents such as counterfeit notes, ransom notes, and forged currency. There have been past attempts to extract gel ink, but none have yet been successful. Three different manufacturers of gel ink were extracted using solvents and Thin Layer Chromatography, TLC. The expected results will demonstrate the comparability of gel ink when the source is unknown. This will allow greater analysis of questioned documents and increase the importance of this evidence in the field.

**\*\*2: Identification of Biomarkers Associated with Prolonged Starvation in Cat (*Felis catus*) Bones**

Annagrace Radocaj | Forensic Science | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Lisa Ludvico, Ph.D.

**ABSTRACT:** According to the Animal Legal Defense Fund, around 250,000 animals each year are victims of hoarding, with the number of cases steadily increasing. Hoarding is defined as the human desire satisfied through collection or control of animals that supersedes the animals' needs. Little tissue is present in the late stages of decomposition, and only depleted bone samples can be collected from the victim. This research aims to identify a biomarker for starvation within the decomposed remains of felines. During starvation, bone turnover biological markers, or BTMs, are expressed due to increased bone resorption. BTMs are degradation products of type I collagen and include C and N terminal cross-linking telopeptides produced from collagen's metabolic breakdown. For this research, the collagen proteins found within the bone will be analyzed to identify a BTM that determines if the individual underwent starvation. Blood and urine testing with an ELISA for C and N telopeptides of type I collagen will be performed before bone protein extraction to confirm that these selected biomarkers can be identified in felines. Once the protein has been extracted from the bone sample, ion-exchange chromatography will be used to separate by charge, and SDS-PAGE will be used to separate by mass and charge. Confirmative tests like an immunoassay and western blot will be performed using respective antibodies to identify the biomarker. Once data has been collected, concentrations of the identified BTMs will be measured and compared to those found in the control sample from a feline who has not undergone starvation.

### **\*\*3: Examining the Impact of Extreme Temperature on the Structure and Downstream DNA Extraction of the Human Tooth**

Michael Brivchik | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior

Faculty Advisor: Pamela Marshall, Ph.D.

**ABSTRACT:** Teeth are often recovered from events and are a viable source of DNA for identification purposes. Examples of these events include human identification cases stemming from natural disasters, terrorist attacks, fires, and car accidents. However, sufficient DNA from a tooth may be a challenge to obtain if they are exposed to extreme heat, especially for an extended time period. This study demonstrates that the DNA quality is compromised under thermal stress. It was hypothesized that a heat transfer occurs within human teeth, causing the teeth to explode into fragment. To test this hypothesis, forty-four human wisdom teeth were collected following extraction by oral surgeon between 2019 - 2020. Each tooth was received without any cleaning process and contained small amounts of blood and tissue related to the extraction. DNA profiles of the remaining blood or tissue on each tooth were created as a reference. This study used two male and two female individual wisdom teeth at each extreme temperature. The extreme temperatures used were 100°C, 200°C, 300°C, and 500°C. A heat resistant firefighter body camera was placed inside the kiln with the teeth to observe the changes that occurred during the time that they were exposed to heat. After the heat exposure, the DNA content from each wisdom tooth was quantified using qPCR (quantitative polymerase chain reaction). Degraded DNA was analyzed by measuring the allele dropouts. This study advances the knowledge on the heat transfer and ability to extract DNA from human teeth that explode under thermal stress.

### **\*\*4: Analysis of Sampling Techniques and Sampling Time for the Detection of Organic Gunshot Residue**

Matthew Lasker | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Stephanie Wetzel, Ph.D.

**ABSTRACT:** Organic gunshot residue (OGSR) is a collection of organic molecules that result from the firing of guns. A transition towards heavy metal free ammunition, which was traditionally analyzed for determination of a recent firing event, brings OGSR to the forefront of forensic importance. Various collection methods of OGSR will be tested and compared to the current standard of gunshot residue collection, scanning electron microscope (SEM) stubs with carbon adhesive tape. The collected OGSR will then be analyzed and quantified by Liquid Chromatography Tandem Triple Quadrupole Mass Spectrometry (LC-QqQ-MS). Volunteers will fire (5 or 6) shots then their hands will be swabbed with the various collection methods. Seven(?) replicates of each method will be collected and statistics will be performed using analysis of variance (ANOVA). The study hopes to determine the most effective method of collection of OGSR for analysis by LC-QqQ-MS. This advances the knowledge of the collection and detection of OGSR and allows for a future path of determination of a firing event if heavy metal free ammunition becomes the norm.

**\*\*5: The Analysis of THC/CBD Compounds in Synthetic Oral Fluid by Liquid Chromatography Triple Quad Mass Spectrometry**

Carmela Gorres | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Stephanie Wetzel, Ph.D.

**ABSTRACT:** In recent years, the decentralization of cannabis products has increased along with its consumption in the United States' general population. With these changes comes a demand for techniques/methods to detect and quantify different cannabis metabolites in an individual's system. In this study, cannabidiol (CBD) compounds extracted from a variety of commercial CBD products were assessed for label accuracy and compared for differences in concentration when either consumed as an oil or as food. Compounds were identified and quantified using liquid chromatography triple quadrupole mass spectrometry (LC-QQQ-MS) where CBD products were mixed with synthetic oral fluid and extracted from synthetic oral samples via solid-phase extraction for analysis. This is important because method of consumption may affect what is quantitated in toxicology reports. The need for a reliable detection and quantification method that can yield consistent results for any product would be beneficial for the toxicology field as it relates to driving under the influence cases and may be a precursor in determining levels of intoxication with marijuana.

**\*\*6: The Effects of Fingerprint Development Techniques on Cartridge Case Identification**

Sasha Valentino | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Faculty Advisor: Lyndsie Ferara, Ph.D.

**ABSTRACT:** When a fired cartridge case comes into a forensic science laboratory there are various pathways it can go through to be analyzed. The more frequent process of analysis is done by the fingerprint section followed by the firearm section, but some laboratories will analyze them in the opposite way. Select forensic laboratories will not attempt to develop fingerprints on cartridge cases. The various methods of analysis is due to there not being a standard set in place among all forensic science laboratories as to which section should analyze the section first, if at all. The purpose of this study is to determine what effects certain fingerprint development techniques may have on cartridge cases and if these techniques and cartridge case comparisons can be done on the same piece of evidence. Brass bullets in a 9mm and .45 caliber were fired using a Taurus 708 and Remington 1911 respectively. The cartridge cases were processed using cyanoacrylate fuming, gun bluing, basic yellow 40, black powder and a combination of the techniques. Microscopic markings left on the cartridge cases from the firing process were compared using the comparison microscope both before and after processing with each development method and a combination of them. The results of this study aim to establish the feasibility of cartridge cases identification after applying various fingerprint development techniques.

**\*\*7: Minimizing Cognitive Bias in Forensic Science**

Taylor Hopkins | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Lyndsie Ferrara, Ph.D.

**ABSTRACT:** One of the challenges in the modern forensic science world is acknowledging and mitigating cognitive bias. Cognitive bias is a natural phenomenon that can unintentionally cause scientists to let extraneous information guide their decisions as opposed to the actual evidence. Literature provides a variety of potential solutions such as the case manager or linear sequential unmasking models to reduce the risk of bias in the laboratory. While these and other mitigation techniques may appear simple in concept, implementation of such techniques requires effort and commitment to overcome barriers. The

goal of this project is to investigate the specific barriers to implementing techniques faced by accredited forensic laboratories in the United States. Those employed by accredited forensic laboratories in the U.S. were contacted via email and asked to voluntarily participate in an interview or complete a survey. Regardless of the mode of participation, participants were asked to share their role in their laboratory, knowledge of bias mitigation methods, what methods, if any, are being used at their laboratory of employment, and what barriers the laboratory faced to implement such changes, if applicable. Furthermore, they were asked to share what solutions they feel are needed to make implementation of such techniques easier. Participant responses reveal important information that can help the field better understand the obstacles that laboratories face when attempting to reduce the effects of cognitive bias. Additionally, the viability of commonly discussed bias mitigation techniques was explored.

**\*\*8: The Significance of 3D Printed Firearms with Regards to Lethal Capacities and Traceable Elements**

Caitlin Baker | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Pamela Marshall, Ph.D

**ABSTRACT:** Ghost guns are problematic in the forensic field due to their untraceable and undetectable elements. Metal detectors, gun-shot residue (GSR), serial numbers, and other commonly used forensic firearm analysis methods have been proven to be no match for these weapons in preliminary results. This research shows the comparison of two models of ghost guns utilizing forensic firearm methods. With the use of a 3D printer, six total guns were produced for this testing, three Songbird models, which is intended to withstand multiple firings, and three Liberator models. Previous results suggest that the Liberator can only withstand one firing. This experiment will utilize three polymers in the printing process: acrylonitrile butadiene styrene (ABS), polylactic acid (PLA), and nylon. By printing with alternating polymers, the structural integrity of each can be analyzed. Due to their explosive nature, once the firearms are printed and assembled, a remote trigger-device will be used to fire the weapons. The guns will be fired directly into a contained system to allow for the comparison and identification of lethality in humans. Any remnants of the gun present after the firing process is complete, are to be collected for analysis. The impact of this research will allow for the further investigation of these weapons and the forensic methodologies used to analyze them.

**\*\*9: The Impact of Age and Sex on Strength and Fracture Patterns of the Human Hyoid Bone**

Olivia DePergola | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Pamela Marshall, Ph.D.

**ABSTRACT:** The human hyoid bone has been studied in conjunction with suicide and homicide since the nineteenth century. Suicide and homicide are two leading causes of death in the United States for all ages, and hanging as a method of suicide has been increasing over the last twenty years. Numerous studies have elucidated the relationship between age and/or sex with the occurrence of hyoid bone fracture, but there is no existing data on the amount of force required to fracture hyoid bones of differing sex and age in simulations of manual strangulation. In this study, STL files of hyoid bones were collected from patients of the University of Pittsburgh School of Dental Medicine. Two male and two female bones were collected for each age group of 18-30, 30-45, and 45-80 years old. The STL files were sent to a 3D printer to create four copies of each hyoid bone for a total of 48 bones. Several morphological measurements were made before encasing the 3D-printed bones in gelatin. The gelatin served to mimic the structure of the human neck to better simulate manual strangulation. The gelatin-encased hyoid bones were subjected to the Torbal FT Odyssey force gauge to determine the amount of force necessary to produce fractures. The locations of fractures were noted as well. The data collected



will better define the relationship between age and sex with regards to strength of the hyoid bone, manual strangulation fracture patterns, and will aid in manner of death conclusions.

**\*\*10: The Makings of a High-profile Case; How Media Bias Influences Forensic Investigations in Missing-Person Cases**

Jennifer Fertel | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Pamela Marshall, Ph.D.

**ABSTRACT:** As the consumption of true crime cases continues to capture the attention of the public, issues arise when adequate media coverage is lacking for those deemed socially excluded. Bias can present itself as an issue when the media focuses around who they value the most in society. This dilemma is encompassed around the term, “White Woman Syndrome,” in which the media prioritizes white women who are missing or murdered rather than individuals of various other identities. Those who do not fit the “ideal image,” are not necessarily prevalent in the media, but it’s not understood how this impacts investigative work. This leads to the question: How does media bias impact forensic investigations? A qualitative landscape study is being currently conducted to determine the impact that these high-profile cases have on the investigative work being conducted: negatively, positively or a mix of both. This study will be conducted through a comparison of high-profile missing persons cases versus those cases which did not receive significant media coverage. The outcomes of both will also be contrasted by the addition of interviews involving forensic investigators and media representatives who work in a series of different platforms to properly understand the implications. In determining how the role of the media impacts the role that Forensic Investigators take on, the results could improve their work and ensure there aren’t biases limiting the involvement law enforcement has on those victims who do not have their cases spotlighted by the media.

**\*\*11: Extraction Efficiency of DNA from Two Swab Types in Contrived Sexual Assault Samples**

Sylvia Hamilton | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Pamela Marshall, Ph.D.

**ABSTRACT:** Sexual Assault Kit (SAK) collection is the process of collecting biological evidence from victims to be used in a court of law for the prosecution and conviction of a sexual assault (SA). Since SAKs development in the 1970s, the collection device utilized are cotton swabs have been shown to embed DNA within the fiber matrix. Due to the typically low quantity of the perpetrator’s DNA compared to the female contributor’s, it is imperative that the separation of the male and female fractions is effective. In this study, two swabs were evaluated for their efficiency in DNA collection and release: cotton swabs and nylon flocked swabs which purportedly absorb and release DNA. Contrived samples of collected vaginal swabs were prepared with varying dilutions of seminal fluid. The mock SA samples were processed with the Promega Differex System to separate the male and female components. The total human to male DNA ratio was determined using Quantifiler™ Duo on the QuantStudio5 by ThermoFisher. Select samples were processed further to generate genetic profiles. Preliminary results in this study have shown increased concentrations extracted from nylon swabs compared to cotton. Improving the quality and quantity of retrieved male DNA from SA samples by replacing the outdated cotton swab as a collection device hopefully will increase conviction rates of SA perpetrators.

**\*\*12: Impacts of Desiccants on DNA Quantity and Quality in Sexual Assault Kits over One Year**

Catherine Hull | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Pamela Marshall, Ph.D

**ABSTRACT:** The way sexual assault samples are collected in hospitals requires a drying process before storage. The drying process could allow contamination or the mix-up of samples to occur in the hospitals. If a desiccant were to be used the drying process could be eliminated to reduce contamination, limit mistakes, and reduce storage space. A desiccant is a substance that absorbs water to allow for dry conditions in storage. Finding the ideal collection and storage process is crucial to maintaining the quality and quantity of DNA. A desiccant-based collection kit, manufactured by Gentueri, and a non-desiccant-based collection kit, used by the Pennsylvania State Police, will be used to make contrived sexual assault samples. The sexual assault samples will be stored for up to 12 months to determine which kit will better preserve the quantity and quality of DNA in the sample. While previous research has shown that both sexual assault kits perform equally over 3 months, it also showed that the Gentueri kit offered a more robust, standardized process. This allows for a controlled design, reducing the number of variables such as temperature, weather, and state of collection. The results will show which collection kit would be ideal for sexual assault samples. The results can be applied to forensic crime labs across Pennsylvania to preserve DNA quantity and quality.

**\*\*13: Can the Use of Sharpies in Forensic Analysis Be a Source of DNA Transfer and Contamination When Examining Difference Fabric Types?**

Haley Murphy | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Pamela Marshall, Ph.D.

**ABSTRACT:** Body fluids on fabric items is a commonly encountered type of evidence at a crime scene. During the processing of evidence, the fluid is outlined using a sharpie marker to assist the DNA analyst to sample the correct area. After the marker has been used, it is capped, cleaned, then put away for next time. The synthetic fiber tip of the sharpie, which has direct contact with the fabric, does not get cleaned between uses. The woven fibers of a sharpie tip are similar to the fibers of a cotton swab. Cotton swabs are utilized in crime labs to collect sources of DNA. Due to the similarities between the fibers of a cotton swab and a sharpie tip, is it possible that sharpie tips can collect DNA and be a source of DNA contamination? The ability of a sharpie to collect DNA was analyzed based the number of uses, fabric type, and what fluid was being circled. Each sharpie was swabbed using a cotton swab wetted with a 50/50 solution of ethanol and water. The QIAGEN QIAamp quantifier kit was utilized to extract the DNA from the swabs. Quantifier HP was used to quantify the amount of DNA extracted from each sharpie. Then, Globalfiler was utilized to determine whether the sharpie collected enough DNA for a profile and the potential of the sharpie having multiple profiles. It is hypothesized that sharpies do have the ability to collect DNA and the concentration of DNA in the sharpie tip increases with more uses. The importance of this research is to prevent future contamination of DNA samples through the continuous use of sharpies.

**\*\*14: The Recovery of Human DNA from an Aqueous Environment Using Novel Technology**

Halle Saf | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Pamela Marshall, Ph.D.

**ABSTRACT:** Through the use of a novel technology, an attempt to recover human DNA from an aqueous environment will be made to advance the recovery of missing persons linked to bodies of water. The importance of this research stems from the prevalence of missing persons cases today. Current methods

of human recovery in water are time costly, and greatly rely on chance. It is anticipated that a trendline may be generated to allow for the area in which a body is likely present to be discovered by studying the natural degradation of human tissue in a body of water. To generate this trendline, a tissue sample will be studied in a freshwater aqueous environment. Water samples will be collected 0ft, 3ft, 6ft, 9ft, and 12ft from the tissue source. A novel technology, Akadeum Nucleic Acid Microbubble Technology, will be used to extract human DNA from the samples collected. Any recoverable DNA within the samples will be analyzed via quantification, amplification, and genotyping. Trials will be performed over the course of a year to examine the effects of temperature, pH, oxygenation, wildlife activity, bacterial activity, depth, and current on the rate of degradation. By accounting for environmental factors and analyzing any recoverable human DNA, the location, presence, and identity of a potential missing persons may be discovered. This research project aims to implement a new method of human detection in bodies of water to assist in missing persons cases.

**\*\*15: The use of Leaf Spray PSI-MS for the Detection of Kratom (*Mitragyna speciosa*) Leaf**

Macenzie Powell | Biochemistry | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Pamela Marshall, Ph.D.

**ABSTRACT:** *Mitragyna speciosa* is a plant that produces Mitragynine. This substance has been used for centuries as a traditional pain remedy in Southeast Asia. Recently it has become available into the United States and is known as kratom. Kratom has become a popular substance for relieving opioid withdrawal. The DEA has currently deemed kratom a drug of concern. There is much unknown about kratom including the effects it has on the human body along with the detection of the substance. The purpose of this study is to use the kratom leaf on a PSI-MS instrument for the detection of the substance. Detection of *Mitragyna speciosa* standard on a piece of filter paper using PSI-MS has been successful. An initial scan contained a peak at 399 m/z. This is indicative of kratom as it has a molecular weight of 398.5 g/mol. The fragment ion peaks that were present in the CID scan at 238m/z, 226m/z, and 174m/z are also specific to kratom. From these results it has been determined that kratom can be detected using a piece of filter paper saturated in kratom on PSI-MS. Due to these results the hypothesis stands that kratom can be detected using kratom leaf spray PSI-MS.

**\*\*16: Determination of Naloxone Levels When Administered in Drug Overdose Cases**

Chloe Bermejo | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Stephanie Wetzel, Ph.D.

**ABSTRACT:** The opioid epidemic in the United States is a product of the increase in opioid use outside of its intended or prescribed use. Opioids are prescribed by healthcare officials to combat chronic or acute pain. Some of the most common opioids prescribed include fentanyl or oxycodone. With the increase of opioid-related deaths, the best counteragent against an ongoing overdose is naloxone, more commonly known as Narcan. Naloxone can be administered intravenously, intranasally, or subcutaneously. Depending on how naloxone is administered, a second dose may be needed to stop the ongoing overdose. In post-mortem toxicology tests, naloxone is either not tested for or if it was tested for, it doesn't appear in the post-mortem reports. Through the use of solid phase extraction (SPE), naloxone may be separated from blood and urine samples acquired from drug overdose cases. The extracted blood and urine samples will then be tested with the liquid chromatography-triple quadrupole-mass spectrometer (LC-QqQ-MS) to determine a method of separation and quantification of naloxone. A method for naloxone quantification is needed so that scientists can obtain further insight into how naloxone interacts with opioids and blood cells. The need for naloxone is only growing with the number

of opioid-related overdose deaths, and scientists need to know the intricacies of naloxone and its success rates.

**\*\*17: Detection of Low Concentration Ignitable Liquid Residues from Fire Debris Using Gas Chromatography: Mass Spectrometry and Accelerant Detection Canines**

Abigail Burke | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Stephanie Wetzel, Ph.D.

**ABSTRACT:** Arson crimes are difficult to investigate because physical evidence tends to be destroyed by fire; however, ignitable liquid residues (ILRs) can be left behind in fire debris. The detection of ILRs could be indicative of criminal activity and can aid investigators in the classification of the fire. Accelerant detection canines (ADCs) are commonly used in fire investigations to detect and locate ILRs at crime scenes. Gas chromatography-mass spectrometry (GC-MS) is used to confirm the presence and identity of collected ILRs. There have been instances where GC-MS has been unable to confirm the presence of ILRs even when detected by an ADC. This leaves a gap in the field as to the differences between the detection limit of GC-MS instruments and accelerant detection canines for ILRs. This research assesses the differences between GC-MS and ADCs in the detection of low concentration ILRs by first using a furnace to create seventy-two mock fire debris samples of gasoline on wood and carpet along with six negative wood and carpet samples. The samples were burned at three different temperatures for three different periods of time. The samples were equally divided to be analyzed by GC-MS and an ADC. The samples for GC-MS analysis were preconcentrated using the heated passive headspace extraction technique. The analyses were conducted, and the detection limit of both methods were noted and compared using statistical analysis. By understanding this gap in fire investigation, future research can be done to enhance the collection and analysis methods of fire debris.

**\*\*18: Methods of Application for Internal Standards in Solid-Phase Extraction, in Preparation for Drug Quantitation on LC-MS QQQ**

Amy Cook | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Stephanie Wetzel, Ph.D.

**ABSTRACT:** Toxicological analysis requires high precision and high accuracy when it comes to sample preparation, which involves the extraction of analytes of interest from an often complicated matrix. Streamlining sample preparation of evidence makes the process more efficient and cost-effective in forensic science and toxicology laboratories that process many samples per day. Specifically, pre-loading deuterated internal standards to later integrate into Solid-Phase Extraction (SPE) could cut out time-consuming steps and possible human error in sample preparation by eliminating the need to add internal standards directly to each sample. The aim of these experiments is to ascertain whether using materials pre-loaded with internal standards is a viable direction for laboratories. SPE will be performed on synthetic urine samples spiked with analytes of interest, using various frit materials and SPE cartridges pre-loaded with internal standards. The drug classes in this study will include amphetamines, barbiturates, benzodiazepines, opioids, and synthetic opioids. Liquid Chromatography–Triple Quadrupole–Mass Spectrometry (LC–QQQ–MS) will be used to analyze the extracted samples and determine percent recovery for each drug in all samples compared to controls. In addition, a time study will be performed in which the pre-loaded materials will be stored for several time periods to determine whether recovery decreases over time. These experiments will provide useful evidence about the reliability of materials pre-loaded with internal standards in SPE, as well as the potential of creating pre-loaded frits and cartridges to eventually market to laboratories.

**\*\*19: Analysis of Drugs on Mail Over Time and Varying Conditions**

Madison Eidemueller | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Stephanie Wetzel, Ph.D.

**ABSTRACT:** As the drug abuse epidemic in the United States persists, the smuggling of drugs through the mail into prisons and jails continues to be a concern for correctional officers and other prison staff. One method frequently used by smugglers is the “soak method”, in which a piece of paper is soaked in a liquid mixture containing the illicit substances, before being placed into an envelope and sent into the prison as mail. This research intends to investigate the transfer of substances from the substance-soaked paper mail onto the envelope, and how different conditions affect this transfer. At this point, limited research has been done to investigate substances on paper, especially when sent through the mail. The research was accomplished by dipping pieces of paper into a mixture of acetone and a desired substance, made to a concentration of 3.33mg/mL. These substance-soaked papers were then placed in manilla or paper envelopes and exposed to different conditions and time periods. The samples were extracted with methanol and analyzed using Gas Chromatography/Mass Spectrometry. Observing and documenting the transfer of substances from the paper mail to the envelope can allow correctional facility staff to be better prepared to keep themselves safe from drug exposure. Additionally, this research can aid in developing better detection technology for drugs in the mail.

**\*\*20: The Impacts of Unequal Public Defense Funding Across Pennsylvania**

Erica Norris | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Pamela Marshall, Ph.D

**ABSTRACT:** Unlike the vast majority of U.S. states, Pennsylvania utilizes county-based funding for public defense rather than the allocation of state funds. Disparities in funding across the state may limit public defenders’ ability to efficiently represent their clients, especially in counties of lower economic status. This study aimed to compare public defense funds across all 67 Pennsylvania counties to determine how funding levels may impact excessive caseloads and citizens’ access to free representation. The study also aimed to compare funding data for public defense to the district attorney funding availability in each county. Funding data was collected from each county’s comprehensive annual financial reports from 2019, and caseload statistics were obtained from the Supreme Court of PA. Characteristics of each county such as population, median household income and crime rate were compared to the amount of money each county allocated to public defense. So far, the study revealed that wealthier counties have higher funding availability, and that counties with higher caseloads receive slightly less funding per case. Additionally, district attorney funding was shown to be significantly higher than that for public defense in the majority of counties across Pennsylvania. Examining the current system of funding across PA is important to determine whether increased state funding may help lessen the public defense crisis and assist citizens in obtaining free representation.

**\*\*21: A Landscape Study: Investigating the Potential Links Between Adoption and Serial Killers**

Amanda Piccirilli | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Pamela Marshall, Ph.D.

**ABSTRACT:** While serial killers can be found everywhere in the world, they became increasingly prevalent in the United States throughout the 1960s to present day. The cases of Ted Bundy and Jeffrey Dahmer sparked a public fascination with serial killers. According to the FBI, a serial killer is someone

who kills two or more people at various times. Anger, pleasure, money, and attention are typically the motives behind serial killing however there are other motives. This study examines several elements, some of which may have resulted from circumstances imposed on these individuals throughout their early childhood, that can further our understanding why these serial killers killed and kept killing people. This study primarily focuses on serial killers who were adopted, placed in foster care, or raised by their nonbiological parents. Approximately 90% of children in foster care, according to the Department of Health and Human Services, have experienced trauma, which may affect how they behave in the future. This study makes use of the Radford / Florida Gulf Coast University Serial Killer Database to broaden research on American serial killers as well as their database's coverage of adopted serial killers. Out of 500 serial killers in the US researched so far, 10% were adopted, placed in foster care, or raised by their nonbiological parents. This study advances knowledge in the field of forensic science and psychology by identifying the serial killers in the United States that were adopted, and the circumstances they experienced that drove them to commit such heinous crimes.

**\*\*22: Analysis of Drug Content Distribution on Paper Using both Soak and Spray Methods by Gas Chromatography-Mass Spectroscopy (GC-MS)**

Aizlynn Michel | Forensic Science and Pre Law | Bayer School of Natural and Environmental Sciences | Senior

Faculty Advisor: Stephanie Wetzel, Ph.D.

**ABSTRACT:** In recent years, illicit drugs have been making their way to inmates through the mail system which presents a hazard for anyone inside the prison. Outsiders who have a connection to the inmate can either soak or spray paper with a drug-containing solution and mail it in for the inmate to have access to. Due to this problem growing in recent years, not much research has been completed. This research aims to investigate the distribution of drugs on different paper types using both soak and spray methods. For this research, a 3.33 mg/mL mixture of caffeine, acetaminophen, or phenethylamine was created with acetone to be used for both soak and spray methods. Each surrogate drug was tested on three paper varieties including cardstock, drawing, and computer papers by soaking or spraying the paper two, four, or six times depending on the respective trial. After the paper is dried, it was cut according to a pre-determined grid system and soaked in acetone. After filtering, each mixture was placed into a gas chromatography-mass spectroscopy vial to run through the instrument to collect data. This data explains how drugs are distributed throughout different paper types. By understanding how drugs distribute in the paper, further research can be done to help identify when a piece of mail has been tampered with and avoid these illicit substances getting into prisons.

**\*23: Application of Supervised Machine Learning for Bacteria Analysis in Droplet Microfluidics**

Shawn Bliss | Biomedical Engineering, Mathematics | Rangos School of Health Sciences | Senior  
Faculty Advisor: Melikhan Tanyeri, Ph.D.

**ABSTRACT:** The ability to identify bacteria quickly and accurately is critical for applications such as medical diagnosis, environmental monitoring, and food safety assurance. For instance, sepsis detection, requires blood cultures that take as long as 1-5 days, preventing of timely intervention and increasing mortality rate. Here, we propose the use of microfluidics and a machine learning algorithm for rapid bacterial cell capture and quantification. The combination of high-throughput droplet microfluidics and a support vector machine (SVM) enables analysis and quantification of bacterial samples within as short as 4 hours. We have performed successful encapsulation of pathogenic bacteria such as E. coli, S. enterica, and P. aeruginosa and demonstrated an average detection accuracy of 98% using our trained SVM model.



#### **24: Improving Frick Park's Accessibility for People with Disabilities**

Joseph Benson Guthrie | Inclusive Post-Secondary Ed | Rangos School of Health Sciences | Senior  
Nathan Pearson | Occupational Therapy | Rangos School of Health Sciences | Senior  
Faculty Advisor: Meghan Blaskowitz, Ph.D.

**ABSTRACT:** Congress passed the Americans with Disabilities Act (ADA) in 1990 to protect all people with disabilities from discrimination, to ensure the right to equal Access. The ADA requires parks and recreation departments to be inclusive. It has helped, but there are still problems. More needs to be done to remove barriers.

The World Health Organization (WHO) says that for quality of life, people need health, independence, social opportunities, and access to the environment. Kapsalis, Jaeger, & Hale's study Disabled-by-Design shows that public places need to improve their accessibility. Being in nature, with friends and family, will help people have a better life. Universal Design can improve access. The National Park Service is working to increase park accessibility. (Washburn & Knox)

In Pittsburgh, Frick Park has many trails, but many are not accessible. Pittsburgh Parks Conservancy (PPC) is planning a Sensory Classroom for Frick Park. This will add trails with more wheelchair access. For people with different sensory needs, the park will have new ways to learn, explore nature, and have fun. The lead presenter has been a Community Engagement Intern with the PPC for the Fall 2022 and Spring 2023 semesters. His internship project focuses on gathering input from the disability community on the proposed Frick Park Sensory Classroom. During his internship, he attended multiple community forums hosted by PPC and held four focus groups to gather data from local self-advocates with disabilities (43% of respondents), their family members (17%), and support staff (40%), about their level of engagement in Frick Park.

#### **25: Final Examination Research Paper**

James Cahill | Business Undecided | A.J. Palumbo School of Business Administration | Freshman  
Faculty Advisor: Christopher Cimorelli, PhD

**ABSTRACT:** The subject of climate change has caused a significant divide among people not just in the United States, but across the world. Being a universal figure, Pope Francis gave the Catholic view on the matter in his encyclical *Laudato Si'* that the climate change crisis must be dealt with because it is our duty not only as Catholics but as humans to do so. Pope Francis goes into great detail on how to fix this problem, and how to deal with its effects financially, morally, and scientifically. There are plenty of real-world examples of how this problem greatly affects some of the poorest countries around the world, especially those which have a high population density. This poster will show the current problems, reasons, and possible solutions as to how great of a problem this is, and how it is a problem that the Catholic Church must deal with head-on using supporting articles from Pope Francis, Elizabeth Johnson, and Kathryn Reid. This poster shows that climate change isn't just a political issue, but it is a morality issue.

#### **26: The Synthesis of N-Oxides: Precursors for Antibiotic Candidates**

Benjamin Musiak | Chemistry | Bayer School of Natural and Environmental Sciences | Junior  
Faculty Advisor: Thomas Montgomery, Ph.D

**ABSTRACT:** As microbes grow increasingly tolerant to current antibiotics, it is critical to develop the next generation of anti-microbial drugs. Imidazolidines, a privileged biomedical core, is a likely source for new

antibiotic compounds. Previous work has shown that N-oxides can be used with imines to efficiently generate imidazolidine cores with a wide range of compatible functionalities. To date, only three N-oxides have been shown to give such structures, a clear limitation of the field. We report the synthesis of two novel N-oxides, synthesized from base starting materials. A significant challenge has been managing the high hygroscopic properties of N-oxides both in their synthesis and long-term storage. This has been addressed by carefully monitoring ambient humidity and removing water from the reaction as quickly and efficiently as possible. Finding a clean pathway that works for a verity of N-oxides is needed to maximize the impact of their chemistry.

### **27: Obsolescence Prediction Tools in Critical Supply Chain Management (OPTIC SCM)**

Olivia Greene | Supply Chain Management | A.J. Palumbo School of Business Administration | Junior  
Benjamin Sadler | Computer Science | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor: Michael Sherwin, Ph.D.

**ABSTRACT:** All supply chains are impacted by diminishing manufacturing sources and material shortages (DMSMS). However, the U.S. Navy is uniquely susceptible to DMSMS. In particular, the obsolescence of products and suppliers poses a substantial risk to the reliable supply of items, assemblies, and systems to support defense activities. In addition to ordinary risks that affect the longevity of a company, irregular procurement cycles, qualification barriers, and strict requirements pose additional obsolescence risks in the supply chain network of manufacturers that provide items to the U.S. Navy. This project is focused on gaining valuable information for strategic and tactical decision-making by 1) identifying the key factors that assure supplier continuity and 2) developing machine learning models to predict the probability and timing of supplier obsolescence. In this project, we aim to utilize data sets that are part of the existing U.S. Navy's Obsolescence Management Information System (OMIS) in combination with public and private data sets to gain these valuable insights.

### **28: Witnessing Traumatic Events in Football**

Noah Madden | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior  
Michael Berretone  
Joshua Imhof  
Faculty Advisor: Alexander Kranjec, Ph.D.

**ABSTRACT:** In 2023 Buffalo safety Damar Hamlin went into cardiac arrest on the field after a seemingly routine hit in a regular season NFL game that would be canceled. The team's reactions made the event even more disturbing, as players were seen crying, praying, and mourning their teammate. The psychological toll was seemingly immense. However, while physical treatments for injured players have increased in quality, little to no research has explored the psychological effects of witnessing such an event. The proposed study seeks to fill this gap. It surveys 40 Duquesne University Football Players via email to ask about their personal experiences with football and on-field trauma. In-person interviews with up to 20 participants ask more in-depth questions about their experiences. Interviews will assess the extent to which players witnessed, or endured, the traumatic event, and whether they were watching the game on television or participating in in-person practice or in a game. Interviews will also explore the extent to which players have sought counseling formally or informally. Throughout the interview process we will ask the participants about their anxiety, depression, and any general psychological symptoms related to experiencing trauma. Though the personal physical injuries are the most noticeable, better understanding the hidden psychological effects of other teammates injuries remains an understudied important question for psychologists and players.

### **29: Crosslinking-Mass Spectrometric Studies of the Serotonin Transporter in the Inward Facing State**

Ashley Berdel | Biochemistry | Bayer School of Natural and Environmental Sciences | Junior  
Faculty Advisor: Michael Cascio, Ph.D.

**ABSTRACT:** Regulation of serotonin levels is essential in preventing diseases such as depression and anxiety. These levels are regulated by re-uptake by presynaptic neurons via their serotonin transporters (SERT). We propose to examine the ibogaine-bound inward-facing state of SERT using cross-linking mass spectrometry (CX-MS). Rat SERT containing a single reactive cysteine at position 310 was overexpressed in insect cells, purified, and reconstituted into vesicles. CX studies were conducted using MTS-diazirine in the presence of ibogaine, and sites of crosslinking were identified by MS. These studies identify distance constraints in full-length SERT and could lead the development of more selective therapeutics that are more effective with less side effects than current selective serotonin reuptake inhibitors.

### **30: Studies of Proton Fragmentation**

Daniel Terrero | Physics | Bayer School of Natural and Environmental Sciences | Sophomore  
Faculty Advisor: Fatiha Benmokhtar, Ph.D.

**ABSTRACT:** Proton is believed to be formed of three quarks, two up and one down quark. But experimental evidence shows that just a fraction of the total mass, electromagnetic properties and spin of the proton is carried by these quarks. One has to take into account the contribution of a sea of virtual quark-antiquark pairs swimming in a bath of gluons. In this presentation, I will talk about the proton fragmentation, the Deep Inelastic regime and the separation of current and target fragmentation in electron-proton scattering through the x-Feynman variable, which is the fraction of momentum carried by the hadron in the center of mass frame. My work on the energy loss corrections to the single spin asymmetries for  $Clas12$   $ep \rightarrow e'pX$  channel at Jefferson Lab will be presented as well.

### **31: Characterizing Manganese Reducing Bacteria That Contaminate Abandoned Coal Mine Drainage**

Kayla Brennan | Biology | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Nancy Trun, Ph.D.

**ABSTRACT:** Abandoned coal mine drainage (AMD) can contain several contaminants including manganese, a toxic metal. Passive remediation systems are designed to precipitate contaminants like manganese from solution utilizing natural geochemical-biological processes. However, solubilized manganese can exit the system polluting the watershed. The resolubilization of manganese in solution can be increased by manganese reducing bacteria (MnRB). The circumneutral Wingfield Pines passive remediation system (PRS) in southeastern Pennsylvania contains solubilized manganese throughout the system with sharp increases of solubilized manganese in the fall in the wetlands, the pond at the system exit. We hypothesize the sharp increases of solubilized manganese in the wetlands is due to MnRB. To determine the abundance of MnRB in the system, manganese reducing screening media was used to determine the frequency of MnRB in each pond in Wingfield Pines PRS. Bacterial isolates positive for manganese reduction were present throughout the entire system. Their capacity to perform manganese resolubilization has been determined using the environmental protection agency's formaldoxime assay to measure soluble manganese. It was found that each MnRB strain is capable of resolubilizing amounts of manganese higher than EPA limits for fresh water. Isolates have been characterized using traditional microbiological techniques. The 16S *rrn* gene was sequenced from purified isolates to identify them via BLAST. Studying the characteristics of MnRB is essential to understanding bacterial driven manganese resolubilization and determining if the Wingfield Pine PRS is successfully preventing manganese pollution in the watershed.

### **32: De Re Coquinaria: Imperial Rome and the Birth of the Culinary Arts**

Juan Corujo | History/Classical Civilizations | McAnulty College and Graduate School of Liberal Arts | Junior  
Faculty Advisor: Sarah Miller, Ph.D.

**ABSTRACT:** My primary research question is what Imperial-age culinary practices are documented in the work of Apicius's *De re coquinaria*, and how the culinary tradition of Europe stems from what is documented in his work. To primarily answer these questions, I examined Apicius's work itself and the numerous recipes for pastries, breakfast dishes, desserts, and the like within the many pages of the book and compare extensively with a modern cookbook. Also, I'd like to show some as well of the modern representations of dishes such as the "placenta" or Roman cheesecake that have been made using the same recipe within *De re coquinaria*. At first glance, the linguistic difference between what is now a "placenta" and what it meant in the ancient world is very evident. This development creates a "the chicken or the egg situation" for example, but this demonstrates the evolution of not only the development of Romance languages but also the development of culinary traditions. The primary conclusion that should stem from this project is how the European Western culinary tradition has not only been evolving for the last two thousand years but that even the diet of Imperial Romans and our tastes are very similar in all matters of food. As well as further steps with this project, I'd like to demonstrate the rich variety of ingredients that the ancient world could obtain through the vast networks of trade from all parts of Eurasia.

### **33: Characterization of Nitrate Respiration in *Bacillus selenitireducens* Strain MLS10**

Nicholas Fetzer | Biology | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: John Stolz, Ph.D.

**ABSTRACT:** A haloalkaliphilic firmicute, *Bacillus selenitireducens* strain MLS10, is capable of using nitrate for anaerobic growth. To further understand the role this organism plays in the nitrogen biogeochemical cycle in the environment we will investigate nitrate respiration involving nitrate reductase (Nar) and nitrite reductase (Nrf). My previous research determined the localization and optimal pH of Nar based on cell fractionation and colorimetric enzymatic activity assays. The purpose of this work is to further characterize Nar, and identify the nitrite reductase, using a combination of activity assays and for Nrf, testing for covalently bound heme C. This project will provide a greater understanding of this organism's metabolism and how it may contribute to the ecology of Mono Lake, where it lives.

### **34: VEGF Regulation by Activated Fibronectin: A Computational Study**

Nicole White | Biomedical Engineering | Rangos School of Health Sciences | Junior  
Faculty Advisor: Kimberly Williams, Ph.D.

**ABSTRACT:** Angiogenesis is the process whereby new blood vessels grow from pre-existing blood vessels and play a major role in maintaining homeostasis. If there is insufficient angiogenic signaling, there can be a decrease in tissue regeneration and healing. Angiogenesis and its signaling process involve the proliferation and migration of endothelial cells and is driven by growth factors such as vascular endothelial growth factor-A (VEGF). VEGF is an important signaling molecule for angiogenesis and it is present in both normal situations as well as pathological environments. VEGF primarily acts through its signaling receptor, VEGFR-2, but can bind other elements in the cellular environment including fibronectin, a cell-extracellular matrix protein. Interactions with fibronectin can control VEGF availability and interactions with the signaling receptor.

In this research, we are pairing computational modeling with experimental biology to investigate various mechanisms related to the regulation of fibronectin binding to VEGF. We will present simulation results tied to experimental cell biology studies to help understand how changes in interactions, either through genetic modification or natural selection, might impact the ability of cell growth factors, like VEGF, to bind and stimulate cell activity. The overall goal of this study is to validate a simple bind model for VEGF-VEGFR-2-Fibronectin which captures experimental phenomena and can be used in a more complex model of the cellular environment.

### **35: Functional Evolution of the KLK2 and KLK3 Proteases in Hominoid Primates**

Hayley Jenkins | Biological Sciences | Bayer School of Natural and Environmental Sciences | Junior Faculty Advisor: Michael Jensen-Seaman, Ph.D.

**ABSTRACT:** The kallikrein-related peptidases (KLKs) are a large family of proteins that code for proteases, many members of which are expressed in a tissue-specific manner. The KLK2 and KLK3 proteases are highly expressed in seminal plasma and are responsible for the breakdown of extracellular coagulum to mobilize sperm for subsequent fertilization. The KLK2 and KLK3 genes arose from a gene duplication approximately 40 million years ago in the ancestor of the catarrhines (apes and Old-World monkeys). In humans, these genes both show prostate-specific expression but with different substrate specificities. While most catarrhines retain functional KLK2 and KLK3 genes, genomic deletions have occurred independently in both gorillas and gibbons. This has resulted in chimeric genes (KLK2/3) where the first four exons are derived from KLK3 and the last exon from KLK2. In order to determine whether the resulting chimeric proteins of gorillas and gibbons function more similarly to KLK2 or to KLK3, we cloned their coding sequences into a mammalian expression vector with a hexahistidine tag. These constructs were then transfected into HEK-293T cells, purified through affinity chromatography. Their ability to cleave two different fluorescently labeled synthetic peptide substrates were subsequently quantified. Human KLK2 and KLK3 served throughout as positive controls. The observed differences in enzyme kinetics on the different substrates will be discussed in light of the evolution of the primate KLK gene family.

### **36: Assessing Fentanyl Concentrations in Forensically Relevant Blow Fly (Diptera: *Calliphoridae*) Larvae to Improve Postmortem Interval Estimations**

Shelby Hale | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Lisa Ludvico, Ph.D.

**ABSTRACT:** Forensic entomotoxicology is a subfield of forensic investigation involving the study of illicit substances in entomological specimens. The presence of illicit drug compounds can alter the growth patterns of carrion insects, which could decrease the accuracy of entomological evidence in postmortem interval (PMI) estimation. The development of this field has identified various effects on growth resulting from drug compounds frequently found in human remains. The number of deaths involving synthetic opioids such as fentanyl continues to climb annually, with over 70,000 overdose deaths reported in 2021. Despite the increasing presence of fentanyl in the United States, few studies reflect the drug's effects on the larval growth of carrion insects. Therefore, this study aimed to identify how varying concentrations of fentanyl in human tissues affected the growth of forensically relevant blow fly (Diptera: *Calliphoridae*) larvae. Fentanyl was distributed within human tissue samples and offered to blow fly larvae, and in vivo measurements of these larvae were taken to measure growth. After reaching the latest larval stage, the larvae were euthanized, homogenized, and subjected to solid-phase extraction. The remaining eluent was analyzed using triple quadrupole mass spectrometry, or LC-QqQ-MS, to determine the percentage of fentanyl consumed at the latest larval stage of growth. By assessing

the effects of fentanyl on the growth of blow fly larvae, the accuracy of PMI estimations can be improved, resulting in more effective forensic investigations.

### **37: Investigating Sex Related Differences in Vestibular Ocular Motor Screening in Collegiate Athletes**

Hanna Pawela | Biological Sciences | Rangos School of Health Sciences | Sophomore

Evelyn Sarle | Biology | Bayer School of Natural and Environmental Sciences | Sophomore

Faculty Advisor: Erica Beidler, Ph.D., LAT, ATC

**ABSTRACT:** A concussion can affect the vestibular and ocular system which controls balance, vision, and head movements. The Vestibular Ocular Motor Screening (VOMS) is part of the multi-faceted assessment of a suspected sport-related concussion. In order to correctly diagnose and treat a concussion, it is important to understand the differences between how men and women perform on vestibular and ocular assessments. Therefore, the objective of this investigation was to determine whether sex differences exist in VOMS scores at baseline and following a bout of multidirectional physical activity. Athletes were recruited from an NCAA Division-I institution. They completed the VOMS before, directly after, and 15-minutes following a multi-directional high-intensity interval training fatigue protocol. The VOMS uses seven different components: smooth pursuits, horizontal saccades, vertical saccades, horizontal vestibular ocular reflex (VOR), vertical VOR, visual motion sensitivity, and near point of convergence (NPC). Participants self-report symptoms of headache, dizziness, nausea, and foginess after each component ranked on a scale from 0 (none) to 10 (severe). The dependent variables of this investigation were the VOMS total score calculated from all components and the NPC distance. The data collection is still in progress. Repeated-measures ANOVA tests will be conducted to determine if there are sex differences in VOMS outcomes. However, based on prior research, we hypothesize that females will score higher than males on the VOMS multidirectional test. The results of this investigation will add to the literature on sex differences in concussion diagnosis and recovery.

### **\*38: Mental Health Perceptions Across Generations**

Rio Scarcelli | Psychology and Music | McAnulty College and Graduate School of Liberal Arts | Senior

Nicole Sitarik | Psychology | McAnulty College and Graduate School of Liberal Arts | Sophomore

Faculty Advisor: Alexander Kranjec, Ph.D.

**ABSTRACT:** Despite its importance, mental health questions remain stigmatized in the 21st century. This societal viewpoint continues to have negative effects on mental health perception and continues to prevent many people from seeking proper help. However, perceptions of mental health have changed over time as discussions of mental health have become more normalized. To understand the generational differences in perceptions regarding mental health, this study will take a deeper dive into societal impacts based on generation which may have caused people to change certain attitudes regarding mental health. As this is an ongoing study, we predict that societal impacts will have an effect on the ways in which people view mental health. More specifically, we predict that older generations have a more negative view of mental health than their younger counterparts due to generational differences. The findings of this study could demonstrate that different generations' societal views could affect the overall perception of mental health that is passed down to future generations. By pinpointing specific demographics, this study hopes to be able to determine the reasons behind negative attitudes toward mental health and educate these populations in hope of encouraging mental health practices.



### **39: Analyzing the Contribution of Vasa Vasorum in Nourishment of the Aortic Models**

Alexis Throop | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Manoela Neves | Biomedical Engineering | Rangos School of Health Sciences | Junior  
Faculty Advisor: Rana Zakerzadeh, Ph.D.

**ABSTRACT:** An abdominal aortic aneurysm (AAA) is a localized dilation of the abdominal aortic vessel. Aneurysms develop asymptotically over time until a sudden and often fatal rupture. The mechanisms of AAA formation and rupture is controversial among literature. Developing a proper understanding of AAA behavior can lead to diagnostic tools to assess the clinical outcomes of aneurysm cases. Previously, our lab has extensively observed the implications of the intraluminal thrombus (ILT) on AAA mechanics. While the ILT plays key role in aneurysm development, other parameters such as the vasa vasorum (VV) and oxygen consumption rate in the arterial wall may also contribute. The VV is a network of vessels residing in arteries or veins that delivers oxygen and important nutrients to support their parent vessel. Given that physiological parameters such as VV oxygen concentration and its consumption rate are not directly measurable, a computational study is helpful to investigate the importance of this effect and assess the contribution of VV to provide oxygen supply within the aortic tissue. This work aims to analyze the influence of the VV flow and its subsequent consumption rate on oxygen delivery to the AAA wall. Numerical simulations with varying levels of adventitial oxygen concentration and consumption rate constants are performed. The sensitivity of the oxygen distribution through contours of concentration and quantitative values of oxygen in the arterial wall domain is analyzed. We observed that hypoperfusion of the adventitial VV has critical effects on reduced oxygen supply inside the tissue and can therefore cause hypoxia.

### **40: Identifying the Presence of Semen Through the Detection of Fructose**

Taylor McClure | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Michael Jensen-Seaman, Ph.D.

**ABSTRACT:** Seminal fluid is among the most valuable sources of biological evidence which can be recovered from a crime scene. Current tests such as the prostate-specific antigen (PSA) test and microscopic examination for spermatozoa are non-comprehensive and have high potential for false positive or false negative results. Fructose is a naturally occurring sugar which serves as the main energy source for sperm in semen. There is currently no testing method for seminal fluid which utilizes fructose as the target molecule. However, it is possible that quantification of fructose in semen under different conditions, and compared to other bodily fluids, may aid in identification of crime scene samples, forming an alternative method to PSA testing. A fluorometric fructose assay kit was used to quantify fructose levels in semen samples, as well as other common biological fluids such as blood, saliva, urine, and vaginal fluid. Additionally, comparisons of fructose levels were made between semen samples from vasectomized and non-vasectomized men, under the hypothesis that the presence of sperm will decrease fructose levels over time as this sugar is metabolized. The differences in fructose concentrations observed across these sample groups, as well as potential implications for the discriminatory power of fructose-based identification of body fluids, will be discussed.



#### **41: Modeling of the Biphasic Vocal Folds with Application to the Influence of Permeability on Fluid Perfusion**

Isabella McCollum | Biomedical Engineering | Rangos School of Health Sciences | Junior  
Durwash Badr | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Faculty Advisor: Rana Zakerzadeh, Ph.D.

**ABSTRACT:** During voice production, pressurized air from the lungs passes through the larynx and the vocal folds (VFs) will start to self-oscillate. This vibration is referred to as phonation and involves complex fluid-structure interactions (FSI) between the tissue of the VFs and the airflow through the larynx. VF modeling provides a prediction of VF dynamics and glottal flow which can lead to an improved understanding of these interactions. The purpose of this study is to investigate the spatiotemporal interstitial fluid dynamics of the porous VF tissue under varying permeability. We develop a multiphysics computational framework of the airflow through the larynx coupled with the poroelastic tissue dynamics to incorporate both aspects of the interaction. The computational model utilizes FSI methodology to simulate the biphasic behavior of the VFs during phonation as a poroelastic tissue. A three-dimensional model of the VFs within the larynx was constructed and computational analysis was implemented in ANSYS Workbench software. The airflow dynamics were defined in ANSYS CFX, while the tissue mechanics were modeled in ANSYS Mechanical. The effect of permeability on the fluid circulation within the VF tissue and the laryngeal aerodynamics was studied. The permeability constant of the VFs was varied in the range of  $k = 10^{-13} \text{ m}^2$  to  $10^{-7} \text{ m}^2$  and the coupled system was solved for each case to provide a prediction of the interstitial fluid flow within the VF tissue. We observed that the tissue permeability significantly affects the filtration velocity distribution and its maximum value.

#### **42: Cannabis, Well-being, and Academic Success: A Correlational Study**

Shannon Porter | Psychology and Sociology | McAnulty College and Graduate School of Liberal Arts | Junior  
Jacquelin Croissant  
Faculty Advisor: Alexander Kranjec, Ph.D.

#### **ABSTRACT:**

Cannabis use is gradually becoming more common in our society. Normalization may occur for various reasons, such as decriminalization, medical use, and increased legalization of recreational use. This has led to a large social acceptance of marijuana around the US. The protentional benefits of marijuana have become more widely recognized. Recently, The Covid-19 pandemic has created a shift in our culture and beliefs. Due to this cultural disruption, one's academic success and their well-being may have been impacted since the start of the pandemic. For this reason, it might be expected that because cannabis can have medical benefits, it may help address levels of stress among students, but also it is still unknown. Intuitions can be made, but it is not definite how Marijuana may affect someone. Our research is a retrospective longitudinal study that uses a survey we created to measure the frequency of cannabis usage across the course of the covid 19 pandemic. The survey started with gathering information from one's current state of mind, and then continued to ask questions from specifically one year ago as well as two years ago. The questions structured around one year ago aim to address someone's state of mind during the peak period of the pandemic, while two years ago grasps people's state before the pandemic. This structure was crucial to our survey to see how people's mindsets, their well-being, academic success, and marijuana use have changed or not changed. This study brings into question whether or not this methodology is accurate in measuring these three variables. There has not been previous data that uses this approach of structuring questions around time periods. This survey will help address the question of whether marijuana is a beneficial substance for humans or not.

#### **43: Genetic Analysis of Putative Genome Segregation Proteins in *Streptomyces venezuelae***

Grace Gernatt | Biology | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Joseph McCormick, Ph.D.

**ABSTRACT:** The life cycle of *Streptomyces venezuelae* involves the construction of aerial hypha that segregate from multigenomic syncytial filaments to unigenomic spores. *smeA* and *sffA* are two genes encoding membrane proteins. The exact role of *SmeA* is unknown, but it is thought to associate with *SffA*, which might be an FtsK-family DNA motor protein that may be responsible for DNA translocation during sporulation. *smeA* and *sffA* mutants with a deletion of both genes, were created through replacement of the gene with an apramycin-resistance cassette using molecular cloning techniques. An investigation was performed into the morphological differences in aerial hyphae during sporulation associated with deletions of both *smeA* and *sffA* genes using differential interference contrast microscopy (DIC) and fluorescence microscopy.

#### **44: Airline Ethics**

Tyler Grupac | Sports information and media | McAnulty College and Graduate School of Liberal Arts | Junior

Alexander Ashe

Jillian Bobey

Daisy Ettinger

Refati Kuermayoufu

Faculty Advisor: Pamela Walck, Ph.D.

**ABSTRACT:** In 2017, a passenger of a United flight was “reaccomodated” off the flight due to over-booking. However, people captured the passenger being forcefully removed by police, causing the passenger to be knocked unconscious and be bleeding off the flight. This situation blew up on social media with viral videos and tweets. United responded saying they had to “reaccommodate” the passenger, causing a social media uproar and a PR nightmare.

#### **45: Are Plastic Nurdles Entering the Food Chain in the Ohio River?**

Mackenzie Leszczynski | Biological Sciences | Bayer School of Natural and Environmental Sciences | Sophomore

Faculty Advisor: Brady Porter, Ph.D.

**ABSTRACT:** Nurdles are small plastic beads created from natural gas products and used to create a variety of plastic products. In 2022, the Shell Petrochemical “cracker” Plant on the Ohio River began production of polyethylene: a plastic component of nurdles. This plant plans on producing up to 1.6 million tons of plastic pellets per year. Given the proximity of the Ohio River and issues with railway transport, there are concerns that nurdles will chronically breach containment and enter the aquatic ecosystem. Nurdles are of similar size and appearance to fish eggs; a common dietary component of many fish and birds. Prior to nurdle production at the Shell Plant, we conducted a boat electrofishing survey along the adjacent stretch of the Ohio River to provide baseline samples of nurdle ingestion. We investigated 89 individuals representing 18 fish species targeting those with a gape size larger than a typical nurdle. Intestines were removed from the fish on site and dissected for nurdles or nurdle-like contents in the lab, revealing two semi-spherical objects in two separate Smallmouth Bass individuals that have the potential to be nurdles but are waiting on further characterization. If these samples are nurdles, they are likely from a derailment spill on Guy’s Run in May 2022, located some 40 miles

upstream in the Allegheny River. Future surveys will be conducted to conclude if the Shell Plant is increasing nurdle pollution in the river and if the increase is entering the food chain.

#### **46: Globalization and Social Media: An Analysis of Meta Platforms' Globalizing Efforts**

George Harris | Finance | A.J. Palumbo School of Business Administration | Freshman  
Faculty Advisor: Karl Menk, Ph.D.

**ABSTRACT:** The concept of globalization encapsulates the spread of both people and ideas globally. This ever expanding push is a key pillar of any modern business, and when utilized correctly results in enormous competitive advantages. No other sector in today's marketplace encapsulates globalization like the social media industry. In particular Meta, formerly Facebook, has grown to become the largest social media conglomerate in existence. This poster seeks to identify the core processes of globalization as well as how they have been, and continue to be, applied by Meta. In doing so the poster will cover the great impact of this technique as well as the rather troublesome areas of its applications throughout the corporation's history.

#### **47: High Throughput GPCR Affinity Assay to Screen for Potential Non-opioid Pain Medication**

Sara Knox | Biomedical Engineering & Nursing | Rangos School of Health Sciences | Junior  
Aidan O'Donnell | Biomedical Engineering | Rangos School of Health Sciences | Junior  
Michelle Bohn | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Faculty Advisor: Melikhan Tanyeri, Ph.D.

**ABSTRACT:** G protein-coupled receptors (GPCRs) are crucial targets for developing pain medications as they mediate the transduction of external stimuli into intracellular responses, leading to pain perception [1]. However, there is a pressing need for discovering novel compounds that selectively target GPCRs, to develop more effective and safe pain medications. Here, we developed an innovative assay for high-throughput drug screening using PsychLight, a genetically encoded fluorescent sensor based on the 5-hydroxytryptamine 2A receptor (5-HT<sub>2A</sub>R) structure [2]. PsychLight is based on ligand-induced conformational changes in 5-HT<sub>2A</sub>R and is capable of detecting endogenous serotonin (5-HT). We utilized PsychLight-expressing HEK293T cells and derived its dose response curve for 5-HT where fluorescence signal increases in a concentration dependent manner. Further, we conducted a preliminary screening assay to confirm and evaluate hits from commercially developed compounds. Our low-cost, high-throughput screening assay may accelerate the identification of potential non-hallucinogenic therapeutic agents for pain management.

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#### **48: Characterization of Development-associated, Genome Segregation and Condensation Proteins in *Streptomyces***

Sophie Kopyar | Biology | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Joseph McCormick, Ph.D.

**ABSTRACT:** *Streptomyces* is a filamentous bacterium with distinctive growth phases: spore germination, vegetative hyphae, aerial hyphae, and sporulation. Their unique cellular development and ability to produce antibiotic metabolites makes them interesting test subjects and prompts further investigation into the molecular mechanisms that regulate their life processes. To study the molecular operations of genome segregation proteins, the scope of my project was twofold. First, I set out to investigate if Lsr2, a DNA condensation protein homolog in *Streptomyces*, was essential to cell survival by incorporating a deletion allele of *Lsr2* into the *S. coelicolor* genome. This was accomplished using plasmid recombineering and conjugation. Following recombineering, double homologous recombination introduced the mutant allele into the chromosome. This study also utilized site-specific recombination to integrate target *Lsr2* mutant alleles at a site other than the native location into the chromosome and to see if alterations to the amino acid sequence of *Lsr2* would influence the *Streptomyces* phenotype. My goal for the second part of the project was to streamline a process for studying the protein-protein binding interface for two *Streptomyces* genome segregation proteins, SlzA and ScpB. Optimization of error prone PCR mutagenesis of *slzA* and a bacterial 2-hybrid assay was accomplished to determine the efficiency of these methods. The results of these studies would allow for a more comprehensive understanding of DNA condensation and segregation processes, which may ultimately have pharmaceutical, medicinal, and educational benefits.

#### **49: American Successes: The Harley-Davidson Company**

Sean Marshall | Finance | A.J. Palumbo School of Business Administration | Freshman  
Faculty Advisor: Andrea Dreher, Ed.D

**ABSTRACT:** Harley-Davidson is the true definition of a successful American company built on the foundations of a unique idea. William Harley and the three Davidson brothers wanted to create a brand known for various luxury motorcycles. After years and years following their first prototype in 1903, their famous "V-Twin" engine skyrocketed them to obtaining one of the most famous brand images of any company. This poster will explore Harley-Davidson's reasons for their massive success in relation to the 4 P's of business: Product, Placement, Price, and Promotion. By using research from Harley-Davidson's own website as well as various financial platforms, this poster examines how a well-executed integrated marketing strategy impacts a business. This poster can show other companies the reason for their possible downfalls when relating to the accomplishments of Harley-Davidson.

#### **50: How Is Focused Attention Related To Infants Learning To Sit?**

Melanie Tommer | Physical Therapy | Rangos School of Health Sciences | Junior  
Melanie Schultz | Physical Therapy | Rangos School of Health Sciences | Junior  
Emma Costello | Nursing | School of Nursing | Junior  
Aleena Purewal | Health Sciences | Rangos School of Health Sciences | Sophomore  
Faculty Advisor: Regina Harbourne, Ph.D.

**ABSTRACT:** Background: Focused attention is when the participant is completely devoted to a task or object. This concept has been connected to learning and other cognitive skills. The Gross Motor Function Measure (GMFM) is a tool used to quantify change in gross motor skills over time.

**Purpose:** The purpose of the study was to investigate the relationship between total focused attention time and GMFM scores in early sitting infants.

**Methods:** 26 Infants all between 6-8 months old were given 3 different types of toys each for 90 seconds and were videotaped while they explored. Videos were later coded using Datavyu, a coding software allowing accurate measurement of timed periods of focused attention to the toys. The total time of focused attention was calculated and correlated to the scores from the GMFM.

**Results:** The relationship between GMFM scores and total focused attention was negative and moderately associated ( $r=-0.30$ ,  $p=0.07$ ), such that infants with higher motor scores had less focused attention. This result supports previous research showing that children with delays have lower attention when transitioning from being sitters to crawlers. As infants gain new motor skills, they engage in greater exploration of their environment, potentially leading to less periods of focused attention to objects.

**Conclusion:** The relationship between motor skills (sitting) and cognitive skills (focused attention) is important in early intervention. This study adds to the evidence that motor skills and cognitive skills are inter-related in complex ways. The trend in this small sample will be further explored with additional children.

#### **51: Student Withdrew**

#### **52: The Role of Teeth in Human Identification**

Julia Filipkowski | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Sophomore  
Faculty Advisor: Pamela Marshall, Ph.D.

**ABSTRACT:** Teeth and dental materials are often used as a method of identification. This is applied in mass casualty and individual identification scenarios. However, the exact benefits and limitations of these methods are often left unclear since procedure for analysis and terminology used in summarizing conclusions are unique to the scientist performing the evaluation. In this review, the effectiveness of dental materials as an identification method in a variety of both individual identifications and mass casualty circumstances was analyzed. The results showed that teeth can be effectively individualizing in both scenarios. Further research is necessary-- specifically in the case of bite mark evaluation, as this method has potential, but is largely untested. Research also indicates that currently accepted identification methods involving teeth are teachable to a broad audience. However, the field of forensic odontology is limited by a lack of accepted, standardized terminology. Overall, this method of identification is beneficial to the field of forensic science and should continue to be expanded by further research and development.

#### **53: Testing the Effects of Topical Retinol Application on Laser Testing and Treatments**

Sarah Bergfelt | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Faculty Advisor: John Viator, Ph.D.

**ABSTRACT:** As the field of dermatology uses lasers for more widespread purposes, it is important for practitioners to know what commonly used products, ingredients, and prior skin care treatments may alter the effectiveness of these lasers or cause possible irritation or harm when used together. This becomes especially important since cosmetics are not regulated by the FDA, yet marketing and phrases

allude customers to blindly believe in the safety of the ingredients, without doing outside research on proper usage of active ingredients. Since much of the research in Dr. Viator's lab revolves around photoacoustic detection of cells, a process that involves laser usage, it becomes necessary for us to greater understand how everyday products used by the general public may impact results of detection. It also is important to know how these products may also affect other surface level treatments such as the removal of birth marks or tattoos. This poster focuses specifically on retinol, a form of vitamin A, that is topically used to reduce the appearance of aging as well as treat acne, Since it is known to increase photosensitivity of the skin, it became a prime choice to test for safety and proper usage when used before laser treatment/tests. The poster shows the findings surrounding the safety of retinol usage for different doses as well as possible guidelines to usage to reduce negatives effects, in the hope to make the common quest to 'age gracefully' safer for all.

#### **54: The Effect of Setting on Exercise Video Appeal**

Amanda Edwards | Psychology | McAnulty College and Graduate School of Liberal Arts | Junior  
Samantha Stevwing | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior  
Faculty Advisor: Alexander Kranjec, Ph.D.

**ABSTRACT:** Since the advent of social media, fitness and exercise videos have an increased ability to motivate or inspire people. However, despite the large amount videos available to the general population, little is understood about what aspects of particular videos are more likely to attract and engage individual viewers. The current study investigates whether the physical setting of an exercise video plays a role in making certain videos more appealing. In particular, we were interested in whether videos taking place in natural or outdoor settings were engaged with differently than videos filmed indoors. Participants viewed 5 indoor and 5 outdoor exercise videos. After viewing, participants answered questions about their levels of engagement, motivation to complete this exercise themselves, satisfaction upon video completion, and how much they liked the video overall. Participants were also asked three questions relating to their general attitudes and feelings about nature. Overall, the present study aims to determine if the environment depicted in an exercise video effects individual's video preferences. Findings will speak to the extent that Nature motivates and inspires people to exercise.

#### **55: Music Technology in Music Education: Prevalence, Challenges, and Potential**

Christian Sullivan | Music Education | Mary Pappert School of Music | Freshman  
Faculty Advisor: Paul Miller, Ph.D.

**ABSTRACT:** The development of new technology has changed the face of education and the music industry today, allowing for a plethora of new opportunities for creativity and collaboration. Music technology, which is defined by the National Association of Schools of Music as "a field of study and practice characterized by integrations and fusions of musical and technological knowledge and skills to produce work for various artistic, commercial, research, educational, and other purposes," has made its way into schools in the United States. Despite technological developments, there exist far too many disparities in the equity and quality of music technology education. Based on the programs of studies from the current 42 school districts in Allegheny County spanning from the last few years, only 19 (~45%) offer secondary Music Technology courses in some capacity. 20 school districts (~48%) don't offer it, and 3 (~7%) don't have programs of study displayed for the last few years. This poster will utilize secondary data analysis to analyze the current prevalence and quality of music technology education in public high schools, the socioeconomic, administrative, and other challenges that currently prevent school districts and communities from implementing music technology education, and some ways that it may be facilitated and made more accessible to different demographics.



### **56: The Effect of Polyanions on the Kinetics of Dehydrogenase Enzymes**

Olivia Kohler | Biochemistry | Bayer School of Natural and Environmental Sciences | Junior  
Faculty Advisor: David Seybert, Ph.D.

**ABSTRACT:** Several studies have reported that ATP and several other polyanions can affect protein stability. These polyanion effects are distinct from high affinity binding sites, similar to those present on enzymes, and appear to operate through weak and nonspecific interactions. The prevalence of common cellular polyanionic molecules including a variety of nucleic acids, ATP, etc., highlights the importance of studying these effects to achieve a better understanding of enzymatic activity in vivo. This project aims to determine the effect of ATP and the model polyanion sodium polyacetate (NaPAC) on the kinetic behavior of four mammalian dehydrogenase enzymes: mitochondrial and cytosolic malate dehydrogenase (mMDH and cMDH) and lactate dehydrogenase 1 and 5 (LDH-1 and LDH-5). MDH and LDH catalyze similar reactions that are central to metabolism. All four enzymes also display substrate inhibition in which high concentrations of substrate cause a decrease in activity. Both mMDH and cMDH are sensitive to the identity of the polyanion, as ATP and NaPAC had opposing effects on substrate inhibition. In contrast, experiments with LDH-1 and LDH-5 demonstrate that both enzymes are less sensitive to polyanions compared to MDH. The results of this comparative study of the effects of polyanions on these four dehydrogenase enzymes will be presented. Our initial findings suggest that this polyanion effect may contribute to the regulation of intracellular metabolism.

### **57: Investigating the Effects of Lung Pressure on Phonation**

Durwash Badr | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Isabella McCollum | Biomedical Engineering/Applied Mathematics | Rangos School of Health Sciences | Junior  
Faculty Advisor: Rana Zakerzadeh, Ph.D.

**ABSTRACT:** Flow-induced vibrations of the vocal fold (VF) produce a pulsatile jet that is the basic source of voiced speech. Most voice dysfunction has been associated with the fluid-structure interaction (FSI) feature of phonation and changes in vibration-induced flow perfusion within the VF tissue. Thus, a better understanding of this connection could lead to improved occupational vocal safety and enhance the diagnosis of voice dysfunction. This study aims to develop a computational fluid-porous structure interaction model of VF to determine phonation conditions that are benign to voice health. While there are several FSI studies of VF available in the literature, none of them considers a range of phonation conditions such as conversational speech and loud talking.

The computational model for the permeable VF tissue is developed and incorporated in FSI methodology by adopting the transient Navier Stokes equation to model airflow through the larynx. The VF deformation is modeled using the Biot system of equations for a poroelastic medium which defines the porous fluid flow by the Darcy equation. The aerodynamics of the model is defined in ANSYS CFX, while the VF mechanics is solved in ANSYS Mechanical. Computational modeling of vibration-induced systemic hydration of VF is performed over a range of phonation conditions. The inlet pressure is varied for four phonation loads between 0.8kPa and 1.5kPa, which covers the range in normal phonation conditions and the highest VF displacement is calculated at each subglottal pressure. Velocity streamlines and pressure contours were observed on a fully coupled module in ANSYS Workbench. Results demonstrate that lung pressure significantly affects filtration velocity and tissue deformation.



### **58: The Relationship Between Social Support Factors and Sleep Disturbance**

Sydney Cooper | Nursing | School of Nursing | Senior  
Allyson Guntrum | Nursing | School of Nursing | Senior  
Isabella Tenreiro | Nursing | School of Nursing | Senior  
Faculty Advisor: Karen Jakub, Ph.D., RN

**ABSTRACT:** Older adults have a higher incidence of sleep disturbances, which have been known to decrease quality of life and increase risk of mortality. Our research analyzed how perceived social belonging, appraisal and tangible support in older adults affected their sleep quality and sleep duration. A secondary data analysis was completed using data from a study on polypharmacy and sleep disturbance in older adults. Forty-seven participants completed assessment tools via Qualtrics® software using a demographic questionnaire, the Pittsburgh Sleep Quality Index (PSQI), and the Interpersonal Support Evaluation List (ISEL-12). A Spearman's rank order correlation analysis was done using SPSS v.26. The results revealed a weak non-significant relationship between perceived social support and sleep quality. However, it was noted that as social support increased sleep duration also increased. Specifically, the subscales of tangible social support and hours of sleep ( $r_s = .316$   $p = .039$ ) and appraisal of social support and hours of sleep ( $r_s = .390$   $p = .010$ ) were statistically significant with a moderate effect size. This study suggested that social support is beneficial for the older adult population to promote sleep quality and improve sleep duration. Sleep duration was improved when older adults believed others could assist them with their problems, provide advice, and be available in a tangible way to assist with in the home environment. Nurses are in a unique position to advocate for and perhaps facilitate reasonable interventions for older adults to promote social support and improve sleep.

### **59: The Impact of Societal Perceptions of ADHD**

Tessa Schlechter | Sociology and Philosophy | McAnulty College and Graduate School of Liberal Arts | Senior  
Faculty Advisor: Matthew Schneirov, Ph.D

**ABSTRACT:** What are the implications and impacts of the opinions and stigma of ADHD? How does the societal perception of ADHD impact medical treatment and treatment outcomes, and how does it impact the overall experience of those with ADHD? The existing literature on the topic of ADHD perception discusses studies which highlight barriers to the recognition of ADHD, specifically due to misconceptions and lack of education or resources. There is little discussion in literature of counseling as treatment or co-treatment for ADHD, or discussion of the involvement of healthcare professionals such as nurses and pharmacists. Additionally, the treatment of ADHD by healthcare providers, the impact of having ADHD, and the impact of treatment, are under researched areas. Across five studies, evidence was found that there is significant negative perception and stigma toward ADHD, differently experienced than the stigma of other mental illnesses, such as depression. There is evidence that teachers and caregivers play a large role in the recognition of ADHD and access to treatment. A conclusion that the societal perception of ADHD impacts medical outcomes and life experience for ADHD patients may be drawn from these pieces of data. My research consisted of 13 qualitative interviews of 4 adults with ADHD and 9 without ADHD, of various occupations. These interviews explored personal experiences, understanding, and feelings regarding ADHD. Data gathered within this study is somewhat consistent with current knowledge while illuminating otherwise under-studied aspects of ADHD.

### **60: Length Variation at a Microsatellite in the Human Relaxin (RLN2) Promoter Affects Transcription Levels in vitro**

Tecora Tisdale | Biology | Bayer School of Natural and Environmental Sciences | Sophomore  
Abigail Maus | Biology | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Michael Jensen-Seaman, Ph.D.

**ABSTRACT:** Complications with preterm birth are the leading cause of infant mortality and morbidity worldwide. Several factors contribute to susceptibility, but previous studies identified an association with the promoter region of the relaxin gene (RLN2) and levels of relaxin during pregnancy. RLN2 codes for human relaxin hormone, which is involved in preparation of membranes and cervical tissue at the onset of labor. We hypothesize that different compositions of a (CT)<sub>n</sub>(GT)<sub>m</sub> microsatellite within the relaxin promoter will produce different levels of relaxin. To test our hypothesis, we amplified the ~1kb upstream promoter region from four different previously genotyped human DNA samples, ligated the products into a pNL1.1 luciferase reporter vector, and transfected into a human placental cell line to quantify transcription in vitro using a luciferase assay. DNA sequencing confirmed these promoter alleles contained 23, 28, 33, and 38 microsatellite repeat units. Differences in transcription levels among alleles were evaluated with a one-way ANOVA test. These results will be discussed in light of human genetic variation at RLN2 and susceptibility to preterm birth.

### **61: Comparing Insanity Defense Evidence: Psychiatric Assessments vs Neuroimaging**

Kaitlyn Svencer | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Lyndsie Ferrara, Ph.D.

**ABSTRACT:** In an insanity defense case, the defendant is not convicted of a crime if they lack the mental capacity to understand their actions which is determined through psychiatric assessments that evaluate an individual's mental capacity. These are the main types of evidence in an insanity defense case. Additionally, neuroimaging could be used in the court room to address insanity pleas, but further examination of this evidence type is needed. Neuroimaging could enhance the psychiatric assessment evidence for an insanity defense case and could become a more important factor in the courts. Neuroscience attempts to understand how the human brain works in terms of molecules, membranes, cells, development, plasticity, learning, memory, cognition, and behavior. This is usually done through the use of brain scans and images to see the different regions of the brain as well as any deformities that could be present. Brain images serve as tangible proof of an underlying neurological disorder which is not present when hearing from the experts alone. The goal of this research is to compare psychiatric assessments and neuroimaging evidence and investigate how they contribute to insanity defense cases and the admissibility requirements for neuroscience in the court room. This was done through a literature review that researched the use of neuroimaging in insanity defense cases as well as a case study analysis that researched cases that have used neuroimages as evidence alongside psychiatric assessments. The advantages and disadvantages of using neuroscience in the courtroom was determined from the results of the case study.

### **62: Method Development for Fluoride Removal Using a Double-Ionic Layer**

John Hostetler | Biology, Environmental Science | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: David Kahler, Ph.D.

**ABSTRACT:** Low concentrations of fluoride in drinking water benefit teeth and bones; however, high concentrations of fluoride harm teeth and bones. Geothermal areas are known to have fluoride-rich

groundwater, which presents a hazard for those who rely on those sources. Previously, a double-ionic layer was formed with bentonite and aluminum cations for successful defluoridation. Unfortunately, this introduced unsafe aluminum into the water. Other cations (calcium, zinc, and sodium) with bentonite were investigated to determine the fluoride sorption properties. Energy dispersive x-ray analysis was used to confirm the double-ionic layer formation. The goal of this research is for use in defluoridation in remote areas. The tested cations are improvements in cost and safety. This research can aid in the creation of an effective point of use water treatment that exploits the double-ionic layer.

### **63: How English Colonialism in Ireland Led to the Troubles**

Delaney Fiore | Sociology and Political Science | McAnulty College and Graduate School of Liberal Arts | Senior

Faculty Advisor: Sarah MacMillen, Ph.D.

**ABSTRACT:** The island of Ireland was colonized by the English in the 1100s and remained colonized until 1922. During this period much of the Irish people's way of life was altered as part of an English "plan to civilize the barbarous Irish by forcing them to abandon their 'wild" ways'..." (Cavanagh). In 1922, Ireland became an independent state, except for a small northern portion of the island, which remained under British control (Cavanagh). In this region, violence broke out between loyalists and Republicans, called The Troubles. During this period, the Irish Republican Army became infamous for terroristic violence. Their actions were driven by the belief that England was a colonizing power who had stripped the Irish people of their land and culture and needed to be expelled, shown in their own art and music. Anthropologist Stephen Millar describes the lyrics to I.R.A. propaganda song "Go on Home British Soldiers" as painting the British as an invading power, tracing interference in Ireland back to the sixth century, framing the I.R.A.'s efforts as part of a long-running struggle for freedom (Millar). I will investigate how the history of English colonialism in Ireland led to The Troubles. I will analyze historical events and Irish art from the period. Additionally, I will analyze how the Good Friday Agreement, noting what aspects of the negotiations were impactful at bringing an end to the thirty-year struggle. This project will involve an exploration of previous research through journals and books, from which I will synthesis my own conclusions.

### **64: History of Pittsburgh's Chinatown**

Julian Cerminara | History | McAnulty College and Graduate School of Liberal Arts | Junior

Faculty Advisor: Jing Li, Ph.D.

**ABSTRACT:** This poster will examine the history of Pittsburgh's often overlooked Chinatown and its Chinese American population. From 1880 to 1950 Pittsburgh's Chinese population built this area through a variety of grocery stores, pharmacies, restaurants, laundry mats, and community associations known as the Hip Sing and On Leong that served as peacekeepers and court within the community. To tell this story, this poster examines newspaper articles from the 1880's – 1920's Pittsburgh Gazette and from the 1950's Pittsburgh Bulletin Index, as well as through the narratives of local descendants via oral and written traditions passed down by the descendants of Pittsburgh's Chinatown. Understanding the two different narratives that developed due to racial discrimination of the 1880's and how those forms of discrimination have carried over to the 21st century which led to the destruction and eventual ignorance of Chinatown's history.

### **65: 73 Hours: The Making of a Domestic Terrorist**

Mackenzie Miller | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Pamela Marshall, Ph.D.

**ABSTRACT:** On April 19 of 1995, the Alfred P. Murrah building was bombed using a deadly cocktail of fertilizer, diesel, and other chemicals. Timothy McVeigh, a Gulf War veteran, was the mastermind behind this explosion. After the incident on Mount Carmel in Waco, McVeigh became enraged with the U.S. government. That act combined with the fear that McVeigh may lose his right to bear arms led him to plot revenge against them.

This research aims to analyze both the childhood and young adulthood of Timothy McVeigh to determine if he exhibited psychopathic behaviors using an indirect personality assessment and a series of interview tapes. The assessment will consider various factors which will all be used to conclude behaviors, if any, reflecting psychopathy. The factors include the family details of McVeigh's family such as their dynamic and environmental conditions during his childhood. The assessment also focuses on the physical characteristics, health, employment, personal relationships, and hobbies/passions. The most important factor is the behavior of the individual under assessment. The details of McVeigh's behavior are discussed in the biography *American Terrorist: Timothy McVeigh and the Oklahoma City Bombing* by Dan Herbeck and Lou Michel. The biography discusses thoughts and feelings of McVeigh throughout his life: childhood up to before and after the bombing. Interview tapes were conducted and recorded by the two authors of the biography. The interview tapes will be utilized to listen for emotional inflection in the voice. Emotion such as excitement which can be indicated by the increased speech or the change in tone. The factors mentioned above will be used to come to the conclusion of whether Timothy McVeigh is a psychopath according to societal standards. This research hopes to validate an indirect personality assessment and compile a list of precautionary questions to assess other individuals in the future.

### **\*66: Integrating Data to Recognize Community Need Across Pennsylvania**

Valerie Koester | Data Science | McAnulty College and Graduate School of Liberal Arts | Senior  
Faculty Advisor: Lauren Sugden, Ph.D.

**ABSTRACT:** Adagio Health, a nonprofit organization that provides low-cost health services to tens of thousands of patients across western Pennsylvania, is constantly working to improve and expand their services throughout the state. For Adagio Health to identify where to potentially allocate resources and expand their services, we produced a needs assessment report for all 67 counties in Pennsylvania. We produced data reports covering adult and adolescent risk factors related to social determinants of health in each county, such as access to public transportation, high school graduation rate, and unemployment rate. Since Adagio Health largely focuses on reproductive healthcare for women, we also included health factors such as breast cancer rates, teen pregnancy rates, and STI prevalence. In total, we covered 69 broader categories, many of which were broken down into multiple subcategories, yielding 290 specific factors for each county.

In addition, we generated informative visualizations from the data using various packages in Python. For instance, Pennsylvania maps broken down by county allow professionals in Adagio Health's network to understand at a glance which counties have a higher level of need in each category, in order to make data-driven decisions and expand their care to those that need it most.

### **67: Using pS6-immunoreactivity as a Marker of Neuronal Activity in the Context of Salamander Reproductive Behavior**

Jenna Mulreany | Biology | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Sarah Woodley, Ph.D.

**ABSTRACT:** Pheromones are chemical signals that trigger a social response between individuals of the same species. To better understand how pheromonal and other reproductive cues are processed by the brain, I used immunohistochemistry (IHC) for phosphorylated ribosomal protein S6 (pS6), which is an indicator of neural activity in mammals and amphibians. I designed an experiment to test the hypothesis that cues associated with mating will increase amounts of pS6 in the brain in terrestrial salamanders. I predicted that male-female pairs that successfully mated will have higher amounts of pS6 in the brain compared to pairs that did not mate, and unpaired salamanders. I also included a positive control of salamanders that were handled to induce a stress response. Tissues were fixed and sectioned using a cryostat and the IHC procedure was completed. I am currently gathering data of the numbers of pS6 in each brain section to test my hypothesis. If successful, the method of pS6 could be used to examine neural activation in response to many sensory cues to better understand neural processing by the amphibian and mammalian brain.

### **68: PA211 and Healthy People: An Analysis of the Social Determinants of Health of the Central Bucks School District**

Evelyn Foster | Physician Assistant Studies | Rangos School of Health Sciences | Sophomore  
Faculty Advisor: Bridget Calhoun, Ph.D.

**ABSTRACT:** Social determinants of health (SDoH) are a variety of factors that influence one's health, well-being, and quality of life. These include economic status, access to health care, education, neighborhood, and social communities. Healthy People 2030 is a nationwide initiative to benchmark areas of health and well-being and to set targets for improvement. Healthy People 2030 establishes national objectives that address well-established SDoH to improve the health for Americans over the next decade, with 358 measurable objectives. The Pennsylvania 211 hotline is available via call, text, or webchat to residents who need assistance in areas ranging from basic housing or transportation to services for veterans and the disabled. PA211 collects data on the types of calls received, along with demographic data of those who call for assistance. Using data from the 211 system and the U.S. Census Bureau, along with objectives from Healthy People 2030, a reliable assessment can be made on the health and emerging needs of a specific area within the state of Pennsylvania. This project evaluates the status of the Central Bucks School District (CBSD) in Southeastern Pennsylvania. According to the U.S. Census Bureau, this area has a population of approximately 145,000 residents. From February 2022 to February 2023, the highest number of requests to PA211 in CBSD were about housing, food, and mental health; this is consistent with baseline Healthy People 2030 data. Analyzing data via this approach can provide the regional insight needed to ensure that current and emerging public health needs are addressed.

### **69: The Effect of Athletics on Persistence**

Cecilia Huntington | Mathematics | McAnulty College and Graduate School of Liberal Arts | Senior  
Claire Heimburg | Applied Mathematics | McAnulty College and Graduate School of Liberal Arts | Senior  
Luke Testa | Applied Math | McAnulty College and Graduate School of Liberal Arts | Senior  
Faculty Advisor: John Fleming, Ph.D.

**ABSTRACT:** Retention rate is a critical measurement of success of a university. The average retention rate for all private, non-profit universities in the United States is 81% according to the National Center for Education Statistics. The average 6-year graduation rate of those colleges for those attaining a bachelor's degree is 68%. Our project will address persistence, which we have defined as either 1) being retained or 2) graduating from Duquesne. We will investigate the possible statistical differences in persistence between athlete and non-athlete students. For this study, we will focus on the years 2012 to 2022. Our data was collected and compiled by the Office of Institutional Research at Duquesne University. Our methods will be the use of R-Studio, which will run our statistical analyses by year and assist us in discovering historical trends as a whole, and Excel, which will then support our findings from R-Studio. Thus far, our findings point to statistical differences in persistence rates between athletes and non-athletes. At the conclusion of our study, we will discuss possible options to increase persistence in both non-athlete and athlete students.

### **70: Comparing Efficacy of Non-oxygenated and Oxygen-assisted Corneal Crosslinking**

Caitlin Greene | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Nicole Bohatch | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Rachel Pardee | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Faculty Advisor: Bin Yang, Ph.D.

**ABSTRACT:** Keratoconus is a disease that affects the structure and strength of the cornea resulting in vision loss. This cornea disease is one that normally begins around puberty and can progress for years after, with no known cure other than cornea transplantation. Corneal cross-linking is a procedure designed to prevent the progression of keratoconus as it strengthens collagen fibers in the cornea to increase its strength. In our research, we are comparing the effects of corneal crosslinking using oxygenated and non-oxygenated solutions with a standard cross-linking procedure based on past research and literature review. This study is a continuation of our previous CXL studies. The goal of the current study is to further improve and optimize the cross-linking procedure, and to collect data for manuscript preparation.

To this point, our research involves 22 porcine eyes divided into two testing groups, standard crosslinking and oxygen-assisted crosslinking. Following standard protocols for corneal crosslinking, each eye was stained with a diluted riboflavin solution, and cut into two strips from the center of the cornea. These strips are placed by side under the crosslinking machine, one being treated, and the other acting as a control. We have spent time resolving issues with inconsistent results by looking at all variables involved in this procedure and plan to continue data collection supporting our research. Our data shows 16.03% improvement achieved without oxygen, and 23.35% improvement achieved with oxygen. Using an oxygenated solution in the standard protocol yields 45.65% improvement in cornea strength, compared to the non-oxygenated solution.



### **71: Investigating the Function of PCNA during Herpes Simplex Virus Type-1 Infection**

Maya Williams | Biological Sciences | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Jill Dembowski, Ph.D.

**ABSTRACT:** Proliferating cell nuclear antigen (PCNA) is a cellular protein that adds processivity to DNA polymerases during DNA replication and tethers DNA repair proteins to replicating cellular DNA. Previous research has found that PCNA associates with herpes simplex virus type 1 (HSV-1) replication forks during viral DNA replication. However, the function of PCNA during HSV-1 infection is unknown. We hypothesized that PCNA helps HSV-1 DNA replication and viral DNA repair. Two inhibitors were used to inhibit PCNA to determine its role during viral infection. The inhibitors PCNA-I1 and T2AA block PCNA DNA binding and protein-protein interactions, respectively. Inhibitors were incorporated into cells before viral infection and viral yield was quantified with plaque assays. We found that PCNA-I1 had a greater effect in decreasing viral yield than T2AA. Both inhibitors were tested on different cells or virus strains and regardless of the viral strain or cell type used, PCNA-I1 reduced viral yield more than T2AA. We therefore conclude that PCNA is important for viral infection and that inhibition of PCNA binding is more detrimental to infection than blocking specific protein-protein interactions. Next, to determine whether the time the inhibitors are added affect the infection cycle, we performed a time-of-addition experiment and measured viral genomes per cell produced. We found that PCNA-I1 inhibited replication when added before the onset of viral DNA replication and could also block ongoing viral DNA replication when added later in the viral life cycle. Our long-term goal is to pinpoint the specific role of PCNA in HSV-1 infection.

### **72: The Gender Bias of Filicide**

Alexandra Chomenko | Psychology | McAnulty College and Graduate School of Liberal Arts | Junior Faculty Advisor: Pamela Marshall, Ph.D.

**ABSTRACT:** Filicide is the murder of a child committed by one or both of their parents, commonly known as a crime against human nature. This crime happens more commonly than one may think and at an alarming rate. After a lengthy review of filicide, many gaps in knowledge exist in the legal, mental health, and medical professions. This research is being undertaken to educate and promote the understanding of filicide in legal, mental health, and medical professions. This research will cover controversies between review articles, the gender of the perpetrator, the cognitive understanding of the perpetrator, and legal disputes. The conclusion of this research will yield more highly trained professionals with a better discernment of filicide to prevent, stop, help, and understand the individuals involved.

### **73: A Biomimetic Cardiac Tissue Model Towards Understanding Etiology of Congenital Heart Disease**

Jackson Jewell | Biomedical Engineering | Rangos School of Health Sciences | Sophomore  
Ryan Slusser | Biomedical Engineering | Rangos School of Health Sciences | Sophomore  
Faculty Advisor: Melikhan Tanyeri, Ph.D.

**ABSTRACT:** Congenital heart disease (CHD) is a common birth defect affecting millions of babies each year, with a 20% mortality rate within the first year of life, making it a leading cause of infant mortality worldwide. CHD comprises various structural heart defects that occur during fetal development, and it has a complex etiology involving genetic, epigenetic, and environmental factors (1). While animal models have been helpful in understanding the cardiac morphologies and multigenic nature of CHD, they pose significant challenges for studying CHDs with high mortality rates. To gain a deeper understanding of the underlying mechanisms of CHD pathophysiology, we are developing tissue-



engineered models that mimic cardiac mechanobiology. In specific, we designed and fabricated a novel bioreactor system emulating the intraventricular pressures and cyclic strain of a human heart. The bioreactor consists of a 3D-printed chamber with a well, a flexible membrane, a teflon O-ring, and two cover slips. The bioreactor system enables cardiomyocyte culture on the flexible membrane, exhibiting heart-like beating, and its real-time visualization for up to 72 hours. The bioreactor system allows for application of 3-D cyclic mechanical strains by pneumatic deflection of the flexible membrane. Additionally, the bioreactor enables access and control of the medium for proteomic, metabolomic, and transcriptomic analyses and intervention. Overall, our platform will provide insights into functional and molecular mechanisms leading to cardiomyocyte failure in CHD, thereby offering potential avenues for treatment in high-risk patients.

#### References:

1. van der Linde, D., et al., Birth Prevalence of Congenital Heart Disease Worldwide. *Journal of the American College of Cardiology*, 2011. 58(21): p. 2241-2247.

#### **74: Chains and Ribbons of Computed and Experimental E to Z Activation Barriers of alkyl and aryl-(thio)urea**

Anna Witte | Chemistry | Bayer School of Natural and Environmental Sciences | Junior  
Faculty Advisor: Jeffrey Evanseck, Ph.D.

**ABSTRACT:** Urea and thiourea are common central components of dual-hydrogen-bond donor organocatalysts used in “greener” approaches to pharmaceutical and industrial processes. While (thio)ureas are ubiquitous in organocatalysis, there are still gaps in our fundamental understanding and ability to predict the structures, energies, and dynamics of such important systems. Specifically, computed activation enthalpies of (thio)urea E to Z isomerization do not align with observed activation enthalpies from isotopically labeled NMR studies. Our work attempts to obtain activation enthalpies for the E to Z isomerization of methyl and phenyl-substituted (thio)urea as compared to NMR experiment. We have found that computed activation enthalpies required for the rotation of the C(O)-N bond of urea in the gas phase are significantly lower than experiment, even with the inclusion of anharmonicity in thermodynamic corrections and extrapolation to the complete basis set limit. Our work suggests that solvent-urea interactions and/or aggregation impact the activation barriers for isomerization. To align our physical model with experiment, simple implicit solvent is not sufficient and explicit solvation and aggregation need to be computed for the rotational barriers. Thus, we employ a discrete continuum model to determine the interactions between hydrogen bond donor and acceptor sites of (thio)ureas, while analyzing how the chain and ribbon structures affect the energetics of the molecule. A greater understanding of the physical properties of these molecules will help the organocatalyst community design more efficient organocatalysts that can be used in a wider scope of reactions.

#### **\*75: Developing a 3-D Computational Model of Neurons in the Central Amygdala To Understand Pharmacological Targets for Pain**

Carley Reith | Applied Math & Computer Science | Rangos School of Health Sciences, McAnulty College and Graduate School of Liberal Arts | Senior  
Kayla Kraeuter | Biomedical Engineering/Applied Mathematics | Rangos School of Health Sciences | Junior  
Faculty Advisor: Rachael Neilan, Ph.D.

**ABSTRACT:** Neuropathic pain is the predominant cause of pain for 20% of people and involves brain areas such as the central nucleus of the amygdala (CeA). Within the CeA, neurons expressing protein

kinase c-delta (PKCd) or somatostatin (SST) have opposing roles in pain modulation. In this poster, we describe our progress towards developing a 3-D computational model of PKCd and SST neurons in the CeA and the use of this model to explore the pharmacological targeting of these two neural populations in modulating neuropathic pain. Our 3-D model expands upon our existing 2-D computational framework by including a realistic 3-D spatial representation of the CeA and its subnuclei and a network of directed links that preserves morphological properties of PKCd and SST neurons. The model consists of 13,000 neurons with cell-type specific properties and behaviors estimated from laboratory data. During each model time step, neuron firing rates are updated based on an external stimulus, inhibitory signals are transmitted between neurons via the network, and a measure of nociceptive output from the CeA is calculated as the difference in firing rates of pro-nociceptive PKCd neurons and anti-nociceptive SST neurons. Model simulations were conducted to explore differences in pain-related output for three different spatial distributions of PKCd and SST neurons. Our results show that the localization of these neuron populations within CeA subnuclei is a key parameter in identifying spatial and cell-type pharmacological targets for pain.

### **76: Competition Assays of Naturally Derived Missense Mutants Reveal a Spectrum of Functionally Important Amino Acid Residues of RsmE**

Austin Summers | B.S. Biology | Bayer School of Natural and Environmental Sciences | Junior  
Faculty Advisor: Wook Kim, Ph.D.

**ABSTRACT:** Laboratory colonies of the bacterium *Pseudomonas fluorescens* Pf0-1 naturally produce mutants with diverse altered sequences in the *rsmE* gene. RsmE is a posttranscriptional regulator that represses the production of extracellular secretions by inhibitive mRNA binding. Mutants in which RsmE has lost repressive function gain a spatial advantage against the wildtype via production of extracellular secretions. Such secretions are utilized by diverse bacterial species to form structured communities, referred to as biofilms, that greatly resist antibiotics and the immune system to manifest chronic infections. Our collection of naturally derived missense *rsmE* mutants provides a unique opportunity to assess the functional significance of the altered amino acid residues. We hypothesize that RsmE's functionality is differentially altered depending on the specific changes in its primary sequence. To test this hypothesis, select *rsmE* missense mutants were competed against each other in a round-robin tournament format to assess their relative competitive advantage. A spectrum of relative fitness values was observed, confirming that specific amino acid residues uniquely contribute to RsmE's function. Moving forward, we will test all missense mutants to comprehensively categorize them across a single competitive scale, and select isolates from each category will be utilized to characterize differential mRNA binding and secretion production.

### **77: Dual Hydrodynamic Trap Based on Coupled Stagnation Point Flows**

Gram Hepner | Biomedical Engineering | Rangos School of Health Sciences | Junior  
Shawn Bliss | Biomedical Engineering, Mathematics | Rangos School of Health Sciences | Senior  
Maxwell Ujhazy  
Faculty Advisor: Melikhan Tanyeri, Ph.D.

**ABSTRACT:** Recent advancements in science and engineering have allowed for trapping and manipulation of particles and macromolecules suspended in an aqueous medium. Here, we demonstrate a novel flow-based method, dual hydrodynamic trap, for simultaneous confinement of two colloidal particles. The method is based on stagnation point flows generated at two microchannel junctions coupled by a connecting channel. A particle is confined at the stagnation point within each junction by implementing a feedback control algorithm along the outlets. We studied particle trapping

and various parameters affecting particle confinement including particle size, strain rate, and feedback control parameters. We simulated particle trapping and manipulation using Brownian Dynamic simulations and a proportional control feedback algorithm. We used particle positions and particle displacements from the trap center at each junction to analyze the effects of the flow and control parameters on particle trapping. We also demonstrated precise control of the interparticle distance by manipulating the strain rates at both junctions and particle position at one of the junctions. Our results demonstrate the versatility of flow-based confinement and further our understanding of feedback-controlled particle manipulation towards applications in polymer science and biology.

### **78: Computational Modeling Addressing Avastin Regulation of VEGF**

Abigail Reith | Biomedical Engineering and Applied Mathematics | Rangos School of Health Sciences | Senior

Faculty Advisor: Kimberly Williams, Ph.D.

**ABSTRACT:** Vascular endothelial growth factor-A (VEGF) is a growth factor that is an important mediator of angiogenesis in the body. VEGF can stimulate angiogenesis by binding and, therefore, activating receptors like VEGF receptor 2 (VEGF-R2). The binding of VEGF to VEGF-R2 not only stimulates angiogenesis in normal states, but is also critical to the pathogenesis of malignant tumors. Avastin or Bevacizumab is an FDA-approved humanized monoclonal antibody that can bind to VEGF and prevent activation of VEGF-R2. Avastin's ability to stop VEGF from activating VEGF-R2 allows it to reduce angiogenesis and, thus, makes it an effective treatment against certain types of cancers. There are however cases where the inhibition is unsatisfactory and additional VEGF inhibitors are in development. In this project, we used computational modeling (Python) to further explore and explain this complex system involving VEGF, VEGF-R2, and Avastin. This model is also used to compare experimental results to the model results to support or reject certain mechanisms. We will highlight our model incorporating Avastin and the role heparin plays in potentiating its inhibition of VEGF. Parameter studies will be shared that are critical to building a broader model addressing the acidic environment characteristic of the tumor microenvironment and how regulation may differ with pH.

### **79: Species Identification Through Bioinformatics Techniques Helps Determines DNA Sequence Variation Present**

Felicia Bedford | Biology | Bayer School of Natural and Environmental Sciences | Junior

Faculty Advisor: Brady Porter, Ph.D.

**ABSTRACT:** Environmental DNA (eDNA) analysis from water samples using the metabarcoding approach is a rapidly developing tool to examine community assemblages and requires bioinformatic processing to recover and produce accurate results of species' genomes. With the implementation of new bioinformatics techniques in conservational biology, species identification from barcoding genes can be further examined intraspecific haplotype diversity and supplement traditional field surveys with non-invasive methods. Here we develop a bioinformatic pipeline to identify freshwater fish species from Illumina MiSeq metabarcoding sequenced data of the mitochondrial COI gene recovered from field-collected water samples. In addition to providing accurate species-level identifications, we attempt to delineate intraspecific haplotype data for population analysis of the most common species. Reference files were created using the NCBI GenBank database and were implemented in blast searches to identify target species. The species list, however, is not exhaustive, and several different types of fish could match with the same barcode. We seek to find a more inclusive method of capturing species identity utilizing operational taxonomic units, OTUs, and overall gene alignment while relying less on reference

lists. This work's results will help determine the genetic variation and population health of fish species in Buffalo Creek, Armstrong, and Butler Counties, in Southwestern Pennsylvania.

**80: Investigation of Concussion-related Anxiety Perceptions among Youth Athletes**

Grace Muccio | Biology | Bayer School of Natural and Environmental Sciences | Senior  
Alexis Dzadovsky | Biology | Bayer School of Natural and Environmental Sciences | Junior  
Faculty Advisor: Erica Beidler, Ph.D.

**ABSTRACT:** This investigation sought to assess the prevalence of concussion-related anxiety in youth athletes, and determine what factors (e.g., sex, sport, concussion history, concussion education, parental concussion anxiety) were associated with greater anxiety. Youth athletes participating in football, soccer, ice hockey, lacrosse (n=411; males=185, females=226; age=11.04±1.8 years) completed a cross-sectional survey. Participants completed demographic items and the Illness Perception Questionnaire. We focused on the following four anxiety perception items scored on a Likert scale from 1 (strongly disagree) to 5 (strongly agree): “The thought of getting a concussion is upsetting to me.”, “I am afraid of getting a concussion.”, “The thought of me having a concussion makes me feel anxious.”, and “Concussions do not worry me [reverse].” The sum of items produced an overall anxiety composite score (20 possible points) with higher values indicating greater anxiety. Overall, 46.72% (n=192/411) of youth athletes were upset, 46.72% (n=196/411) afraid, or 29.0% (n=119/411) anxious at the thought of sustaining a concussion. Additionally, 49.9% (n=205/411) indicated concussions worry them. The sample mean anxiety perception composite score was 12.48±3.84. Participating in soccer (B: 1.49, 95% CI: 0.35, 2.62), being a girl (B: 1.4, 95% CI: 0.55, 2.26), and having a parent with higher concussion anxiety (B: 0.2, 95% CI: 0.82, 0.32) were associated with greater youth athlete concussion-related anxiety perceptions. Ultimately, concussion-related anxiety perceptions are fairly prevalent in youth athletes. Further research is needed to determine how these beliefs may influence avoidance of risky sport behavior, intention to report a suspected concussion, and post-injury recovery outcomes.

**81: In the Beginning, God Created Atoms**

Samiya Henry | Physics | Bayer School of Natural and Environmental Sciences | Sophomore  
Faculty Advisor: William Wright, Ph.D.

**ABSTRACT:** Genesis 1:1 states “In the beginning, God created the heavens and the earth.” This is the defining statement in the Bible and acts as the foundation of creation and God’s power in the Christian faith. On the other hand, many scientists believe the Big Bang Theory and the discoveries made in other fields of science solely define the creation of the universe and explain life as we know it, also disproving the Christian creation story and the overall existence of God. However, the exact opposite is true; God is science.

Alone, neither of these concepts (faith and science) fully solve the mysteries surrounding our universe, who we are, and how we came to be. These mysteries create a bridge that unite faith and science that lead us down a path of discovering what happened 13.8 billion years ago. Instead of furthering the war between these two worlds (i.e. faith and science), “In the Beginning...” is a project that will focus on establishing the duality of these two complex concepts in a way that reveals the roots of the Christian faith within the realm of science and its proven theories. Only then, when the connection between these two concepts is understood, will we be able to solve the world’s greatest mysteries without having to disregard our faith or our love for science.

### **82: Effects of Pesticides and Stress Hormones on Amphibian Liver Function**

Madison Mellott | Biology | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Sarah Woodley, Ph.D.

**ABSTRACT:** Contamination of wetland habitats by sublethal toxins, like pesticides, are causing amphibian populations to decline worldwide. This exposure to toxins and contaminants induce a stress response in amphibians that can lead to major health effects. Exposure to stress hormones like corticosterone (CORT) and pesticides like chlorpyrifos (CPF), can impact the physiology and histology of livers in tadpole anurans. Little is known about how these environmental stressors affect the physiology and histology of amphibians. I am testing the hypothesis that exposure to CPF has damaging effects on liver function in tadpoles (Leopard Frogs, *Lithobates pipiens*). To do so, I am examining livers from tadpoles exposed to either CPF, CORT, or a vehicle control. I analyzed the liver tissue by obtaining a set of sections on unstained slides, slides that are stained with hematoxylin and eosin (H&E), and slides stained with periodic-acid Schiff (PAS). I will then assess melanomacrophages content and carbohydrate content using ImageJ. I predict that exposure to CPF and CORT will cause an increased concentration in glycogen content in the liver as well as a decrease in melanomacrophage content. This will contribute to our knowledge of how trace amounts of pesticides might impact liver development. My results in tadpoles may also offer insight to possible causes of amphibian declines.

### **83: Women of the Sui, Tang, and Song Dynasty and Their Agency and Resistance to the Hardships and Constraints of Marriage**

Camdyn Landahl | International Relations and Psychology | McAnulty College and Graduate School of Liberal Arts | Senior  
Faculty Advisor: Kathleen Roberts, Ph.D.

**ABSTRACT:** In the High Empire (618-1179), under the Sui, Tang, and Song dynasties, Chinese women were expected to conform to the role of wife as outlined by Confucianism, the dominant philosophy of the epoch. This paper explores the customs and expectations of marriage during the High Empire, as well as the lack of socially accepted recourse for women in unsafe conditions. The lived experiences of women are examined, with a focus on their agency and acts of resistance. Through their own agency, women of the Sui, Tang, and Song dynasties were able to ameliorate their own situations and those of other women, as well as pave the way for changes to the marriage institution which would be implemented in the future.

### **84: Construction of Chimeric Proteins To Characterize the Functional Specificity of the Post-transcriptional Regulator RsmE in *Pseudomonas fluorescens***

Mayelin Ebersole | Biology | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Wook Kim, Ph.D.

**ABSTRACT:** RsmE is a post-transcriptional regulator in the bacterium *Pseudomonas fluorescens* that forms a heterodimer to sequester multiple mRNA and repress their translation. *P. fluorescens* also harbors two RsmE paralogs: RsmA and RsmI. Although Rsm paralogs are generalized to be functionally redundant, we have recently demonstrated that RsmE exclusively represses the production of extracellular secretions that collectively function to create remarkable spatial structures in a densely populated colony. The core peptide sequence of Rsm paralogs are highly conserved, with the same set of predicted secondary structures. In contrast, the C-terminus tail region of the paralogs does not appear to encode any secondary structures and varies greatly in sequence. Deleting the tail region of RsmE abolishes its repressive activity, we thus hypothesize that the C-terminus tail specifies RsmE's

unique function from its paralogs. We constructed three chimeric proteins, RsmE core fused to the tail of RsmA, RsmE, or RsmI, with the expectation that only the RsmE core and RsmE tail construct (RsmE/E) will restore the repression of extracellular secretions in an rsmE knockout strain. Indeed, we observed that RsmE/E restores the repressive function while RsmE/A fails to do so. However, RsmE/I also restored repressive activity, indicating that the tail of RsmI could functionally complement that of RsmE. We are now in the process of constructing additional chimeric proteins to comprehensively decode the functional differences and similarities among the Rsm paralogs. The C-terminus tail sequences of individual orthologs appear to be highly conserved among *Pseudomonas* species, suggesting that the functional specificity assigned by the tail of Rsm homologs manifests across diverse environmental niche.

### **85: How Social Media Influences Self-image and Beauty Standards with an Emphasis on Eating Disorders and Body Dissatisfaction**

Makenzie Barchiesi | Modern Languages and International Relations | McAnulty College and Graduate School of Liberal Arts | Sophomore  
Faculty Advisor: Dina Huehn, Ph.D.

**ABSTRACT:** Research has been done on eating disorders, mental illness, and self-image— with some research on the topic of social media influencing certain behaviors, like the onset of eating disorders. There is a lot of literature on the topic of social media and how it influences self-image and eating disorders. The majority of the research, to date, has focused on women, with very little attention towards men and how they are impacted by the effect of social media. There has been substantial research on college-aged individuals and negative body image, but there are gaps in the literature when it comes to long-term effects. My project summarizes these factors but primarily focuses on social media's effect on self-perception and the potential for eating disorders, like how Instagram or TikTok, affect one's well-being and sense of self.

### **86: A Myositis Mouse Model Induced through Histidyl-tRNA Protein**

Shaelyn Walker | Biology / Pre-medicine | Bayer School of Natural and Environmental Sciences | Sophomore  
Faculty Advisor: Matthew Kostek, Ph.D., FACSM

**ABSTRACT:** Myositis is a chronic autoimmune disorder which causes muscle inflammation characterized by increased creatine kinase levels or presence of the myopathic triad. Currently, Myositis does not have a cure but only treatment options to control disease's symptoms. Environmental and genetic factors can also trigger this disease process. We sought to create an experimental model for myositis and use the anti-Jo-1 autoantibodies as a disease biomarker. Purpose: The study's purpose was to establish a myositis model using Jo-1 protein in order to cause muscle damage and pathology. Methods: Male and female mice were split into two groups. Mice were given 50ul of Jo-1 protein (experimental) or saline (control) in the medial head of the left and right gastrocnemius muscles on day 0. Muscle physiology testing was performed 10 (N=24), 21 (N=21), and 42 (N=22) days after injection, followed by hind-limb muscle sacrifice and dissection for H&E and F480 histological analysis. Results: The experiment was completed by all mice. The female and male mice that received the Jo-1 protein had significantly lower muscle force production compared to the mice that received just saline. The male mice experienced peak tension substantially faster compared to the female Jo-1 mice at 10 days. Conclusions: Injections of the Jo-1 protein may trigger inflammatory processes and consequent muscle fiber damage that are similar to those seen in myositis.



### **87: Executive Powers and the President: Their Roles in the Constitutional Amendment Process**

Lauren Zelnis | International Relations, Political Science | McNulty College and Graduate School of Liberal Arts | Senior  
Faculty Advisor: Kristen Coopie, Ph.D.

**ABSTRACT:** Although much of The United States Constitution leaves room for expansion and interpretation, it is explicit in the processes of ratifying an amendment. Article V makes no mention of the president within this very detailed procedure. This research examines instances in and implications of which the president used their otherwise constitutional powers to become involved in the amendment process. Despite having no expressed power in regards to the Constitutional amendment process, presidents still try to exert their influence through other expressed or implied powers of the Executive Branch, such as invoking the Presentment Clause, using the bully pulpit, or issuing Executive Orders or Memorandums. Through examination of historical instances of presidential involvement, the conclusion reached argues that the president should have a limited role in the amendment process. The president should use the powers of the Executive Branch to uphold and defend the Constitution. This might include advocacy for amendments, but their involvement should be on the basis of a Constitutional question, not a personal or political one. It is important that the president honors both the expressed amendment process in Article V as well as the framers' intent.

### **88: Censorship of Andrew Tate**

Lydia Musser | Sports Information Media | McNulty College and Graduate School of Liberal Arts | Junior  
Faculty Advisor: Pamela Walck, Ph.D.

**ABSTRACT:** Social media personality Andrew Tate has been at the center of many controversies and been banned on various social media platforms. Tate has self-proclaimed sexist and misogynistic views but still has a very large group of supporters that were angry when his accounts were restricted. Tate's actions affect and involve his viewers, podcasts, and companies he has worked with, The Romanian government and multiple social platforms. This situation faces multiple ethical dilemmas some being, is censorship situational or absolute, should all platforms have the same guidelines, and is this violating Tate's First Amendment rights.

### **89: Objective Beauty and an Individual's Abstract Approach to Its Classification**

Zachary Strennen | Data Science | McNulty College and Graduate School of Liberal Arts | Senior  
Faculty Advisor: Russell Walsh, Ph.D.

**ABSTRACT:** The sentiment that beauty is subjective rings true among several psychologists when trying to break down what makes something beautiful. When viewing a photo, one's sense of beauty can be easily provoked by certain aspects including the photo's setting, physical elements, lighting, etc. In this project, meta data specific to certain psychological stimuli were created and linked to several photos. Subjects then classified each photo as objectively beautiful or not. A machine learning model using gradient boosted decision trees was produced for each individual to predict if they would classify a photo as objectively beautiful. Once image features not specific to the individual were filtered out, the model was able to predict with somewhat high accuracy in most cases. Regardless, these features varied immensely from individual to individual once again confirming the subjectivity of beauty itself.



### **90: Designing a Polyprotein for Paratransgenesis To Halt the Transmission of Malaria**

Jessica Wellmann | Biological Sciences | Bayer School of Natural and Environmental Sciences | Junior Faculty Advisor: David Lampe, Ph.D.

**ABSTRACT:** Malaria is a deadly vector-borne disease responsible for over 600,000 deaths in 2020 alone, and is caused by Plasmodium parasites. These parasites are transmitted to humans through a bite of an infected female Anopheles mosquito. Current preventive measures include bednets and indoor spraying of insecticides. However, due to increasing resistance from both the parasite and the mosquito vector, these are rapidly becoming ineffective, therefore indicating new control strategies are needed. One strategy to control the spread of malaria is paratransgenesis. Paratransgenesis is a technique that manipulates the microbiota of the mosquito vector to inhibit and kill the parasite within the mosquito. *Asaia bogorensis* is a commonly found bacterial species in the mosquito microbiome and has previously been engineered to express single antiplasmodial effectors and reduce the oocyst burden in the mosquito. This project looks to engineer strains of *A. bogorensis* that secrete a “polyprotein” of known antiplasmodial molecules. Each antiplasmodial has a different mechanism of action against Plasmodium, and should behave similarly to a drug cocktail. This should reduce the likelihood of Plasmodium developing resistance against any one antiplasmodial. In this study, we developed various strains of *A. bogorensis* that expressed two-effector polyproteins. We analyzed these strains for their ability to secrete our antiplasmodial polyprotein, and the effects of these polyproteins on fitness of transgenic *A. bogorensis*.

### **91: “It’s part of me, but it’s not who I am”: A Qualitative Study Analyzing the Impact of Gynecologic Cancer Treatment on the Ability To Perform Valued Life Activities**

Sydney Moyer | Nursing | School of Nursing | Senior  
Kayleigh Noll

Julianna Cappelli | Nursing | School of Nursing | Senior  
Faculty Advisor: Grace Campbell, Ph.D.

**ABSTRACT:** Purpose: Over 50,000 women are diagnosed annually with gynecologic cancer in the United States. Gynecologic cancer is treated with surgery, radiation, and/or chemotherapy that lead to high rates of disability that begins during treatment but persist long after treatment is completed. This qualitative study explored the impact of having previous gynecological cancer treatment on emotional and functional health.

Methods: Thematic analysis of videotaped interviews of gynecological cancer survivors. Participants had completed cancer treatment  $\geq 6$  months before the semi-structured interview about post-treatment emotional and functional health. A code book of preliminary themes was developed and iteratively refined by the team and all interviews were coded by 3 researchers to identify themes and subthemes.

Results: Participants (n=5, ages 68-71) were all White and retired; four were married/partnered. Participants endorsed three overarching themes: Mental health concerns; Vulnerability; and Support. Subthemes include: health- and recurrence-related anxiety; depression; family worry; persistent fatigue; and decreased ability to perform valued life activities. Some positive subthemes were uncovered (e.g. gratitude for family and friends; religion/spirituality; appreciating life), but were not described by all participants.

Conclusions/Implications: We uncovered both negative and positive aspects of the cancer experience, yet published literature focuses primarily on negative aspects of cancer. Additional research in a more

diverse sample is needed to confirm and extend our findings. Nurses should initiate proactive psychosocial support and rehabilitation during cancer treatment to assist patients to maintain their emotional and functional status and remain engaged in valued life roles and activities.

**92: Acknowledge the Privileged and Underprivileged: A Personal Experience on Intersectionality**

Vito Palou | Biological Sciences | Bayer School of Natural and Environmental Sciences | Freshman Faculty Advisor: Luci-Jo DiMaggio, Ed.D

**ABSTRACT:** Martin Luther King Jr. implied that injustice exists to oppose justice anywhere, and whatever affects one directly, affects all indirectly. Today, intersectionality refers to the multiple categorizations that are associated with every individual in society. This includes race, education, sexuality, culture, and many others which creates a disparity among racial groups. This is significant because each person has their own experiences and categories that ultimately lead to subconscious or intentional racial discrimination. In the United States, there are various racial groups that coexist, but many are still unaware of the encompassing vulnerabilities and privileges that one has, which can lead to explicit biases and additional racial abuse. Intersectionality is a way for the Pittsburgh community to practice social justice and strive for social equality amidst root issues that lie within inequitable racist policies and power. This poster aims to create awareness for each persons' advantages and disadvantages in society, while taking into account these different categories. Through my experience in the non profit organization, ARYSE, I wrote a rap song that highlights my experiences moving to Pittsburgh as an Asian and able bodied male, while interacting with children from various cultural backgrounds as part of my role there. I pointed out my struggles and newfound realizations that underline the significance of intersectionality to help further reduce racial discrimination and pave an avenue for authentic relationships in the Pittsburgh community.

**93: Conducting A Psychoanalytic Analysis Using Collateral Materials: A Case Study of Theodore Kaczynski**

Rebekka Range | Forensic Science & Law | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Pamela Marshall, Ph.D.

**ABSTRACT:** Competency to stand trial and sentencing are both factors impacted by the results of a mental health evaluation. Currently, these evaluations utilize interviews with the defendant to answer the question of their mental state. In cases of fifth amendment invocations, these individuals do not have to speak with the mental health expert. For such cases, a method of analysis that does not require the interview becomes necessary. A case study of Theodore Kaczynski was used to develop such a method, specifically with the documents collected by the Federal Bureau of Investigation (FBI) during his arrest. Previous research proposed diagnoses of paranoid schizophrenia and Asperger's disorder, which now falls under autism spectrum disorder (ASD). The diagnosis of paranoid schizophrenia was reached in a court-ordered psychiatric evaluation. This differs from the Asperger's disorder diagnosis, which was reached through a more holistic approach. The documents were compared to the diagnostic criteria found in the DSM-5 to determine if a potential diagnosis could be reached. This research could be utilized in the future when defendants will not cooperate with the court to best determine their competency, which can be related to culpability, and what sentencing would be best after that decision is reached.

#### **94: Evaluating the Effect of Timing of Injury of Sport Related Concussions on Recovery Timelines in Collegiate Athletes**

Anusha Kikani | Health Sciences (Physical Therapy) | Rangos School of Health Sciences, Bayer School of Natural and Environmental Sciences | Senior

Natalie Bell | Biochemistry | Bayer School of Natural and Environmental Sciences | Senior

Faculty Advisor: Erica Beidler, Ph.D.

**ABSTRACT:** Prior research has looked at the experiences of athletes with in-season concussions, the influence of timing of reporting and its effects on clinical outcomes, and optimal length of recovery for collegiate athletes with sports related concussions. However, there is limited research on timing of injury for sports related concussions and the relationship to recovery timelines. Therefore, the purpose of this investigation was to determine how the length of symptom resolution from diagnosis and return to play (RTP) from diagnosis timelines were different in NCAA collegiate athletes when the sports related concussion occurred during pre-season (PS), in-season (IS), or off-season (OS). We conducted a retrospective medical chart review of 1102 NCAA collegiate athletes with a mean age of  $19.9 \pm 3.9$  years. Of those, 475 athletes were female and 627 were male while 143 injuries occurred in pre-season, 651 in-season, and 308 in the off season. The independent variables of interest for this study were timing of injury (PS, IS, or OS) and the dependent variables were date of diagnosis to symptom resolution and date of diagnosis to RTP. While the time it takes to reach symptom resolution is similar between groups, there was a significant difference in days between diagnosis to RTP depending on the timing of injury. A Kruskal-Wallis H test showed that there was a statistically significant difference in days between diagnosis and RTP,  $H(3) = 9.923$ ,  $P = 0.007$ , with a median days from diagnosis to RTP of 10 for PS, 11 for IS, and 16 for OS. There was no statistical difference between the timing of injury and the days from diagnosis to symptom resolution.

#### **95: Human APE1 Overexpression in Transgenic Rats Modifies the Neurological Impact of Alpha-synucleinopathy**

Roxanne Kim | Psychology | McAnulty College and Graduate School of Liberal Arts, School of Pharmacy | Senior

Faculty Advisor: Rehana Leak, Ph.D.

**ABSTRACT:** Lewy body disorders are characterized by loss of protein homeostasis, redox disequilibrium, and oxidative DNA damage. Oxidative DNA damage can be repaired by the coordinated action of base excision repair enzymes, including the abundant apurinic/apyrimidinic endonuclease 1 (APE1). The main goal of this study was to assess the in vivo effects of APE1 in a preclinical model of limbic-centered Lewy body disease. To induce the experimental disease, we infused preformed alpha-synuclein fibrils into the olfactory bulb/anterior olfactory nucleus (OB/AON) of wildtype or human APEX1-overexpressing transgenic rats. Preliminary findings suggest that the presence of the APEX1 transgene improved the ability of fibril-infused male rats to find a buried food pellet. Wildtype female rats infused with PBS preferred sucrose-sweetened water over regular water, but this normal hedonic behavior was not observed in fibril-infused, wildtype females. The disease-induced suppression of sucrose preference was less robust in hemizygous APEX1(Tg/0) transgenic females but no impact of the experimental disease or forced transgene overexpression on sucrose preference was noted in male rats. We also observed that PBS-infused wildtype female rats buried more marbles than fibril-infused females. In hemizygous APEX1(Tg/0) transgenic females, this loss of marble-burying behavior after fibril exposure was not observed. The neurological behavior tests demonstrate a complex but statistically significant interaction between APEX1 genotype and experimental Lewy body disease. The behavior results reveal that base excision repair status influences preclinical disease outcomes in the preformed fibril model.

### **96: Money as a Force in *Hamilton*: An American Musical**

Sami Dragar | Accounting, Finance | A.J. Palumbo School of Business Administration | Sophomore  
Faculty Advisor: Jotham Parsons, Ph.D.

**ABSTRACT:** From golden age musicals like *Gentlemen Prefer Blondes* to modern favorites like *Les Miserables*, money has been, and will likely always be, an important factor for each character in musicals and for the story they are in as a whole. Possibly the most prominent example of money as a theme is found in the musical *Hamilton* by Lin-Manuel Miranda. This musical is based on real people and takes place in an extremely financially important time in American History, the foundation of America. *Hamilton* tells the story of Alexander Hamilton, a founding father of the United States of America, from his arrival in the colonies to his eventual death at the hands of Aaron Burr. Through this musical, money's influence on Hamilton's life and the lives of those around him become abundantly clear and paint a picture of how a desire or obsession with money can give people a chance to reach their true potential and produce powerful and brilliant ideas, but can also weaken and hinder relationships and human connection. This poster demonstrates how money is a constant driving force throughout Hamilton's life, most prominently in his early years, his rise to political power, and his relationships with the women in his life.

### **97: Demonstrating Thermodynamic Properties of Pure Substances To Improve Student Understanding**

Natasha Novak | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Faculty Advisor: Kimberly Williams, Ph.D

**ABSTRACT:** Thermodynamics is an essential concept for engineers when developing, improving, and understanding various products and systems. Engineers must determine the relationship between thermodynamic properties when considering the design and development of products. Without proper knowledge, thermodynamic properties can lead to the failure of products and may even pose danger. Phase diagrams are a graphical presentation of a system's conditions (temperature, pressure, volume) among the system's phases. Developing a real-time interactive visual demonstration will provide students the opportunity to observe and recognize the thermodynamic information learned in class and how it applies to phase diagrams.

The demonstration involves a syringe, a hairdryer as a heat source, and tool for temperature measurement. Students will be executing the demonstration in groups of 3, where each is assigned a role. Acetone is placed in the syringe where then the hairdryer is used to heat to the acetone. Students will observe that with acetone's temperature increase, the syringe volume will increase during phase change. Students will record measurements throughout the procedure to allow them to understand thermodynamic properties and relationships. Overall, this will provide a visual understanding and assist students with an alternate learning strategy in hopes for successful understanding of thermodynamics that they can further use when eventually working as engineers.

### **98: The Use of a Free Skin Cancer Screening To Improve Healthcare Access**

Nicholas Viggiano | Biology | Bayer School of Natural and Environmental Sciences | Junior  
Faculty Advisor: Urmi Ashar, MBBS, MD, DNB, MBA

**ABSTRACT:** Since skin cancer is the most common form of cancer in the United States and worldwide, the need for skin cancer screenings, early detection, and an expanded education about skin cancer risk factors and prevention is extremely important. Some rural, underserved communities lack convenient access to health care providers, particularly specialists like dermatologists. To remove some barriers that

prevent access to a medical specialist in the rural community of Mercer County, PA, a free skin cancer screening was set up in the downtown area of Mercer County. The data collected from this screening was analyzed to determine its effectiveness in reaching the people who need it the most. This screening provided access for the majority of participants who did not have a regular dermatologist and have never been screened for skin cancer before. Also, all participants were older adults or senior citizens, which is the group most at risk of developing skin cancer and in need of regular screenings. Although most participants lacked a regular dermatologist, there was no statistically significant association with having a presumptive diagnosis of a precancer or cancerous lesion. Almost all participants had one or more modifiable risk factors, but this was not correlated to a presumptive diagnosis of a precancer or cancerous lesion. Findings from this analysis can be used to improve outreach for future free skin cancer screenings.

### **99: Antifungal Susceptibility of Phospholipase B Mutants in *Saccharomyces cerevisiae***

Emily Heiser | Biology | Bayer School of Natural and Environmental Sciences | Junior  
Faculty Advisor: Jana Patton-Vogt, Ph.D.

**ABSTRACT:** Phospholipase B (lysophospholipase) plays an important role in lipid metabolism within the cell membrane. Due to the impact of membrane composition on cellular activities, PLB function is essential to understanding the role of membrane manipulation in susceptibility to antifungal drugs. Plb1 is involved in acylation of phosphatidylcholine (PC) and deacylation of PC and phosphatidylethanolamine (PE). Its ortholog Plb3 displays similar acylation activity, hydrolyzing phosphatidylinositol (PI) and phosphatidylserine (PS), as does Plb2. In these studies, we use growth assays to examine the sensitivity of yeast strains lacking phospholipase B activity to antifungals (plb1 $\Delta$ , plb123 $\Delta$ ). Drugs tested include Rapamycin, Tunicamycin, Miltefosine, Myriocin, and Amphotericin B. These results indicate that a loss of one or more phospholipase B genes results in increased susceptibility to cell disruptions.

### **100: Surveying Student Interest in a Medical Humanities Program at Duquesne**

Emma Kazmierczak | Sociology | McAnulty College and Graduate School of Liberal Arts | Junior  
Faculty Advisor: Kristin Klucsevsek, Ph.D.

**ABSTRACT:** Medical humanities (MH) is an interdisciplinary field which incorporates social science, humanities, and the arts, and applies these perspectives to medical and health education and practice. MH programs can help to provide students with greater empathy and understanding towards the individuals and communities they serve. Our working hypothesis is that an MH program at Duquesne would build on our Spiritan Mission to build authentic relationships, consider issues in health and community equity in our region, and add greater depth and breadth to the educational experience. This poster details my current work with members of the Duquesne University faculty to assess the viability of creating a future medical humanities program at our university. So far this project has involved a comparison of MH programs at peer and other institutions, and the creation of a survey that will be administered this spring to Duquesne students. The survey will gather information on student interest pertaining to the potential development of a MH program and what this future program might look like. A Medical Humanities working group in the McAnulty College plans to use information from this project when applying for future grants, building a viable program, and ensuring that such a program would align with Duquesne's mission.

### **101: Progress Towards the Synthesis of Chrysosporazine D**

Tyler Kiss | Biochemistry | Bayer School of Natural and Environmental Sciences | Sophomore  
Faculty Advisor: Thomas Montgomery, Ph.D.

**ABSTRACT:** Second only to cardiovascular disease, cancer is the leading cause of death worldwide. With no current cure for cancer, millions of individuals are afflicted by these malignancies every year—including patients, friends, families, and a slew of other individuals. Despite this harsh reality, patients who survive various forms of cancer do so because of the development of cutting-edge treatments. This includes surgical interventions to remove the malignancy in early stages, preventing spread, and/or the use of chemotherapeutics to suppress tumor growth and suppress metastasis. Nonetheless, cancer cells evolve resistance to chemotherapeutics and they become less effective as the disease progresses—resulting in negative patient outcomes. To address this problem, we are interested in investigating new molecules which have anticancer properties, particularly ones that can avoid resistance mechanisms. Chrysosporazine D is a piperazine alkaloid and natural compound that has been isolated from the gastrointestinal tract of the Australian mullet fish. The compound consists of a nitrogen-containing heterocyclic ring and is believed to have fungal origins. When tested against cancer cells in combination with doxorubicin, a widely used chemotherapeutic, researchers observed a significant reversal in resistances to the drug. To date, there is no total synthesis of any member of the chrysosporazine family, and one unreported synthesis of iso-chrysosporazine D. We discuss here our efforts to obtain chrysosporazine D selectivity—avoiding isomer formation—through judicious selection of reaction conditions.

### **102: The Ethical Dilemma of Discovery of Misattributed Paternity in Living Kidney Donation**

Zehra Mehdi | Biology | Bayer School of Natural and Environmental Sciences | Junior  
Faculty Advisor: Joris Gielen, Ph.D.

**ABSTRACT:** A major ethical dilemma in living kidney donation is the sharing of information about either the recipient or donor. Ethical policies have been created for donor's and recipient's privacy, generally called "Confidentiality Policy for Patient/Recipient." This policy ends up clashing when it comes to discovery of misattributed paternity. The discovery of misattributed paternity reveals information that is directly linked to both donor and recipient. This information is the discovery by healthcare providers that the recipient (father or child) is not biologically related to the donor (father or child). Each case of misattributed paternity can vary, such as the age of child, presence of mother, and how misattributed paternity was discovered. This poster will explore this ethical dilemma assuming that both recipient and donor are adults, the mother is dead, and misattributed paternity was discovered during a blood test to determine whether or not the donor can donate their kidney. Several ethical principles (autonomy, confidentiality, deontology, informed consent, paternalism, beneficence, and nonmaleficence) were applied in this poster to analyze three distinct ethical arguments: nondisclosure, disclosure, and informed consent. Empirical studies have surveyed donors', recipients', and healthcare providers' thoughts on this matter. As this ethical dilemma affects all three parties, this analysis provides an ethical justification for choosing one ethical argument as the foundation for proper policies that protects donor's and recipient's privacy without the physician violating either one of these privacies. Overall, this poster analyzes three distinct ethical arguments and possibly provides a foundation for policies regarding this ethical dilemma.



### **103: The Effects of Topoisomerase 1 Inhibition and Knockdown on Herpes Simplex Virus Type-1 Infection**

Raegen Esenwein | Biological Sciences | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Jill Dembowski, Ph.D.

**ABSTRACT:** Herpes simplex virus type-1 (HSV-1) is a universal human pathogen that requires cellular factors to create new infectious viruses. Specifically, human topoisomerase 1 (Top1) associates with HSV-1 genomes throughout infection. In uninfected cells, Top1 creates transient single-stranded nicks to relieve topological stress of supercoiled DNA to promote transcription and replication. We hypothesize that Top1 binds to and acts on viral DNA to promote HSV-1 transcription and/or DNA replication. To investigate the role of Top1 in HSV-1 infection, cells that inducibly express Top1 targeting short-hairpin RNA sequences (shRNA) and the Top1 inhibitor, camptothecin, were used. I found that Top1 knockdown or inhibition decreases the total number of infectious virus particles produced per cell. Furthermore, Top1 knockdown desensitizes viral infection to camptothecin, demonstrating that the inhibitor is acting through Top1. We determined that Top1 is essential for HSV-1 infection. Further studies will investigate which step Top1 inhibition and knockdown blocks within the infection cycle and where Top1 binds to HSV-1 DNA.

### **104: Medical Physics: A Day of Shadowing**

Rachael Hall | Physics | Bayer School of Natural and Environmental Sciences | Junior Faculty Advisor: Fathia Benmokhtar, Ph.D.

**ABSTRACT:** Medical physics is a field of work that has three specialties: therapeutic, diagnostic, and nuclear. As part of an undergraduate research and career development class, exploring possible careers has been a large segment of the learning process. During a two day period, the experience of shadowing a therapeutic medical physicist was accomplished and reflected upon. The ability to shadow someone in a professional setting allows students to experience a field that interests them to aid in determining if this is something they would enjoy doing as their own profession. This poster summarizes the experience of shadowing a therapeutic medical physicist as well as what they do.

### **105: Bacterial Identification Using Fluorescent Phage**

Ethan Radeschi | Biomedical Engineering | Rangos School of Health Sciences | Senior Faculty Advisor: John Viator, Ph.D.

**ABSTRACT:** The current protocol for identifying bacterial infections in patients involves culturing a sample of the infected tissue for upwards of three days before using staining to identify the type of bacterial cells. This necessitates the application of broad-spectrum antibiotics until the bacteria can be identified. Use of these antibiotics can accelerate antibiotic resistance the more often they're used. A faster method of identification would allow for more specific antibiotics to be used to combat bacterial infections, possibly allowing us to use a phage-based antibiotic approach that has been theorized for decades. The point of this research is to use photoacoustic flow cytometry to speed up the process by infecting bacterial cells with fluorescent-dyed phage specific to that bacterial line. Phage, specific to one infectious bacteria species, were labeled with red dye and incubated with samples containing the bacteria it infects. The phage would attach only to the bacterial cells they are specific for, effectively dying those bacteria cells red. The sample is then run through a photoacoustic flow cytometry device and illuminated with 532 nm laser light. Infected bacterial cells would convert the light coming out of the laser to sound waves as they pass through the chamber, which would be picked up by an oscilloscope to identify the number of infected cells that pass through. Since we know what phage was



added into the sample and what bacteria they infect, the signal picked up by the oscilloscope indicates the presence of that specific bacteria in the sample.

#### **106: Investigating the Function of Host RECQL in Herpes Simplex Virus Type 1 Infection**

Julia Gibson | Biology | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Jill Dembowski, Ph.D.

**ABSTRACT:** Herpes Simplex Virus Type-1 (HSV-1) is a prevalent human pathogen, infecting over half of the U.S. population. While the most common symptoms of infection are cold sores, more severe cases can cause genital herpes, herpes keratitis, or encephalitis. While HSV-1 is a common and potentially deadly virus, we do not fully understand the infection process. We do know that HSV-1 utilizes both viral and cellular factors during infection and replication, several of which have been identified. Through previous studies in our lab, we discovered that human RECQL, a helicase protein involved in the DNA damage response, associates with the HSV-1 genome during DNA replication. In uninfected human cells, RECQL plays a role in restart of stalled replication forks, homologous recombination, and base excision repair. However, the role of RECQL in HSV-1 infection has not been studied. To determine the effects of RECQL knockdown on HSV-1 infection we created an inducible shRNA knockdown cell line. We found that in the absence of RECQL protein, the amount of virus produced per cell increases. Other proteins involved in the DNA damage response are seen to act in an intrinsic antiviral defense against incoming HSV-1 genomes. We hypothesize that RECQL may be part of this antiviral response. Some proteins are degraded by HSV-1 protein ICP0, a ubiquitin ligase that allows the virus to evade the host cell's antiviral defenses. In the future we will investigate a potential relationship between RECQL and ICP0 and determine the effects of RECQL overexpression on HSV-1 infection.

#### **107: ADHD in the Service Industry**

Samantha Sacco | Psychology, IMC | McAnulty College and Graduate School of Liberal Arts | Senior Faculty Advisor: Alexander Kranjec, Ph.D.

**ABSTRACT:** The restaurant industry is notorious for creating a high-stress working environment, as employees must be able to multi-task in a timely manner. In theory, individuals with ADHD seek out high-stimuli environments, such as the restaurant industry. Despite 4.4% of adults in the U.S having ADHD, little research has been done regarding the correlation between ADHD individuals and specific work environments. To determine if individuals with ADHD are drawn to the fast-paced environment of restaurants, several interviews will be conducted prior to the creation of a survey. The interviewees will be restaurant and bar employees who will be asked questions related to the reasons behind joining the service industry, and their personal traits and habits. The data gathered from these interviews will then be used to design a survey. New participants will then be asked to complete the survey. The survey will be composed of questions surrounding the DSM ADHD characteristics. The survey will also include questions about the service industry. Data will be collected using surveys using Qualtrics. Analyses will utilize a mixed method and exploratory approach aiming to describe trends and examine the correlation between ADHD symptoms and particular work behaviors between employees in the restaurant industry and other service industries. These findings can provide a framework for understanding how ADHD impacts choice of working environments for individuals.

### **108: An Analysis of Mental Health Representation in Physician Assistant Programs' Technical Standards**

Matthew Swift | Physician Assistant Studies | Rangos School of Health Sciences | Sophomore  
Jordan Baney | Physician Assistant Studies | Rangos School of Health Sciences | Sophomore  
Faculty Advisor: Bridget Calhoun, DrPH, PA-C

**ABSTRACT:** Mental health is a state of well-being that enables people to cope with stress, maximize their abilities, learn well, and work well. It is the integral component of health that enables a person to make decisions and build relationships. In a time where mental health is being prioritized, it is imperative for individuals in high-stress environments, like health care, to have access to resources for the preservation of mental health. This original research project examines and analyzes the technical standards of 298 accredited physician assistant programs for mental health keywords, phrases, and themes. Technical standards outline the requirements for cognitive, physical, and behavioral abilities that students must meet to be successful in the program. Through these non-academic standards of admission, institutions can ensure that applicants have the capabilities to assess and cope with mental health needs. Each program's standards were analyzed and compared in an initial review, where keywords, important phrases, and major themes were extracted. An independent second reviewer then organized each program into categories based on these themes, and data was compared. This poster shows that most programs across the country have mentions of mental health themes in their technical standards, with no significant correlation between mental health mentions and accreditation status. The data also offers an interesting commentary on how mental health is being treated in professional settings, suggesting a new way forward in assessing applicants in healthcare professions.

### **109: ~The Digital Divide~**

Sydney Lynch | Criminal Justice Concentration - Sociology | McAnulty College and Graduate School of Liberal Arts | Junior  
Natalie Onofrey | Psychology | McAnulty College and Graduate School of Liberal Arts | Junior  
Sociology 415/515 Students  
Justin LeWinter  
The Big Idea Team  
Faculty Advisor: Cathleen Appelt, Ph.D.

**ABSTRACT:** While technology can open doors to increased efficiency, social connectedness, and quality of life, the unequal distributions of devices, high speed internet connectivity, and the knowledge necessary to use of everyday technologies prevent everyone from benefiting. Older adults, persons in lower socioeconomic classes, members of racial and ethnic minority groups, and persons in rural areas are among persons most greatly affected by society's digital divide. The importance of digital equity to social connectedness, well-being, and quality of life in modern society was made clear during the COVID-19 pandemic. This in-progress work is part of an ongoing community-engaged project to leverage intergenerational collaboration between Duquesne University students and older adults living in local high-rise apartment buildings. Supported by a gift from Comcast, students in Health, Illness & Social Policy (SOCI/GREF 415/515) have partnered with Macedonia FACE's Senior Program and the Big Idea Team to reach three key project milestones in Spring 2023. The first milestone is a questionnaire-based assessment of current access to and utilization of everyday technologies among residents in 192 apartment units in the K. Leroy Irvis building in the Hill District Community. Second, students are developing a curriculum for intergenerational collaborative learning related to the use of everyday technologies. Third, students have designed a pilot research study to assess the program's effectiveness

related to both older adults' successful engagement with technology and learning outcomes among student tech mentors.

**110: Full-thickness Rotator Cuff Tear in a 67-year-old Male Rancher: A Level 1 Validation Case Study**

Katherine Podlaski | Athletic Training | Rangos School of Health Sciences | Senior  
Faculty Advisor: Jason Scibek, Ph.D., ATC

**ABSTRACT:** Rotator cuff tears are a prevalent injury in active populations and occur in 20-54% of patients between the ages of 60 and 80. They most often occur in the supraspinatus and infraspinatus muscles because of their anatomical location in relation to the acromion and humeral head. The patient of focus in this case study is a 67-year-old male rancher that reported to the physician with left shoulder pain following a machinery incident. A reported history, physical exam, and imaging led to the diagnosis of a high-grade tear in the supraspinatus with a posterior labral tear and severe tendinitis in the supraspinatus and infraspinatus. Many factors are believed to put a patient at an increased risk of a rotator cuff tear including age, genetics, smoking, hypertension, hypercholesterolemia, hand dominance, overweight BMI, and history of trauma. This poster explores the specific risk factors that potentially predisposed the involved patient to a rotator cuff tear, which included old age, an os acromiale, and acromion morphology. Patient care is outlined following his history of risk factors, diagnosis, and treatment plans. Using current research and patient data, the purpose of this poster is to evaluate the risk this patient and others with a similar clinical presentation may have for injury prior to an inciting incident causing a rotator cuff tear.

**\*111: Collaborative Supply Chain Management through a Christian Business Ethics Lens**

Daniel Oldak | Supply Chain Management; Information Systems and Technology | A.J. Palumbo School of Business Administration | Senior  
Faculty Advisor: Matthew Drake, Ph.D.

**ABSTRACT:** Supply chain management has become a source of competitive advantage for many organizations over the past few decades, as they have collaborated with their major suppliers and distribution partners to improve the flow of goods and services to end consumers. Many organizations have also placed an increased emphasis on developing ethical business practices, particularly related to decisions and operations that have significant social and/or environmental implications. In this presentation we compare best practices in collaborative supply chain management with the principles of Christian business ethics to show that these best practices and their outcomes are aligned with the ethical decision making from a Christian perspective. Supply chain strategies such as responsible sourcing, supplier development, design collaboration, lean production, collaborative distribution, and vendor managed inventory all enable the organization to accomplish ethical outcomes that balance stakeholder interests and result in fair decision making, fair reward, and fair communication between supply chain partners. We discuss examples of these collaborative strategies in practice and show how they help to create an ethical supply chain that provides a competitive advantage in the market.

**112: The Identification of Gammarid Amphipod Species by Scanning Electron Microscopy and DNA Barcoding**

Mikayla Bayto | Environmental Science | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: John Stolz, Ph.D.

**ABSTRACT:** Amphipods – also known as scuds or freshwater shrimp – are aquatic, bottom-dwelling members of subphylum Crustacea that inhabit various freshwater, brackish, and saline communities

globally. Gammarid amphipods exhibit collector-gather feeding behaviors and are moderately-tolerant to aquatic pollution. The identification of amphipod species is difficult due to small specimen size, little morphological variance, varying environmental phenotypes (ecophenotypes), and lack of study at the species level. We were interested in examining the morphological diversity of Gammarid amphipod specimens from the Mingo Creek watershed of Washington County, Pennsylvania, United States of America. Specimens were collected in compliance with the “Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers” established by the Environmental Protection Agency of the United States of America (US EPA). Specimens from the Gammaridae family – *Gammarus* and *Crangonyx* genera, specifically – were previously analyzed using scanning electron microscopy (SEM) and low power light microscopy. Specimen identification determined with microscopy was verified by DNA barcoding. Primers for DNA barcoding were designed from published universal sequences of the cytochrome oxidase subunit 1 (COX1 or CO1). DNA was extracted from amphipods culled from field samples and was used for amplification of specimen COX1 fragments by polymerase-chain reaction (PCR). Positive results were obtained for the primer sets and the DNA sequences were confirmed by Sanger sequencing. The results may potentially confirm that DNA barcoding is an effective approach for identifying amphipods in natural environments.

### **113: Implementing Education on Newborn Falls Prevention and Intervention: A Quality Improvement Project**

Katrina Taliani | Nursing | School of Nursing | Senior

Madison Conrad | Nursing | School of Nursing | Senior

Veronica Phillipson

Faculty Advisor: Melanie Turk, Ph.D., RN, FTNNS

**ABSTRACT:** Reported as high as 21.2 per 10,000 live births, newborn falls are a highly prevalent risk for infants on postpartum units. A fall, or dropping a newborn, can produce detrimental impacts on the health and wellbeing of parents and babies. Through this Quality Improvement project, we aimed to promote safety practices and awareness of newborn falls on the postpartum unit of a local hospital. This project was proposed due to an increasing proportion of new nurses on the unit and a general lack of awareness among hospital staff regarding newborn falls and prevention methods. After completing a comprehensive Evidence Based Practice (EBP) literature search using scholarly databases, our group was able to identify six key risks that exponentially increase the prevalence of dropping a newborn. We then created a 15 minute in-person PowerPoint presentation outlining these six key risks and the interventions that have been evidenced by research to reduce such occurrences within the postpartum setting. The presentation, along with a pretest to evaluate registered nurses’ and patient care technicians’ (PCTs) prior knowledge on the issue, was then delivered at three nurseries within the postpartum unit at the local hospital in an educational session format. Efficacy of the session was evaluated via a posttest. The most significant findings revealed an increased understanding of the risks associated with newborn falls and increased commitment by staff to educate all patients and families on fall prevention strategies. Overall, awareness about newborn falls prevention strategies improved from pretest to posttest.

### **114: Evaluating the Impact of Concomitant Medications on Inpatient Potassium Supplementation**

Marissa Parisi | Pharmacy | School of Pharmacy | Senior  
Mackenzie Bortmas | Pharmacy | School of Pharmacy | Senior  
Maura Fleming  
Samantha Gaffey | Pharmacy | School of Pharmacy | Senior  
Faculty Advisor: Branden Nemecek, PharmD, BCPS

**ABSTRACT:** Purpose: Hospitalized patients commonly receive potassium supplementation for hypokalemia, with clinicians anticipating a rise in potassium of 0.1 mmol/L per every 10 mEq delivered. However, patients often take concomitant medications that can alter potassium levels, and there is limited data to help clinicians understand their effect on potassium supplementation and resulting levels. The objective of this study was to investigate the impact of concomitant medications on serum potassium levels among hospitalized patients receiving supplementation.

Methods: A single-center, retrospective descriptive study of adult hospitalized patients receiving potassium supplementation was conducted. Patients were included if they received at least one dose of potassium while admitted to the general medicine ward. The primary outcome was the impact of concomitant medication use on change in serum potassium, normalized per 10 mEq of potassium administered.

Results: A total of 985 patients were included. The cohort was 47% men, 78% Caucasian with a mean age ( $\pm$  standard deviation) of  $65 \pm 17$  years. Potassium-altering medications were given in 797/1291 (61.7%) instances of potassium supplementation, with insulin, magnesium, and loop diuretics most commonly administered. Administration of loop diuretics resulted in a potassium change of 0.036 mmol/L per 10 mEq compared to a change of 0.067 mmol/L in all patients (95% CI: 0.014-0.049,  $p < 0.05$ ). Other medications analyzed did not significantly impact the change in potassium per 10 mEq. Conclusion: This study identified only loop diuretics significantly altered serum potassium levels among hospitalized patients. Future prospective controlled studies are warranted to provide further guidance on potassium supplementation in this patient population.

### **115: The Effect of Political Party vs. Platform on Voter Preference**

Maura Heusey | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior  
Rachael Ranone  
Faculty Advisor: Alexander Kranjec, Ph.D.

**ABSTRACT:** George Washington, as the first U.S. president, set the precedent against partisan politics. In his farewell address, Washington warned against political parties that “are likely in the course of time and things, to become potent engines, by which cunning, ambitious, and unprincipled men will be enabled to subvert the power of the people and to usurp for themselves the reins of government.” However, as the nation developed, partisan convictions heightened – possibly beyond the ideals they were originally meant to represent. This type of polarization can contradict the goals and ideals of a true democracy. When voters are blinded by their party affiliation, our country may end up with a leader who does not align with anyone’s true values. The present study investigates the importance of party affiliation on voter preference experimentally. To investigate the relative effects of political party and platform on voting preference, the current study “mixes” each in a number of fictional campaign advertisements. Participants will be asked to choose between two posters in a forced choice design. On one hand, we may find that our elections are obstructed by people only voting Democrat or Republican, rather than voting for what they believe in. On the other, we may find no data that is able to determine

lack of research prior to voting. In turn, if we do not find any contradiction between party and platform, this will show that our voter system is working properly. All findings will be relevant in observing the voting habits of U.S. citizens.

**116: Micro Is Not Meaningless: A Focus on Asian Women**

Elisha Schoeneck | Physical Therapy: Health Sciences | Rangos School of Health Sciences | Junior  
Faculty Advisor: Elisabeth Vasko, Ph.D.

**ABSTRACT:** Racism has evolved over the history of the United States and has camouflaged itself as harmless remarks or anything but the issue of race. Asian women used mental health services roughly four times less than their white counterparts. These disproportionate impacts on Asian women are rooted in racialized microaggressions. Microaggressions are a subcategory of racism. Exploring and understanding racialized microaggressions is a way for everyone to dismantle racism hidden in everyday life, expose racism's grasp on society, and to make society a more accepting and safe place for people of color. Using an interdisciplinary and intersectional framework that focuses on the experiences of Asian women such as Mitsuye Yamada and Grace Kim's take on invisibility, the poster will explore common examples of microaggressions and how they negatively affect women of color, specifically Asian women. I argue that microaggressions are relevant to racial discussions and conclude with suggesting strategies for dismantling racism.

**\*117: Now Screening...Teachers: Developing a Community-Engaged Voice Screening**

Kathryn Leash | Speech-Language Pathology | Rangos School of Health Sciences | Junior  
Megan Mathias | Speech-Language Pathology | Rangos School of Health Sciences | Junior  
Faculty Advisor: David S. Ford, Ph.D.

**ABSTRACT:** Voice disorders are remarkably common among teachers in the US and across the world. However, they often go undiagnosed due to teachers' demanding schedules and a lack of awareness that symptoms may be atypical and can be treatable. The purpose of this study was to develop a voice screening protocol for teachers that accommodates their schedules and is sensitive to subtle changes in voice production. A survey was developed to evaluate the feasibility of the project and to explore the needs of teachers in the greater Pittsburgh area. Informed by the results of the survey, a specific voice screening protocol was established. The screening consists of an interview about vocal demand inside and outside the classroom, a validated self-rated quality of life instrument (i.e. Voice Handicap Index or Voice-Related Quality of Life), and acoustic analysis. Duquesne University students will travel to local elementary schools to perform screenings, while supervised by practicing speech-language pathologists. These screenings will be embedded into their SLP 310: Speech Science course, as hands-on lab activities. The screenings will also allow for undergraduate clinical practicum experience and community-engaged learning. This poster will discuss the methods, procedures, and conclusions that were developed throughout the conception of this project.

**118: The Beauty of African Clothing**

Brayden Parker | Multi-platform Journalism | McAnulty College and Graduate School of Liberal Arts |  
Freshman  
Faculty Advisor: Anna Scheid, Ph.D.

**ABSTRACT:** The whole idea of this infographic was born when thinking about the countless ways in which Africa is misapprehended. The problem being addressed in this project specifically, is the common preconceived notion that Africa and Africans have no ascribed meaning in life and that anything they



have holds no significant meaning. I chose to speak out about this very important issue in a very abstract way, and that was through the many ascribed meanings of clothing, of three of the major ethnic groups in Africa, the Massai, the Zulu, and the Yoruba. The lack of knowledge and overall ignorance of the Westerner's assumptions about Africa motivated me to educate others and to really show them that Africa is so much more than a giant landmass with over 1.4 billion citizens inhabiting it. I have achieved this by briefly explaining the overall importance of traditional African clothing, then going into detail tapping on the history, symbolization, and even the status that some clothing materials can ascribe to an individual. The final results of my research concluded that Africa has a deep and complex background when it comes to their culture and that everything they do is on purpose and holds an immense amount of meaning. Africa is intelligent and prideful when it comes to their culture and the people in it.

#### **119: What Impacts Retention Rate Among Different Schools Within Duquesne?**

Vikram Iyer | Data Science | McAnulty College and Graduate School of Liberal Arts | Senior  
Zachary Strennen | Data Science | McAnulty College and Graduate School of Liberal Arts | Senior  
Pablo MacHado | Data Science | McAnulty College and Graduate School of Liberal Arts | Senior  
Nicolas Gutierrez Olvera Flores | Finance and Data Science | McAnulty College and Graduate School of Liberal Arts, A.J. Palumbo School of Business Administration | Senior  
Faculty Advisor: John Fleming, Ph.D.

**ABSTRACT:** Retention rate is a reflection of how well a university serves the students' immediate needs as well as how a university can prepare students for future careers. Retention rate at Duquesne University is highly unpredictable given the thousands of students spread across the several undergraduate programs that the school has to offer. Reasons for why a student might be retained can be attributed to academic performance, financial status, a change in career paths, or an overall unfulfilling experience as a student.

While there is no singular reason explaining why a student would choose to end their time at Duquesne University prematurely, this project looks at individual undergraduate programs, examines data concerning the students in such programs, and finds extremities associated with lower retention rates. Using data provided by Duquesne University's Office of Institutional Research, retention rate is calculated based on whether a student continues to study at Duquesne or graduates, and the project compares retention rate amongst various subcategories of students such as their program, class, year, residence, etc. Through this method, significant evidence analyzed from the data explains low retention among the many undergraduate programs of Duquesne University. The goal of this project is for these results to be further examined by each individual program to improve the student experience and better serve their needs.

#### **\*120: A Multielectrode Array (MEA) for Electrophysiological Measurements from Neural Spheroids**

Emily McCarty | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Jacob McKinley | Biomedical Engineering | Rangos School of Health Sciences | Junior  
Mitchell Fox | Biomedical Engineering | Rangos School of Health Sciences | Sophomore  
Faculty Advisor: Melikhan Tanyeri, Ph.D.

#### **ABSTRACT:**

Gliomas are the most common form of primary cancer in adults. Previous studies have shown that glioma form electrically active synapses with neurons in vivo and are electrically active in response to drugs in vitro [Kim, Kwang-Min, et al]. To better study the electrophysiological response of gliomas, we are designing and developing a microelectrode array to measure electrical signals from brain spheroids.



The current commercial platforms for electrophysiology measurements on cell culture have either too few electrodes or the electrodes are distributed sparsely, thereby limiting accurate measurements. Here, to address these limitations, a custom electrode array to measure electrophysiological properties of brain spheroids has been developed.

We fabricated a prototype multielectrode array (MEA) and performed biocompatibility testing with U-87 cells. Three MEA devices containing microfluidic wells were fabricated using conventional microfabrication and soft lithography methods. The devices consisted of a glass slide with lithographically patterned Ti/Au electrodes (5/150 nm thick) and traces insulated with a layer of SU-8 (10  $\mu$ m thick). To facilitate cell culture, we bonded the MEA device to a 10-15 mm thick slab of PDMS with a cylindrical well, approximately 1 cm in diameter.

The U-87 cells grew abundantly in the fabricated devices. The cell growth on each surface showed a branching network of cells and tumor-like cell clumps. The branching networks formed by the U-87 cells in the various devices suggests that they communicate with one another in the same manner as neurons, but further electrophysiological testing will be performed to test this hypothesis.

### **121: The Role of the Acyltransferase Gpc1 in Antifungal Susceptibility in *Candida albicans***

Justin Singer | Biology | Bayer School of Natural and Environmental Sciences | Junior  
Faculty Advisor: Jana Patton-Vogt, Ph.D.

**ABSTRACT:** *Candida albicans* is a prevalent fungal pathogen. The World Health Organization recently released a fungal priority list with *C. albicans* in the critical priority group (1). Most treatments for *C. albicans* target aspects of membrane synthesis. An abundant membrane glycerophospholipid is phosphatidylcholine (PC). PC is synthesized by two major biosynthetic pathways. These include the phosphatidylethanolamine (PE) methylation and the CDP-choline (Kennedy) pathway. However, we previously identified a third PC synthesis route, denoted the PC de-acylation reacylation pathway (PC-DRP). PC-DRP begins with the deacylation of PC by phospholipases to form glycerophosphocholine (GPC). GPC is acylated by Gpc1 to form lysophosphatidylcholine (LPC), followed by a second acylation by Ale1 to form PC. In these studies, we used growth assays to examine the sensitivity of a strain lacking the committed step in the reacylation sequence, *gpc1 $\Delta$ / $\Delta$* , to antifungal agents. We observed sensitivities to drugs targeting membrane synthesis, including ketoconazole, myriocin, and miltefosine. These results indicate that inhibition of PC-DRP via loss of Gpc1 increases the susceptibility of *C. albicans* to a variety of membrane perturbations.

1. WHO fungal priority pathogens list to guide research, development and public health action. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO.

### **122: Women of the Irish Revolution**

Ireland Parker | History | McAnulty College and Graduate School of Liberal Arts | Senior  
Faculty Advisor: John Mitcham, Ph.D.

**ABSTRACT:** Minimizing the involvement of women in the historical record reinforces the sexist ideology that erased them in the first place. Sex stereotypes label women solely as mothers and wives and often give men credit for women's doings. Women's history is everyone's history, and we are teaching inaccurately by neglecting them. Women's accomplishments, especially their involvement during wartime, should be equally integrated into the historical record.

Since 2012 the Irish have been celebrating the one-hundredth anniversary of events representing their freedom. The Irish have been giving special attention to the men who fought for Ireland's liberation but hardly credited the females who served. This contemporary situation is similar to the lack of publicity female soldiers received a hundred years prior.

This paper will examine how women who participated in the Irish fight for independence were erased from history, how members of Cumann na mBan were refused pension, and reveal cases of women who were victims of physical and sexual assault by the British and Irish military. Primary sources, such as memoirs and published photographs, will be used to provide the context of how female military members played a role in achieving freedom. Court and other official government documents will show how easily women were denied payment for their service. Lastly, the paper will examine the cases of two women who were victims of assault by male soldiers; documents will show that the identifiable men were never prosecuted for their crimes. War is a gendered phenomenon.

### **123: Rare Chemical Bonding Scheme of Urea: Stereoelectronic Competition between Amino Groups**

Lindsay Moskal | Chemistry and Mathematics | McAnulty College and Graduate School of Liberal Arts, Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Jeffrey Evanseck, Ph.D.

**ABSTRACT:** Urea,  $\text{CO}(\text{NH}_2)_2$ , is an important and naturally occurring carbamide that has been firmly established in the chemical enterprise as evidenced by its long-standing history and modern applications in a prodigious number of scientific fields. Most recently and notably, urea was recognized by the 2021 Nobel Prize in Chemistry for its use as a popular core motif of larger catalysts known as dual-hydrogen-bond-donors (DHBDs), which are safer, greener, and more cost-effective alternatives to the metal catalysts frequently used in important pharmaceutical and industrial processes. Despite its importance and utility, however, the chemical bonding that underpins urea's unusual structure and properties is not well understood. Specifically, recent studies indicate that urea presents a unique type of chemical bonding that contradicts traditional resonance theory used to describe the vast majority of organic molecules. Experiments and computations predict a charge distribution that conflicts with its resonance pattern. To interrogate this conflict, we utilized state-of-the-art quantum chemistry to model the three-dimensional geometry and charge distribution of unsubstituted urea in comparison to other organic molecules that obey traditional resonance theory, such as formamide and acetamide, where conjugative forces dominate hyperconjugative forces. In urea, we find that the presence of two competing amino groups ( $-\text{NH}_2$ ) results in conjugation frustration, increasing the importance of hyperconjugative forces relative to conjugative forces. This unusual chemical bonding scheme is key to understanding the structure and properties of urea, a molecule vital to the development of metal replacements, or DHBD catalysts, and the technological growth of the chemical enterprise at large.

### **124: Genetics and Alcohol Use Disorders**

Kristen Fisher | Psychology | McAnulty College and Graduate School of Liberal Arts | Sophomore  
Faculty Advisor: Melissa Kalarchian, Ph.D.

**ABSTRACT:** As the descendant of people with alcohol use disorders on both sides of my family tree, I have often wondered about my predisposition for related diseases. I asked myself, to what extent does genetic makeup affect the risk of developing alcohol use disorders? During my initial research, I discovered more than 140,000 people die from alcohol-related causes each year in the United States according to the National Institutes of Health. This finding fueled my desire to ascertain how inheritances affect the progeny of alcoholics. I am searching literature databases to explore the genetic

and neurobiological roots of alcoholism to provide the answer to my question. In my poster, I will provide data on the role genetic factors play in alcohol use disorders. The finished project will answer the question of how genetics may predispose those families to develop alcohol use disorders, teasing apart the relative influences of nature versus nurture.

**\*125: Tagging Natural Derived RsmE Mutants with Antibiotic Resistance and Fluorescent Markers To Analyze the Functional Role of RsmE's C-Terminus Tail in *Pseudomonas Fluorescens***

McKenna Carroll | Biology | Bayer School of Natural and Environmental Sciences | Junior  
Faculty Advisor: Wook Kim, Ph.D.

**ABSTRACT:** Densely populated microbial communities create an environment where individual cells must compete fiercely for nutrients and space. In colonies of *Pseudomonas fluorescens*, naturally occurring mutations in the gene *rsmE* allow resulting mutants to outcompete the wild type by creating of unique spatial structures. *RsmE* is a posttranscriptional regulator that represses the production of several extracellular secretions. *RsmE*'s paralogs in *P. fluorescens*, *RsmA* and *RsmI*, do not possess the same function. Only mutations in *rsmE* result in the production of extracellular secretions. The primary sequences of the *Rsm* paralogs can be divided into two distinct regions: the highly conserved core, and the highly variable C-terminus tail. Because each C-terminus tail is individually conserved across divergent species, we hypothesize that the C-terminus tail of *RsmE* is responsible for its functional specificity from its paralogs. To test this hypothesis, ten previously isolated *rsmE* mutants that have naturally gained mutations in the C-terminus tail were tagged with antibiotic resistance and fluorescent markers using a specialized transposon system, creating a library of 40 tagged mutants. In the future, these selectively tagged mutants will be competed against the wild type to assess their relative fitness and imaged using confocal microscopy to explore the differences in spatial structure formation.

**126: Clinical Ethics Seen with Machine Learning in Healthcare**

Caitlyn Brannon | Biology for Physical Therapy | McAnulty College and Graduate School of Liberal Arts | Junior  
Faculty Advisor: Rebecca Maatta, Ph.D.

**ABSTRACT:** Machine learning is a type of artificial intelligence used in healthcare. An outstanding feature of machine learning in a healthcare context is the machine does not need continual programming because it can learn on its own. This process allows patients to receive more accurate diagnoses from the first examination, allowing the patient to receive proper treatment promptly. However, machine learning presents ethical dilemmas that contradict the four major principles of healthcare ethics: autonomy, non-maleficence, beneficence, and justice. A wide range of journals, such as bioethics, healthcare ethics, biomedical engineering, clinical infectious diseases, and machine learning reviews, discuss the importance of machine learning and the unavoidable dangers behind this technological advancement. This poster shows three different disadvantages of machine learning that violate these healthcare principles. As technology becomes more advanced, the safety of patient's private data becomes defenseless, allowing a violation of autonomy and creating a severe risk of inflicting harm on the patient, non-maleficence. Machine learning removes the individuality and responsibility of the healthcare system between the patient and doctor, permitting a breach with the patient's justice and possible non-maleficence. Finally, there are technological limitations within machine learning, causing a lack of beneficence and justice the patient deserves. Through discussing the data vulnerability, lack of individuality and responsibility, and technology limitations, this poster demonstrates the ethical dilemmas behind machine learning.

### **\*127: An Assay for Measuring Water Permeability of Mammalian Cells**

Raegan Gouker | Biomedical Engineering | Rangos School of Health Sciences | Junior  
Katherine Flannery | Biomedical Engineering | Rangos School of Health Sciences | Junior  
Faculty Advisor: Melikhan Tanyeri, Ph.D.

**ABSTRACT:** Aquaporin water channel proteins (AQPs) are a family of small integral membrane proteins that facilitate fluid secretion and absorption across epithelial surfaces in various organs, including the kidneys, exocrine glands, and gastrointestinal tract. These proteins are also involved in osmoregulation and play a crucial role in several diseases, such as cancer, epilepsy, glaucoma, and obesity.

In this study, we present a novel method to measure the aquaporin-based water permeability in mammalian cells using Chinese Hamster Ovarian (CHO) cells overexpressing AQP-1, which is homologous to human kidney aquaporins. We examined water permeability under hypertonic, hypotonic, and isotonic conditions by suspending CHO cells in solutions with varying tonicity. Our observations revealed that cell size tends to decrease with increasing tonicity.

To quantify the change in CHO cell size as a function of tonicity, we measured the average cell size in an isotonic solution (1x PBS) and repeated this measurement under hypotonic and hypertonic conditions. Specifically, we suspended CHO cells in 1mL of each osmotic agent (PBS, glycerol, sorbitol, mannitol, and sucrose) and imaged them in 6-well plates under a phase-contrast microscope (at 10x magnification). We analyzed the cell images using FIJI and plotted cell size histograms to determine the average cell size as a function of tonicity.

Overall, our method provides a facile approach to investigate the effects of osmotic stress and permeability in mammalian cells. This technique can be used to study the underlying mechanisms of several diseases associated with AQPs and to develop effective therapies to combat these conditions.

### **128: Capri Sun Recall**

Isabella Abbott | Multiplatform Journalism and Communications | McAnulty College and Graduate School of Liberal Arts | Junior  
Peter Boettger | Digital Media Arts | McAnulty College and Graduate School of Liberal Arts  
Russell Macias | Sports Information and Media | McAnulty College and Graduate School of Liberal Arts | Senior  
Camille Agie  
Faculty Advisor: Pamela Walck, Ph.D

**ABSTRACT:** On August 16th, 2022, Kraft Heinz had to recall cases of their Wild Cherry Capri Sun, with the best when-used-by date on it being June 25th, 2023. While only this flavor was affected, 5,760 cases were recalled, with 230,000 pouches contaminated. When customers started to complain about a foul taste, the company recalled the product for it containing a diluted cleaning solution used in food processing equipment. The solution got into the product on the production line in one of their factories. While a press release came out on the Kraft Heinz company website on August 12th, most publications reported on it days later, like the FDA, which released an article on August 16th. The company's PR team didn't immediately respond to many news outlets' questions quickly enough and only offered refunds for the product, which isn't shown on their website as to how much money consumers received.

### **129: The Hinderance of Insider Trading within Capital Markets**

Samuel James | Economics, Finance | A.J. Palumbo School of Business Administration | Junior  
Faculty Advisor: Patrick Deegan, J.D., M.B.A., M.S.-I.S.M.

**ABSTRACT:** Insider trading has been outlawed since 1933, right in the middle of the Great Depression. Executives inside of companies and outside of companies alike have been prohibited to trade upon non-public knowledge that they have gained as a direct result of being tied to a corporation. Proceeding through this paper will expose the intricacies of the laws and regulations regarding insider trading. Notwithstanding the current regulations and how they are enforced but also how these regulations can be modified to create a conducive environment for optimal level of national investment in the capital market.

### **130: Screening of Click Chemistry Products for Antimicrobial Properties**

Remy Pastierik | Biology | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Nancy Trun, Ph.D.

**ABSTRACT:** Microbe infections are posing a serious health risk as antibiotic resistance and multidrug resistant bacteria increase. Over prescribing of antibiotics has contributed to the occurrence of antibiotic resistance genes in clinically relevant bacteria. Without action, antibiotic resistance genes will lead to millions of deaths annually. One way that the challenge of antibiotic resistance can be addressed is through the development of novel antibiotics. Fully functionalized small molecule probes (FFSMPs) were synthesized using click chemistry, to be pharmacologically evaluated as potential novel antibiotics. One advantage of these FFSMPs is that they can rapidly identify new drug targets for the treatment of infectious disease by covalently attaching to the target, as target identification is a rate limiting step in antibiotic discovery. The pipeline of synthesis can allow for further testing including phenotypic screening, and target identification to create a library of potential novel antibiotics. The current primary focus is the synthesis of novel compounds and phenotypic screening of these compounds. Fifty-four FFSMPs were tested using a disk assay to determine sensitivity of both *Escherichia coli* (gram-negative) and *Bacillus subtilis* (gram-positive). Of the 54 FFSMPs tested 27% inhibited the growth of either *E. coli* or *B. subtilis* with compound RLPDU-005 showing the most potential. The compounds that showed growth inhibition are being screened for their minimal inhibitory concentration. Subsequently, the compounds will be screened using clinically relevant bacteria.

### **131: The Impact of Systemic Racism on Food Insecurity and Disparities in Pittsburgh**

Brittany Ketter | Health Sciences | Rangos School of Health Sciences | Senior  
Faculty Advisor: Bridget Calhoun, DrPH

**ABSTRACT:** Systemic racism is the soil in which racial disparities and unconscious biases are deeply rooted impacting food insecurity and promoting inequitable outcomes. An example of the cumulative effects of systemic racism is seen in the significant health disparities which are a direct result of food insecurity. The lack of access to adequate nutrition affects the physical, mental, and social well-being which further aggravates the existing disparities. Statistics show that approximately 20% of our Pittsburgh residents are food insecure, meaning 1 in every 5 people does not have access to either adequate food intake or proper nutrition. In a more recent highlight, two Pittsburgh neighborhoods that are predominantly African American saw an 80% increase in food insecurity post-COVID-19, in contrast to the 60% increase in food insecurity seen on average in the United States as a whole. The purpose of this paper is to explore the ground that promotes these racial disparities and outcomes in order to address the systemic change that is required to dismantle systemic racism with its toxic effects that we

see in the form of food insecurity, health disparities, and socioeconomic differences to promote equity, justice, and a healthier Pittsburgh.

### **132: The Impact of the Microbial Environment and Chronic Exposure to Stressors on Behavior of Larval Amphibians**

Damiana Bradley-Slagle | Biology | Bayer School of Natural and Environmental Sciences | Senior Faculty Advisor: Sarah Woodley, Ph.D.

**ABSTRACT:** The gut-brain axis describes the interaction between the central nervous system and the enteric nervous system; increasingly, evidence also suggests that the gut microbiota plays an important role in these interactions. The gut microbiota is the collection of microorganisms that inhabit the gastrointestinal tract of all vertebrates. Previous studies working with germ-free mice have found that removing the gut microbiota impacts brain development and behavior. The impact of the gut microbiota on brain development and behavior in amphibians is virtually unstudied. The aim of this study was to determine whether changes in the gut microbiota, as well as exposure to stressors, affects behavior using Northern Leopard Frog tadpoles (*Lithobates pipiens*). Newly hatched tadpoles were grown in one of two microbial environments: natural pond water or autoclaved pond water to reduce the diversity and abundance of environmental microbes that colonize the amphibian gut. In addition, tadpoles were exposed to one of three stressors: predator cues, corticosterone (a stress hormone), or a vehicle control. Tadpole behavior was recorded and then analyzed using a behavioral tracking software (ToxTrac). We found that tadpoles raised in autoclaved pond water exhibited increased locomotory and exploratory activity in response to predator cues during behavior analysis compared to tadpoles raised in natural pond water. To conclude, we found that the microbial environment in which tadpoles were raised had dramatic effects on their behavior, which likely impacts their performance and fitness.

### **133: Psychological Effects of Online Gambling in Adults**

Edward Young | Physician Assistant Studies | Rangos School of Health Sciences | Freshman Faculty Advisor: Daniel Selcer, Ph.D.

**ABSTRACT:** In the United States alone, about 2 million people suffer from a severe gambling problem, while another 4 to 6 million have a mild to moderate gambling problem (Gambling Addiction: Resources, Statistics, and Hotlines, 2022). These statistics are likely influenced not only by casino gambling but also, in recent times, by online gambling as many players make the transition to this mode of play (Sally M. Gainsbury, 2015). This project aims to evaluate the rapidly growing scene of online gambling through several lenses of psychology and how it compares to traditional methods of play; by analyzing articles compiled from various journals specializing in gambling, public health, and other topics, this project will assess online gambling's effects from the perspective of motivation, cognition, behavior, and emotion. The information in this project serves as means to become aware of this potentially harmful mode of entertainment and protect the welfare of players and other members of society as a whole.



### **134: Developing an Electrospinning System for Water-soluble Polymers**

Jackson Lee | Biomedical Engineering | Rangos School of Health Sciences | Junior  
Burton Carbino | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Zachary Avondo  
Alex Barr | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Faculty Advisor: Kimberly Williams, Ph.D.

**ABSTRACT:** Electrospinning has received continued attention in recent years as a highly versatile technique for manufacturing a variety of natural and synthetic polymers into nanofibers. The process typically involves applying a high voltage to a syringe filled with polymer solution, which results in a fine jet that is then drawn to a grounded collector plate. The resultant fibers have a high surface area-to-volume ratio, giving the final product relatively high porosity and permeability. Electrospinning is also advantageous when manufacturing polymeric materials because it offers a wide range of control over fiber thickness, pore size, and mechanical properties (eg. Stiffness and tensile strength). Within the scope of biomedical engineering, electrospun nanofibers can be used for a myriad of applications, from customizable bandages to scaffolds for tissue-engineered artificial organs.

This project focused on developing a simple electrospinning set up that could be used for both educational and research designs. We based the original set up off an inexpensive set up from the literature but will present issues with that design and the troubleshooting that led us to move towards our current set up. We will show our initial results using polyvinyl acetate in water and discuss why this material was selected and how it helped in our design process. We will conclude with survey results and feedback from its use in an undergraduate tissue engineering course and the value to their understanding of scaffold production.

### **135: Creation of Dual ABI and TBI Device for Common Clinical Use**

Alexander Guy | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Alex Barr | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Michelle Bohn | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Zachary Avondo  
Abigail Reith  
Faculty Advisor: Leda Kloudas, Ph.D.

**ABSTRACT:** The Ankle-Brachial Index (ABI) is a measurement taken to compare the blood pressures between the upper and lower limbs, useful for detecting and locating venous ulcers that do not heal unless treated, assessing the severity of peripheral artery disease, and verifying whether a patient is safe to undergo certain surgeries. Issues arise when patients have incompressible arteries in their legs due to diabetes or rheumatoid arthritis. To circumvent this, the physician uses a Toe-Brachial Index (TBI), which takes measurements at the toe. However, the current technology capable of computing both TBI and ABI measurements have failings: Firstly the technology is relatively uncommon, and is either outdated, too expensive, or requires specialized training to operate. We aim to create a device that is cost efficient, simple to use, and is capable of taking both TBI and ABI measurements. When using our device, the clinician will choose between taking an ABI or TBI measurement. Then, following the prompts on screen, they will take blood pressure measurements, which will be stored within the device, and ultimately used to compute either an ABI or a TBI measurement and compare the measurements to normal or expected values to determine whether the patient is suffering from venous ulcers or other complications. We have programed a Raspberry Pi with the appropriate code to calculate and store



values, with the design and corresponding measurements for the device finalized, and are in the process of integrating the circuit with a motor and valve to find the blood pressures.

**\*136: The Cor Unum Garden: Using Hydroponics and Community Engagement to Address Food Disparity in Pittsburgh**

Burton Carbino | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Faculty Advisor: Sarah Wright, Ph.D.

**ABSTRACT:** Food insecurity is a serious public health issue in the city of Pittsburgh, as roughly a fifth of the city's population do not have consistent access to adequate food. Food inequity is rooted in systemic poverty, inequality, and oppression, and plays a direct role in health outcomes. Addressing food insecurity in Pittsburgh's at-risk neighborhoods is equally vital and challenging, as food environment is linked to local economy and culture. Not only must healthy food be accessible to city residents, but healthy meal options must be made available, affordable, convenient, and desirable for all. A number of nonprofit organizations have been addressing food insecurity in Pittsburgh through outdoor gardening initiatives. The Cor Unum Garden project exists to supplement these efforts with budget friendly, portable, hydroponic, indoor community gardens that can harvest produce year-round. Moreover, we aim to improve the food landscape of Pittsburgh through community engagement programs on and off the Duquesne University campus. The garden structures will be built from low-cost materials, and will be assembled and maintained entirely by the Duquesne community. Inspired by Duquesne University's mission to create authentic relationships and walk with those on the margins, we aim to promote increased access to fresh produce for those who are at risk for food insecurity in the Pittsburgh community.

**\*137: Developing an Inexpensive and Moisture Resistant 3D Printed Microscope for Imaging Cardiomyocytes in a Cell Culture Incubator**

Lucia Secaida Del Cid | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Maria Luiza Hermann | Biomedical Engineering | Rangos School of Health Sciences | Junior  
Faculty Advisor: Bin Yang, Ph.D.

**ABSTRACT:** Understanding the behavior and response of cardiomyocytes under external loading provides critical information for studying certain congenital heart diseases. An inflation chamber (bioreactor) is often used to introduce controlled stress and strain to cells. Continuous imaging of cells seeded in a bioreactor has proven to be challenging due to the lack of compatible microscopes. Our study aimed to fill the gap by developing a compact microscope using 3D printing technology and inexpensive electronic parts that met the following requirements: 1) compatible with a cell culture incubator and a bioreactor, and 2) capable of imaging cardiomyocytes under different testing conditions.

The 3D printed microscope that we developed features adjustable focusing via a tunable lens, a programmable LED array for flexible illumination, moisture resistance and a long working distance compatible with the bioreactor. A Raspberry Pi single-board computer is used to control focusing, illumination, and image acquisition. Samples are imaged through a microscope lens and a Camera connected to the Raspberry Pi.

This new design allows for the microscope to be affordable and moisture resistant as none of the electronic components are exposed to the outside. The intuitive GUI that we developed allows users to preview images in real-time and fully control the microscope with minimal training. Our initial results

suggest that the compact microscope is compatible with a bioreactor and cell culture incubator to study cells response to mechanical loading.

### **138: Reducing Vaccine Hesitancy with Game-Based Learning**

Kelly Bruzdewicz | Biology | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: John Pollock, Ph.D.

**ABSTRACT:** Vaccine hesitancy is a major public health concern, rates of which have increased in response to the COVID-19 pandemic and the subsequent availability of its newly developed vaccines. To address this problem, The Partnership in Education has created a board game, “N.O.V.E.L.- Newly Observed Variant of Extreme Lethality”, to increase student understanding of the vaccine development process. We believe that if students have a greater understanding of how vaccines are made, they will have less anxiety related to vaccines and reduce rates of vaccine hesitancy. The game was designed to allow students to play the role of scientists tasked with saving humanity from a global pandemic by creating a vaccine. The game, advised by experts from the Center for Vaccine Research at the University of Pittsburgh School of Medicine, simulates the real-world steps of vaccine development and engages students in the process in an active way. To increase the games’ effectiveness, supplementary materials have also been created. The evaluation of N.O.V.E.L. and its supplementary materials in-situ is the next step in determining their impact on students’ levels of vaccine hesitancy. To do this, N.O.V.E.L. and its supplementary materials will be tested with students in the game’s target age range. Pre-game and post-game survey assessments will be completed to determine how their attitudes about vaccines were affected. After our testing is complete, the game and associated materials will be available on our website, [www.thepartnershipineducation.com](http://www.thepartnershipineducation.com), to ensure the science of vaccine development is accessible to teachers, students, and the general public alike.

### **139: MadEasy: A Sterile and Safe Solution to Patient Toileting**

Joseph Ciniello | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Ante Bevanda | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Shawn Bliss | Biomedical Engineering, Mathematics | Rangos School of Health Sciences | Senior  
Alexis Throop | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Durwash Badr | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Faculty Advisor: Leda Kloudas, Ph.D

**ABSTRACT:** Toileting, or assisting someone with using the bathroom, is a daily activity for patients in healthcare facilities and an arduous task for caregivers, requiring labor-intensive procedures and incurring risk of complications such as falls and infection. Existing solutions, such as the Sara-stedy and bedpan toileting, face considerable limitations; the Sara-stedy is limited to sitting and standing transfers, and is only available in limited quantities in healthcare facilities, while current bedpan-based methods incur risk of bed sores, UTIs, and other complications. There is evident need for more affordable and accessible methods of toileting, especially given the severe staffing shortage in healthcare facilities. Here, we present a novel toileting solution to enhance patient safety, promote autonomy, and reduce healthcare costs associated with toileting-related complications. Our device, MadEasy, consists of a retractable sling beneath the commode seat that positions a bedpan for ease of use. The durable plastic and sling will hold the bedpan and will be easy to clean and sterilizable. It will be lined with disposable liners to limit sanitary risks, while the hooks will firmly hold and position the sling. The verification protocols for MadEasy includes ease-of-use testing to ensure the device can be assembled and disassembled in a timely manner, load testing to ascertain its capacity to safely accommodate an acceptable range of weight, and absorbance testing to determine the level of sterility afforded by the

use of bedpan liners. These tests intend to demonstrate our solution's promise of addressing the need for a safe, facile, and economical means of toileting patients in the healthcare setting.

**\*140: PURmap: A Comprehensive Pressure Ulcer Reduction Technology**

Rachel Pardee | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Caitlin Greene | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Nicole Bohatch | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Ethan Radeschi | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Cody Rougeux  
Burton Carbino | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Faculty Advisor: Leda Kloudas, Ph.D.

**ABSTRACT:** Pressure ulcers are one of the costliest and physically debilitating conditions in the last century, affecting 2.5 million Americans each year and taking the lives of 60,000 annually. Pressure ulcers form within 1-2 hours in bedridden patients when an area of skin experiences prolonged pressure/shear (above 33 mmHg). This can lead to gradual tissue breakdown/necrosis, and even deadly infections. Pressure ulcers not only have a 20% incidence rate in clinical settings; they cost the US medical industry over \$11 billion each year. While contemporary technologies have been designed to reduce the incidence of pressure ulcers, the excessive cost and complexity of these devices has inhibited widespread use and notable change in ulcer mortality rates.

Our product, PURmap, is a cost-effective and user-friendly mattress topper device that helps healthcare workers monitor and prevent pressure ulcer formation in immobilized individuals. The device consists of four panels that detect pressure changes in the head/neck/shoulder, torso, buttock, and ankle regions. The pressure sensor array monitors localized peaks in skin pressure, the microprocessor records pressure data over time, and the user-interface alerts the caretaker to move the patient with LED lights. Through a series of verification and validation studies, we have proven the effectiveness of our device in monitoring pressure ulcer formation. While conducting research, we supplemented literature review with feedback from healthcare professionals. While we are continuously improving our design, it's implicated that our product will be designed to facilitate implementation into healthcare facilities and maintain usability to reduce the occurrence of pressure ulcers.

**141: Healthcare and Unstable Housing In Pittsburgh, PA: A Comprehensive Analysis on Disparities & Education**

Emma Patton | Biology | Bayer School of Natural and Environmental Sciences | Senior  
Faculty Advisor: Cathleen Appelt, Ph.D.

**ABSTRACT:** In February 2022, the Allegheny County Department of Human Services estimated that 880 individuals in the county were currently experiencing homelessness. Research suggests that most of these individuals suffer from one or more conditions including mental illness, substance abuse, chronic illness, and more. Despite this, homeless individuals do not access healthcare due to barriers that must be identified and addressed.

Through personal experiences including working at UPMC Mercy's emergency department in Downtown Pittsburgh, participation in Duquesne University's Community Engagement Scholars program, internships at Pittsburgh nonprofits, and past research on intersectionality in Pittsburgh, I have identified a severe lack of knowledge concerning patients facing unstable housing. Conjointly,

research has shown that healthcare providers often display negative attitudes toward these patients due to a lack of education for care and bias.

To tackle this systemic problem and find a long-term solution the following is addressed: “What do healthcare employees and future healthcare employees need to know to better support low-income and homeless populations in Pittsburgh, PA?”. To analyze this, my work represents an expansion to an existing faculty research project at Bethlehem Haven’s Medical Respite Program. Medical respite staff members and medical respite residents were asked what future healthcare workers need to know to best serve persons who are unhoused, and the results were used to form a learning module on caring for patients with unstable housing. While this research shows a better understanding, to make long-term change, this information must be utilized to guide learning for those in the healthcare field.

#### **142: CAUTI-gone: Redesigning Urinary Catheter Tubing To Prevent Catheter Associated Urinary Tract Infections (CAUTIs)**

Taylor Short | Biomedical Engineering | Rangos School of Health Sciences | Senior

Nathan Watkins

Austin Connor | Biomedical Engineering & Nursing | Rangos School of Health Sciences, School of Nursing | Senior

Katie Haley | Biomedical Engineering and Nursing | Rangos School of Health Sciences, School of Nursing | Senior

Lucia Secaida Del Cid | Biomedical Engineering | Rangos School of Health Sciences | Senior

Faculty Advisor: Leda Kloudas, Ph.D.

**ABSTRACT:** In the United States, 449,000 people develop a catheter associated urinary tract infection (CAUTI) each year, treating such infection costs around \$760 per patient. Our project aims to provide a way to reduce the incidence of urinary tract infections in hospitalized patients through a novel catheter redesign.

CAUTI-gone is redesigning the tubing of urinary catheters with the goal of preventing backflow of urine. This design utilizes both the balloon insertion and the urine collection bag from an approved catheter model to which our tubing will be attached. The novelty of our design includes silicone valves incorporated in the catheter tubing and addresses the problem of CAUTIs by preventing backflow of urine from the tubing into the bladder. Multiple minimum viable products (MVP) have led to the development of a 3D printed mold for injection molding of silicone to have a fully functional prototype.

Based on testing thus far, it can be concluded that the redesign of the catheter tubing will reduce backflow of urine into a patient’s bladder, therefore reducing the incidence of CAUTIs. Initial testing has shown that fluid was able to flow smoothly through to the catheter bag. When flipped upside down, there were only a few drops of water that could backflow past the valves, proving our concept successful. It is anticipated for this standard to continue when further testing is done. Future work includes refining the prototype and testing the design to evaluate the effectiveness of it preventing urine backflow.

### **143: Developing a Novel Attachment to the Covidien Electrosurgical Unit Handpiece to Advance Current Treatment of Compartment Syndrome on the Battlefield**

Kiearra Saldi | Biomedical Engineering | Rangos School of Health Sciences | Senior  
Sarah Bergfelt

Emily McCarty | Biomedical Engineering | Rangos School of Health Sciences | Senior

Natasha Novak | Biomedical Engineering | Rangos School of Health Sciences | Senior

Cassandra Sikes

Faculty Advisor: Leda Kloudas, Ph.D.

**ABSTRACT:** The U.S. Military is the world's lead fighting force, having developed the most advanced technology. However, shortcomings within combat medicine have resulted in an unproportionate number of tragedies. The combat environment compromises medical care, leading to 18% of tragedies being otherwise preventable. Soldiers have a significantly increased risk for trauma, which can develop into dangerous complications. Therefore, adequate medical care is essential.

Compartment syndrome is a common condition developed from physical exertion and injury. The trauma causes swelling/bleeding within the muscles, increasing compartment pressure and inhibiting blood flow from the inelastic surrounding fascia. This leads to ischemia, hypoxia, tissue/muscle/nerve damage, and (if severe) limb amputation. The standard treatment method is fasciotomy, a surgical procedure cutting skin and fascia to re-establish normal blood pressure and flow.

Currently, fasciotomies require cauterization through skin and fat, then a scalpel to cut the underlying fascia. However, we've condensed this procedure into a singular device by developing a tip attachment to the Covidien Electrosurgical Unit handpiece (standard). The attachment includes a specialized hooked blade for precise gripping underneath fascia, relieving pressure in a singular cutting motion. Cutting from the fascia's inferior side eliminates potential damage to underlying tissue. This device simultaneously eliminates operation time while aiding in precision and efficiency, improving overall user performance and eliminating patient risk.

With successful operation and integration of our device, we envision its possibility to revolutionize treatment of compartment syndrome. This device is universally beneficial; however, its greatest impact could be seen within the struggling field of combat medicine.

### **144: From Gyl Music to Dog Meat: A Gastromusicological Autoethnography of Traditional Dagara Culture**

Gordon Cortney | Music Performance | Mary Pappert School of Music | Junior

Faculty Advisor: Nicole Vilknor, Ph.D.

**ABSTRACT:** The Dagara people, located primarily in the Upper West region of Ghana, take pride in their careful preservation of traditional customs, amidst years of brutal colonization and ethnocide. Previous ethnomusicological research has recognized the gyl, a Ghanaian xylophone, as the focal point of Dagara society, noting how it interacts with and is inherent in all aspects of their culture. In June and July 2022, I spent approximately three weeks studying gyl repertoire at the Dagara Music Center, located in Medie, Ghana. I participated in local Dagara traditions, observing how gyl music-making is deeply connected to food and drink culture. Reflecting on these experiences through an autoethnographic discussion, I examine the gyl through the lens of gastronomy. In this study, I analyze the gyl's role in the following distinct experiences: consuming dog meat following a traditional Dagara funeral and eating some variation of saab almost every evening for dinner. My presentation will include some live

demonstrations on the gyl, in order to connect the music with the anecdotes I discuss. Food and drink, paired with gyl music, is meant to be shared with company, encouraging solidarity while simultaneously resisting outside influence. Through this study, I argue that these collective activities transmit traditions across generations, thus strengthening the community. My gyl instructor Jerome Balsab told me once that “if the gyl has died, Dagara itself has died.” I build on his view by showing how the acts of eating, drinking, playing, and listening sustain Dagara culture as a whole.

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\*Indicates oral presenter

\*\*Indicated virtual participation

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