26th Annual Graduate Student Research Symposium & Exhibit

Sponsored by
the Graduate Student Association
& the Graduate School

April 25, 2023

University Student Commons,
Commonwealth Ballrooms

VCU Graduate School

gsa Graduate Student Association at VCU

April 25, 2023

Dear Participants and Guests:

I am pleased to welcome you to the 26th Annual Graduate Student Research Symposium and Exhibit sponsored by the Graduate Student Association (GSA) at Virginia Commonwealth University. The Symposium is organized by graduate students and provides them an opportunity to display their scholarly work and cutting-edge research.

The Research Symposium and Exhibit also gives our faculty, staff, undergraduate students, and other members of our university community a chance to witness the outstanding work of our graduate students. The work presented today covers an array of topics reaching across many academic disciplines, representing the impressive scholarship of our graduate student body. I congratulate all of this year's presenters for their contribution to the success of this important program.

I would particularly like to thank Mallory Stephenson, chairperson of the Symposium, and the officers of the GSA who have helped in planning this Symposium. This event is an excellent example of how an active GSA can benefit all graduate students.

Thank you for attending this year's, Symposium. I hope that you enjoy the event.

Sincerely,

Manu Gupta, Ph.D.
Interim Dean, Graduate School

Graduate Student Association

What is the GSA?
The Graduate Student Association (GSA) provides many valuable services to the graduate student body at Virginia Commonwealth University (VCU). The GSA organizes events throughout the academic year including Graduate Student Orientation, Meet & Greet events and social mixers, and the Graduate Research Symposium & Exhibit. The GSA also appropriates funds for graduate student organizations to enhance the quality of the graduate student experience at VCU. Finally, the GSA helps to place graduate students on campus committees, where they represent the voice and express the concerns of VCU's graduate student body.

Our Mission:
The purpose of the GSA is to serve as an advocate for the issues and needs of the graduate students at VCU. The GSA is committed to facilitating programs that enhance the academic skills, professional development, and social environment of all graduate students. There is no fee to join the GSA, every graduate student is a member and eligible to participate in and contribute to the GSA and GSA activities. However, the GSA-sponsored events are not limited to graduate students – all students and faculty are welcome.

Executive Committee:
The purpose of the GSA Executive Committee is to represent, advocate, facilitate communication and provide social activities for the VCU graduate community.

2022-23 Executive Committee

Nick Devlin, President
L. Douglas Wilder School of Government and Public Affairs

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VCU Life Sciences

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Emily Miller, Communications Chair
School of Pharmacy

GSA Council:
The purpose of the GSA Council members is to represent VCU graduate schools, programs and departments by relaying student concerns to the GSA and the Executive Committee. The GSA is looking for representatives from each school to form the Graduate Student Council. Applications may be found at: https://graduate.vcu.edu/life/graduate-student-association/

More Information:
For more information about the GSA, please visit: https://graduate.vcu.edu/life/graduate-student-association/

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Facebook.com/VCUGraduateStudentAssociation
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Contact us at gsa@vcu.edu

26th Annual Graduate Research Symposium and Exhibit
Program Agenda

11:00 a.m.
Poster and Presentation Exhibit Opens

11:30 a.m.
Please join us for refreshments

12:45 p.m.
Student Poster Awards
Closing Remarks

2023 Symposium
Judges

A heartfelt thank you to all the faculty and staff who supported the graduate students presenting today, as well as those faculty who were involved in the symposium but not named below. We could not host such an innovative event without your help!

College of Engineering
Joshua Cohen, Ph.D.
Michael McClure, Ph.D.

College of Humanities & Sciences
Emanuele Alves, Ph.D.
Victor Chen, Ph.D.
Christopher Ehrhardt, Ph.D.
Ryan Garten, Ph.D.
Derek Johnson, Ph.D.
Derek Prosser, Ph.D.
Sarah Seashols-Williams, Ph.D.
Oliver Speck, Ph.D.
Chelsea Williams, Ph.D.

L. Douglas Wilder School of Government and Public Affairs
Lindsey Evans, Ph.D.
Nancy Morris, Ph.D.
Chernoh Wurie, Ph.D.

National Scholarship Office
Meredith Sisson, Ph.D.

Office of Research and Innovation
Amy Olex, Ph.D.

School of Education
Michael Broda, Ph.D.
Jeffery Wilson, Ph.D.
Yaoying Xu, Ph.D.

School of Medicine
Russell Boyle, Ph.D.
Kirsty Dixon, Ph.D.
Andrew George, Ph.D.
Séverine Lannoy, Ph.D.
Javier González-Maeso, Ph.D.
Martin Mangino, Ph.D.
Brien Riley, Ph.D.
Roxann Roberson-Nay, Ph.D.
Chelsea Sawyers, Ph.D.
Maria Teves, Ph.D.
Stacey Wahl, Ph.D.
Timothy York, Ph.D.

School of Pharmacy
Caitlin Gibson, Ph.D.

School of Social Work
Adrienne Baldwin-White, Ph.D.
Karen Chartier, Ph.D.
Jacob Goffnet, Ph.D.
Nicole Lee, Ph.D.

VCU Life Sciences
Sarah Rothschild, Ph.D.

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College of Engineering

Peter Muto
Predictive Modeling of Thermophysical Properties of Shocked Solid Diamond
Peter Muto and Gennady Miloshevsky

Background: Shocks are high pressure waves that propagate in a material above the local speed of sound and induce severe pressure, density, and temperature changes, thus it is critical to be able to predict these effects.

Methods: The shock Hugoniot Equations of State (EoS) allow for the calculation of Hugoniot pressure and volume in a shocked material, but require a linear relationship between shock velocity and particle velocity, both experimentally determined variables. A computational approach is required to evaluate shock propagation in materials and calculate the Hugoniot temperature. Currently a combination of Density Functional Theory (DFT) and Quantum Molecular Dynamics (QMD) is the most widely used method capable to predict the EoS of materials. While useful, it require large amounts of computational power and time. Diamond is a simply structured form of the carbon, an abundant element found in most materials. The EoS of diamond calculated from the DFT-QMD approach were parametrized and implemented as the REODP computer code. REODP can evaluate the pre-shock state of solid diamond phase much faster than it can be done using the DFT-QMD method.

Results: The shock Hugoniot EoS implemented into REODP successfully replicated data compiled by the DFT-QMD code and experimental data to a high degree of accuracy. The Hugoniot temperature was calculated as the difference in the straight line Rayleigh energy and the Hugoniot energy determined from the integral of curve fits.

Conclusion: REODP predicts the thermophysical properties of shocked solid diamond at a given initial temperature, volume, and shock velocity.

Md Fazle Rabbe
Properties of Graphene for Mid-Wave Infrared Detectors

Background: Technologies for long-wave infrared LWIR has developed so much and detector are available on room temperature for LWIR. However, the room temperature mid-wave infrared (MWIR) detector is not available. So for developed MWIR detector requires cooling which make the detector bulky, costly and power hungry. Graphene is a very potential material which can be used for making room temperature MWIR detector.

Objectives: Experimentally measure, calculate and analyze different properties of graphene in different structure to show the potentiality of graphene to be used for MWIR as a 2D material.

Methods: Graphene was doped with boron and its electron transport properties was measured practically with Hall measurement system which showed a stable property over wide range of temperature. Graphene based FET was fabricated in the cleanroom (Virginia Microelectronics Center) of VCU which shoed modulation characteristics of graphene. These results opens the pathway of for graphene to be consider for a room temperature MWIR detector.

Results: Electron transport properties of graphene are independent of temperature. Graphene transport properties can be modulated with external factors.

Conclusions: Graphene is a very good candidate for room temperature mid-wave infrared detector.

Juniper Savchick
First Principles QMD Modeling of Carbon EOS Under Extreme Conditions
Juniper Savchick and Gennady Miloshevsky

The equations of state (EOS) relating density (or volume), temperature, and pressure describe the specific state of matter. There is no universally applicable approach for generating the EOS for all known materials, phases, and thermophysical conditions. It is therefore necessary to combine the experimental and computational approaches when determining the EOS for a given material. The accuracy of a particular approach is significantly affected by the temperature and pressure regimes being studied in relation to the phase of the material. Phase transitions in extreme thermophysical conditions present a unique challenge because they require a unified computational approach that can describe materials in all relevant states of matter. Therefore, the EOS determined from a first principles Quantum Molecular Dynamics (QMD) approach are of great importance for high-fidelity prediction of thermophysical properties of material phases and warm dense plasmas in a range of densities and temperatures. The resulting EOS can then be compared to high-energy laser induced shock compression experiments. This experimental technique is incredibly effective at generating the required temperature and pressure regimes. The Quantum Espresso software package is used to perform the Car-Parrinello and Born-Oppenheimer QMD modeling in order to generate the EOS and phase diagram of solid Carbon (C) phases in extreme environments. This method will be utilized in the future to model the liquid phases of C as well. The other thermodynamic properties such as the internal energy, enthalpy, etc. are also evaluated. The cold pressure and internal energy isotherms of C are compared to those calculated using a parametric model implemented in the REODP code. The thermal contribution to the total EOS due to the vibration of atoms and the motion of electrons is analyzed. The QMD EOS data are also used as an input for quantifying and reducing model uncertainty of thermophysical properties of material phases.

Logan Schorr
Sustainability in Post-Processing of Additive Manufacturing Using Machine Vision and Collaborative Robots

Background: The industrial standard for post-processing of metal additive manufacturing (AM) parts is entirely manual or enabled by human agents. These conditions can be very dangerous due to the high temperatures and respiratory irritants, so there are significant benefits to automation. By using a style of robot called collaborative robots, which are designed to work safely in close proximity to humans, certain environmental safety measures are removed as they can be walked around safely on a shop floor.

Methods: This automation is achieved by using a TOF camera on the end effector of a collaborative robot. This camera allows for collection of a point cloud, accurate 3D information about the workspace. This is used with a custom high-temperature end effector to facilitate autonomous post-processing.

Results: This pointcloud is processed to identify the orientation and location of the AM machine, so that the robot capable of navigation without needing direct human control. The processing techniques filter out extraneous data and reorient the pointcloud with respect to the robot coordinate system. Once the pointcloud is only the working surface, a bounding box is generated from the convex hull. The location of the table is sent to the robot using ROS, which controls the robot accordingly.

Conclusion: This system, once fully implemented, will be able to safely remove humans from

the dangers of the metal AM manufacturing process, and allow for AM to serve as a sustainable replacement for subtractive manufacturing, with less material waste and more efficient topology.

Edmund Semaha
Modeling of Expansion of Laser-Produced Aluminum Plasma Plume in Ambient Air
Edmund Semaha and Gennady Miloshevsky

When a laser pulse is focused on an aluminum target, it interacts with the material's surface and a plasma plume is developed. Hydrodynamic expansion of generated plasma plume consisting of interacting target and ambient gaseous species remain one of very significant subjects of plasma plume chemistry, yet to be fully understood. The revealing of fundamental physics processes which occur within these plasma plumes is not only of purely scientific advancement, but it is also of industrial interest. Our research focuses on the development of Computational Fluid Dynamics (CFD) model that is used to investigate the chemistry of expanding plasma generated during laser ablation of aluminum in air ambient. We apply the reactingMultiPhaseEulerFoam (rMEF) solver that is a part of OpenFOAM software package in order to model the expansion of plasma plume into an ambient gas. The proper thermodynamic, transport, atomic, and phase change properties for aluminum-air plasma are set in this solver. The formation of chemical compounds is believed to be due to the hydrodynamics of interactions between plasma species. The rMEF CFD results on the time and spatial evolution of plasma plume are validated against those calculated from other OpenFOAM solvers. The hydrodynamic fields of pressure, density, temperature, and velocity are analyzed and compared with published experimental data. The expansion dynamics of aluminum plasma plume into an air background provides the insights into the atomic and chemical processes occurring in the laser-produced plasma.

Casie Slaybaugh
Sex Differences in Immune Response to Extracellular Matrix Nanoparticle Treatment of Endotoxin-Induced Lung Injury
Casie E Slaybaugh, Keith L Li, Jessica M Nguyen, Rebecca L Heise

Background: Acute respiratory distress syndrome (ARDS) is a severe form of lung injury that leads to the breakdown of gas exchange in the lung. There is no cure and the current standard of care is merely providing respiratory support through mechanical ventilation. This study utilizes an electrically charged nanoparticle fabricated from lung extracellular matrix (ECM). Inhaled ECM has been explored in multiple ways for treatment of lung disease; however, organ-specific inhaled nanoparticles are a novel treatment. We hypothesize that ECM nanoparticles will improve the immune response to LPS injury.

Methods: Male and female mice aged 12-20 weeks were injured with lipopolysaccharide or saline control and treated with ECM nanoparticles or saline control. Animals recovered for 24 hours then were sacrificed and samples including bronchoalveolar lavage fluid (BALF) and lung tissue were collected. Protein in BALF was analyzed.

Results: Lipopolysaccharide significantly increases total protein in BALF. With treatment, female mice show a significant decrease in lavage protein while male mice show no significant difference from positive control.

Conclusions: ECM nanoparticle treatment significantly decreases total protein in BALF in female mice while there is no significant difference between sexes in positive control. It is known

that male mice show a more exaggerated immune response to LPS injury than female mice, but sex differences in response to ECM treatment have not been explored. Future directions of this study include modulating the dose of nanoparticles and conducting further analysis of samples.

College of Health Professions

Brian Battle
Community Narratives and Experiences of Alzheimer's Disease and Other Dementias

Background: According to the Alzheimer's Association, African-Americans have the highest Alzheimer's disease rate and are about twice as likely as white Americans to be diagnosed with Alzheimer's disease. However, there has been a dearth of research elucidating the narratives that undergird these facts. This project uses a qualitative approach to explore African-American perspectives on Alzheimer's disease and other dementias.

Methods: This study uses qualitative thematic analysis to examine interviews with African-American community members which were conducted following educational presentations related to Alzheimer's disease and other dementias. This research is also informed by the constructs, concepts, and analytical tools of narrative gerontology.

Results/Conclusions: Data collection and analysis for the current study is ongoing and is being conducted within the context of a larger project seeking to increase community awareness and knowledge of Alzheimer's disease and other dementias.

Meghan Farkas
Nonpharmacological Practices for Reducing Agitation in Persons with Dementia

Background: 1 in 11 people aged 45 years and older experience subjective cognitive decline, with nearly a third identifying a decline in the ability to participate in social activities, work, or volunteering. There are twelve modifiable risk factors that can either increase or decrease an individual's possibility of developing Dementia. This can include excessive alcohol consumption, head injury, air pollution, lower education level, hypertension, hearing impairment, smoking, obesity, depression, physical inactivity, diabetes, and infrequent social contact. These modifiable risk factors may prevent or delay up to 40% of dementias. Furthermore, many risk factors cluster around inequalities, which occur particularly in Black, Asian, and minority ethnic groups and in vulnerable populations. Of the individuals who develop dementia, they may experience behavioral and/or psychological symptoms, such as agitation, depression, apathy, aggression sleep changes, wandering, and psychosis. Therefore, pharmacological intervention has become the most used treatment for those with dementia, such as antidementia drugs, antidepressants, antipsychotics, mood stabilizers, and benzodiazepines.

Methods: The purpose of this literature review is to determine the non-pharmacological interventions that may help in the reduction of agitation among persons with dementia, thus attempting to highlight alternative treatments that may be more beneficial than pharmacological interventions. In addition, this review examines living options for individuals with dementia, as well as the types of dementia care that are offered at such places. This includes assisted living facilities, long term care facilities or nursing homes, continuing care retirement communities, as well as adult day care centers in the Richmond area.

Results and Conclusion: It was determined that there are several psychosocial and physical

interventions that may offer more benefits in reducing agitation among persons with dementia. However, many of these interventions are not offered at many places of living, such as assisted living facilities or continuing care retirement communities. Thus, posing further challenges in providing the best care for persons with dementia.

Jenna Schiferl
Psychometric Validation of the Stress Appraisal Measure-Revised in a Sample of Individuals with Multiple Sclerosis

Background: People with multiple sclerosis (MS) must often cope with a high level of stress. Lazarus and Folkman's (1984) stress-appraisal-coping theory described the importance of stress appraisals to determine which behavioral responses and coping strategies an individual draws upon following stressful events. One of the most validated stress appraisal measures is the *Stress Appraisal Measure* (SAM; Peacock & Wong, 1990), which was further developed as a dispositional measure, SAM-revised (SAM-R: Roesch & Rowley, 2005). However, it has not been validated in adults with MS. The purpose of this study was to confirm the measurement structure and psychometric properties of the SAM-R with a sample of adults with MS.

Methods: A confirmatory factor analysis was used to examine the factor structure of SAM-R with 477 adults with MS.

Results: CFA confirmed the three-factor structure; $\chi2 /df$ = 3.94 (less than 5), *CFI*= .95 (higher than .90), *RMSEA* = 0.079 (90% confidence interval [0.070, 0.087]; less than .08), and the *SRMR*= .046 (less than .08). The three factors include (a) challenge appraisal, (b) Threat appraisal, and (c) centrality appraisal. Correlations among these three factors and external measures of related concepts provided evidence of the validity of these factors.

Conclusion: The SAM-R is a psychometrically validated measure that can be incorporated in rehabilitation counseling, mental health, and health care settings to assess stress appraisal style. Rehabilitation and health professionals can use it to evaluate the effectiveness of psychosocial interventions to help people with MS manage stressful life events and improve their mental health.

College of Humanities & Sciences

Saleh Bin Khulayf
What Motivates Saudi Females' Intentions to Get Mammography? A Randomized Control Trial to Evaluate Effective Preventative Messages

Background: In Saudi Arabia, breast cancer mortality is a public health concern where females often discover breast cancer at an advanced stage due to ignoring preventative testing such as mammography. While increasing mammography awareness is essential in Saudi Arabia, almost nothing is known about the effectiveness of health communication messages in mammography's context. This research tested whether exposure to Entertainment-Education (E-E) message or educational infographic messages would influence Saudi females' intentions to get mammography.

Method: This research relied on a randomized control trial among n=240 Saudi females older than 40. Respondents were randomly assigned to watch YouTube E-E message or read educational infographic messages. The control group was not exposed to any preventative

messages. All participants in the three arms received one validated questionnaire that measured the constructs of the Theory of Planned Behavior (TPB) (i.e., attitude, subjective norms, and perceived behavioral control) and issue involvement.

Results: Hierarchical regression revealed that females' intent to get mammography was associated with those who watched the E-E message and had a positive attitude, norms, control, and involvement. Moreover, females' intent to get a mammogram was associated with females who got a mammogram in the past, at younger ages, without a family history of breast cancer in their mothers.

Conclusion: The findings explain what Saudi health communication professionals should consider when designing mammography educational messages for Saudi females. However, to reduce breast cancer mortality in the future, it is essential to increase health communication campaigns and assess its impacts on females' screening decisions.

Casey Burton
Intergenerational Transmission of Alexithymia as a Predictor of Child Posttraumatic Stress Outcomes During COVID-19
Casey Burton, Wendy L. Kliewer, Traci Wike, Marcia A. Winter

Background: Given the importance of emotion socialization in children's development and mental health (Eisenberg et al., 1998; Hajal & Paley, 2020), examining how emotion dysregulation (e.g., alexithymia) may be transmitted from parent to child could inform our understanding of why some children are functioning relatively well during the pandemic while others are experiencing poor mental health. Thus, the objective of this study was to test the role of parent alexithymia in explaining heterogeneity in child COVID-19 outcomes.

Methods: A path model was hypothesized, in which greater alexithymia symptoms in parents would be associated with greater alexithymia symptoms in children, which in turn would be associated with greater child post-traumatic stress symptoms (PTSS). An alternative model, in which the relations between parents' alexithymia symptoms and greater child PTSS was moderated by alexithymia symptoms in children, was also tested. Participants were 88 U.S. children (M_{age} = 9.94 years; 54.5% female, 45.5% male; 59.1% White) and their primary caregiver (68.2% female, 31.8% male; 59.1% White).

Results: The path model was statistically significant (β = 0.15, *SE* = 0.05, 95% CI: [0.07, 0.25]) whereas the alternative model was not (β = .06, *p* = .44).

Conclusions: Findings highlight the importance of emotion understanding and regulation during mass trauma. Parents who struggle to process emotions may be less able to assist their children with the emotional processing necessary to cope during a mass trauma like the COVID-19 pandemic.

Thomas Cecil
Standardization and Characterization of Multidirectional Stationary Phase Gradient Formation Along Commercial HPLC Columns

Multimodal multi-column separations have been used for a number of years. These approaches provide flexibility in creating separations, but are slow and experimental in application. However, a multimodal separation using a continuous solid phase gradient provides the promise of affecting difficult separations using a single chromatographic column. Multimodal columns are

created using a controlled rate infusion to create a directional linear gradient. However, to date this has been established using C-18 columns alone. This work establishes the ability to form a gradient along a C-8 column as the starting functional group. The gradient is formed using trifluoroacetic acid to cleave the silica oxide bonds and remove the attached groups. The method is stable enough to cleave the functional groups even with polar groups imbedded into the column protecting the silica. Once portions of the stationary phase have been stripped of functional groups, the resulting column can affect separations of a mixture relying on both C-8 mechanisms as well as bare silica mechanisms. In the pursuit of better understanding of the gradients created standardization of important causes of variability in the columns were pursued. TGA analysis along the length of the column allows for a quantification of the remaining functional groups attached to the silica. Additionally testing of the radial homogeneity of the stripped columns were explored.

Kolton Cobb
Myocardial Perfusion is Compromised in Patients with COPD and Associated with Reduced Functional Capacity
Kolton Cobb**,** Tijana Simovic**,** Chloe Matheson**,** Allison Heefner, Christopher Thode, Rebekah Lavender, Patrick Nana-Sinkam**,** Paula Rodriguez-Miguelez

Introduction: Chronic Obstructive Pulmonary Disease (COPD) is a leading cause of death worldwide with elevated cardiovascular mortality. Arterial stiffness, a risk factor for cardiovascular disease (CVD), may impair myocardial blood flow and functional capacity in COPD, key components of cardiovascular health and quality of life. Despite this the relationship between myocardial perfusion and functional capacity in COPD remains unexplored.

Purpose: To test the hypothesis that myocardial perfusion is reduced in COPD and positively associated with functional capacity.

Methods: Ten patients with COPD and 10 controls completed an analysis of vascular function and functional capacity. Vascular function was assessed via myocardial perfusion (subendocardial viability ratio (SEVR)) and arterial stiffness (Pulse Wave Velocity (PWV)). Functional Capacity was measured via six-minute walk test distance (6MWT) with dyspnea utilizing a 0-10 scale.

Results: COPD exhibited reduced (p=0.041) myocardial perfusion (SEVR: ΔCOPD=131±19% *vs.* ΔControl=153±28%) with increased arterial stiffness (PWV: ΔCOPD=8±1 m/s vs. ΔControl=6±1 m/s, p=0.013). Functional Capacity was reduced (p<0.001) in COPD (6MWT Distance: ΔCOPD=274±87 m *vs.* ΔControl=476±99 m) with increased (p=0.02) post exercise dyspnea (ΔCOPD=3.1±2.4 *vs.* ΔControl=0.8±1.2 a.u.). Myocardial perfusion was associated with 6MWT (r=0.693; p=0.038).

Conclusion: Myocardial perfusion in COPD is associated with functional capacity, a key component of quality of life and mortality. This data emphasizes how myocardial perfusion may predict prognosis in COPD without diagnosis of CVD. Future studies should explore the causational role of myocardial perfusion in decreasing functional capacity and its potential as a therapeutic target.

Samuel Crawford
Climbing for Community: Qualitative Analysis of Gender-Identity and Climbing

Background: Sociological study of queer representation in sports has historically focused on gender within team sports, but less is known about these dynamics in more individual-oriented sports like climbing. Sociological scholarship on these dynamics in climbing has been relatively sparse. More mainstream analyses of queer issues in sports generally could potentially help examine these concepts. However, my experiences as a climber and former industry professional led me to believe that a more targeted qualitative sociological approach would provide valuable insight and perspective, particularly regarding this sports comparison.

Methods: This analysis draws upon ethnographic observation of a climbing gym in the Richmond area in Fall 2022, supplemented with in-depth, semi-structured interviews with climbers.

Results: Respondents of different identity backgrounds contrasted their experiences in climbing with those in other sports, team and individual. In particular, they commented on the inclusivity of the climbing community, providing examples of less hostility towards their queerness and more queer community. Most climbing requires collaboration and community, leaving less room for discrimination.

Conclusions: Climbing as an activity necessitates community due to its collaborative nature. Climbing has always been centered around a counter-cultural ethos, making it a prime candidate for inclusion of queer participants seeking community. This research suggests how the structure of certain sports may create different interpersonal dynamics. Specifically, it also deepens our theoretical understanding of how behaviors of toxic masculinity or queer inclusion may be rooted in the design of sports and the extent to which they encourage collaboration.

Brandon Daul
Microchannel Effect on Cellular Growth Behavior

Background: 3D printed cell culture platforms have a diverse range of possible applications. One such platform is 3D printed microchannels which have garnered interest recently as a means to investigate the growth behavior of cellular cultures. Understanding cellular behavior within the channels will first require a complete understanding of interactions between cells and the local microenvironment. A complete understanding of cell-to-local microenvironment interactions will allow for greater control over cellular growth patterns within increasingly complex microchannel structures.

Methods: In this study we bioprinted and cultured NIH/3T3 cells between 3D printed RTV silicone walls to form microchannels. Various channel and wall widths were used to allow for interactions between the microenvironment and cellular behavior to be fully investigated. Images of microchannels were taken at three-day intervals and ImageJ was used to map and analyze cellular growth.

Results: Cells constrained with microchannels were observed to form distinct thin wire-like shapes within the center and along the length of the microchannel. This shape is unique as cells without microchannels will grow unrestrained and with no discernible pattern. Microchannel constrained cells were also observed to exhibit 3D proliferation and growth after fully filling the microchannel base.

Conclusions: Constraining cells with microchannels allows for greater control over cellular growth patterns and even for 3D proliferation and growth of cells. Using these microchannels

and understanding how they affect cellular behavior promises construction of more complex in vitro microchannel culture platforms with better control over cellular growth patterns.

Elizabeth Amona

Incorporating Interventions to an Extended SEIRD Model with Vaccination: Application to COVID-19 in Qatar
Elizabeth Amona, Edward Boone, and Ryad Ghanam

The COVID-19 outbreak of 2020 has required many governments to develop and adopt mathematical-statistical models of the pandemic for policy and planning purposes. To this end, this work provides a tutorial on building a compartmental model using Susceptible, Exposed, Infected, Recovered, Deaths, and Vaccinated (SEIRDV) status through time. The proposed model uses interventions to quantify the impact of various government attempts made to slow the spread of the virus. Furthermore, a vaccination parameter is also incorporated in the model, which is inactive until the time the vaccine is deployed. A Bayesian framework is utilized to perform both parameter estimation and prediction. Predictions are made to determine when the peak Active Infections occur. We provide inferential frameworks for assessing the effects of government interventions on the dynamic progression of the pandemic, including the impact of vaccination. The proposed model also allows for quantification of number of excess deaths averted over the study period due to vaccination.

Phillip Glass

3-D Printed Artificial Cilia Arrays: A Versatile Mechanosensing Tool for Perception and Response

Background: Mechanosensors are essential for robotic detection of environmental stimuli in e-skin and minimally invasive surgery with industrial, environmental, biomedical, and bionic skin applications in soft robotics, where tactile sensors are used to supplement human skin. Recently, artificial cilia sensors offer a new way of sensing and responding to changes in the environment, with applications ranging from microscale fluidics to soft robotics.

Methods: To fabricate fully 3D printed cilia sensing devices, a facile synthesis and printing method were developed for rapidly cured high aspect ratio electrically conductive micro-cilia. The ink was fabricated with a blend of Polycaprolactone (PCL), Graphene nanopowder, and dichloromethane (DCM), and iteratively tested using Raman spectroscopy, X-Ray photoelectron spectroscopy, scanning electron microscopy, viscosity, and contact angle measurements.

Results: A new, bio-inspired 3D-printable cilium sensing mechanism has been developed to detect mechanical stimuli. This 'inter-cilium contact' based sensing mechanism is capable of transducing physical changes in the environment into interpretable electrical responses when perturbed. High-aspect-ratio micro-towers with high conductivity are 3D printed and organized so that allowing them to brush against each other when disturbed creates a current pathway for sensing.

Conclusions: This novel sensing mechanism has the potential to revolutionize the development of multi-sensing and flexible electronic skin (e-skin) for smart robotics and human prosthetics. The sensor is versatile and easily tailored to a range of perception and reception sensing functions, such as Braille readers, artificial eyelashes, hinge sensors, and air and water flow sensors.

Chandler Golden and Thea Racelis
Funds of Racialized Identity: A Conceptual Model of Funds of Identity, Ethnic-Racial Socialization, and Ethnic Racial Identity Development
Chandler Golden, Thea Racelis, Hillary Parkhouse, Chelsea Williams, Fantasy Lozada, and Jesse Senechal

Background: This research draws from the fields of education and psychology to combine theories centering on students' experiences as assets that can be leveraged to enhance their educational experience. The theories specifically informing this work are Funds of Identity (FOI), Ethnic Racial Socialization (ERS), and Ethnic Racial Identity (ERI). FOI is a framework that disrupts deficit thinking and centers experiences that students consider meaningful to forming their own identity (Esteban-Guitart, 2014, 2016; Saubich & Esteban-Guitart, 2011). One key element of students' identity is their ethnic-racial identity and racial socialization experiences. ERS refers to the practices, messages, and experiences about race and culture that are communicated to youth of color by socializing agents (Hughes et al., 2006). ERI encapsulates the processes and content related to an individual's sense of self regarding their ethnic and racial background (Williams et al., 2020). Together these theories provide a culturally affirming framework to further uplift students' lived and educational experiences

Method: Two doctoral students engaged in a rigorous literature review of the aforementioned theories to create a conceptual model.

Results: The FOI framework consists of five types with scholars proposing additional types worthy of investigation (Esteban-Guitart, 2012; Poole & Haung, 2018; Zippin, 2009). Within ERI and ERS individuals undergo a similar process wherein they receive a myriad of ERI and ERS types (Williams et al., 2020; Hughes et al., 2006).

Conclusion: Viewing FOI as racialized through the lens of ERS offered new frameworks for educators to incorporate students' identities and experiences into the classroom as assets.

Miles Gomes
The COVID-19 Pandemic Impact on Academic Performance in College Students: Effects of Mental Health and Pandemic Severity
Miles Gomes, Kaitlin E. Bountress, Ananda B. Amstadter

Since the Winter of 2019, the world has been entrapped by the spread of COVID – 19, causing college students to transition from in person classes to remote learning. Since the start of the pandemic, research has found associations increased prevalence of mental health and substance use difficulties within developing adults, perhaps due to the stress and trauma associated with the pandemic. Mental health and substance use have been associated in prior studies with poor academic performance prior to the pandemic. It is unknown if academic performance has been altered by severity of exposure to the pandemic, or moreover, if performance is moderated by pandemic-related mental health and substance use. Thus, this present study is aimed to fill these gaps. Analyses will test the hypothesis that the severity of pandemic impact will be related to poorer academic performance. Further analyses will test the hypothesis that the relationship between pandemic severity and academic outcomes is influenced by mental health and substance use outcomes. To test the research questions, survey data from an ongoing longitudinal study of college students will be used (n = 897, 79% female; 40% White, 23% Asian, and 18% Black), including data before the pandemic (Spring 2019), initial pandemic onset (Spring 2020) and during the ongoing phase of the pandemic (Fall 2020). Survey data on pandemic severity (negative impacts as a result of the pandemic), mental

health (e.g., anxiety, depression, posttraumatic stress disorder), substance use (e.g., alcohol, illicit substances), and academic outcomes (e.g., GPA) will be used. Latent growth curve modeling will examine the trajectory of GPA across time. Mental health symptoms and pandemic severity will be examined as predictors of the trajectory, adjusting for demographic covariates. Next, we will examine the interaction between impact severity and mental health symptoms in prediction of academic outcome. Results will be discussed and implications for college student mental health and academic performance will be reviewed.

Brittney Hackworth
Use of Optical Trapping Coupled with a Microfluidic Device for Cell Separation

Background: Biological mixtures are prevalent in many forensic science evidentiary samples and make interpreting DNA profiles difficult. Currently, differential extractions are used to separate a mixture into a spermatozoa fraction and non-spermatozoa fraction, however, this separation method can result in ambiguous allele calls, masking of alleles and persistent mixtures in the DNA profiles.

Methods: Optical trapping is a front-end separation technique that utilizes a highly focused laser beam capable of manipulating dielectric particles such as cells. The optical tweezer method paired with a microfluidic device can isolate cells of interest from a mixed sample and minimize interpretation discrepancies that may occur. The microfluidic device layout was created using AutoCAD LT ® 2018 software and consists of PET, a heat sensitive adhesive and a coverslip. Spermatozoa and epithelial cells were trapped with a 5W ytterbium linearly polarized laser.

Results: In the sperm fraction, 97.37± 2.63% of the expected alleles were observed and a full DNA profile was observed with as few as 25 sperm cells. The average degradation index from the quantification stage was calculated to be 1.00± 0.52 for the 1:20 seminal fluid samples and 1.16±0.52 for the mixture containing equal parts of 1:20 seminal fluid and vaginal fluid, corresponding to a negligible amount of degradation.

Conclusion: This novel cell separation method shows promise for use in differentiating cells in forensic mixtures – not only in sexual assault samples, but in mixed samples of other types.

Hannah Heintz
Examining the Relations Between Temporal Discounting and Mental Health Outcomes in Individuals with Traits of Obsessive-Compulsive Personality Disorder
Hannah Heintz, Adanya Johnson, Kelsey Hagan, Ann Haynos

Background: Temporal discounting (TD), a measure of delay tolerance, has been used to measure impulsivity and self-control across mental disorders. Higher self-control (i.e., greater delay tolerance) on temporal discounting is associated with greater quality of life (QOL) and is typically seen as adaptive. However, symptoms of obsessive-compulsive personality disorder (OCPD) such as perfectionism, excessive productivity, and miserliness may reflect a maladaptive, dogged form of self-control. Thus, we examined whether higher TD predicted worse mental health (anxiety, depression) and QOL in those with higher OCPD traits.

Methods: Cross-sectional survey data from two studies (n_1=86, n_2=92) were analyzed to test whether OCPD traits moderated relations between TD and anxiety, depression, and QOL.

Results: A significant main effect was found of TD on anxiety (p=.012) in Study 1; higher self-

control was associated with lower anxiety. No interaction effects were found between TD and OCPD traits in predicting outcomes in either sample. Exploratory analyses of specific OCPD trait domains found main effects of higher neuroticism (i.e., negative affectivity) on greater depression (Study 1 and 2: $ps<.001$) and lower QOL Physical Health, Psychological, and Environmental dimensions ($ps=.003$ to $<.001$). No interaction effects were observed between TD and specific trait domains on outcomes of interest.

Conclusions: Results suggest that, while certain OCPD traits are associated with depression and worse QOL, these traits do not necessarily alter relations between self-control and mental health. As our sample was not selected for OCPD diagnosis, the traits observed may not have reached a severity level at which self-control becomes maladaptive.

Rebecca Hoppe
When a Parent Dies: A Scoping Review of Protective and Risk Processes for Child Bereavement

Background: The death of a parent has the potential for profound effects on child development. Yet, little is known about the individual and environmental processes that contribute to heterogeneity in youth bereavement outcomes. This review identified and synthesized protective and risk-related processes to bereavement outcomes in parentally bereaved children.

Method: Quantitative studies were included if they focused on (a) parentally bereaved youth (ages zero through 17 years) and (b) protective or risk processes for childhood bereavement outcomes in the form of a moderation, mediation, or compensatory main effect. The literature searches were conducted in CINAHL, PsycINFO, and PubMed databases.

Results: Twenty-three studies reported one or more protective and risk processes for childhood bereavement outcomes, including child level coping and self-system processes and environmental processes caregiver and family, stress exposure, and mentor processes.

Conclusion: Findings can be used to apprise families, clinicians, and policy makers of the unique nature of youth bereavement processing and those processes that are associated with better outcomes. Theoretically, interventions that promote those processes can be proximal targets for change by interventions designed to promote resilience of parentally bereaved children.

Morgan Jackson
Evaluating a Temperature-Dependent Mosquito Population Model

Background: Dengue Virus causes over 390 million infections and around 40,000 deaths each year. This virus is primarily transmitted by the mosquito Aedes aegypti. The life cycle of these mosquitos is significantly impacted by temperature, however, temperature is often neglected in mechanistic models. Predictive models of mosquito populations thus require the inclusion of temperature and are valuable for helping medical officials plan for the impact of outbreaks.

Methods: Using mosquito and climate data collected in Córdoba, Argentina from 2010-2013, we developed a non-autonomous ordinary differential equations model that includes temperature-dependent parameters associated with mosquito life history. We performed local sensitivity and identifiability analysis to determine which model parameters should be estimated. We explored the effects of incorporating temperature in different combinations of life history

characteristics to find the most parsimonious model that includes temperature. Additionally, we estimated values for combinations of density-dependent parameters to improve the model fit. These parameters control nonlinear population regulation but are often difficult to estimate from data alone.

Results: We found that including even just three temperature-based parameters: eggs laid per adult female, development rate of juveniles to adults, and adult mortality rate, produced a model that matches the data well. Additionally, we fit a density-dependent parameter and combinations of density-dependent parameters to improve the model fit.

Conclusion: We discuss these results in the context of improving mosquito population and dengue epidemiological models.

Wuwei Li
Infection Prevention and Treatment Based on Controlled Release of Nitric Oxide

Background: Biofilms (clusters of free bacteria) are responsible for a significant proportion of infections and are often resistant to antibiotics, leading to high morbidity and mortality rates. However, there are limited options for preventing and treating biofilm infections. Nitric oxide (NO)-releasing chemical compounds have shown promise as anti-infective agents, but their effectiveness has been limited by uncontrolled release, resulting in either insufficient or excessive doses in different situations.

Methods and Results: Our study aimed to address this limitation by developing methods for precisely controlling NO release for use in anti-infective applications. Specifically, we embedded NO-releasing compounds into a 3D-printed silicone matrix, allowing for customized medical devices such as airway stents. By controlling the size and shape of the drug particle through recrystallization, we were able to further regulate NO release from solid forms. We also screened host molecules to encapsulate and slow down drug degradation in aqueous solutions, leading to several NO-releasing solution formulations that can be infused into intravascular catheters and urinary catheters to reduce the risk of catheter-related infections.

Conclusions: Our findings have important implications for improving the treatment and management of biofilm infections. By controlling NO release, we provide safer and more effective approaches to protect medical devices from bacterial colonization.

Kylie Richardson
Assessment of the Acidified Hydrogen Peroxide Method on Uncontrolled Fired Cartridge Case Samples

Background: Using fingerprints to identify individuals in forensic cases has been useful for many years due to the persistence and individuality of fingerprints. As a firearm is loaded, fingerprints are left on the ammunition; however, it is hypothesized that the pressure of the firing process evaporates and destroys the sebaceous oils that would be left on the cartridge case.

Methods: The firing process of the samples were uncontrolled and not monitored. Once the ammunition had been fired, the cartridge cases were left for a short time to be exposed to the natural elements as well as human interaction; however, the samples were not touched with bare skin. The samples were processed using cyanoacrylate fuming, acidified hydrogen peroxide, rhodamine 6G dye stain, and photographed using an alternate light source. The visualized results were then rated on a scale of 0 - 4 from no ridge detail present to potentially

being used for identification, respectively.

Results: A total of seven calibers were collected: 9mm, .22 short/long, .38 SPL, .40 S&W, .45 Auto, .223 Remington, and .380 Auto; rating an average of 0.114, 0.084, 0.694, 0.169, 0.187, 0.134, and 0.141 out of 4, respectively.

Conclusions: On average, no caliber visualized latent prints that would be valuable enough to be used in a comparison to known prints. There was a noticeable correlation between the pressure produced by the firearm and the surface area of the cartridge case associated with it.

Tijana Simovic

Chronic Electronic Cigarette Users Exhibit Reduced Cardiorespiratory Fitness and Associated Increased Cardiovascular Disease Risk

Tijana Simovic, Chloe Matheson, Kolton Cobb, Allison Heefner, Christopher Thode, Hayley Billingsley, Hannah Salmons, Syed Imran Ahmed, Salvatore Carbone, Ryan Garten, Alison Breland, Caroline Cobb, Patrick Nana-Sinkam, Paula Rodriguez-Miguelez

Background: Electronic cigarettes (e-cigs) are popular tobacco products that are advertised as safer traditional cigarettes alternative despite preliminary data suggesting negative effect of e-cigs use cardiovascular (CV) profile. Cardiorespiratory fitness, a marker of CV health, is diminished in traditional tobacco users, however cardiorespiratory fitness has never been investigated in chronic e-cigs users. Thus, the purpose of this study was to investigate the impact of chronic e-cig use on cardiorespiratory fitness and CV disease (CVD) risk in healthy young adults.

Methods: Ten chronic e-cig users (ECU; e-cigs usage 3±1.5 yr.) and ten never users (NU) participated in this study. Cardiorespiratory fitness was measured by peak oxygen consumption (VO_{2peak}) during a cardiopulmonary exercise test. CVD risk was calculated using Framingham's 30-year CVD risk score accounting for 8 risk factors.

Results: Chronic e-cig users exhibited significantly lower VO_{2peak} (ECU *vs*. NU; 30.9±4.9 *vs*. 37.8±6.4 ml/kg/min; *p*=0.015) and percent predicted (ECU *vs*. NU; 85.9±16 *vs*. 105.4±14 % predicted; *p*=0.001) when compared to never users. Framingham's 30-year CVD risk score was significantly higher in ECU than in NU (7.7± 4.8, *vs*. 2.7±0.8 %; *p*=0.017). Furthermore, an inverse association was identified between VO_{2peak} and 30-year CVD risk (*r*=-0.720; *p*= 0.030).

Conclusions: For the first time, we have identified significantly reduced cardiorespiratory fitness and higher CVD risk scores in chronic e-cig users when compared to never users. Results from our study imply a negative effect of chronic e-cig use on CV health, however, future studies are warranted to further investigate this relationship.

Fatemeh Valizadeh Gamchi

Improving Classification Performance with Conjecturing System

This study investigates the effectiveness of utilizing a conjecturing system in classification tasks. The conjecturing system is used to generate necessary or sufficient conditions for a property of interest that are applicable to any input example. We focus on situations where the target variable is a categorical feature. By incorporating bounds for each class, the model captures the unique characteristics of each category, resulting in improved classification performance. To evaluate the effectiveness of our approach, we used a microbiome dataset to identify Body Fluid type. We included the conjectures as predictors in a random forest model, in addition to the

original features, and observed an improvement in prediction accuracy. Our results demonstrate that the conjecturing system can enhance the accuracy of classification models and improve interpretability, making it a valuable tool in the field of classification.

Claire Wood
Race, Space, and Property: A Geospatial Analysis of Communities Displaced by the Construction of Interstate 95

Eminent domain affords governments the right to take any property for "public use." Existing research reveals a disproportionate number of minorities affected by the use of eminent domain. Building upon a wealth of scholarship theorizing racial capitalism and primitive accumulation, I will explore the racist tendencies of eminent domain. Specifically, I will analyze what is considered "public use", arguing that eminent domain often becomes a form of racial capitalism and primitive accumulation in the modern world. I reach these conclusions through a spatial analysis of the demographics of communities or property owners that have been affected by one specific case of eminent domain, the construction of Interstate 95 through Richmond, Virginia.

School of Education

Destini Braxton
Teacher-Student Relationship Quality, Science Emotional Engagement, and Motivational Beliefs Scale: Scale Development and Validation

Background: As the U.S. student population continues to grow and diversify, it is crucial that researchers begin to explore and identify the factors that influence Black and Latinx adolescents' success in school. Student emotional engagement, which includes a sense of belonging or valuing of the school, is a critical precursor in students' cognitive development and motivation in science classrooms (Gregory & Weinstein, 2008; McClain & Cokley, 2017; Tenenbaum & Ruck, 2007; Van Meale & Van Houtte, 2010). Likewise, teacher-student relationships are essential for fostering optimal levels of student emotional engagement and motivation (Jamsen & Bartell, 2013; Romero, 2018; Russell et al., 2016). Past research on motivation has been mostly conducted with and centered around the Whiteness of academic motivation (Usher, 2018). Further, we know little about the ways in which emotional engagement is experienced by Black and Latinx students.

Methods: The purpose of this study was to develop and test two scales for measuring students' and teachers' awareness of emotional engagement and teacher-student relationships. Participants included science teachers (N = 3) and their students (N = 23) at an inner-city, Title 1, urban middle school in a southeastern state.

Results/Conclusion: Findings suggest good reliability for emotional engagement (student scale, α = .91; teacher scale, α = 0.857) and teacher-student relationships (student scale, α = 0.91; teacher scale, α = .956). The current scale will further researchers' and teachers' understanding in important ways to provide teachers with the opportunity to assess and conceptualize the importance of teacher-student relationships and its influence on motivational beliefs and emotional engagement among minoritized students.

Erin Drulis
The Writing Workshop Pedagogy: A Socio-Emotional Tool for Learning

Background: The aim of this qualitative research project is to highlight student-centered writing pedagogies that are positioned to strengthen student self-efficacy around writing and facilitate a sense of belonging in secondary English classrooms. Pedagogies that center student voices and connect student assets to classroom writing instruction will be explored. In practice, we know little about how teachers receive writing methods for instruction. This qualitative research project aims to capture how three secondary English Language Arts teachers developed and implemented student-centered instruction via the writing workshop pedagogy.

Methods: Qualitative methods and purposeful sampling was used. Data collection involved three semi-structured interviews with secondary English teachers. A codebook was generated for analysis and transcripts were transcribed using Otter.ai software. Codes were sorted by frequency for each participant and were used holistically when analyzing the data.

Results: Emergent findings of this qualitative study found four major themes across three participant interviews: teacher influences matter, students learn by doing, project-based coursework and real-world connections are important, and values are deeply engrained in the classroom. All three participants spoke to these themes in ways that displayed similarities in theory, while yielding a range of different end-products in their respected classrooms.

Conclusions: Positioning students at the center of the learning process proves to be a necessary component in creating lifelong readers and writers. When writing is situated as a deeply personal act, it has the opportunity to encourage students to be change agents, active members of their community, and contributing members of society. We need students with strong voices and modes of expression now more than ever; reading and writing has the opportunity to position students to be more confident in their abilities and more empathetic to others in the process.

Regina Frazier
The Current Science of Morphological Pathways

Inspired by the evidence that morphology is important in literacy development (Breadmore et al., 2021) the role of morphology receives low visibility in models of reading comprehension (Perfetti & Stafura, 2014). Public Schools in the United States struggle to provide qualified educators who effectively cultivate literate members of society. This review of literature inquires: What recent research, if any in reading and special education include the Morphological Pathways Framework? Literature will be analyzed through Atlas.Ti and fills the gap in conversations supporting reading instruction in the K-12 Special Education setting with diverse linguistic learners, and those with disabilities. This in turn impacts practice. Results, and conclusions for future research will be shared and include a highlight on research findings of students with disabilities and adolescent populations.

Preeti Kamat
To Open or Not to Open: Exploring Factors Influencing Faculty Engagement with Open Academic Practices
Jessica Kirschner, Jose Alcaine, Sergio Chaparro, Nina Exner, Hillary Miller, and Preeti Kamat

Background: Open practices such as open-access publishing and open educational resources

(OER) have emerged to increase access to scholarly outputs by removing several barriers to knowledge dissemination. While faculty engagement with open practices is increasing, there still remain barriers to widespread participation. This pilot study aims to explore the influence of various factors on faculty engagement with open practices through the lens of social exchange theory.

Methods: Using an explanatory sequential mixed-method research design, this pilot study obtained the survey responses of 15 faculty members about their perceptions, engagement in open practices, and demographic data such as faculty rank. To better understand the quantitative data, we conducted follow-up focus groups (*N*=7) and individual interviews (*N*=8).

Results: Most faculty members felt the importance of open practices. However, Promotion & Tenure (P&T) seemed a strong influence on faculty engagement. Intrinsic factors (i.e., altruism) are not enough to outweigh the influence of extrinsic factors like P&T in many cases. Trust, recognition & publicity, P&T, and culture were some of the most frequently co-occurring thematic codes. Faculty aren't aware of institutional support for open practices.

Conclusion: The results support the previous research (Lwoga & Questier 2014, Kim 2010, Kirschner, 2019). While refining the survey measures could be the next step for research, the preliminary implications for higher learning institutions could be designing explicit support for open practices in P& T documentation, and increasing faculty awareness about the availability of resources for open practices faculty engagement.

Kimberly Lintag-Nguyen
A Case Study Exploring William & Mary Military Alums' Experiences with Career Transitions
Dirron Allen, Amanda Baldwin-Estep, Matthew Grinsell, and Kimberly Lintag-Nguyen

Background: The purpose of this qualitative study was to understand William & Mary (W&M) Master of Business Administration (MBA) military alums' experiences with their career transitions post-graduation and the influence of the program on their experiences.

Methods: This study utilized a case study design, including focus groups and interviews with 21 alums from the last 10 years and formal, semi-structured interviews with six current faculty and staff. We used Schlossberg's (1981) individuals' situation, self, support, and strategies to analyze data using thematic analysis, and then iteratively reducing codes into themes.

Results: Demographic findings showed a lack of diversity, such as women, people of color, and LGBTQ+. Our findings indicated participants' perceptions of the program's impact on their transitions were positive. We recognized academic and career development resources, impact of military on transitions, and offering of the Executive Partner Program. Our research recognized influential policies and networks and determined the importance of human networks. Lastly, we identified a lack of reported disabilities and shared experiences of minorities.

Conclusions: We found that active-duty alums' situations differed from veterans due to delayed transitions into the civilian workforce. Our participants shared different supports used, such as the Center for Military Transition (CMT), the Executive Director of the CMT, the Graduate Career Management Center, and the Executive Partners Program. Networking and use of coaches also benefited military alums.

Amy Sabet
A Mixed Methods Approach to Evaluation of Action Step Content and Completion

Background: Older adults engage in transdisciplinary health and wellness services with VCU students, led by Richmond Health and Wellness Program (RHWP) faculty at community sites. One program offering was the Prescription Produce Program (PPP). Participants with chronic health conditions received 6 bags of fresh fruits/vegetables, worked towards wellness goals with associated action steps, and tracked health measures over the 6 or 12 week program. Researchers evaluated program effectiveness using a mixed methods approach.

Methods: 56 participants enrolled in the PPP. Participants were 66 years old on average and mostly female (64%). The majority identified as African American/Black (85%). After creating an action step, participants reported their confidence to complete the step on a scale from 0 to 10. Students recorded action step completion during PPP visits. This mixed method analysis includes a) a qualitative analysis of action step content and themes, b) a descriptive analysis of action step set and completed, and c) a correlational analysis to investigate the relationship between action step completion and associated confidence level.

Results: Action step content analysis revealed eight categories: physical activity, smoking management, intake awareness, fruit/vegetable intake, blood pressure/sugar management, intake preparation, weight management, and fluid intake. Thematic evaluation of action steps revealed three domains of change: engagement, management, and awareness. Further descriptive and correlational analyses results will be presented.

Conclusions: Preliminary results of this mixed method evaluation show that PPP participants successfully worked towards wellness goals and set action steps focused on three areas of change.

Lindai Xie
Experiences of Students from China Studying at Universities in the United States Since the Onset of COVID-19

Background: In 2020, COVID-19 brought challenges to the world which were exacerbated by major events such as the Black Lives Matter movement and the presidential election. Because China is where COVID-19 was first reported, Chinese international students (CISs), the largest group of international students in the U.S., are facing a unique and usually difficult situation.

Methods: This paper presents a phenomenological study exploring what Chinese international students went through in 2020 in regard to the challenges, reflections, and implications of what they experienced.

Results: Three themes and a total of seven subthemes were summarized based on in-depth semi-structured interviews with eight participants. The first theme is the typical challenges that might be encountered by CISs such as cultural and communication barriers. The challenges specific to 2020 including safety concerns and worries of racism were illustrated in the second main theme. The last theme involved support and services that need improvement in both quantity and quality to best support CISs.

Conclusion: Themes illustrated above provide a different perspective to understand international students underutilizing on-campus services. This study urges that it is unfair to use international students' culture, parenting style, or the non-western education system they studied before as excuses for their "failure" of utilizing resources. Institutions need to learn more

about this population, their cultures, and the reasons for lacking help-seeking behaviors. Implications of the findings were discussed, followed by limitations of this study.

School of Medicine

Christiana Appiah
Role of Epigenetic Regulators in Tumor Recovery of Triple-Negative Breast Cancer
Christiana O. Appiah, Manjulata Singh, Christiane Morecock, Nasser Alabsulaly, Abigail Andrews, Aashka Shah, Alex Azzo, Joseph W. Landry

Background: Post-therapy tumor recurrence in triple-negative breast cancer (TNBC) remains an issue despite advances in modern chemotherapeutics. The epigenetic regulation of gene expression has been implicated in the ability of tumor cells to recur following treatment. Using CRISPR/Cas9 knockout screen, we identified epigenetic regulators that strongly correlate with tumor recurrence and tested benefits of a sequential approach to chemotherapeutic exposure over classical concurrent strategies. We hypothesize that a sequential strategy will disable novel epigenetic states promoting recovery, and will reduce the toxicity associated with combination therapy.

Method: We validated novel epigenetic targets that regulate TNBC cell recovery using commercially available inhibitors *in vitro* (MBA-MB-231 cells) and *in vivo* (tumor-bearing NSG mice). To test these inhibitors MBA-MB-231 cells were either treated with Doxorubicin (Dox) followed by epigenetic inhibitors in combination or sequentially. Cell count (*in vitro*) and tumor volumes (*in vivo*) were used to determine the anti-tumor effects. Weight loss was used as an index of toxicity in mice.

Results: Inhibitors of lysine acetyltransferases (Drug 1 and Drug 2) and nuclear-cytoplasmic transport pathway (Drug 3 and Drug 4) used both in combination and sequentially with Dox differentially reduced tumor recurrence *in vitro*. Drugs 1 and 4 used sequentially after Dox treatment reduced tumor growth *in vivo* in comparison to Dox only and combination treatment. Sequential, unlike combination treatment trended towards significantly reducing drug toxicity.

Conclusion: Collectively, these findings suggest that novel epigenetic states are established post-therapy exposure which can be targeted therapeutically, and toxicities are reduced with sequential strategy.

Nixon Arauz
Correlates of Human Papillomavirus Vaccine Uptake Among Black and White Latinx Adults in the United States: Behavioral Risk Factors Surveillance System 2019-2021
Nixon R. Arauz, Dina T. García

Background: Latinx face a disproportionate burden of human papillomavirus (HPV) related cancers. Research on HPV-vaccine uptake has typically aggregated Latinx into a single group or by ethnic subgroups, which does not account for possible variation between Latinx by race. To address this gap in the literature, this study examines correlates of HPV-vaccination uptake among Latinx adults by race.

Methods: Data from the 2019-2021 Behavioral Risk Factors Surveillance System on Latinx adults aged 18-34 years were analyzed. HPV-vaccine completion status was classified as

individuals who reported receiving three doses of the vaccine. Self-reported race was dichotomized as Black or White. Descriptive statistics were generated for sociodemographic characteristics (sex, age, marital-status, education, and income), psychosocial (mental and general health), and contextual (state, language, medical-cost) factors by race. Chi-squared tests were used to compare differences between sociodemographic characteristics, psychosocial, and contextual factors by HPV-vaccine uptake.

Results: Overall, 9% (N=2,46) Latinx reported having completed the HPV-vaccine series, of which 87.8% were White Latinx and 12.2% were Black Latinx, p=0.67. The likelihood of HPV-vaccine uptake was significantly associated with variables sex, age, marital status, education, income, mental, general health, US state of residence, survey language) factors. All analyses were adjusted for survey design.

Conclusion: Research on the health of Black Latinx is limited and should be expanded to fully understand their experiences in the United States. Findings from this study underscore the need to develop culturally appropriate programs to improve HPV-vaccine uptake and the well-being of this population.

Belle Buzzi
Using Psychedelic Psilocybin to Mitigate Oxycodone Withdrawal
Belle Buzzi, Javier Gonzalez-Maeso, M Imad Damaj

Background: Opioid Use Disorder is a major health issue in the United States, with more than 100,000 opioid overdose deaths every year. Treatments for opioid use disorder currently exist, but their efficacy is limited due to misuse potential, undesirable side effects, and low levels of compliance. Classical psychedelics such as psilocybin have recently shown promising potential as a therapeutic treatment in several neuropsychiatric disorders including substance use disorder. Therefore, the current study sought to characterize the effects of psilocybin on different aspects of oxycodone, a prescription opioid, withdrawal in mouse models.

Methods: We evaluated the effect of psilocybin on oxycodone spontaneous withdrawal in mice. This study used 7-9 week old C57BL/6J male and female mice who were surgically implanted with osmotic minipumps containing oxycodone (60 mg/kg/day) or saline for 7 days. Each treatment group was further injected with either saline or psilocybin (1 mg/kg ip) 2 hours following removal of minipumps. The next day, mice were evaluated for somatic signs of withdrawal and 7 days later for mechanical hypersensitivity, both established aspects of oxycodone withdrawal in mice.

Results: Oxycodone male but not female mice that received psilocybin showed significantly less somatic signs of withdrawal. However, both female and male oxycodone mice who received psilocybin showed a reversal in oxycodone withdrawal-induced mechanical hypersensitivity.

Conclusions: Psilocybin shows promising potential for the treatment of opioid withdrawal. Future studies will determine the effect of psilocybin on the reinforcing properties of oxycodone in animals.

Eva Davis

Combinatorial Treatment with Small Molecule Inhibitors AEG-1 and MYC for Hepatocellular Carcinoma (HCC)

Background: Hepatocellular carcinoma (HCC) is the most common form of primary liver cancer. The median overall survival of advanced HCC patients is only 6.5-10.7 months. Identifying novel therapeutic targets and developing effective combinatorial treatment is highly relevant to HCC. Two oncogenes, Astrocyte elevated gene-1 (AEG-1) and MYC (coding for c-Myc) are co-amplified in HCC patients and cooperate to promote aggressive, metastatic HCC. The purpose of this study is to evaluate therapeutic efficacy of the combination of C26-A6 and MYCi975, small molecule inhibitors of AEG-1 and MYC, respectively, for HCC.

Methods: Following combination treatment, cell proliferation was measured by MTT and colony formation assays in 4 human HCC cell lines, SNU-449, SNU-182, HuH-7, and Hep3B, and the data was analyzed by two-tailed T-test. RNA-sequencing (RNA-seq) was performed after treatment in SNU-449 cell line and the data was analyzed by Ingenuity Pathway Analysis (IPA).

Results: In all four cell lines MYCi975 was more potent than C26-A6 to inhibit cell proliferation. Combination of C26-A6 and MYCi975 showed significant inhibition in proliferation versus either agent alone. RNA-seq revealed that MYCi975 inhibited pathways associated with cell proliferation, C26-A6 inhibited pathways regulating cell migration and invasion, and the combination inhibited both.

Conclusions: C26-A6 and MYCi975 combination inhibited pathways regulating major cancer hallmarks. Studies are ongoing, analyzing the effect of the combination on cell migration, invasion and angiogenesis in vitro, and tumor growth and metastasis in vivo. Completion of these studies will allow development of C26-A6 and MYCi975 combination as potential therapy for HCC.

Valerie Ericsson

SPAG17 Deficiency Promotes Accelerated Female Reproductive Aging and Fibrosis Leading to Reduced Fertility and Parturition Defects

Background: Advanced female age is associated with fibrosis in the reproductive tract causing uterine and cervical dysfunction. These changes lead to infertility, pregnancy complications and congenital defects in the offspring. As mean maternal age is increasing worldwide, there is a pressing need to prevent age-associated infertility and pregnancy complications. The molecular mechanisms underlying female reproductive aging and fibrosis are complex and currently not well understood. We have recently discovered a new mechanistic pathway implicated in aging and fibrosis via sperm associated antigen 17 (SPAG17) signaling.

Methods: Immunohistochemistry, Immunofluorescence

Results: Our studies revealed different expression levels of *Spag17* mRNA at various gestational ages (D6 to D18), and in the postpartum (2 to 48 h) period in mouse uterine and cervical tissues. Loss of function of this gene promotes accelerated aging in the female reproductive tract accompanied with constitutive activation of profibrotic signaling pathways. Moreover, increased collagen deposition, tightly packed extracellular matrix accumulation and increased stiffness was detected in the uterus and cervix of *Spag17* knockout females compared to same age wild-type females. Importantly, loss of *Spag17* showed reduced litter size and obstructed labor leading to maternal death.

Conclusion: In conclusion, these results show that SPAG17 is an important regulator of aging and fibrosis and pharmacologic approaches targeting SPAG17 signaling may be a potential mechanism to prevent reproductive aging.

Emma Gnatowski

Mechanisms of Ethanol Anxiolysis: Role of Global Ninein Deletion on Ethanol and Anxiety-Like Behaviors
E. R. Gnatowski and M. F. Miles

Purpose: Anxiety disorders serve as a predictor of developing Alcohol Use Disorder (AUD) where stress and anxiety are drivers of ethanol consumption. The Miles Lab has identified Ninein as a candidate gene underlying ethanol's acute anxiolytic-like properties in BXD recombinant inbred mice. We hypothesize deletion of *Nin* will decrease basal anxiety, increase ethanol anxiolysis, and increase ethanol consumption.

Methods: Mice wild-type (WT, *Nin*+/+), heterozygous (HET, *Nin*+/-), or homozygous (HOM, *Nin*-/-) for *Nin* deletion underwent a behavioral battery to assess anxiety-like behavior, acute ethanol anxiolysis, ethanol consumption, and ethanol sensitivity. Anxiety-like behavior was measured using the light-dark box transitional model (LDB) and elevated plus maze (EPM). Ethanol consumption was measured using the two-bottle choice intermittent access model (2BC-IEA). Withdrawal anxiety was measured 24-hours following drinking. Loss of righting reflex (LORR) was assessed to examine ethanol sensitivity.

Results: *Nin*-/- animals showed no differences in basal anxiety compared to *Nin*+/+ or *Nin*+/-. *Nin*+/- and *Nin*-/- mice demonstrated a decreased anxiolytic-like response to ethanol in the LDB. *Nin*-/- mice decreased their ethanol preference but did not decrease ethanol intake (g/kg) in the 2BC-IEA of ethanol consumption. Only female *Nin*-/- mice had an increased anxiety-like phenotype during withdrawal in the LDB. In the LORR assay, females exhibited a decreased ethanol sensitivity compared to males.

Conclusion: Ninein may be a novel contributor to mechanisms underlying ethanol's anxiolytic properties. Future experiments will investigate selective *Nin* deletion on anxiety-like and ethanol-related behaviors.

Sam Gottlieb

Selective GSK3B Overexpression in Medial Prefrontal Cortex CaMKIIa Cells Produces Sex-Specific Changes in Ethanol Self-Administration, Anxiety-Like Behavior, and Working Memory
S Gottlieb, Z Tatom, and MF Miles

Background: Glycogen synthase kinase 3 beta (*Gsk3b*) is central in a gene network regulated by ethanol in mouse medial prefrontal cortex (mPFC). GSK3B abundance/activity modulations regulate ethanol consumption, suggesting GSK3B could be a target in treating alcohol use disorder. However, the critical cell type in this ethanol response is not yet known, nor have sex differences in GSK3B modulations been fully investigated. Here we report results of GSK3B overexpression selectively in CamKIIa+ mPFC cells on multiple behaviors.

Methods: Mice underwent stereotaxic injections to overexpress GSK3B in mPFC CamKIIa+ cells or control virus (n=4-6/sex/virus). We assayed working memory using a 5min delay novel-object recognition test (NOR), basal anxiety-like behavior via light/dark box (LDB), 5-weeks 2-

bottle choice, intermittent ethanol access to measure ethanol consumption and preference, withdrawal-induced anxiety-like behavior 24hrs after last ethanol access, and taste-preference for saccharin (1.2mM) and quinine (200uM). Location of injections and deletion/overexpression was validated via immunofluorescence.

Results: In initial results, GSK3B overexpression produced a significant sex*genotype interaction in NOR (p=0.018), percent distance traveled in the light during LDB (p=0.025), 24hr ethanol consumption (p=0.040), and 2hr and 24hr ethanol preference (p=0.019; p=0.007 respectively). There was no effect on taste-preference Extension to fully statistically powered studies (n=15/sex/virus) are currently underway.

Conclusions: GSK3B is a promising target for treatment of alcohol use disorder as inhibition decreases ethanol self-administration. However, sufficient preclinical analysis requires full evaluation of GSK3B-modulated behaviors in both sexes. These experiments showed CaMKIIa+ cells are critical in the GSK3B-ethanol pathway, as well as revealed sex-specific responses to overexpression.

Alaina Jaster
Sex-Specific Role for the 5-HT$_{2A}$ Receptor in the Effects of Psychedelics on Opioid Place Preference in Mice
Alaina M. Jaster, Javier González-Maeso

Opioid use disorder affects over two million people in the United States with more than 120,000 deaths worldwide annually attributed to opioids. Psychedelic serotonergic agonists, such as lysergic acid diethylamide (LSD) and psilocybin, are being increasingly studied for their potential therapeutic effects in treatment of a variety of psychiatric conditions, including substance use disorders (SUD). Psychedelics produce profound alterations in human perception and sensory processing through activation of the serotonin 2A receptor (5-HT$_{2A}$R), but they do not cause dependence, and there is no known risk of lethal overdose. Activation of serotonin receptors has modulatory effects on the mesolimbic pathway, which is implicated in the neurobiology of addiction. Administration of psychedelics activates 5-HT$_{2A}$Rs in frontal cortex pyramidal neurons, which also project to subcortical regions involved in dopaminergic pathways, such as the nucleus accumbens. Our recent findings suggest differences across sexes on head-twitch behavior - a physiological proxy of psychedelic action - in C57BL/6J mice. Here, we aimed to assess the effect of psilocybin, a tryptamine psychedelic, on oxycodone-induced conditioned place preference (CPP) as a model of drug-craving in male and female C57BL/6J mice. Male and female animals displayed oxycodone preference as compared to vehicle. Importantly, male mice showed a decrease in expression of oxycodone-induced CPP following post-acute psilocybin administration, a phenotype that was not observed in female mice. The potential role of 5-HT$_{2A}$R-dependent signaling mechanisms in these SUD-related phenotypes was tested in knockout mice and controls. Our results support the notion that psychedelics alter sex-specific behaviors associated with preclinical models of SUDs potentially via 5-HT$_{2A}$R, and suggest that this class of psychoactive drugs may induce long-lasting therapeutic effects relevant to addiction.

Dana Kneisley

Site of α3β4-Nicotinic Acetylcholine Receptor Current Modulation by the Prototoxin lynx1

Background: Smoking, maintained by nicotine-seeking behaviors, is the leading cause of preventable death worldwide. α3β4 nicotinic acetylcholine receptors (nAChRs), found on GABAergic neurons of the interpeduncular nucleus (IPN), mediate aspects of nicotine withdrawal. Previous work shows that the prototoxin lynx1 is also highly expressed in these neurons, and that lynx1 diminishes α3β4-nAChR response differentially depending on receptor subunit ratio. This study probes a subunit interface unique to the most sensitive α3β4 isoform to determine the molecular interactions through which lynx1 exerts its effects.

Methods: Molecular dynamics simulations were used to identify residues of α3β4-nAChR where lynx1 may interact. These residues were mutated to alter potential side chain interactions with lynx1. Two-electrode voltage clamping (TEVC) on *Xenopus* oocytes was used to compare the difference in ACh-evoked currents between the wild-type (WT) and mutant receptors coexpressed with increasing amounts of lynx1.

Results: Eleven of fifteen nAChR mutations tested showed altered sensitivity to the effects of lynx1 in comparison to WT α3β4-nAChRs. Mutating an aspartate (D157) or a glycine (G162) to alanine exhibited the largest decreases in sensitivity compared to WT, while changing a tyrosine (Y190) to alanine displayed the largest increase.

Conclusions: Lynx1 produces dose-dependent decreases in α3β4-nAChR function. Mutations at the putative interaction site show altered lynx1 sensitivity compared to WT-nAChR, confirming the importance of this region for lynx1-nAChR interaction. Mutation effects appear to depend on location; those at residues corresponding to the conventional agonist-binding site produced increased sensitivity to lynx1, while mutations elsewhere in the receptor produced decreased lynx1 sensitivity.

Sindhuja Koppu

Improving Representation of All Skin Tones in a Medical School Preclinical Dermatology Curriculum Through a Sarcoidosis and Erythema Nodosum Learning Module: A Pilot Study

Background: Despite the diversity in skin color in the US population, medium and dark skin tones have historically been underrepresented, depicted in only 21% and 4.5% of images in medical textbooks, respectively. This lack of representation has been linked to higher morbidity and mortality for dermatologic patients of color. We developed a module delineating the pathology and clinical manifestations of sarcoidosis and erythema nodosum (EN) in patients of all Fitzpatrick skin types and aimed to assess whether completion of the module would increase students' knowledge and confidence in identifying dermatologic findings in all skin tones.

Methods: Medical students completed a fictional case-based learning module with patients presenting with sarcoidosis or EN. They also took identical pre- and post-test quizzes that contained ten fact-based questions (with blinded scores) and six subjective questions on a graded scale assessing personal comfort with identifying dermatologic diagnosis in all skin tones. Data were collected anonymously and analyzed using a two-tailed paired t-test.

Results: Ten medical students completed the module and quizzes. Module completion led to a mean score improvement of 32% (p<0.0001, α=0.05) for the factual portion of the quiz and at least a 1-point increase in the comfort level of identifying skin findings in all skin tones for 50%

of the students.

Conclusion: Completing the module significantly improved learners' confidence and knowledge in identifying skin manifestations in patients of all skin tones. Implementing this module into our medical school's curriculum may help bridge the educational gap in dermatology for skin of color.

Jyoti Lodha

Behavioral Effects of DREADD Activation of the vHip mPFC Circuit Following Adolescent Social Isolation Stress And/Or Binge Drinking in C57BL/6J Mice
J Lodha, V Purcell, JT Wolstenholme

Rationale: Adolescence is characterized by increased social interaction and risk-taking behavior. Disruptions to neurodevelopment by social isolation or binge ethanol can lead to social and cognitive deficits in adulthood and increase risk for alcohol use disorders. A monosynaptic connection from the ventral hippocampus (vHip) to the medial prefrontal cortex (mPFC) develops during adolescence and is critical for intact social and working memory.

Objectives: Our goal is identifying behavioral consequences of adolescent social isolation (aSI) and binge drinking in adulthood.

Methods: Social stress was modeled by aSI. Adolescent C57BL/6J mice were single (1/cage) or group housed (4/cage) with or without access to 20% ethanol using a drinking in the dark (DID) model. Adult mice underwent 2-BC IA. In a separate cohort, aSI M/F mice with or without a history of DID were injected with a hM3Dq-DREADD in the vHip and a rAAV-Cre virus in the mPFC. Mice were tested on light dark box, social preference, and novel object recognition with or without DREADD activation of the vHip mPFC circuit.

Results: A history of aSI increased drinking during both adolescent DID and adult 2-BC intake. aSI mice also showed a modest escalation in 2BC-IA. DREADD mediated activation of the vHip mPFC circuit did not affect anxiety-like behaviors nor cognition.

Conclusions: aSI increases intake during both adolescent and adult drinking. Activation of the vHip mPFC circuit does not affect cognition or anxiety-like behavior. Future experiments will investigate changes to structural synaptic plasticity in the mPFC to determine impacts of aSI and/or DID on dendritic spine morphology.

Dionna Long

Repurposing FDA-Approved Drugs to Inhibit IL-33-Mediated Mast Cell Function
Dionna Long, John Ryan

Interleukin (IL)-33 is an IL-1-family cytokine that is released from epithelial, endothelial, and some immune cells in response to tissue damage or inflammatory signals. IL-33 activates mast cells, innate leukocytes that play a key role in asthma. IL-33 induces production of inflammatory cytokines that worsen allergic diseases like asthma. It is essential to better understand IL-33 function and how to suppress it. Computer modeling studies using the SYBYL and GOLD algorithms to screen 3035 FDA-approved drugs for interactions with the IL-33 receptor, ST2, at the IL-33 binding site revealed several potential ST2 antagonists. In this study, we show that mouse bone marrow derived mast cells (BMMCs) treated with the antiviral drug lopinavir show diminished IL-33 responsiveness. Specifically, lopinavir ($15\mu M$) reduced IL-33-mediated IL-6 secretion by ~50%. Lopinavir effects noted when the drug was given simultaneously with IL-33

and were maximal when given 1 hour prior to IL-33 and suppression. These rapid effects suggest a direct drug-receptor interaction. We treated BMMCs with drug for up to 24 hours to assess for alternative mechanisms such as ST2, which was not noted. Our data demonstrate that lopinavir can inhibit IL-33 mediated mast cell function, likely as an off-target effect of the drug. These data support further investigation of lopinavir for repurposing in allergy and asthma treatment.

Lauren May
Sex Differences in the Innate Immune Response to Lung Cancer
Lauren May, Howard Li, Paula Bos, Rebecca Martin, Joseph W. Landry

Background: Lung cancer is the second most diagnosed cancer. Lung cancer exhibits a sex difference, though the exact mechanisms behind this are not well understood. Men have a higher lifetime risk of developing lung cancer and often have more severe disease than women. There are thought to be multiple factors that contribute to this difference, including the environment, lifestyle, sex hormones, and differing immune responses.

Methods: Mouse tumor models of lung, breast, colon, melanoma, and kidney were used in immune-competent or immune-compromised mouse models treated with the chemotherapy ABT-263. The study of the immune response utilized ex-vivo killing assays, multicolor flow cytometry, and clonogenic survival, as well as humanized mice and patient-derived xenografts.

Results: We observe a sex difference in two models of lung cancer in immunocompetent mice, but not in models of breast, colon, kidney, or melanoma. This difference is dependent on the innate immune system, specifically through NK cells and macrophages. Preliminary data suggests the pro-apoptotic ligand TRAIL secreted from innate immune cells is more effective on cells exposed to female compared to ovariectomized female mouse serum. Reduced tumor growth in female mice can be further enhanced with ABT-263, and this requires NK cells. Patient-derived xenografts transplanted into female humanized mice grow more slowly than those transplanted into non-humanized mice.

Conclusions: The innate immune system modulates the sex difference in lung cancer. This research opens the potential for immune stimulating therapies, combined with ABT-263, as a novel treatment approach.

Bryan Mckiver
The Role of Astrocyte Elevated Gene-1 (AEG-1), a Novel Multifunctional Protein, in Chemotherapy-Induced Peripheral Neuropathy

Background: Chemotherapy-induced peripheral neuropathy (CIPN) is a dose-limiting side effect of chemotherapy treatment, often resulting in the discontinuation of treatment. Taxanes, such as Paclitaxel, are a class of chemotherapeutics associated with high prevalence of CIPN development. Taxanes activate peripheral macrophages, generating a neuroinflammatory response that contributes to CIPN development and maintenance. Astrocyte Elevated Gene-1 (AEG-1) is a multifunctional protein that modulates macrophage activity and regulates inflammation through direct interaction with NFκB, a transcriptional regulator of proinflammatory cytokine (PIC) expression. Our goal is to investigate the role of AEG-1 in Paclitaxel-Induced Peripheral Neuropathy (PIPN) and associated neuroinflammation in dorsal root ganglia (DRG).

Methods: Adult AEG-1 global knockout (KO) and wildtype (WT) male and female mice

(C57BL/6J background) were used in a model of CIPN produced by administration of a cumulative dose of 32 mg/kg, i.p. injections of paclitaxel. Mechanical hypersensitivity and cold sensitivity were assessed via Von Frey filaments and acetone test, respectively. Electrophysiological activity of peripheral nerves was assessed via caudal tail nerve conduction assay. mRNA expression in the dorsal root ganglia (DRG) was quantified via qRT-PCR. Plasma level concentrations of paclitaxel were assessed via mass spectrometry.

Results: Unlike their WT counterparts, AEG-1 KO mice displayed protection from paclitaxel-induced mechanical hypersensitivity, cold sensitivity, and peripheral nerve disfunction. Paclitaxel increased the expression of AEG-1 and multiple pro-inflammatory cytokines (TNFα, IL1-β, IL-6) in the DRGs of WT mice. However, pro-inflammatory cytokines levels were unchanged in paclitaxel treated AEG-1 KO mice. Plasma concentration levels of paclitaxel did not differ between AEG-1 KO or WT mice.

Conclusions: Our data suggest that AEG-1 plays a significant role in the development and maintenance of multiple paclitaxel-induced pathologies associated with CIPN. The prevention of CIPN by AEG-1 genetic deletion seems to be mediated by neuroinflammation reduction in the DRGs. These data lead us to conclude that targeting AEG-1, potentially with the use of targeted nanoparticles-conjugated to AEG-1 siRNA, may be a significant step towards the development of treatment strategies specifically aimed at preventing or reversing CIPN.

Marie Michenkova
Multivariate Analysis of Ethanol Consumption in a Complex Mouse Genetic Model

Background: Alcohol abuse disorder (AUD) poses a significant public health challenge globally. Identifying the genetic factors underlying ethanol intake is vital for developing effective treatments, and Diversity Outbred (DO) mice are an ideal model for studying complex AUD traits. In this study, we utilized Principle Component Analysis (PCA) to simplify the data and identify patterns in the mice's drinking behavior.

Methods: This study involved 556 DO mice bred and housed at the Jackson laboratory to increase genetic variability. The mice were given a two-bottle choice of water, 15%, or 30% ethanol solutions for 12 days. Ethanol consumption was measured in grams of ethanol per kilogram of body weight. After imputing missing values, daily ethanol consumption data was analyzed using PCA and k-means clustering in R software with Amelia, mice, and missMDA packages.

Results: Daily ethanol consumption data was analyzed using k-means clustering, which identified distinct clusters for early (days 2-4), mid (days 5-6, 8), and late (days 9-11, 13) phases. Principal component analysis revealed that days 6-11 had the largest impact on PC1, accounting for 54.83% of total variance, while days 2-4 had the largest impact on PC2 (7.70%). These findings suggest that different genetic factors contribute to the amount of escalation in ethanol consumption over time.

Conclusions: The study's results reveal the intricate genetic factors influencing ethanol consumption, including variations in the progression of drinking behavior as evidenced by distinct principal components during the study's first and last weeks. This research has opened the door for further investigation into the significant behavioral quantitative trait loci associated with progressive ethanol consumption.

Joseph Picone

Reprogramming Transcription Factor Function Regulates Drug Specific Behavioral Responses and Transcription

J.A. Picone, G.M. Silva, K. Kim, N.L. Truby, X. Cui, P.J. Hamilton

Understanding the molecular substrates of the stages of drug addiction may allow for the design of pharmacotherapies that block or reverse key events of the progression of drug addiction. *Zfp189* is a CREB-target gene which itself encodes an unstudied nucleus accumbens (NAc) neuronal transcription factor that has been demonstrated to regulate transcriptional networks in neuropsychiatric disorders. Preliminary data reveals that using the CRISPR/dCas9-mediated CREB delivery to the *Zfp189* CRE site increases *Zfp189* mRNA levels in the NAc and decreases reward associations for mild doses of cocaine. To further examine the downstream relationship between ZFP189 and physiological response to saline, cocaine, and morphine, three reprogrammed synthetic ZFP189 variants were used to study behavioral responses. Three ZFP189 variants used were: ZFP189$_{WT}$, ZFP189$_{DN}$, and ZFP189$_{VPR}$. Mice received one of these ZFP variants to the NAc via viral-mediated gene transfer. We then performed a drug locomotor sensitization assay with saline, cocaine, or morphine. In response to cocaine treatment, mice with ZFP189$_{VPR}$ intra-NAc moved significantly more than the ZFP189$_{WT}$ group. More interestingly, this increased locomotion appears to be unique to cocaine, as there is no difference in locomotor activity between the ZFP189 variant groups in response to saline or morphine administration. RNA sequencing of manipulated NAc tissues from these mice revealed that the differences in behavioral response to cocaine across the variant groups coincided with transcriptional changes. Specifically, ZFP189$_{VPR}$ was only able to regulate NAc transcription in mice that had been treated with cocaine. These results suggest ZFP189 specifically drives cocaine-induced transcription and behaviors.

Elizabeth Ransone

Ocular Adverse Reactions After Receiving COVID-19 Vaccine

Elizabeth Ransone, Alwiya Ali, Meagan Shinbashi, Jessica Randolph

Background: The coronavirus disease 2019 (COVID-19) pandemic is an ongoing global health crisis that is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV 2). COVID-19 vaccinations are highly effective at preventing severe, symptomatic disease. Despite the efficacy of COVID-19 vaccines, vaccine hesitancy remains high with a global vaccine acceptance rate ranging from 54% to 86%. Many of the concerns stem from perceived harms of receiving the vaccination. Ocular adverse events following COVID-19 vaccines, although exceedingly rare, have also been documented. The objective of this study is to summarize the various ocular adverse events following COVID-19 vaccination reported in the peer-reviewed literature.

Methods: The literature search was conducted in July 2022 using the PubMed database and reviewed using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRIMSA) guidelines. Data regarding ocular manifestations of patients that received the COVID-19 vaccine were reported using key ophthalmology terms. Case series, case reports, review articles, or correspondences reporting on the ocular manifestation in patients receiving the COVID-19 vaccine of any gender, age, or ethnicity were included. Reference lists from the retrieved articles were reviewed and relevant studies were included.

Results and Conclusions: COVID-19 vaccines are known to be an effective form of prevention of severe disease with a risk of adverse ocular side effects. However, the incidence of reported

ocular complications associated with COVID-19 vaccines is low. Ophthalmologists should carefully monitor patients with pre-existing conditions that have been associated with the development of ophthalmologic side effects.

Walker Rogers

Ethanol-Induced Analgesia: QTL Mapping with Recombinant Inbred Mouse Lines
W. Rogers, A. White, E. Legge, M.I. Damaj and M.F. Miles

Purpose: Alcohol consumption produces analgesic effects, and people experiencing pain conditions may drink alcohol to alleviate discomfort. However, tolerance to alcohol analgesia contributes to escalating consumption and dependence. Both nociception and ethanol analgesia have high inter-personal variability and are under significant genetic control. A recent study in our laboratory showed substantial differences in ethanol-induced antinociception between B6 and D2 mice with moderate heritability estimates (h^2=0.42). Understanding the genetic architecture of these processes could inform better treatment options for people with pain conditions. This study aims to identify loci associated with variation in alcohol-induced analgesia across C57BL/6xDBA/2J (BXD) mouse lines.

Methods: On Day 1, male and female mice from 62 BXD recombinant inbred strains were assayed for basal hotplate latency times as a quantitative metric of pain sensitivity. After baseline reading, mice received either alcohol (2g EtOH/kg) or saline via oral gavage and repeated the hotplate test 30 minutes post-gavage. For three days, mice received either saline or 0.5g EtOH/kg. On Day 5, mice were gavaged with saline or acute alcohol (2 g EtOH/kg) and underwent a final round of hotplate testing. Quantitative trait locus (QTL) mapping of hotplate latencies was performed using the R package qtl2.

Results: A significant QTL was identified on chromosome 1 for Day 1 hotplate latency in ethanol-receiving mice. Using transcriptomic and phenotypic correlations, ethanol analgesia candidate genes were identified.

Conclusions: A genetic study of ethanol-induced analgesia using BXD mouse strains identified significant sex-specific QTLs linked with variation in analgesic responses to acute ethanol.

Lesly Sejas

Using a Whole Animal C. Elegans Cancer Model to Analyze pnpt-1 Overexpression to Reduce Excess Intestinal Cell Proliferation

Lesly Sejas, Niara Gray, Brian Hur, Jabili Angina, Shauny Daquin, Jade Crabtree, Laura Mathies, Rita Shiang

Background: The intention of this project is to investigate a possible new cancer therapy. pnpt-1 encodes for PNPase, a phosphorolytic exonuclease that is able to degrade RNA. Controlled upregulation of *PNPT*1 in melanoma cells results in a senescence phenotype and growth inhibition. This study aims to analyze the effect of pnpt-1 overexpression using various *C. elegans* intestine cancer models. C. elegans has many conserved human genes and pathways involved in cancer. This study will create the first whole animal model of PNPase overexpression and determine if the effect of PNPase can mitigate cell over-proliferation.

Methods: Crossing known cancer mutations, lin-4(e912) and lin-23(e1883) with double transgenic lines containing pnpt-1 under a heat shock promoter, and intestinal marker. pnpt-1 overexpression will be induced by heatshock then intestinal cell count will be recorded and compared to controls. An ANOVA test will be performed on all imputed data to compare cancer model sets. The average of these tests will be compared and displayed as line graphs.

Results: Both mutation lines have been successfully crossed into our double transgenic lines including lines with vector-only controls. The lines containing the mutations have been confirmed to still manifest the cancer phenotype as cell counts of intestinal cells have numbers greater than 20 as expected. We expect to see a decrease in intestinal cells in the groups that received heat shock treatment and overexpress pnpt-1.

Conclusions: Future steps for studying pnpt-1 will be to identify the pathways that PNPase uses to control cell proliferation.

Shanwei Shen

Role of hPRLrI I-tail in the Pathogenesis of Breast Cancer

Shanwei Shen, Charles Clevenger

Background: Evidence from epidemiological, cellular, and genetic analyses indicate that the hormone prolactin (PRL) and its receptor (hPRLr) in humans are significantly involved in breast cancer pathogenesis. The intermediate form of hPRLr (hPRLrI) induces significant proliferation and anchorage-independent growth of normal mammary epithelia in vitro when co-expressed with the long form hPRLr (hPRLrL). However, the exact mechanism of how hPRLrI is transforming is not well understood. The hPRLrI produced by alternative splicing which induces a frameshift, resulting in a premature stop codon and a novel 13 amino acid tail ("I-Tail") gain. The ubiquitin-like protein neural precursor cell expressed developmentally down-regulated protein 8 (NEDD8) was found to be associated with the I-tail. Treatment with a selective NEDD8 inhibitor resulted in the changed stability of hPRLrL and the death of breast cancer cells. We hypothesize that hPRLrI I-tail is contributed to the transformation.

Methods: hPRLrL, hPRLrI, hPRLrIΔ13 (I-tail removed mutant due to loss of 13 C-terminal amino acid resides) was delivered to MCF10AT cells by lentivirus transduction. Anchorage-independent cell growth was determined by soft agar assay. Cell proliferation was examined Incucyte Live-Cell Analysis Systems. Cell motility was examined by wound healing assay. Involvement of Ras/MAPK signaling was measured by WB. Signaling pathway involvement and differential gene expression was determined by RNA-seq.

Results: MCF10AT cells successfully expressed either hPRLrL+hPRLrI or hPRLrL+hPRLrIΔ13. I-tail deletion decreased anchorage-independent growth. Cell proliferation was decreased when hPRLrI I-tail was removed. I-tail deletion attenuated cell motility. I-tail deletion attenuated ERK1/2 activation. PRL induced different gene expression profile when hPRLrI I-tail is removed.

Conclusions: hPRLrI I-tail is involved in the transformation of normal epithelia cells.

Aishwarya Shirke

Regulation of Ovarian Aging and Fibrosis via SPAG17 Signaling

Aishwarya Shirke, Le My Tu Nguyen, Madisyn Elam, Francesca E Duncan, John Varga, Jerome F Strauss III, Maria E Teves

Advanced female age is associated with decreased oocyte quality and quantity which leads to infertility and pregnancy complications. Fibrosis has been implicated as an early hallmark of the aging ovarian stroma. However, the molecular mechanisms underlying ovarian aging and fibrosis are currently not well understood. We have recently discovered a new mechanistic pathway implicated in aging and fibrosis via sperm associated antigen 17 (SPAG17) signaling. Our studies revealed expression of SPAG17 in different cell types including the theca and granulosa cells. Loss of function of this gene leads to fibrosis evidenced by increased collagen deposition and tightly packed extracellular matrix accumulation in the ovarian stroma. Moreover, histological studies revealed reduced number of follicles and increased aging features. Consistently, *Spag17* knockout females have reduced fertility and have pregnancy complications compared to same age control females. Further studies using cultured fibroblasts determined that loss of *Spag17* promotes constitutive activation of TGF-β and HIPPO pathways, which are two major regulators of extracellular matrix remodeling and fibrosis. Based on these findings, we suggest that SPAG17 signaling plays a key role regulating ovarian aging and fibrosis. Future studies will stimulate the search for therapeutic targets influencing SPAG17 signaling.

Gabriella Silva

ZFP189 Function in the Nucleus Accumbens Regulates Cocaine-Induced Transcription and Behaviors in a Cell Type Specific Manner

Background: ZFP189 is a transcription factor (TF) that regulates the reinforcing effects of cocaine within the nucleus accumbens (NAc), but the direct function is unknown. To interrogate the function and gene targets of ZFP189, we reprogrammed the endogenous ZFP189[WT] by replacing the repressive domain with an enhanced transcriptional activation domain (ZFP189[VPR]) or by removing the functional moiety (ZFP189[DN]). Synthetic ZFP189 TFs exert divergent transcriptional regulation at a *luciferase* target gene, *in vitro*. Upon packaging these ZFP189 TF constructs in herpes viral vectors and delivering to mouse NAc, ZFP189[VPR] affects only cocaine behaviors. After performing RNA sequencing on these tissues, we see mice with ZFP189[VPR] intra-NAc and treated with cocaine experience significant transcriptional upregulation, but the cell types involved in this response is unclear.

Methods: We performed single nuclei RNA sequencing (snRNAseq) on infected NAc tissues of cocaine exposed mice. We next investigated the NAc cell type specific contribution of our ZFP189 variants to cocaine-induced locomotor behavior. Lastly, we investigated the consequences of the synthetic ZFP189 TFs on dendritic spine density and morphology in differing NAc cell types.

Results: Nuclei could be isolated from infected NAc tissue and identified by NAc cell type gene markers. Delivering ZFP189[VPR] to *Drd1+* MSNs and ZFP189[WT] to *Drd2+* MSNs led to a similar cocaine-induced increase in locomotive behavior. Lastly, delivering ZFP189[VPR] to *Drd1+* MSNs and ZFP189[WT] to *Drd2+* MSNs caused an increase in mature spine formation.

Conclusions: This work links the MSN-specific function of a drug-induced TF in governing lasting drug-related transcriptional neuroadaptations and behaviors.

Fariha Tariq

Assessing Racial Differences in Distress and Sources of Distress among Breast Cancer Survivors on Adjuvant Endocrine Therapy
Fariha Tariq, Teletia Taylor, Vanessa B Sheppard

Purpose: The purpose of this study was to examine racial differences in overall distress and sources of distress among Black and White breast cancer survivors receiving adjuvant endocrine therapy.

Methods: This is a secondary analysis of data from the Women's Hormonal Initiation and Persistence (WHIP) study, an observational trial of hormone receptor positive breast cancer survivors. Participants completed the National Comprehensive Cancer Network (NCCN) Distress Thermometer (DT) and 38-item problem list of potential sources of distress. Descriptive statistics were computed by race (Black vs. White) for distress and reported problem items. Multivariate logistic regression was used to predict high distress (> 4 on DT) by race adjusting for sociodemographic and clinical characteristics. Chi-square and Fisher's exact tests were used to assess association between each problem item and race.

Results: Of the 572 participants; 72% were White and 28% were Black. Women who demonstrated the following characteristics reported significantly higher levels of distress in the multivariable model (White, younger age, lower income). Results for the Chi-square items indicated that Black survivors were significantly more likely to report fear, loss of interest in usual activities, problems in appearance, eating problems, and fatigue, as compared to their White counterparts.

Conclusion: There were racial differences in overall levels of distress and sources of distress. Although White survivors reported higher distress, Black survivors were more likely to report emotional and physical problems as sources of distress. Future work should focus on the development of culturally appropriate interventions for distress management in breast cancer populations.

Zachary Tatom

Regulation of Car8 Gene Transcription in Prefrontal Cortex Identifies it as a Novel Candidate Gene Influencing Ethanol Consumption
Z Tatom, MF Miles

Background: While risk for alcohol use disorder has been estimated to be roughly 50% heritable, identifying causal genes and polymorphisms driving this heritability remains difficult. Our lab has recently performed a genetic study on voluntary ethanol-drinking phenotypes across 636 male Diversity Outbred (DO) mice over five weeks of intermittent ethanol access, identifying 3 significant behavioral quantitative trait loci (bQTL). A 90% Bayesian confidence interval for a significant bQTL for last week ethanol consumption spanned only 1 Mbp bQTL on

mouse chromosome 4 and contained 11 genes. Top-ranked variants by LOD score did not include any resulting in coding sequence variation, suggesting a role for regulation of transcription.

Methods: We collected RNA-seq data from 220 prefrontal cortex (PFC) samples from these DO mice, which we analyzed for eQTLs and correlations with ethanol consumption. Structural equation modeling techniques were then applied to these data to infer directionality and effect size of the observed relationship between transcription and ethanol consumption.

Results: Of the 11 genes in the chromosome 4 bQTL C.I., only Car8 had a significant cis-expression QTL located near the bQTL and the peak eQTL and bQTL markers were in strong linkage disequilibrium. This gene also had a significant negative correlation between transcript count and last week ethanol consumption (-0.22, p = 0.008) and preference compared to water (-0.23, p = 0.006), and haplotype analysis suggested similar roles for founder strain alleles.

Conclusions: These findings suggest a role for transcription of Car8 in prefrontal cortex in modulating voluntary ethanol drinking in mice.

Natalie Truby
ZFP189 Tunes Social Behaviors by Controlling Transposable Elements and Immune Response in Prefrontal Cortex

Background: Social behaviors are central to the health of society and the individual and are disrupted in a number of psychiatric illnesses. However, the neurobiological origins of complex social behaviors are incompletely understood.

Methods: The *Zfp189* gene product is a KRAB zinc finger transcription factor of unknown function. To interrogate the function and gene targets of ZFP189, we reprogrammed the endogenous ZFP189[WT] by replacing the repressive KRAB domain with an enhanced transcriptional activation domain (VP64-p65-Rta (ZFP189[VPR]) or by removing the functional moiety entirely (ZFP189[DN]). Upon packaging these ZFP189 variant constructs in viral vectors and delivering to mouse prefrontal cortex (PFC), we tested social behaviors. The infected PFC tissues were then microdissected and subjected to RNA-sequencing (RNAseq.) Lastly, we investigated the consequences of altered ZFP189-mediated transcription on dendritic spine density and morphology in cortical pyramidal neurons.

Results: Delivery of synthetic ZFP189[VPR], precipitates pronounced social behavioral deficits in terms of social interaction, social motivation, and the social cognition necessary for the maintenance of social hierarchy. We discover that ZFP189 transcription factors of opposing function have divergent influence on the expression of genetic transposable elements as well as genes that participate in immune functions, with particular impact on genes that comprise the interferon anti-pathogen response. Additionally, we observe that ZFP189-mediated transcriptional control promotes mature dendritic spine morphology on transduced pyramidal neurons.

Conclusions: ZFP189 function in the prefrontal cortex coordinates structural and transcriptional neuroadaptations necessary for social behaviors by directly binding transposable element-rich regions of DNA to regulate immune-related genes.

Atika Farzana Urmi

Novel Feature Evaluation in Ultra-High Dimensional Right-Censored Data, with Applications to Head and Neck Cancer

Background: Head and neck cancer is the 6th most common cancer worldwide with an expected 1.08 million new cases each year. Such cancer data are ultra-high dimensional with thousands of clinical features and gene expressions, making it challenging for the traditional analytical tools to extract the potential biomarker for the cancer survival and control false discoveries. In addition, presence of heavy censoring can affect the screening procedures based on Kaplan-Meier (K-M) survival estimates.

Aim: To propose a model free, ultra-high dimensional feature screening method with two-dimensional survival outcome allowing false discovery rate (FDR) control.

Method: 516 primary tumor patients with 17702 normalized mRNA gene expressions & 16 clinical covariates were analyzed. covariates associated with survival were identified using a screening procedure. Further, an FDR control procedure was introduced along with the screening algorithm. Performance was evaluated using cross validated AUC values and log-rank test.

Results: A total of 12 covariates (8 gene expressions and 4 clinical features) were selected in the screening with FDR control procedure. AUC values of 1-,3-, 5- years overall survival were 0.75,0.71 and 0.68 respectively. The selected covariates also significantly differentiated low and high risk patients (p-value <.001).

Conclusion: The proposed method can capture both linear and non-linear correlation between predictors and outcome without requiring any complex estimation or optimization. Furthermore, the issue of false discoveries in the screening procedure was also tackled. Thus, the method can be used to identify potential risk factors to improve early screening, treatment and ensure prolonged survival.

School of Pharmacy

Raneem Aldaqqa

Pharmacokinetics of a Macrophage Immunotherapy Upon Pulmonary Administration in an in Vivo Murine Model

Raneem R. Aldaqqa, Fatemah S. Sunbul, Slaiman S. Alhudaithi, Cory B.Fines, Matthew S. Halquist, Adam C. Pearcy, Paula D. Bos, Joshua J.Reineke, and Sandro R. P. da Rocha

Background: PLX-3397 (PLX) is a colony stimulating factor 1 receptor inhibitor that targets tumor associated macrophages and may shift the phenotype of tumors towards an anti-tumorigenic state, thus supporting standard of care. Our aim is to develop a strategy for measuring the pharmacokinetic (PK) profile of PLX upon pulmonary administration (P.A.) to develop suitable pulmonary formulations.

Methods: Healthy BALB/c mice received free PLX once through P.A. at 2 mg/kg. Three mice were sacrificed at each time point (1, 12, 24hs). Lungs were harvested and snap frozen in liquid nitrogen. Blood was collected and plasma separated. They were stored at -80°C until HPLC-MS/MS analysis of PLX concentration.

Results: PK analysis was performed using a one-compartment and area under the curve (AUC) was calculated using trapezoidal rule. For plasma, $\int$ AUC = 254 $*10^3$ ng*hr/ml and C_{max}= 34

*10^3 ng/mL. For lungs, $\int_0^\infty$AUC= 28 ng*hr/ml and C_{max}= 3 ng/mL. Our preliminary results indicate that PLX is rapidly cleared from lungs with ~ 0.2% of dose remaining in the lungs 24h post P.A.

Conclusions: Our results show rapid clearance of PLX from the lungs indicating the need for repeated dosing or a formulation strategy for this highly hydrophobic molecule to attain sustained release in lungs. In our next steps, we will expand our studies by obtaining earlier and later time points and increasing the number of animals per time point to get a full PK profile of PLX.

Asma Al-Terawi
Development of a PLX Liposomal Formulation Using a Continuous Manufacturing Approach and Design of Experiments (DOE)
Asma M. AlTerawi, Fatemah S. Sunbul, David Edwards, and Sandro R. P. da Rocha

Purpose: PLX-3397 (*PLX*) is a macrophage-targeting therapy with potential application in the treatment of solid tumors. Our objective is to develop clinically translatable liposomal PLX (*L-PLX*) suspension formulation using a continuous manufacturing approach for use in nebulizing dosage forms.

Methods: L-PLX will be prepared using a scale-independent microfluidic approach. L-PLX's critical quality attributes (CQAs) will be characterized in terms of their hydrodynamic diameter (*HD*), polydispersity index (*PDI*) and zeta potential (*ζ*) using light scattering, as well as the drug (PLX) encapsulation efficiency (EE%) and Drug Loading (DLwt.%) using HPLC. Experimental analysis/design will be performed with JMP. In this study, we will investigate the following critical materials attributes (*CMAs*): PLX (1 and 3mg/mL) and lipid (10 and 15mg/mL) concentration in ethanol; drug:lipid (1:24 and 1:11) molar and DPPC:CHO (2:1 and 2.5:1) weight ratio; and lipid type (DSPC and DPPC). The critical process parameters (*CPPs*) that will be investigated include: total flow rate (12 and 15mL/min) and temperature (25 and 65∘C), at a mixing ratio of 3:1.

Results: A L-PLX formulation with desirable TPP was achieved with 1 and 15mg/mL of PLX and lipids; 1:11 drug:lipid; 2.5:1 DPPC:CHO; 12mL/min at 65∘C. CQAs of this formulation include a HD<200 nm (84±8nm), homogeneous dispersion PDI<0.2 (0.08±0.05), high encapsulation efficiency >80% (85±2%) and suitable D.L.(5.3±0.3%).

Conclusions: An L-PLX formulation with suitable TPP was found. In our next steps we will perform an optimal DOE to find an optimum formulation by probing the whole parameter space of relevant CMAs and CPPs in an efficient way.

Sebastian Jaques Garcia
Heparin Calculator for Adult General Cardiovascular and Adult and Children's Deep Vein Thrombosis and Peripheral Edema Using KNIME Data Analytics
Sebastian Jaques, Micah Buller, Payam Davari, and Dayanjan Wijesinghe

Background: Heparin, an anticoagulant agent, is widely used to prevent blood clots that can develop into deep vein thrombosis (DVT) and pulmonary embolism (PE). Heparin infusion dosing is complex, time consuming, and patients must be monitored using Activated Partial Thromboplastin Time (aPTT) to prevent adverse events.

Methods: We utilized KNIME, a free data analytics software, to create a heparin dosing calculator based on VCU Health's protocols for adult general cardiovascular (CV), adult

DVT/PE, and pediatric DVT/PE. The calculator provides initial bolus dose, infusion rate, infusion rate/bolus dose adjustment, and time to repeat aPTT measurement.

Results: The KNIME workflow comprises three main sections: adult general CV, adult DVT/PE, and pediatric DVT/PE heparin dosing. Each section calculates initial bolus and infusion rates and adjusts heparin dosing based on the patient's aPTT. The program follows different pathways depending on the aPTT, with therapeutic aPTT goals of 70-100 seconds for adults and 70-110 seconds for pediatrics. It also alerts users to dangerous aPTT levels and provides response guidance.

Conclusions: Our heparin dosing calculator, developed with KNIME, offers advantages over existing calculators, such as availability to be integrated into different health systems, multiple heparin dosing protocols, and an open-source platform. The program aims to ease healthcare providers' burden, reduce dosing errors, and rapidly retrieve dosing regimens, making it a valuable clinical tool.

Aimalohi Okpeku
A Review on the Prevalence and Cost of Care Among PLWH with Co-occurring Mental Health and Substance Use Disorders

Background: The co-occurrence of mental health and substance use disorders (MHSUD) among people living with HIV (PLWH) presents significant challenges to healthcare systems in the USA and globally. MHSUD is associated with poorer health outcomes and higher healthcare costs among PLWH. Future intervention plans should address the high prevalence of MHSUD in PLWH and provide integrated care to optimize healthcare services.

Method: This literature review conducted a comprehensive search of databases for studies in the USA from 2005-2022 that focused on the cost and healthcare utilization associated with co-occurring HIV/AIDS and mental health/substance use disorders in adults. 87 studies were reviewed and categorized into cohort studies, cross-sectional studies, and reviews with/without meta-analysis. The PICO strategy was used, with no specific intervention, comparing non-HIV infected vs. HIV infected, and focusing on prevalence and healthcare cost outcomes, including treatment and management costs, benefit approaches, and payment plans.

Results: There is high prevalence of co-occurring mental health and substance use disorders among people living with HIV and reported higher cost utilization. A trend of increasing cost of treatment associated with mental health and substance use disorders was observed from $20,114 in 1998 to $62,600 in 2010. Healthcare cost in PLWH with comorbid MHSUD were 2-3 times higher than HIV patients without comorbidities.

Conclusion: This review strongly showed an increasing prevalence and economic burden of these triple coexisting conditions among HIV-infected patients. These findings can serve as potential opportunities for cost evaluations and cost-effectiveness investigations in evaluating the impact of integrated models.

Sagun Poudel
Therapeutic Potential of Dexamethasone Sodium Phosphate Loaded Polymeric Nanoparticles for Nitrogen Mustard Induced Corneal Injury
Sagun Poudel, Divya Bande, Ehsan Kaffash, Qingguo Xu

Background: Nitrogen mustard (NM) is a potent vesicating chemical warfare agent that causes

severe corneal injuries leading to inflammation, ulceration, neovascularization etc. Effective treatment therapies for vesicant-induced ocular injuries are not yet available. To address this potential threat, we engineered biodegradable polymeric nanoparticles (NPs) loaded with water-soluble dexamethasone sodium phosphate (DSP) or DSP-NP. These NPs aim to achieve anti-inflammatory and neuroprotective effects to a nitrogen mustard induced corneal burn model in Sprague Dawley (SD) rats following a single subconjunctival (SCT) injection.

Methods: DSP-NPs were prepared by nanoprecipitation method, and characterized for particle size, surface charge, particle morphology, drug loading and *in vitro* drug release. The rats' eyes were exposed to 1% NM topically and treatment was started immediately after exposure to NM. Animals were randomly divided into five different groups; Healthy, NM treated, Saline treated, DSP eyedrops treated and placebo NP treated. Clinical evaluation for corneal neovascularization, corneal opacity, corneal ulceration, histology, and mRNA expression level of associated cytokines in the cornea were performed at day 7 and day 14.

Result: DSP-NPs exhibited a drug loading of 6.5 wt.%, diameter of 250 nm and *in vitro* drug release of DSP for about 2 weeks. SCT injection of DSP-NP significantly prevented corneal neovascularization and corneal ulceration/ inflammation in NM treated eyes compared to DSP eyedrops, saline and placebo treated groups. It was also evident from a significantly reduced clinical disease scoring and low expression of various inflammatory and angiogenic cytokines.

Conclusion: DSP-NPs could be a potential treatment option with easy translational possibilities for treating vesicant induced corneal injury.

Hadi Sudarjat
Development of Electrospun Nanofiber Buccal Films of Levo-Alpha-Acetyl Methadol (LAAM) for Opioid Use Disorder (OUD) Treatment

Hadi Sudarjat, Chaolong Qin, Aji Alex Moothedathu Raynold, Adam Pearcy, Rudra Pangeni, Diane Ingabire, Tuo Meng, Jennifer Puetzer, Matthew Halquist, Xiuling Lu, F. Gerard Moeller, Charles O'Keeffe, Qingguo Xu

Background: Opioid use disorder (OUD) affects millions worldwide, leading to a significant socioeconomic burden. Though much progress has been made in OUD treatment with the development of methadone, buprenorphine, and naltrexone, a significant portion of the OUD population could benefit from advanced pharmacologic treatments. We developed electrospun film to deliver LAAM and applied it to the buccal mucosa, which allows faster delivery and enhanced bioavailability.

Methods: The film was characterized, including morphology via SEM, Drug release *in vitro* via an Apparatus dissolution device and HPLC, *ex vivo* mucoadhesive strength, and the transmucosal diffusion and pharmacokinetic study *in-vivo*.

Results: These films have stable nanofiber matrices with submicron-sized diameters (400-900 nm) and exhibited high drug loading (50% w/w) and optimal mucoadhesive property (0.56 ± 0.19N). The loaded LAAM drug can be completely released at a steady rate within 5 to 30 minutes (determined by HPLC analysis). We also observed successful transmucosal drug diffusion of LAAM over time ex vivo using the pig buccal mucosa tissue. We tested the pharmacokinetic study for our optimum film formulations with the oral solution and IV control treatment groups. The F5 showed optimal mucoadhesive strength with 0.56 Newton. The pharmacokinetic study revealed a significant difference in bioavailability between F5 and oral solution (3.5-fold higher).

Conclusions: The results highlighted that the transmucosal delivery of LAAM nanofiber might pose a potential candidate for clinical translation, contributing to better clinical outcomes.

School of Social Work

Addy Cooley

Redlined Richmond: The Relationship Between 1930s HOLC Grades and Contemporary Residents' Quality of Life Indicators in Richmond, VA

Background: Recent research shows that New Deal-era redlining practices have had lasting impacts on the economic, social, and environmental conditions of today. However, few studies have examined residents' opinions on quality-of-life indicators. Given the importance of public investment in the development history of these neighborhoods, this study examines the relationship between HOLC grades and contemporary residents' opinions on quality of life, quality of city services, quality of public schools, and feelings of safety in the city.

Methods: Data were obtained from a 2014 Richmond City community survey and from the Mapping Inequality project from the University of Richmond. Using ArcGIS, HOLC spatial data were overlaid with the survey data, and a Spearman correlation test was performed to determine the relationship between HOLC grades and satisfaction levels.

Results: Results show a significant positive association between HOLC grades and satisfaction with quality of life (ρ=.210, p<.001) and feelings of safety (ρ=.128, p<.001). The relationship between HOLC grades and quality of public schools was also significant, but negatively correlated (ρ=-.180, p<.001). Correlation was not significant between HOLC grades and satisfaction with city services (ρ=.061, p=.078).

Discussion: The history of redlining may be a risk factor in residents' quality of life and feelings of safety. Further research is needed to replicate these results and to investigate whether redlining may play a role in other quality of life indicators. This study highlights the continued effects of anti-Black racism in the U.S. and underscores the need for a racial equity lens in contemporary development and planning.

Seon Kim

The Relationship Between Neighborhood Environment, Social Services, and Aging in Place of Korean Older Adults: Focusing on Age Differences and Health Status of Older Adults

Background: Aging in place (AIP) is continued living in the community, which is not only cost-effective but also a preferred form of residence for older adults. However, AIP can threaten later life if the individual characteristics of older adults and the diverse neighborhood environment are not considered.

Objectives: This study aims to identify the relationship between neighborhood environments, social services, AIP, and the difference between AIP intentions according to age and the health status of older adults.

Method: This study used data from the 2020 National Survey of Older Koreans collected from 10,097 Korean older adults aged 65 and older and Korean administrative data.

Results: Based on the one-way ANOVA, the older the age when the health is good, the higher

the AIP intention (F=12.853, *p*<.001), and the younger when the health is poor, the higher the AIP intention (F=3.952, *p*<.05). The regression analysis showed that when older adults are in good health, the higher the number of medical welfare facilities (B=.495, *p*<.01), social welfare public officials (B=.699, *p*<.001), and social workers (B=.009, *p*<.01), the higher intention of AIP. In terms of older adults in bad health, the higher the number of home care services (B=1.050, *p*<.001) and leisure services (B=.050, *p*<.001), the higher the intention of AIP.

Implications: Our results indicate that policymakers should consider older adults' age and health status when distributing social work services and social workers. It can be a clue to solving the current concentration of facilities in the city or the work overload of social workers.

Seon Kim
Neighborhood Impact on Older Adults' Health Outcomes in Korea

Background: The health of older adults is not only affected by biological factors but also strongly influenced by their accumulated social determinants. Neighborhood characteristics have been identified as structural contexts that significantly impact the health outcomes of older adults. As older adults tend to spend more time in their homes and neighborhoods than young adults, it is important to understand the neighborhood factors that affect their health outcomes. This study aims to explore the neighborhood characteristics that impact the health outcomes of older adults in Korea.

Method: This study used the 2020 National Survey of Older Koreans data, which was collected from 10,097 Korean older adults aged 65 and older. Neighborhood characteristics considered in this study included satisfaction with neighborhood characteristics (e.g., safety, transportation) and proximity to infrastructure in the neighborhood (e.g., senior centers, hospitals, supermarkets). The health outcomes considered in this study were self-rated health, the number of chronic diseases, and mental health among older adults.

Results: The regression results showed that satisfaction with the neighborhood was related to older adults' better self-rated health (B=.014, *p*<.001), lower number of chronic diseases (B=-.007, *p*<.001), and better mental health (B=.034, *p*<.001). On the other hand, proximity to infrastructure in the neighborhood was only related to older adults' better mental health (B=-.018, p<.001).

Conclusions: These results suggest that policymakers should consider neighborhood characteristics when addressing older adults' health outcomes. Especially, for the better mental health of older adults, policymakers should consider both proximities to infrastructures and satisfaction with the neighborhood.

Katie Kim
The Link Between Resilience and Alcohol Use Among a Sample of College Freshmen and the Mediating Role of Alcohol Expectancy
KN Kim, KG Chartier, Spit for Science Working Group, and MW Francis

Background: College transition can cause increased stress and alcohol use, leading to negative alcohol-related outcomes. Positive alcohol expectancies (AEs) can amplify alcohol use, while negative AEs reduce it. Resilience, the ability to adapt to stress, may influence alcohol use, but its relationship with AEs is unclear. We examined the mediating role of AEs in the relationship between resilience and alcohol use among college freshmen.

Methods: A sample of 2,639 freshmen (60.8% females) participated in the Spit For Science study. Resilience was assessed using the revised Connor-Davidson Resilience Scale (CD-RISC; α=.61), AEs using the Comprehensive Effects of Alcohol (CEOA; positive domains: α=.71, negative domains: α=.63), and alcohol use as the number of standard drinks consumed on a typical day. Mediation analysis controlled for sex.

Results: Positive AEs had direct positive effects (liquid courage: b=.31, p<0.001; sexuality: b=.23, p<0.001; sociability: b=.43, p<0.001) and negative AEs direct negative effects (cognitive and behavioral impairment [CBI]: b=-.20, p=0.006; self-perception [SP]: b=-.22, p=0.002) on alcohol use. Resilience had a direct negative effect on negative AEs (CBI: b=-.03, p=0.003; SP: b=-.09, p<0.001) and indirect positive effects on alcohol use through CBI (b=.003, 95%CI [0.0006, 0.0067]) and SP (b=.009, 95%CI [0.003, 0.017]). Positive AEs didn't mediate the relationship between resilience and alcohol use.

Conclusions: Among college freshmen, resilience was associated with increased alcohol use through lower expectations of negative alcohol effects. Further investigation of the mediating role of negative AEs is needed to inform alcohol education programs for first-year college students, reducing the risk of negative outcomes.

Michele King
Evaluating Weight-Related Behavioral Health Research Using a Critical Race and Health Framework

Background: Behavioral research wields significant power in informing public health campaigns and public discourse. Most research on body weight has focused on (weight loss) interventions and a segmented view of health. Absent are the lived experiences of higher-weight people, and a critical consideration of socio-political-historical context. Research has not accounted for weight stigma itself, a social process of disempowerment that is correlated with poor health. These practices create and perpetuate structural violence against higher-weight people.

Methods: This systematic literature review used Critical Race Theory and application-spotting to understand the dominant ideologies in behavioral research, highlighting the gaps in literature. Social Work Abstracts and Psychology and Behavioral Sciences were reviewed, using key words "behavioral" and "weight" yielding 310 articles.

Results: Of the 310 articles reviewed, most positioned higher weight as dangerous and pathological, with lower weight as a self-evident truth about health. Zero articles undertook a critical perspective to analyze the relationship between race, class, and health, and none utilized a strengths-based or empowerment approach, unless to achieve weight loss. Weight stigma, when mentioned, is only understood as a barrier to weight loss.

Conclusion: Framing weight as a "behavior" and larger bodies as inherently deviant is an oppressive practice that directly leads to interpersonal and structural harms for higher-weight people. Current mainstream research typifies colonialist and paternalistic norms by exerting power through social discourse. Future research can prioritize a critical perspective on health that considers historical context, social, economic, and environmental factors, and the strengths and autonomy of higher-weight individuals.

Jenee Lee
'All Abilities Shine': Parents' Perceptions of the Philly Goat Project's All Abilities RAMble

Background: The All Abilities RAMble is a monthly event hosted by the Philly Goat Project (PGP), a non-profit organization in the inner city of Philadelphia. The RAMbles provide an inclusive and sensory-friendly space for individuals with disabilities and their families. This constructivist qualitative study examined the perspectives of 19 parents of 23 children with disabilities who attended the PGP event.

Methods: During phone interviews, the researchers used open-ended questions to gain insight into how parents perceived the experiences of their children with disabilities at the RAMbles. All interviews were recorded and transcribed using OTTER A.I. software and later uploaded into Dedoose, a qualitative coding program. The findings were systematically analyzed using both descriptive and InVivo coding methods.

Findings: Several overarching themes emerged from the interviews. (1) RAMbles as a positive experience; (2) RAMbles as a unique service, more beneficial than other services; (3) RAMbles as a program that offers personalization and is child-directed; (4) RAMbles as a place where children with disabilities can learn and practice skills; and (5) RAMbles as a program that offers a sense of community.

Conclusion: The study's results affirm the benefits of animal-assisted interventions, specifically animal-assisted activities on children with disabilities. Parents' interviews about their children's experiences highlighted the opportunities the RAMbles provided for their children to practice and build confidence in both communication and social skills that could be transferable to other settings. Overall, the results provide valuable insight that can inform future goat-assisted therapy interventions for children with intellectual and developmental disabilities.

Angela Matijczak
Family and Friend Social Support Moderates the Association Between Microaggressions and Psychological Distress Among LGBTQ+ Emerging Adults
Angela Matijczak, Camie A. Tomlinson, Shelby E. McDonald

Background: Microaggressions are discriminatory statements targeted at members of a marginalized group, such as lesbian, gay, bisexual, transgender and queer (LGBTQ+) emerging adults. Few studies have investigated how different sources of social support may buffer the relation between minority stressors and mental health. This study examined whether the association between LGBQ microaggressions and mental health symptoms varies as a function of two sources of social support.

Methods: We recruited 229 LGBTQ+ emerging adults (18-21 years; 42.8% racialized minority; 43.7% gender minority). We used SPSS to conduct six multiple moderation analyses to examine whether family and friend social support moderates the relation between LGBQ microaggressions (i.e., interpersonal, environmental) and mental health symptoms (i.e., depression, anxiety, psychological distress), adjusting for covariates.

Results: Friend social support was a significant moderator of the relation between environmental microaggressions and psychological distress, when family social support was held constant. Specifically, there was a significant positive association between environmental microaggressions and psychological distress when participants reported high family support, but low friend support. However, this association was not significant when participants reported high levels of both family and friend social support or high levels of friend social support and moderate levels of family support. Family and friend social support were not significant moderators in the other models.

Conclusions: Receiving family and friend social support may buffer the harmful association

between environmental microaggressions and overall psychological distress. Social support from friends, specifically, may be a key protective factor for LGBTQ+ emerging adults.

Christine Rucker
The Link Between Bereavement and Expressive Processing
Alexis Hingle and Christine Rucker

Background: The loss of a loved one is a significant event that can prove to be challenging to cope with and process. Research indicates that loved ones left behind often adopt maladaptive coping mechanisms to make sense of their life-altering loss.

Methodology: The following mixed methods study used various processes to ascertain the link between bereavement and a memorial book-making project between the participants and researcher between 2013 to 2019.

Results: The study suggests a positive link between the processing of grief, meaning-making, and self-awareness through expressive art projects.

Conclusions: Expressive projects can be a powerful tool for individuals who are grieving, providing a means of expression and a way to connect with painful feelings in an adaptive way.

Ya-Li Yang
Lifestage Moderates the Impact of Recovery Capital on Quality of Life for Collegiate Recovery Program Participants
Y. L. Yang, K. G. Chartier, The National Longitudinal Collegiate Recovery Study Group, and M.W. Francis

Background: Collegiate Recovery Programs' (CRPs) goals are to support students in sustaining recovery and improving quality of life (QOL). Recovery capital (RC) is a key component of QOL, and increases with age. The relationship between RC and QOL may vary according to lifestage as CRP participants have a wider age range than general college population. This study examines whether the relationship between RC and QOL varies by lifestage, and explores factors may explain these differences.

Methods: We categorized 179 participants from the the first follow-up from the National Longitudinal Collegiate Recovery Study into three lifestages (emerging adulthood (EA), young adulthood (YA), and middle adulthood (MA) and analyzed differences in recurrence, employment, and service utilization with bivariate statistics. We regressed RC (Brief Assessment of Recovery Capital; dichotomized at a clinical cutoff of 47) and lifestage on QOL (EUROHIS-QOL-8) with lifestage examined as a moderator.

Results: Higher RC predicted higher QOL ($F(1,152)=17.42$, $p<.001$). EA had lower QOL than older groups ($F(2,152)=3.87$, $p=.023$). Lifestage moderated the effect of RC on QOL: EA and YA below the RC cutoff had significantly lower QOL ($F(2,152)=3.21$, $p=.043$). MA worked more hours weekly and used more individualized, off-campus services, while younger groups utilized more on-campus services.

Conclusions: CRPs need to tailor services to lifespan-specific needs. As EA had lower RC and QOL but were more linked to on-campus services and MA were more independent, CRPs can focus on boosting EA engagement to campus activities that enhance RC and QOL and provide individualized services for MA with lower RC to promote sustained recovery.

Skye Yellin
Mix Methods Research to Understand Risk & Protective Factors for HIV Treatment Fatigue Among Virginia Ryan White Customers

Background: HIV Treatment Fatigue (HIVTF) is a behavioral challenge Ryan White Consumers with HIV (RWCHIV) commonly experience resulting in Antiretroviral Therapy (ART) non adherence. However, RWCHIV adhering to ART regimens can combat viral levels to undetectable and essentially untransmittable levels. This research will explore HIVTF risk/protective factors qualitatively while quantitatively calculating RWCHIV factors using the workload/capacity (W/C) model into a W/C index score (independent variable). Finally, various hypothesis testing from the following dependent variables will measure for any significant bivariate relationship(s): HIVTF Index "case adherence study"; 2. Intersectional Marginalized Identities (IMI) Index; 3. Psychosocial Syndemic (PS) Index; and 4. Multimorbidity Syndemic (MS) Index.

Methods: Twenty-nine Virginia RW agencies collaborated to provide consumers flyers/QR codes to 49-item REDCap surveys transcribed in Spanish/English. Pilot testing showed RWCHIV appreciated REDCap security practices to reduce participation risk as fears of HIV criminalization & stigma can affect accuracy of responses to HIVTF Index questions. Secondly, 120 RWCHIV at consumer summit were invited to respond to engagement questions posted on walls to share their 1. favorite inspirational quotes, 2. motivations to take medication, and 3. things needed to support their healthcare engagement.

Results: Fifty-six REDCap surveys and 95 summit responses were collected. Next steps will include Pearson correlational analysis testing of various hypotheses as previously described, and content analysis of summit responses using coding framework.

Conclusions: Assessing HIVTF risk/protective factors using multidimensional and equitable lenses is essential to navigate adherence challenges for RWCHIV and improve their quality of life.

School of the Arts

Tawny Chamberlain
Empowering Women's Health Through Healing Design: We Can Do It!

Background: Despite the immense focus on patient-centered care over the past two decades, a lack of knowledge exists regarding how to apply these guidelines to women, which contributes to gender disparities in healthcare (Filler et al, 2020). Decreased engagement with providers, coupled with disjointed healthcare, leaves women in a vulnerable position. This research will explore if designers have the tools they need to advocate for patient-centered care for women (PCCW) and the design of holistic, healing environments.

Methods: A comprehensive literature review, precedent studies, a user survey, and interviews with designers have been conducted to determine which environmental factors impact women's engagement with their healthcare center.

Results: There is ample evidence that the environment impacts patient care and satisfaction, providing designers with a unique opportunity to deliver innovative environments that promote wellbeing and active health (Locatelli et al., 2015). Designers must recognize that women often have significant fear and anxiety surrounding exams and take care to utilize strategies that can mitigate these emotions, including empowering women by giving them a sense of control over

their environment. Biophilic and salutogenic design principles should be incorporated and care should be provided in a safe, women friendly environment with strong continuity of care from an interdisciplinary team (Peters, 2010).

Conclusions: To promote optimal health and wellness, women should have access to a holistic healthcare center they perceive as non-intimidating. This research will help interior designers better understand how to advocate for PCCW and encourage engagement with the clinics they design.

VCU Life Sciences

Alba Dutra
Spontaneous Peptide Cyclization Using Glu-γ-Hydrazide and ρ-Acetyl Phenylalanine

Cyclic Peptides are promising therapeutics for diseases. In the last two decades (2001-2021), eighteen cyclic peptides have been approved for clinical use. Formation of cyclic peptides can be achieved with both canonical and non-canonical amino acids. The cyclic structures that have been formed use a variety of disulfide, thioether, lactone, ether, and amide bonds. New approaches to creating peptide cyclization's are important for research development, as the rigidity of cyclic peptides increases binding affinity and selectivity towards a target molecule, and thus, are promising therapeutics for diseases. Here we propose a new way of creating a spontaneous cyclic peptide by Reacting Glu-γ-hydrazide with ρ-acetyl phenylalanine, resulting in a spontaneous cyclization forming a hydrazone bond. Maldi-TOF mass spectrometry is used to characterize the incorporation and cyclization. The quantity of peptide produced relative to the canonical amino acid standards is determined by $_{35}$S-methionine incorporation. Results so far have indicated that Glu-γ-hydrazide and ρ-acetyl phenylalanine can be incorporated in in vitro translation. In addition, both compounds have shown some cyclization. Our work so far has demonstrated incorporation of both compounds and a new spontaneous cyclization method. The creation of chemically diverse cyclic peptides is valuable to the design of inhibitors and may facilitate the discovery of therapeutics for diseases or illnesses.

Alaina Holt
Vaping Ethanol: Roadside Investigations, Clinical Implications, and Subjective Effects
Alaina K Holt, Akansha Anbil, Madison M Combs, Edward L Boone, Justin L Poklis, Edgar Greer, Nareg Karaoghlanian, Alison B Breland, Michelle R Peace

Background: Electronic cigarette (e-cig) liquids (e-liquids) have been reported to contain >20% ethanol. Anecdotal reports describe e-cig users receiving driving under the influence charges, though no alcohol was said to be consumed. Vaping ethanol could affect a myriad of groups, devices, and settings, including roadside standardized field sobriety tests (SFSTs), ethanol treatment and recovery, vehicle interlock systems, workplace drug testing, and court-mandated drug testing.

Methods: E-liquids (0% or 20% ethanol) made by a commercial manufacturer were analyzed in-house monthly. Twelve participants were enrolled in a clinical study (VCU IRB HM20015064) where they vaped one or ten puffs of an e-liquid (0% or 20% ethanol). Law enforcement officers assessed indicators of impairment by following a study design incorporating SFSTs and preliminary and evidentiary breath tests (PBT and EBT) at predetermined intervals.

Computerized self-assessments were administered at three timepoints.

Results: Ethanol concentrations were determined to be stable at -20 °C. Positive breath ethanol results ranged from 0.007-0.030 and 0.013-0.074 g/210 dL by PBT immediately after using a 20% ethanol e-liquid when vaping one puff and ten puffs, respectively. All subsequent PBTs, and all EBTs were negative for ethanol. Subjective effects were reported by some individuals, but few statistically significant differences between conditions were indicated.

Discussion/Conclusions: These results demonstrate that a wait period must be employed prior to breath testing to prevent vaping-related false positives. Results should be considered for scenarios that utilize breath ethanol testing. Further studies are needed to assess any effects of vaping ethanol on ethanol biomarker concentrations.

Anushka Jain
Studies on the Relationship Between Chromatin Remodeling Complex NURF and CpG Methylation Patterns of Breast Cancer
Anushka Jain, Joseph Landry

Methylation of the CG-rich regions in DNA plays a critical role in determining the course of cancer. It decides many properties of tumors including immune system avoidance, survival, proliferation and metastasis. DNA methylation inhibitors are known to activate silenced tumor suppressor genes, and viruses resulting in the arrest of tumor growth. How these drugs are influenced by other epigenetic regulators is not known. In this study, I aim to determine if there are functional connections between the NURF chromatin remodeling complex and the DNA methylation inhibitor Guadecitabine. For this, we treated NURF control and knockout breast cancer tumors in mice with Guadecitabine and measured for changes in the ability of Guadecitabine to alter CpG methylation status. Tumor caliper measurements show that the combination of NURF knockout and Guadecitibine treatment slows tumor growth. To measure changes in CpG methylation we FACS-purified GFP-labeled tumor cells from the Glowhead mouse background and performed MBDSeq. Genome-wide methylation data from these studies were analyzed for methylome-wide associations using the RaMWAS pipeline. MBDSeq is known to generate a greater specificity to methylated CpGs by following affinity-based capture of methylated sequences. So, this data is expected to determine the methylation risk score of the mice and understand the dynamics of Guadecitabine by running it through the RaMWAS pipeline. Thus, by the end of this project, we look at read quality, methylation risk scores and other methylation values to understand the impact and effectiveness of Guadecitabine as a treatment for breast cancer.

Preksha Jerajani
Advancing Our Knowledge About BPTF's Role in Cancer Onset

Background: Chromatin-remodeling complexes are fundamental bodily elements that regulate quality expression. Nucleosome Remodeling Factor (NURF) is a chromatin-remodeling complex involved in the catalysis of nucleosomes sliding to aid in gene expression. NURF's largest subunit BPTF is encoded by the BPTF gene, which has previously been indicated as being overexpressed in almost all types of cancer. As epigenetic modifications play a major role in cancer, the objective is to find how BPTF expression and function is related to the onset or recurrence of different cancers. This study explores splicing, gene correlation, gene ontology and other factors to advance understanding of BPTF's role in cancer.

Methods: The analysis was conducted by writing multiple scripts and using statistical tools within R. Datasets were gathered and analyzed by bioinformatics tools such as CBioportal, DAVID, DepMap, CIBERSORT, and TCGA SpliceSeq. These publicly available databases host data from large consortium efforts like TCGA, contain gene analysis, patient data and much more information that can be downloaded.

Results: The gene correlation analysis evaluated the top ten positively (eg. MED13, INTS2) and negatively correlated genes (eg. ZNF445, SP2). Splicing analysis of BPTF in different cancers revealed significance between splicing events in normal versus tumor samples. Gene ontology analysis showed that there are many common molecular functions, cellular components and biological functions between cancers.

Conclusion: BPTF could potentially be targeted for cancer therapy. However, understanding BPTF transcripts, interactions and functions could aid in providing a more thorough understanding of the mechanisms that can be responsible for such overexpression.

Grace Lumsden-Cook
University Course Supports New Scenic Segment and Formal Collaboration with the State
Grace Lumsden-Cook, Lynn Crump, Jennifer Ciminelli, and James Vonesh

The Virginia Commonwealth University Scenic Natural Resources course introduces students to scenic resource policy and assessment in the classroom while engaging topics more deeply through an experiential learning approach focused around a course-embedded research project in collaboration with the Virginia Department of Conservation and Recreation Scenic Rivers Program. Through the scenic rivers project students implement the concepts and tools they have learned to examine Virginia State Code as it pertains to Scenic River designation to complete a scenic river assessment for a specific river segment and produce a technical report and GIS Storymap summarizing the assessment findings. In 2020 the course focused on a segment of the Piedmont James River in Virginia between New Canton to Columbia and presented at the RMS Symposium in Richmond in Spring 2021. Since that time the project has resulted in two additional outcomes that positively impact Virginia rivers. For one, the segment surveyed by the class in 2020 was proposed for scenic designation in HB 49, and voted into law in July of 2022. Thus, the efforts of the class played an important role in designating a new segment of Scenic River. Secondly, VCU and the Virginia Department of Conservation and Recreation formalized their collaboration around Scenic River Assessment with a formal agreement in the Fall of 2021. DCR provides support for the scenic river field assessment through hands-on training of students. This agreement provides for the development of training resources, and piloting their use on a river segment being considered for scenic designation.

Daniel Rioux
Characterization of the Putative Rab Guanine Nucleotide Exchange Factor (GEF), Avl9
Daniel Rioux and Derek C. Prosser

In eukaryotic cells, vesicular trafficking between organelles is mediated by a subgroup of Ras family of small GTPases known as Rabs, which are locally activated by guanine nucleotide exchange factors (GEFs). Rab GEFs typically contain conserved elements that are responsible for catalytic activity, including Vps9 and DENN (differentially expressed in normal versus neoplastic) domains. In the budding yeast *Saccharomyces cerevisiae*, there is a single DENN-like

domain-containing gene, *AVL9*, that is poorly characterized but may function in the late secretory pathway. To better understand the function of Avl9, we combined a loss-of-function *avl9Δ* allele with deletions or temperature-sensitive mutations in Rabs or Rab GEFs, as well as genes involved in autophagy. We then tested for synergy or suppression of phenotypes associated with loss in Rab function using plate- or liquid-based growth assays. Using this approach, we find that *avl9Δ* appears to exacerbate phenotypes associated with loss-of-function mutations in numerous Rabs and their corresponding GEFs: Ypt1, Sec4 and its GEF Sec2, Vps21/Ypt52/Ypt53 and their GEFs Vps9 and Muk1, and Ypt7 and its GEFs Mon1/Ccz1. In contrast, *avl9Δ* appears to suppress phenotypes associated with loss-of-function in Ypt6 and its GEFs Ric1 and Rgp1. Additionally, loss of *AVL9* increases sensitivity to rapamycin and that deletion of autophagy genes *ATG1* and *ATG9* rescues this phenotype. However, deletion of *AVL9* and *ATG8* together results in a temperature-sensitive growth defect. Surprisingly, deletion of *AVL9* rescues growth defects in *TOR2* temperature-sensitive mutants. Based on current evidence, our results suggest a role for Avl9 in membrane-trafficking and growth regulation.

AnnaMari Stump

Yeast Models of Amyotrophic Lateral Sclerosis Type 8 Mimic Phenotypes Seen in Mammalian Cells Expressing Mutant VAPB[P56S]

Amyotrophic lateral sclerosis (ALS) is a complex neurodegenerative disease that results in death of motor neurons and can occur sporadically or due to genetic mutations. Over 30 genes have mutations linked to familial ALS, each of which may cause motor neuron loss for distinct reasons based on alterations in protein function. Among these, a P56S mutation in VAPB, an ER-resident protein that functions at membrane contact sites, causes ALS subtype 8. Mammalian cells expressing VAPB[P56S] show distinctive phenotypes including ER collapse, formation of protein and/or membrane-containing inclusions, and sensitivity to ER stress. *VAPB* is highly conserved through evolution, and has two homologs in budding yeast, *SCS2* and *SCS22*. Previously, a humanized version of *SCS2* bearing disease-linked mutations was shown to form inclusions when overexpressed in yeast. Here, we describe a yeast model for ALS8 (yALS8) in which the two *SCS* genes are deleted and replaced with a single chromosomal copy of either wild-type or mutant yeast *SCS2* or human *VAPB* expressed from the endogenous *SCS2* promoter. These cells show similar ER collapse, inclusion formation, and sensitivity to ER stress as seen in mammalian cells expressing VAPB[P56S]. Based on these similarities, we propose that these models can be used to study the molecular basis of cell death in ALS8.

Marie Vergamini

Using SerpApi and Gephi to Visualize Citation Networks in Paleoanthropology
Marie Vergamini and Amy L. Rector

Background: A citation network analysis is a method used to study and analyze the relationships between scholarly publications based on the citations they receive from other publications. Citation networks are used to identify the most influential publications, authors, and research areas, as well as to track the evolution of research topics and the emergence of new fields.

Methods: Here, we use SerpApi, a google scholar data scraper, and Gephi, an open-source network visualization program, to illustrate the citation network of Dr. William Kimbel and his impact in the fields of Biological Anthropology, Paleoecology, and Human Evolution. By visualizing the citation networks formed by Dr. Kimbel, we can further analyze his research

themes and his impact with other scientists in the field.

Results: Our results highlight that Dr. Kimbel's work is fundamental in Paleoanthropology. During his career, he amassed an impressive number of journal and book publications with over 9000 citations; a number that continues to rise. Dr. Kimbel's knowledge contributed to the improvement and richness of our area, and our analyzes show just how lasting his influence will be.

Conclusions: Overall, citation network analysis is a useful method for comprehending the dynamics of academic work as well as the evolution of various research disciplines.

L. Douglas Wilder School

Amy Clifton-Mills
Youths' Awareness of Sex Offender Registration Policy and Associated Registerable Sexual Behaviors

Background: Sex offender registration laws are widely implemented, increasingly restrictive, and intended to serve both specific and general deterrent functions. Most states have some form of policy mechanism to place adolescents on sex offender registries, yet it remains unclear whether adolescents possess the requisite policy awareness to be deterred from sexual offending.

Methods: This poster presents the first wave of data from a two-wave longitudinal study of adolescents' awareness of sex offender registration as a potential sanction and its cross-sectional association with engagement in several registrable sexual behaviors (sexting, forcible touching, and sexual assault) in a community sample of 319 adolescents. To empirically evaluate whether legal knowledge that certain sexual behaviors may be punished with sex offender registration and notification deters adolescent sexual offending over time, this study experimentally manipulates whether adolescent participants are exposed to educational information about the risk of criminal justice involvement and sex offender registration and notification associated with illegal adolescent sexual behaviors.

Results: Results revealed that many adolescents were unaware that these behaviors could result in sex offender registration. Notably, over two-thirds of the sample had engaged in at least one of the four registrable behaviors we assessed, and policy-aware youth were just as likely as others to have engaged in those registrable sexual behaviors.

Conclusions: Our findings cast doubt on arguments that juvenile sex offender registration serves as a general deterrent, adding to a growing body of literature suggesting that the policy is ineffective and in need of reform.

Keandra Davis
Rent on the Rise: An Examination of Evictions, Poverty, and the COVID-19 Eviction Moratorium

Background: In the United States, discriminatory housing practices such as eviction, redlining, urban renewal, and other dispossessions that undervalued black neighborhoods and hindered fair investment and wealth creation continue to impede the prosperity of these vulnerable groups. Minority neighborhoods are frequently unfairly targeted and discriminated against during

evictions, and residents of these districts are highly economically insecure during economic crises. Virginia is noted as a state with the highest eviction rates across major localities. Currently, five Virginia localities have the highest eviction rates in the U.S. Particularly in Virginia; black renters are disproportionately affected by the eviction. This study explores the relationship between eviction and poverty in Virginia localities and the moderated effects of Rent Relief Payments on eviction rates.

Methods: The Eviction Data is retrieved from Virginia Court Data that the RVA Eviction Lab retrieved. Rent Relief Payments were aggregated from Trust Fund Dollars by the CARES Act, and Poverty Data was taken from the U.S. Census.

Results: Poverty was the highest contributor to evictions. Rent Relief Payments (RRPs) decreased evictions in the lowest poverty rates. Following the moratorium, medium-poverty areas saw slight increases in evictions, and localities that received the highest RRP still had the highest eviction rates.

Conclusion: Despite an Eviction Moratorium and state funding meant to alleviate the cost for eligible low to high-poverty renters, renters with the highest poverty still had the highest eviction rates. Temporary financial assistance can help, but only to some extent; policies focused on Deconcentrating poverty would substantially reduce evictions.

Zehra Sahin Ilkorkor
Education for All: The Role of Religion on School Climate Perceptions and Student Academic Achievement

Background: This study examined how 7th to 12th-grade students' school climate perceptions are associated with their GPA and whether this association varies according to religion. Using data (n = 6504) from the National Longitudinal Study of Adolescent to Adult Health, this study aimed to understand the relationship between school climate perceptions and academic performance for students from different religious affiliations.

Methods: This study calculated the two-sample t-test to examine whether the mean score of school climate perceptions varied across different religious affiliations. Additionally, the study used a nonexperimental associational research design and conducted a multilevel regression analysis to examine whether religion is a moderator in the association between school climate perceptions and student academic achievement.

Results: Results indicated that there were significant differences in students' school climate perceptions due to their religious affiliations. Students with non-Christian faiths (Muslim, Jewish, Buddhist, and Other) reported significantly less positive school climate perceptions than Catholic students and Protestant students while they reported more positive school climate perceptions than students with no religion. It was also found that school climate perceptions were positively associated with GPA scores for all student subgroups regardless of their religious affiliations. The magnitude of this positive association between school climate perceptions and academic achievement is not different for students who are Protestant, Catholic, Muslim, Jewish, Buddhist, or students with no religion.

Conclusion: It is suggested that supporting youths to develop and maintain positive school climate perceptions may be a viable means to boost their academic performances regardless of religious background.