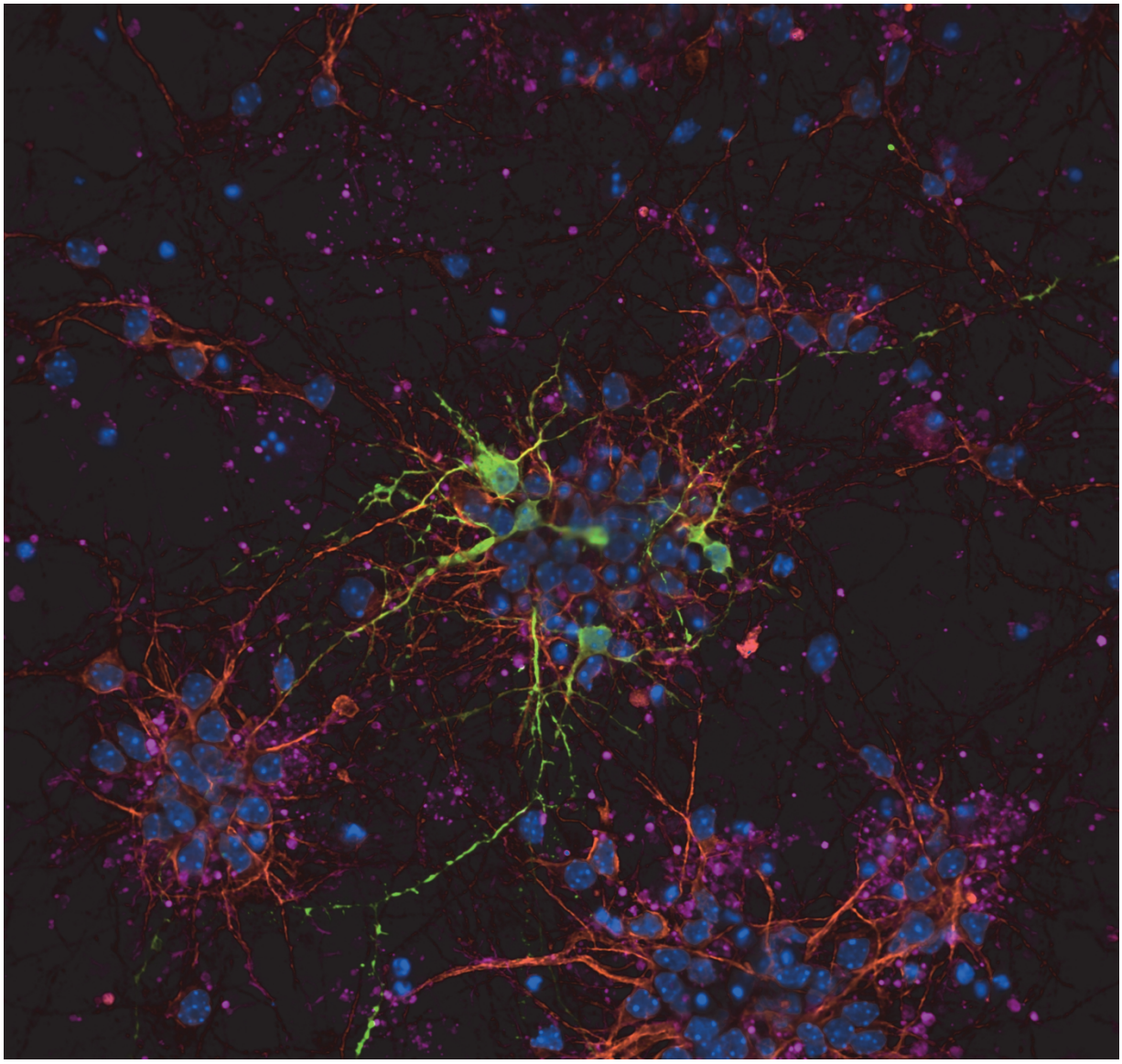
UNIVERSITY of MARYLAND
BALTIMORE

46th Annual

Graduate Research Conference



Credit: Sophie Bruckmeier

Friday, April 12, 2024

46th Annual
Graduate Research Conference

Friday, April 12, 2024
SMC Campus Center
Baltimore, MD

Organized by:

The Graduate School
The Graduate Student Association
The Graduate Research Conference Subcommittee

Jonathan Lawton
Sarah Clem
Jessica Cornell
Makenzie Mull
Kaustubh Joshi

Cover Art: ***Nprl2 KO primary cortical neurons***
Microscopy image

Credit: Sophie Bruckmeier
PhD Candidate, Program in Neuroscience

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Foreword

Welcome to the 46th Annual Graduate Research Conference (GRC) at the University of Maryland, Baltimore (UMB)! The Graduate Student Association (GSA) is proud to host this unique opportunity for PhD and master's students to present their hard work to the broader campus community.

The interdisciplinary nature of UMB allows us to showcase an exciting variety of topics under one roof, including basic, social, clinical, and translational sciences. This year, over 100 graduate students will present their research, hailing from 23 programs and departments across UMB and the University of Maryland, College Park. During the lunch intermission, Graduate School Dean Kenneth Wong and Senior Associate Dean Erin Golembewski will highlight the strength and diversity of our community. After the scientific sessions, we will end the day by recognizing outstanding student presenters and celebrating the doctoral candidates who recently passed their qualifying exams.

The GSA graciously acknowledges those who helped make the GRC possible. Special recognition is given to Dr. Golembewski for her invaluable guidance and dedication to graduate student affairs. We also thank President Jarrell and Dean Wong for their staunch support of interdisciplinary research here at UMB. We are immensely grateful to the faculty judges for donating their time, expertise, and critiques. We extend special thanks to our amazing sponsors and supporting organizations for making this event possible. Finally, we thank the members of GSA and the GRC planning committee for their service throughout the year. It is our pleasure to host the 46th annual Graduate Research Conference, and we hope you enjoy the day's program!

GSA Executive Board

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President's Message

Dear Graduate Students,

Congratulations on your 2024 Graduate Research Conference. This year marks the 46th year that the University of Maryland, Baltimore (UMB) has hosted this conference. It serves as a testament that we are committed to our mission to the human condition and to serve the public good. If this year has taught us anything, it's the importance of understanding that we are interconnected. The biggest breakthroughs in human health and well-being often happen at the intersection of scholars, schools, and disciplines.

True creativity and innovation occur when we see each other as sources of good ideas, when we're eager to talk with one another, to work with one another, to redesign the way we think about problems and solutions. When we collaborate and share, we see possibilities open up before us where we thought we had reached a dead end. We dream up new applications for our work, ways to broaden its reach or amplify its impact.

I wish you the best of luck at your Conference – and hope that you take a spirit of collaboration with you now and in the future.

Sincerely,

Bruce Jarrell, MD, FACS
President

Schedule of Events

8:00 – 9:00am	**Breakfast & Registration**	First Floor
9:00am	**Opening Remarks**	Room 349
9:00 – 10:30am	**Poster Presentations***	
	Session A	Room 349
	Session B	
	Session C	
10:00 – 11:30am	**Oral Presentations**	
	Session D	Room 351
	Session E	Room 353
	Session F	Room 223
	Session G	Room 115
11:30 – 1:00pm	**Lunch**	Elm Ballroom
	Graduate School Address	
1:00 – 2:30pm	**Poster Presentations***	
	Session H	Room 349
	Session I	
	Session J	
2:00 – 3:30pm	**Oral Presentations**	
	Session K	Room 351
	Session L	Room 353
	Session M	Room 223
	Session N	Room 115
3:30 – 4:00pm	**Break**	
4:00 – 5:00pm	**GRC Awards**	Elm Ballroom
	Advancement to Candidacy Ceremony	
5:00 – 6:30pm	**Reception**	Second Floor

*Poster setup will commence one hour prior to each session

Session Assignments

Poster Session A – 9:00-10:30am – Room 349

#1 Lindsey Mathis
#2 Abaneh Ebangwese
#3 Zijin Xu
#4 Sorina Tomoiaga
#4 London Beckett
#4 Tra'Mya Lauderdale
#5 Simon Ho
#6 Philippa Murray
#7 Leonardo Soto
#8 Abosede Elesinnla

Poster Session B – 9:00-10:30am – Room 349

#9 Katie Dudek
#10 Douglas Gyamfi
#11 Sanjana Rao
#12 Christina Kratzmeier
#13 Jenna Bowman
#13 Isabella Brothers
#13 Ashlee Durham
#13 Francesca Rossi
#14 Jessica Tiner
#15 Lena Grogan
#16 Ian Mills
#17 Madeleine Ndahayo

Poster Session C – 9:00-10:30am – Room 349

#18 Kylie Tomlin
#19 Gillian Choquette
#20 Tara Dillman
#20 Anne Francavilla
#20 Jiro Ezaki
#21 Jacob Weiner
#22 Aarion Romany
#23 Emily McCarthy
#24 Alexia Smith
#25 Alexandra Mora

Oral Session D – 10:00-11:30am – Room 351

#26 Mitchell Moyer
#27 Matthew Eason
#28 Noha Ghonim
#29 Jernelle Miller
#30 Haelim Lee
#31 Melissa Culligan

Oral Session E– 10:00-11:30am – Room 353

#32 Nesreen Alissa
#33 Katherine Bowers
#34 Shabnam Lateef
#35 Khady Ouattara
#36 Aman Shrestha
#37 Eman Mirdamadi

Oral Session F – 10:00-11:30am – Room 223

#38 Catherine Stapf
#39 Chia-Yun Hsu
#40 Sabrina Bielefeldt
#41 Jennifer Mariano
#42 David Rickert
#43 Diane Terry

Oral Session G – 10:00-11:30am – Room 115

#44 Aishwarya Iyer
#45 Arseniy Braslavskiy
#46 Emmanuel Asiedu
#47 Heather Buck
#48 Hephzibah Edwin
#49 Cosette Schneide

Poster Session H – 1:00-2:30pm – Room 349

#50 Sorah Levy
#51 Ben Friedman
#52 Rhea Mehta
#53 Ran Yu
#54 Kelly Griffiths
#55 Meng-Hsuan Yu
#56 Anu Sunkara
#57 Aryan Sonawane
#58 Claudia Choque

Poster Session I – 1:00-2:30pm – Room 349

#59 Nader Almutairi
#60 Anne Hagan
#61 Ibrahim Ba-Armah
#62 Jihyeong Jeong
#63 Victor Andrade
#64 Kenneth Dietze
#65 Crystal Trent Paultre
#66 Annie Brong
#67 Monica Schneider

Poster Session J – 1:00-2:30pm – Room 349

#68 Gretchen Tucker
#69 Elisha Oduro
#70 Jiwon Park
#71 Kurt Espinosa
#72 Megan Delaney
#73 Theeb Alquria
#74 Jonathan Soldemyr
#75 Sandeepan Ghosh

Oral Session K – 2:00-3:30pm – Room 351

#76 Rhea Mehta
#77 Loretta Anderson
#78 Sushrut Pathy
#79 Ishraq Alshanqiti
#80 Zhenyao Ye
#81 Ruth Akinlosotu

Oral Session L – 2:00-3:30pm – Room 353

#82 Ryan Mayers
#83 Sarah Margerison
#84 Vicente Telles
#85 Juliet Obi
#86 Haixi Cui
#87 Jeremie Oliver Piña

Oral Session M – 2:00-3:30pm – Room 223

#88 Yueh-Yi Chiang
#89 Arjun Savel
#90 Jae Lee
#91 Noah Pollack
#92 Daniela Fuller
#93 Luisa Valencia

Oral Session N – 2:00-3:30pm – Room 115

#94 Brandon Lowe
#95 Jillian Baker
#96 Allison Mancini
#97 Rebecca Collins
#98 Indira Bhattacharya
#99 Salome Ricci

Student Award Winners

The GSA would like to congratulate the recipients of select awards during the 2023-2024 academic year. The Professional Development Award allows students to participate in enrichment opportunities such as workshops or certificate programs. The Research Award provides supplemental funding for research supplies and logistics. The Travel Award and Global Travel Award support students so they may attend seminars and conferences in their fields.

GSA Research Award

Kylie Tomlin

GSA Travel Award

Lamia Mokeem
Christie Dionisos
Uzma Pathan
Noah Pollack
Haelim Lee
Catherine Haga
Riki Egoshi
Sydney Lloyd
Saba Shahzad
Avelina Hemingway
Jannat Saini
Catherine Stapf
John Rizk
Nikita Aggarwal

Sponsors

The GSA would like to extend thanks to our sponsors for their generous support of graduate student research at UMB. Without them, we would not be able to gather and celebrate our campus's unique interdisciplinary nature in this way. Make sure to visit the exhibitor tables and learn how their products and services can benefit your dissertation or laboratory!

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Abstracts

1. Associations Between Peak Expiratory Flow and Community Mobility Loss in Older Adults: A Cohort Study

Lindsey Mathis

Poster Session A (Room 349)

Mathis, L., Sun, N., Ho, S., White, L., Savin, D., Falvey, J.

RATIONALE: Impaired pulmonary function, a potentially modifiable risk factor for community mobility disability, has been significantly understudied. Community mobility is critical for home-dwelling older adults, and limited mobility correlates with higher mortality, hospitalizations, and healthcare costs. OBJECTIVES: This study aimed to assess the relationship between peak expiratory flow (PEF) and community mobility loss within one year among home-dwelling older adults. Additionally, it examined potential racial and ethnic disparities in this association, considering impacts of structural racism and resultant clustering of neighborhood-level barriers to mobility. MATERIALS/METHODS: A cohort of 4742 older adults from the National Health and Aging Trends Study (NHATS) was identified. The primary exposure was pulmonary function measured by PEF in NHATS, while a mobility loss outcome was indicated by the inability to walk three blocks in one year. Logistic regression adjusted for demographics, comorbidities, pain, and assistive device use, with an interaction term for racial/ethnic differences. RESULTS: Of the weighted sample (n=18,513,667), 5% had severely impaired PEF, which was more prevalent in males and Black individuals. Severe impairment significantly increased odds of mobility loss (OR=2.1, 95% CI 1.2-3.8), while moderate impairment showed a similar but weaker association (OR=1.2, 95% CI 0.79-1.7). Effects were not different for Black compared to White older adults. CONCLUSIONS: Over 1 million community-ambulating US older adults had severe pulmonary function impairments in 2015; and these older adults have a substantially higher risk of losing the ability to ambulate in the community over the subsequent year.

2. Exploring Cardiovascular Risk Factors Among Long-Term Care Workers: A Descriptive Analysis Using Secondary Data

Abaneh Ebangwese

Poster Session A (Room 349)

Ebangwese, A., Doran, K., Resnick, B., Holmes, S.

Long-term care workers, an essential workforce group, encounter distinctive challenges in their occupational environment, potentially predisposing them to cardiovascular disease (CVD) risk factors. The purpose of this study was to examine CVD risk in long-term care workers. This descriptive study used baseline data from a worksite wellness project with139 long-term care staff from six facilities in Maryland. Descriptive statistics were used to describe CVD risk based on the American Heart Association's (AHA) essential 8 risk factors for

heart disease. The sample was 87.5% (n=122) female with a mean age of 50 years (SD 13.45). Tobacco use was minimal (n=6, 5.2%), although exposure to secondhand smoke was reported by 50% (n=54) of the participants. More than half (59.8%, n=71) of participants slept less than 6 hours and 29.7% (n=35) reported poor sleep quality. Most participants (92.8%, n=) had sedentary to low physical activity levels. Unhealthy dietary habits were common, with high consumption of common unhealthy food and beverages such as fast food (46.6%, n=54), sweetened beverages (42.6%, n=49), chips (50.9%, n=57), desserts (52.1%, n=61), and fats (46.6%, n=55). Additionally, 82.6% (n=109) of participants were classified as overweight or obese. Furthermore, 40.6% (n=56) had elevated SBPs, 14.3% (n=19) had high cholesterol, and many had fasting glucose readings out of normal limits with 25.6% (n=34) above normal and 21.8% (n=29) below normal. Overall, this population displayed poor behavioral CVD risk factors and moderate health CVD risk factors, emphasizing the importance of interventions targeting behavioral modifications to prevent adverse health outcomes.

3. Disulfiram Active Metabolite-Mimicking Inhibitors for ALDH2

Zijin Xu

Poster Session A (Room 349)

Xu, Z., Ai, Y., Xue, F.

Alcohol use disorder (AUD) is a prevalent medical condition characterized by a diminished ability to control alcohol consumption, commonly known as alcoholism. With over 140,000 annual deaths attributed to alcohol-related causes, it stands as the fourth-leading preventable cause of mortality in the United States, following tobacco, poor diet and physical inactivity, and illegal drugs. Disulfiram, FDA-approved in 1951 for treating AUD, serves as a deterrent against alcohol consumption rather than a cure. Positioned as a second-line treatment after acamprosate and naltrexone, disulfiram inhibits ALDH2 activity. ALDH2 plays a pivotal role in alcohol metabolism by converting acetaldehyde into acetate, facilitating its elimination from the body. However, Disulfiram as a pre-drug does not have inhibition ability; its primary metabolites, DDTC-Me-SO and DETC-Me-SO, are responsible for ALDH inhibition. The limitation of Disulfiram is that its metabolite, DDTC, poses a risk of cytotoxicity due to metal chelation. Recent studies have highlighted the potential of metal-DDTC complexes as anti-cancer agents. Also, disulfiram lacks selectivity for ALDH enzymes, resulting in the irreversible inactivation of both ALDH1A1 and ALDH2. To address this limitation, our research aims to synthesize analogs of DDTC-Me and DETC-Me as probes to elucidate the binding interactions with the ALDH2 enzyme. Through these probes, we seek to uncover the binding mode within the enzyme pocket and, ideally, develop compounds with enhanced selectivity for inhibiting ALDH2 over related ALDH enzymes.

4. Homicide in Children: a Retrospective Study of Autopsy Population in Maryland (2020 -2022)

Sorina Tomoiaga, London Beckett, Tra'Mya Lauderdale

Poster Session A (Room 349)

Tomoiaga, S.I., Beckett, L.M., Lauderdale, T.

This research project aims to evaluate and interpret child homicide rates in the State of Maryland between 2020 and 2022, from

newborn to 10 years old. The data was collected from the cases examined by the Office of the Chief Medical Examiner. This research was conducted by identifying common themes, demographic characteristics, and contextual factors associated with child homicides. The objective of the research is to inform targeted prevention strategies, intervention efforts, and policy initiatives aimed at safeguarding the well-being and safety of vulnerable young children. During the three-year period, there were 37 children homicide cases, of which 11 (29.7%) involved infants less than 1 year of age. The leading cause of death was gunshot wounds (24.3%), followed by multiple injuries (21.6%) and drug intoxication (21.6%). Of the 37 cases, 54% were female victims. African American victims accounted for 70.3%, whereas White individuals represented the 24.3% and the remaining 5.4% were Hispanic. Among the perpetrators, fathers accounted for 16.2%, additionally, in more than 21% of the cases, the perpetrators were unknown. In addition, the study explores the psychological, social, and emotional ramifications of child homicide on families, communities, and society at large, emphasizing the urgent need for proactive measures to address this pressing public health issue. It is important to note that all the cases in this study were preventable deaths. This research endeavor ultimately aims to inform the development of prevention strategies and intervention programs to safeguard the well-being and safety of vulnerable children.

5. Postural Control Correlates with Locomotor Efficiency during the 6-minute Walk Test in Children

Simon Ho

Poster Session A (Room 349)

Ho, S., Rock, K., Marchese, V.

BACKGROUND: Excessive energy cost during walking can lead to lower participation in physical activity. Furthermore, the energy cost of walking is dependent on mechanical factors that are influenced by postural control. Our objective was to explore whether postural control is related to locomotor efficiency during the 6-minute walk test (6MWT) in children and adolescents. METHODS: Postural control (direction control [DCL], maximal excursion [MXE], average velocity [VEL]) was measured during the limits of stability (LOS) and rhythmic weight shift (RWS) tests. Locomotor efficiency during the 6MWT was determined via the oxygen cost of transport expressed as energy expenditure (EE) in J/kg/m. The rate of perceived exertion (RPE) at the end of the 6MWT was measured a 0–10 scale. RESULTS: RPE negatively correlated with DCL forward ($r = -0.71$, $p = 0.03$), DCL to the right ($r = -0.72$, $p = 0.03$), and MXE to the right ($r = -0.67$, $p = 0.05$) on the LOS test, and VEL in the forward-backward direction during slow transitions ($r = -0.75$, $p = 0.02$) on the RWS test. EE negatively correlated with DCL in the forward-backward direction during slow transitions ($r = -0.81$, $p = 0.01$) on the RWS test. CONCLUSION: Our findings suggest that better postural control was associated with less perceived exertion and lower EE, and thus, higher locomotor efficiency. Given the importance of increasing physical activity to reduce cardiometabolic risk, a better understanding of potential barriers such as decreased locomotor efficiency may lead to promising interventions for children and adolescents.

6. Unexpected Low Bone Mass Induced by Global Deletion of Keratin 18 in Mice

Philippa Murray

Poster Session A (Room 349)

Murray, P.J., Buck, H.V., Leser, J.M., Pathy, S.M., Bloch, R.J., Stains, J.P.

Osteocytes, the most abundant cell type of bone, are responsible for receiving mechanical stimuli and transmitting this signal to neighboring cells, in order to tune bone formation. Keratin 18 is a type I intermediate filament that is known in other tissues (e.g. skeletal muscle) to contribute to force transmission, cellular integrity, and signaling. Keratin 18's role in bone has not been previously established. Interestingly, deletion of vimentin, the most abundant intermediate filament in bone, results in no obvious phenotype, however, as shown by our lab, deletion of less abundant intermediate filaments, such as synemin, can produce a severe bone phenotype. Here, we characterize the impact of the global deletion of Keratin 18 in mice in bone. Using micro computed tomography and dynamic histomorphometry, we can conclude that mice lacking Keratin 18 have significant loss of bone microarchitecture and a decreased bone formation rate.

7. Exploring Haloarchaeal Genomes and Proteomes: Methodologies and Implications for Biotechnology and Biomedicine

Leonardo Soto

Poster Session A (Room 349)

Soto, L., DasSarma, P., DasSarma, S.

Haloarchaea possess unique adaptations that offer biological and biotechnological potentials that stand out in the extremophile landscape. This study presents an integrated bioinformatic approach to examine the genotypes in haloarchaea, highlighting methodologies and preliminary findings. Utilizing Python scripting alongside the Diamond bioinformatic tool, we performed reciprocal best hit (RBH) analyses to explore protein conservation across different haloarchaeal species, focusing on the recognized orders Natrialbales, Haloferacales, and Haloarchaeales. A novel aspect of our research incorporates a phylogenetic framework based on 16S rRNA sequences for the taxonomy and evolutionary context of haloarchaeal diversity. This guides further proteomic analyses to improve our understanding of haloarchaeal traits. Particular attention is given to the isoelectric points (pI) of identified proteins, with a prevalence of proteins having acidic pI values below 7, raising questions about their evolutionary significance under extreme conditions. Additionally, we highlight a signature protein of Haloarchaea (Ral) associated with radiation resistance identified across all examined strains. This discovery opens new opportunities for biotechnological applications, in fields requiring ionizing radiation resilience. Additionally, we are exploring the potential of Haloarchaea to bioremediate toxic pollutants such as nitrate, nitrite, ammonium, perchlorates, and bromate in saline conditions. Furthermore, Haloarchaea produce beneficial pigments such as bacterioruberin, which offers natural UV protection, creating valuable applications as anticancer agents. In biomedicine, Haloarchaea are valued for their non-pathogenic nature and absence of lipopolysaccharides (LPS), enhancing their suitability for therapeutic uses. The gas vesicles of Haloarchaea serve as intracellular nanoparticles for antigen and drug delivery, underscoring the wide-ranging biotechnological applications of Haloarchaea.

8. Sex-Dependent Differences in Alcohol-Induced Alpha-Tubulin Acetylation in Different Regions of the Mouse Brain

Abosede Elesinnla

Poster Session A (Room 349)

Elesinnla, A. R., Khatoon, R., Fick, J. F., Kristian, T.

The downstream product of ethanol metabolism, acetyl-CoA, can be utilized by acetyltransferase ATAT1 to acetylate Alfa-tubulin. Changes in the expression and activity of the acetylase ATAT1 and deacetylase HDAC6 can influence the acetylation of alpha-tubulin. We examined ethanol-induced effects on enzymes regulating a-tubulin acetylation in male and female mice brains. We used, adult, 3-month-old male, and female C57BL/6 mice for experiments. We randomly divided animals into control (vehicle-injected) and ethanol-treated (20% in PBS, 2g/kg) groups. We determined changes in α-tubulin acetylation and the levels of enzymes regulating a-tubulin acetylation by western blots. As expected, we observed a significant increase in hippocampal α-tubulin acetylation at different times in both male and female animals following ethanol administration. The levels of the ATAT1 enzyme remained unchanged after ethanol injection in male hippocampal samples. However, in female samples, the αTAT1 significantly increased 4 hours following ethanol administration. Ethanol intake did not affect the male hippocampal HDAC6 levels. However, in females, the level of HDAC6 reduced significantly, due to ethanol administration. Our study shows significant sex differences in ethanol-induced upregulation of α-tubulin acetylation in the mouse hippocampus following ethanol administration. An increase in the activity of the acetyltransferase ATAT1 due to the elevation of acetyl CoA may be responsible for the acetylation of α-tubulin in the male mouse brain. However, in females, the reduced HDAC6 levels probably also contributed to the increase in α-tubulin acetylation. In the follow-up study, we will determine changes in acetyl-CoA levels following ethanol intake.

9. Virtual Reality Induced Fear of Falling

Katie Dudek

Poster Session B (Room 349)

Dudek, K.E., Westlake, K.

As previous literature states, the psychological fear of falling is a common issue amongst elderly people. Fear of falling is described as “a person's anxiety towards usual or normal walking or mobilizing, with the perception that a fall will occur." When an increased fear of falling is present, individuals may be less likely to participate in community or physical activities, which can result in social isolation, decreased mobility, and deconditioning. Furthermore, these resulting impairments in turn decrease the individual’s ability to respond to balance challenges at home or in the community. Thus, an increased fear of falling may result in an increase in falls. The purpose of this study is to determine whether or not a perceived fear of falling influences a person's reaction to a balance perturbation. We hypothesize that an increased perceived fear of falling will result in a decreased ability to properly respond to balance perturbation, evidenced by an increase in muscle co-contraction and decreased balance reaction times. Data will be collected on 10 individuals, ages 18-30. Participants will be fitted with a VR headset to elicit a fear of falling. The program allows us to drop the perceived floor of the VR system, resulting in the participant standing on what appears to be a balance beam. We will then introduce a balance perturbation. We will also be using a non-invasive assessment

instrument to record physiological responses to record physiological stress (electrodermal activity and heart rate variability) at baseline and during the reactive balance responses assessment.

10. The Influence of Social Support on Mood Symptoms Among Long-Term Care Workers: A Cross-Sectional Study

Douglas Gyamfi

Poster Session B (Room 349)

Gyamfi, D., Doran, K., Resnick, B., Saini, G. K.

BACKGROUND: Long-term care (LTC) staff have consistently described their jobs as highly stressful. Sixty-one percent of LTC staff reported at least moderate levels of stress due to their jobs and about 60% have turnover intentions. Studies indicate that work characteristics such as job control and social support influence stress in healthcare settings, but their impact in long-term care remains largely unexplored. Hence, this study sought to identify what work characteristics impacted mood symptoms among LTC staff. We hypothesized that social support, job demands, and job control would influence mood symptoms (stress, anxiety, and depression) among this population. METHODS: This was a cross-sectional descriptive study that used baseline data from a worksite wellness study in six LTC facilities in Maryland. Within the selected facilities, 139 employees met the inclusion criteria and consented. Data was collected through self-reported surveys and included: demographics, mood symptoms assessed via the 21-item version of the Depression Anxiety Stress Scale and work characteristics assessed via the Job Strain Model tool. Stepwise regression was used to test our hypothesis. RESULTS: Participants of the study were predominantly female (85.6%) with a mean age of 50.11 years (SD=13.45 years) and mainly identified as Black or African American (64.0%). Higher reports of social support (B=1.042, p=<.001) and increased age (B=.027, p=.020) were significantly correlated with fewer mood symptoms. CONCLUSIONS: Social support emerged as the sole significant work environment factor influencing workers' mood. This suggests that social support interventions may offer an impactful approach to improving mood symptoms in this workforce.

11. Validation of Robot Based Kinematic Assessment of Reach Function

Sanjana Rao

Poster Session B (Room 349)

Rao, S., Boettger, B., Eversely, D., Roy, A., Hennessy, B., Westlake, K.

75% of individuals post stroke experience persistent upper extremity (UE) impairments, which results in inefficient UE use during activities of daily living (ADL). Reaching is one such essential ADL and hence accurate assessment of reaching deficits is a requisite to provide efficacious UE rehabilitation. Rehabilitation robots have been developed with the purpose of performing higher resolution kinematic measurements. However, few studies have examined their clinical applicability as an evaluation tool. It is therefore important to evaluate the robotic system’s validity to a gold standard like OptiTrack motion tracking system. In this study, we propose to utilize REACH robot, which has embedded sensors to capture kinematic measures and the aim is to investigate its validity by comparing the kinematic measures of REACH with that of the OptiTrack. To date, 10 healthy young adults and 6 individuals with chronic stroke have been assessed. The participants performed five trials

of five target reaching out (extension) and reaching in (flexion) movements with the REACH device. Concurrently, kinematic data was collected from the OptiTrack system. Smoothness (1/s2), peak speed (cm/sec), and range of motion (ROM) kinematic parameters for both extension and flexion were recorded. Spearman Rank correlation was used to assess the relationships between the REACH and OptiTrack kinematic parameters. We found strong correlation for the following: extension peak speed, $\rho=0.90$ ($p<0.01$), flexion peak speed,$\rho =1.00$ ($p<0.01$), extension ROM,$\rho =0.93$ ($p<0.01$) and flexion ROM,$\rho =0.98$ ($p<0.01$). REACH robot can provide valid kinematic measures of reach movement, essential for capturing motor recovery post stroke.

12. Unique Immunoregulation of Lung Cancer

Christina Kratzmeier

Poster Session B (Room 349)

Kratzmeier, C., Khalil, M.A., Lim, I., Mei, A., Taheri, M., Ahuja, H.K., Banerjee, A., Krupnick, A.S.

The lung, being a mucosal organ, has developed unique mechanisms of immunoregulation when compared to other organs, and CD8+ T cells play a key role in pulmonary host defense specifically tumor immunosurveillance. Therefore, we hypothesize that immunoregulation of lung cancer by CD8+ T cells may differ from other malignancies. We compared primary induced carcinogen models, intravenously injected tumor cells lines, and subcutaneously injected tumor cell lines of lung and non-lung cancers in vivo and found that the presence of CD8+ T cells accelerated tumor growth in lung cancers, while ameliorating the growth of non-lung cancers. Cytokine analysis revealed a significant increase of Th1 polarizing cytokines, IFN-γ and TNF-α, in lung cancer-bearing but not melanoma-bearing mice in the presence of CD8+ T cells. High levels of IFN-γ are also seen at the mRNA and protein level in human lung cancer patient samples. Neutralization of these Th1 cytokines in vivo resulted in accelerated tumor growth in melanoma-bearing mice but decreased tumor growth in lung cancer-bearing mice. Flow cytometric analysis has indicated CD45- nonhematopoietic cells as prominent producers of IFN-γ in the tumor bed of lung cancer mice. Using GFP-actin mice to differentiate tumor cells and host cells, we have identified lung cancer cells themselves as major producers of IFN-γ. In addition, we have found that CD8+ T cells increase the percentage of CD4+Foxp3+ T regulatory cells in the tumor bed. Overall, out data suggests that immunoregulation of lung cancer is unique and may require novel immunomodulating strategies for future treatments.

13. Trends in Motor Vehicle Accidents: A 2022 Forensic Autopsy Analysis in Maryland

Jenna Bowman, Isabella Brothers, Ashlee Durham, Francesca Rossi

Poster Session B (Room 349)

Bowman, J., Brothers, I., Durham, A., Rossi, F.

Motor vehicle accidents (MVAs) continue to be a public safety crisis in the state of Maryland with the impact extending across every county and demographic. At a national level, MVAs are a leading cause of death, resulting in an average of 36,791 deaths per year from 2015 to 2019. In an effort to identify trends and potential contributory factors involved in Maryland MVA deaths, this research retrospectively analyzed

autopsy records in 2022 from the Maryland Office of the Chief Medical Examiner. In Maryland, from January to December 2022, 253 people died from motor vehicle related accidents. Of the 253 cases, 162 involved vehicle collisions and 91 involved pedestrians, cyclists, and others. Of the 162 vehicle related deaths, 38.3% did not wear a seatbelt and 25.9% were unknown. Males accounted for 176 deaths (69.6%) while females accounted for 77 (30.4%). Postmortem toxicological analysis revealed that 39.9 % (N=101) MVA victims were positive for alcohol; 16.2% (N=41) were positive for illegal substances. High rate of speed was a risk factor in 52 cases (20.5%). Alcohol, drug use, and speeding were the three main contributory factors to MVA-related deaths in our study. Further research will be conducted on reoccurring life-threatening injuries within the 253 autopsy cases examined to create avenues for injury prevention. This research serves to mitigate the mortality rate of MVAs in Maryland by addressing risk factors and safety issues; results will contribute to statewide and national-level motor vehicle safety campaigns.

14. An Analysis on Physical Activity and the Metabolome in Old Order Amish

Jessica Tiner

Poster Session B (Room 349)

Tiner, J.C., Mitchell, B., Beitelshees, A.

OBJECTIVE: Metabolomics refers to the systematic study of small molecules, or metabolites, measured in a biological sample (eg, blood) that arise from the products of cell metabolism. The goal of this project was to compare the metabolomic profiles between individuals with high and low usual levels of physical activity to provide insights into the beneficial role of physical activity in health. METHODS: Data for this study were obtained from 639 generally healthy Amish adults. Physical activity was measured using 7-day accelerometer data. A comprehensive 1,242 metabolites were measured from serum samples by Metabolon. Men and women were analyzed separately, and physical activity levels adjusted for age and age2 prior to analysis. We first compared levels of each metabolite between the upper and lower tertile of physical activity levels then tested for association of each metabolite with physical activity levels using linear regression. Results were adjusted for multiple comparisons using the Benjamini-Hochberg false discovery rate. RESULTS: In women, levels of two metabolites differed significantly between the high and low physical activity group (q-value ≤ 0.05). In men, 104 metabolites differed significantly between the groups. Seven metabolites were significantly correlated with physical activity levels in women, and 129 in men. Notably, higher levels of physical activity were associated with lower levels of valine in both men and women. CONCLUSION: The consistent association of valine with physical activity is intriguing given its role in energy and protein synthesis. These results support previous work showing higher levels of valine associated with poor health.

15. The Role of a Cysteine Residue Near a ERK1/2 Substrate Docking Site on Signaling and Proliferation of Melanoma Cells Containing a BRAF Mutation

Lena Grogan

Poster Session B (Room 349)

Grogan, L., McClean, N., Shapiro, P.

The extracellular signal-regulated kinase 1/2 (ERK1/2) signaling pathway is crucial for cell

proliferation. Specific types of cancers, including malignant melanoma, contain activating mutations in the BRAF kinase, which is an upstream regulator of ERK1/2, leading to uncontrolled proliferation. One docking site in ERK1/2 that has been targeted controls the activation of oncogenic transcription factors. Compounds identified to target this substrate docking site were found to covalently interact with a specific cysteine. To evaluate the role of this cysteine in ERK1/2 signaling, CRISPR CAS9 was used to generate isogenic cell lines with cysteine mutations in both ERK1 and ERK2. The proposed studies investigate the effects the ERK1/2 cysteine mutations have on A375 melanoma cells regarding cell signaling and proliferation.

16. Using Single Cell RNA Sequencing to Understand Influence of HPV Integration on Tumor Heterogeneity

Ian Mills

Poster Session B (Room 349)

Mills, I.W., Mukhina, V., Gaykalova, D.A.

Head and neck squamous cell carcinoma (HNSCC) is distinguished etiologically between cancers caused through carcinogen exposure or by persistent human papillomavirus (HPV) infection. Expression of HPV oncoproteins in infected epithelial cells suppresses DNA damage response and cell cycle progression checkpoints, leading to tumor initiation and progression. Integration of HPV into the human genome magnifies this effect through loss of a transcriptional repressor, increasing HPV oncoprotein expression. Recent studies report HPV gene expression heterogeneity within HPV+ HNSCC tumors, however the impact of HPV integration on tumor heterogeneity is not well studied. To observe the effects of HPV integration at a single cell level, a computational pipeline was established to align publicly available single cell RNA sequencing (scRNAseq) reads to human and HPV genomes and discover chimeric reads indicative of transcriptionally active sites of HPV integration. Chimeric transcript data was incorporated with conventional scRNAseq analysis to identify cell types expressing HPV genes and HPV-human chimeric transcripts. Nine HPV+ HNSCC primary tumors with matched normal samples were selected from the NCBI sequence read archive. Four tumor samples showed evidence of HPV integration sites, including genes related to cell cycle progression (E2F1), DNA repair (RAD51B), or Notch signaling (MIB1). No HPV-human fusion transcripts were observed in the matched normal samples. Despite the unpaired and short reads used in high throughput scRNAseq, custom genomic alignment and fusion transcript analysis still showed support for HPV integrations with potential to impact tumor progression, providing additional information regarding the heterogeneity of HPV gene expression within HPV+ HNSCC.

17. Investigating the Function and Impact of UBASH3B in Head and Neck Squamous Cell Carcinoma and its Implications for Racial Health Disparities

Madeleine Ndahayo

Poster Session B (Room 349)

Ndahayo, M., Werner, S., Gupta, I., Mukhina, V., Gaykalova, D. A.

Head and Neck Squamous Cell Carcinoma (HNSCC) exhibits significant cancer health disparities. African Americans (AAs) with HNSCC demonstrate worse overall survival compared to European Americans (EAs). While the reasons behind this disparity are

multifaceted, recent findings suggest that biological features in HNSCC may contribute to differences in disease progression. We have identified the gene UBASH3B, a protein tyrosine phosphatase that plays a role in the stabilization of the Epidermal Growth Factor Receptor (EGFR). This study seeks to examine the role of UBASH3B in HNSCC and determine its impact on tumor progression. We hypothesize that the upregulation of UBASH3B in AAs contributes to the survival disparity by promoting tumor growth. An analysis using HPV negative HNSCC The Cancer Genome Atlas (TCGA) patients showed overexpression of UBASH3B in tumor samples of both AA and EA patients, with high expression in AAs correlating with significantly worse survival outcomes. UBASH3B overexpression showed an association with perineural invasion and advanced T-stage among AA patients. The copy number value (CNV) of UBASH3B in HNSCC cells was assessed with qPCR and showed a positive correlation with UBASH3B expression. Additionally, in-vitro experiments demonstrated decreased cell viability and migratory capacity upon UBASH3B knockdown. UBASH3B is significantly associated with worse overall survival in HPV negative AA-HNSCC patients and has been shown to increase cell proliferation and migration. These results indicate that UBASH3B is a critical oncogene in HNSCC. and presents a potential therapeutic target for new treatments and a biomarker for detection, enhancing our understanding of HNSCC's racial disparities.

18. Motor Learning in Mild Cognitive Impairment: Protocol and Pilot

Kylie Tomlin

Poster Session C (Room 349)

Tomlin, K. B., Westlake, K. P.

Motor learning, or the ability to acquire and retain new motor skills, is an important component of physical rehabilitation. Neural processes of motor learning can be impacted by age-related cognitive decline. Persons with dementia, for example, often demonstrate slower rates of motor skill acquisition than cognitively intact, age-matched controls; relatedly, they may benefit from modified motor training approaches such as task simplification and implicit practice. It remains unclear, however, if earlier stages of age-related cognitive decline, such as mild cognitive impairment (MCI), similarly affect motor learning outcomes. Therefore, the purpose of this ongoing research is to compare acquisition, retention, and transfer of a novel visuomotor skill between older adults with and without amnestic MCI using a kinematic motion tracking system (Kinereach). Additionally, this research will explore relationships between motor learning outcomes and an electroencephalography (EEG) index of cognitive workload in these populations. This presentation outlines the research protocol, pilot data, and potential clinical implications.

19. Fatty Acid Oxidation Has Age-Dependent Effects on Osteoblast Function

Gillian Choquette

Poster Session C (Room 349)

Choquette, G.M., Pathy, S., Li, Z., Wilkinson, K., Riddle, R.

Skeletal homeostasis requires the fine balance between bone resorption and bone formation during bone remodeling. During skeletal aging, bone remodeling becomes dysregulated with bone resorption by osteoclasts outpacing bone

formation by osteoblasts. Since bone matrix mineralization by osteoblasts is an energy demanding process, our lab seeks to better understand the fuel selectivity and utilization by osteoblasts during age-related bone loss. Previous data from our lab underscored the importance of fatty acids as an energy source for bone formation in young mice, as mice deficient for carnitine palmitoyltransferase 2 (Cpt2flox/flox; Ocn-Cre) exhibited lower bone mass than littermate controls, but energy utilization during aging remains unclear. Cpt2 knockout mice and control littermates were aged for 6 or 20 months before examining bone structure by DEXA and microCT, bone cell function by histology, and bone strength by mechanical testing. In contrast to the phenotype of 3-month-old Cpt2 KO mice, BMD was comparable to controls in male mutants at 6 months of age and trended higher in the Cpt2 KO at 20 months of age. MicroCT suggested the increase in BMD was due to a significant increase in cortical thickness. In line with this finding, bones from mutant mice exhibited increased bending rigidity and failure load. These data suggest fatty acid oxidation has distinct age-dependent effects on osteoblast function and skeletal homeostasis.

20. Hypothermia-related Deaths: State-wide Retrospective Study in Maryland, US

Tara Dillman, Anne Francavilla, Jiro Ezaki

Poster Session C (Room 349)

Dillman, T., Francavilla, A.M., Ezaki, J.

Hypothermia-related deaths are preventable and commonly occur in vulnerable populations. The database of the State of Maryland Office of Chief Medical Examiner (OCME) was searched for all fatalities related to hypothermia between 2018-2022. 139 hypothermia-related deaths were evaluated in this study. Males were more likely to die of hypothermia than females (OR 3.1, 95%CI 2.37-5.22). In females, the number of hypothermia deaths per population aged 85 years old or more was significantly larger than those aged 40-64 (OR 5.6, 95%CI 1.96-15.82). However, in males, there was no significant difference between ages 85 or older and 40-64. 32% were homeless, and 71% were found outdoors. Previous medical history was also examined for these cases. Of the 139, 130 had autopsies performed, which yielded 34% positive ethanol, 10% positive cocaine results, along with 35% Wischnewski spots and pancreatitis, respectively. The rate of homeless cases in Baltimore City was significantly higher than in counties (non-Baltimore City cases) (44% vs 28%, $p=0.009$.) However, there were no significant differences in the rate of hypothermia death in the outdoor cases, manner of death, ethanol or cocaine-positive cases between Baltimore City cases and County cases ($p>0.05$). Local public health agencies should provide intensive support to the homeless and elderly to prevent hypothermia. This study is the first report analyzing state-wide hypothermia death in cities and counties (state-wide). Local public health agencies can use present study data to target higher-risk populations and offer appropriate support to prevent hypothermia.

21. Effects of Calprotectin on Pseudomonas Aeruginosa Gene Expression in Low Oxygen Environments

Jacob Weiner

Poster Session C (Room 349)

Weiner, J.M., Oglesby, A.G.

Calprotectin (CP) is a multi-metal sequestering protein that contributes to host nutritional

immunity against microbial infections. CP is released by immune cells to combat microbes by sequestering essential transitions metals at sites of infection. Pseudomonas aeruginosa (Pa) is an opportunistic pathogen that causes chronic respiratory infections in individuals with cystic fibrosis (CF). CF sputum samples contain increasing levels of CP as Pa becomes the dominant CF pathogen highlighting its importance during CF disease progression. Recently, we determined how CP affects iron homeostasis in Pa under aerobic conditions. However, Pa grows as a biofilm in anaerobic pockets within thick layers of mucus of the CF lung. Thus, the current study examines how CP affects Pa gene expression and iron homeostasis under anaerobic condition. We performed RNAseq on anaerobic cultures with or without CP treatment to analyze the effects on the Pa transcriptome and confirmed the results via RT-PCR. We found that CP has wide ranging effects on Pa gene expression indicating an Fe starvation response that is distinct from aerobic conditions. This includes upregulation of genes encoding the Fe(II) transporter feoB, and heme uptake systems. Additionally, we found that the iron and heme responsive prrF and prrH sRNAs are upregulated by CP during anaerobic growth. We plan to perform further experiments to determine the effects of CP on Pa phenotype. We expect that some of these responses will be due to CPs ability to withhold one or multiple transition metals while others will be CP specific revealing contact dependent mechanisms.

22. Mechanism of Temperature-Dependent Self-Assembly and Polymorphism of Chitin

Aarion Romany

Poster Session C (Room 349)

Romany, A., Payne, G.F., Jana, S.

Chitin is the second most abundant natural biopolymer. Its crystalline structures have been extensively studied. However, the mechanism of chitin's self-assembly is unknown. Here, we applied all-atom molecular dynamics to study chitin's self-assembly process at different temperatures. Strikingly, at 278 K, an amorphous aggregate was formed, whereas at 300 K single-sheet and at 323 K both single-sheet and multisheet nanofibril regions were formed. The nanofibrils contain antiparallel, parallel, or mixed orientation chains, with antiparallel being slightly preferred, recapitulating chitin's polymorphism observed in nature. The inverse temperature dependence is consistent with a recent experiment conducted in the aqueous KOH/urea solution. The analysis suggested that the multisheet nanofibrils are assembled by stacking the single nanofibril sheets, which are formed through two types of pathways in which hydrophobic collapse either precedes or is concomitant with the increasing number of interchain hydrogen bonds and solvent expulsion. Furthermore, the antiparallel and parallel chains are mediated by different interchain hydrogen bonds. The analysis also suggested that the inverse temperature dependence may be attributed to the hydrophobic effect reminiscent of the low critical solution temperature phase behavior. The present study provides a rich, atomic-level view of chitin's polymorphic self-assembly process, paving the way for the rational design of chitin-derived novel materials.

23. Comprehensive Assessment of Vestibular Function in Children with Cancer and Childhood Cancer Survivors

Emily McCarthy

Poster Session C (Room 349)

McCarthy, E., York, T., King, A., Marchese, V.G.

Balance deficits are commonly reported in children undergoing cancer treatment and can persist well into survivorship. The vestibular system is an integral sensory system for the maintenance of balance, however vestibular function is grossly understudied in this population. Therefore, the purpose of this study is to compare vestibular function in children with cancer and childhood cancer survivors as compared to age-matched controls. Twenty children undergoing treatment for cancer and childhood cancer survivors (CCS) and 20 age-matched controls will be included in the study (data collection ongoing). Using video head-impulse testing (vHIT) and cervical and ocular vestibular evoked myogenic potentials (cVEMP, oVEMP) as measurements of vestibular function, this study aims to (i) determine whether children with cancer and childhood cancer survivors have a higher prevalence of vestibular loss compared to age-matched controls, (ii) evaluate balance function in children with cancer and childhood cancer survivors compared to age-matched controls, and (iii) investigate if vestibular function is correlated with balance function. This presentation will present a preliminary analysis of the data which has been collected to date, as data collection for this study is ongoing. This study is optimized to identify (i) if vestibular function is affected during/after treatment for childhood cancer, (ii) to what degree vestibular function is related to balance outcomes, ultimately informing clinicians in order to optimize treatment strategies and improve balance function in children with and beyond cancer.

24. Polyhydroxybutyrate Production in Rickettsia

Alexia Smith

Poster Session C (Room 349)

Smith, A.L., Gillespie, J.J.

Rocky Mountain Spotted Fever (RMSF) is an infection caused by Rickettsiae. Rickettsiae is an obligate intercellular bacterium with a reductive genome. Due to the reductive genome, some Rickettsiae have phenotypically expressed granules. In Cupriavidus necator these granules contain polyhydroxybutyrate (PHB). PHB is created by bacteria in nutrient rich environments to store energy metabolites to be used in nutrient poor environments. This carbon polymer can be degraded and used as substrates in the citric acid cycle for cellular energy. Obligate intercellular bacteria such as Rickettsiae benefit from the ability to synthesize this molecule and store them in granules. In this study, the gene expression of PHB was observed in Rickettsiae to construct a theoretical metabolic pathway for synthesis. Additionally, phylogenomic studies were run for specific species with this ability and the gene origins were estimated. This information will allow further understanding of Rickettsiae pathogenesis inside and outside the host cell.

25. Factors Influencing Cervical Cancer Screening Behaviors in Undocumented Latinx Females: A Scoping Review

Alexandra Mora

Poster Session C (Room 349)

Mora, A.

BACKGROUND: Cervical cancer ranks as the second leading cause of cancer mortality among women aged 20 – 39 years in the United States. Although the incidence rates of cervical cancer are declining by 1 -2 % annually for the general

population, Latinx individuals, including undocumented Latinx women, have seen a concerning increase of 2%. OBJECTIVE: The purpose of this scoping review is to examine the evidence on cervical cancer screening behaviors among undocumented Latinx women. METHODS: A review was conducted using PubMed, CINAHL, and PsychINFO databases. The Social-ecological Model (SEM) guided the literature search. Eligibility criteria included articles published between 2014 and 2024 in English, using terms such as “undocumented Latinx/Hispanic females,” “access,” and “barriers” related to cervical cancer screening. Exclusion criteria included studies of undocumented immigrant populations outside the United States. RESULTS: The review yielded 23 studies, primarily using descriptive and qualitative approaches. Initial findings suggest that, in addition to personal beliefs, language barriers, socioeconomic status, and cervical cancer knowledge, immigration status emerges as a significant factor influencing screening behaviors among undocumented Latinx women. Several studies have examined the effect of discriminatory policies on healthcare access among undocumented individuals. However, their direct implications for cervical cancer screening remain relatively unexplored. Additionally, undocumented Latinx women were often underrepresented in these studies. CONCLUSIONS: Future research should focus on exploring cervical cancer screening behaviors among undocumented Latinx females through engagement with immigrant communities. More research may inform targeted interventions and policies to improve screening rates and promote health equity within this population.

26. The Role of SUR1-TRPM4 in Chronic Epilepsy

Mitchell Moyer

Oral Session D (Room 351)

Moyer, M.B., Ivanova, S., Langbein, J., McAfee, D., Bachani, M., Gerzanich, V., Ksendzovsky, A., Simard, J.M.

RATIONALE: One third of epilepsy patients become resistant to current anti-seizure therapies. A promising novel target for reducing seizures in epilepsy is SUR1-TRPM4, a sodium channel minimally expressed in healthy brain that upregulates de novo after status epilepticus and other epilepsy-associated pathologies. SUR1-TRPM4 inhibition was shown to be therapeutically beneficial in numerous CNS pathologies in preclinical studies and clinical trials; however, this has not been explored in epilepsy. Here we investigated whether SUR1-TRPM4 upregulation increases chronic seizure susceptibility in epilepsy. METHODS: SUR1-TRPM4 expression was assessed by immunohistochemistry in resected brain tissues from epilepsy patients electrographically sorted as normal or epileptic. To investigate the mechanism that SUR1-TRPM4 promotes seizures through neuron hyperexcitability, cortical cultures were recorded with microelectrode array, treated with low Mg2+ to induce hyperactivation, and co-treated with TRPM4 inhibitor CBA or vehicle. To assess effects of SUR1-TRPM4 inhibition on chronic seizure susceptibility, a pentylenetetrazol (PTZ) kindling epilepsy model was used in mice. SUR1-TRPM4 was inhibited during PTZ kindling either pharmacologically by the FDA-approved SUR1 inhibitor glyburide or the TRPM4 inhibitor 9-phenanthrol, or genetically by constitutive or neuron-specific TRPM4 knock-out. RESULTS: Compared to controls, SUR1-TRPM4 expression was increased within epileptic tissues resected from patients

($p<0.05$, paired t-test). Inhibition of SUR1-TRPM4 reduced neuronal population hyperactivity induced by low $Mg2+$ ($p<0.01$, 2-way ANOVA) and attenuated ($p<0.0001$, logistical regression analysis) PTZ-induced chronic seizures. CONCLUSIONS: This study suggests SUR1-TRPM4 is upregulated in epilepsy and increases chronic seizure susceptibility through neuronal hyperexcitation. SUR1-TRPM4 may be a clinically relevant biomarker and therapeutic target to reduce seizures.

27. Pleckstrin Homology Domains Regulate PI3K/AKT to Block Breast Cancer Dissemination

Matthew Eason

Oral Session D (Room 351)

Eason, M., Sen, A., Lee, S.J., Mahmud, M., Dubey, P., Guardia, T., Kim, A., Wright, N., Konstantopoulos, K., Kontrogianni-Konstantopoulos, A.

Metastasis remains a major challenge in breast cancer, as current therapies target tumor proliferation and survival, but fail to target metastatic dissemination. Obscurin (720-870 kDa), a giant scaffolding and signaling protein that localizes to the breast epithelial cell membrane, serves as a potent metastasis suppressor and is commonly lost in breast cancer. Although functionally effective at suppressing metastasis via CRISPR-mediated restoration, obscurin is too large to exogenously deliver. Our prior work has identified the obscurin-pleckstrin homology (PH) domain as a strong interactor of the PI3K-P85 regulatory subunit. Here, we demonstrate that ectopically expressed, membrane-targeted obscurin-PH domain in aggressive breast cancer cells sequesters P85, suppressing PI3K/AKT activity. Remarkably, P85 sequestration eliminates filopodia, hampering migration and adhesion to pre-metastatic niche extracellular matrix substrates, eradicates invadopodia, and reduces matrix metalloproteinase expression, blocking invasion and dissemination. We expand this phenotype using the structurally homologous kalirin and PLCγ1 PH-domains, and ultimately uncover a family of seven PH-domains, as P85-regulators, pinpointing shared structural elements mediating this effect. As PI3K small molecule inhibitors targeting the P110 catalytic subunit are currently limited to metastatic hormone receptor positive breast cancer, our work establishes the PH-domain as a novel PI3K-P85 inhibitor, founding a new direction of PI3K/AKT targeting agents to suppress breast cancer metastasis.

28. Novel Artemisinin-containing Nanodrug for Leukemia Treatment

Noha Ghonim

Oral Session D (Room 351)

Ghonim, N.A., Cooper, B., Mirdamadi, E., Rudek, M.A., Lapidus, R.G., Civin, C.I., Lowe, T.L.

Acute myeloid leukemia (AML) affects both adults and children, with a 5-year survival rate only 30%. With low toxicity, Artemisinins (ARTs) are active against leukemias resistant to antineoplastic drugs. We found that several 2-carbon-linked dimeric artemisinin analogs (2C-ARTs: US9487538B2) effectively killed 9 human leukemia cell lines at half maximal inhibitory concentrations (IC50) <50 nM. However, many of these ARTs including ART631 have poor water solubility and shorter than desired half-life in vivo. The objective of this project is to develop an ART631-loaded biodegradable nanogel system (NanoART631,

PCT/US2023/019974) with enhanced water solubility and sustained release of ART631, as a potential antileukemic. NanoART631 increased ART631's water solubility >400-fold. The z-average diameter of NanoART631 was 100-200 nm in water at 37°C, with a polydispersity index <0.2 and a 9-16 mV zeta potential. Single particle size was estimated to be 22-50 nm. In vitro cytotoxicity assays determined that NanoART631 had IC50 <40nM after two-day incubation with the three AML cell lines: MOLM14, MV4;11, and THP1. All AML cells took up >98% of NanoART631 after 2 h of incubation. NanoART631 sustained ART631's release for at least one month. The single-dose IV maximal tolerated dose (MTD) of NanoART631 in NRG mice was 500 mg/kg of the nanoparticle (containing ~25 mg/kg ART631). Empty nanoparticles had no clinical toxicity to mice at concentrations ≥800 mg/kg IV doses. In conclusion, the innovative NanoART631 has potential as an effective antileukemic therapy that addresses the limited solubility and in vivo half-life of artemisinin analogs.

29. A Klebsiella pneumoniae Neonatal Sepsis Model to Evaluate Vaccines

Jernelle Miller

Oral Session D (Room 351)

Miller, J.C., Baliban, S.M., Cross, A.S., Tennant, S.M.

Klebsiella pneumoniae (Kp) is a major cause of neonatal sepsis in low-to-middle income countries. With the proportion of multidrug-resistant Kp strains increasing globally and the lack of novel antibiotics, vaccination to prevent infections is an attractive strategy. Several Kp vaccines are in development, however, there are no animal models of Kp-related neonatal sepsis that could be used to evaluate vaccine efficacy. Our goal is to identify a model which produces a 50% lethal dose (LD50) of ~106 CFU in neonatal animals and shows an age-dependent susceptibility to infection. We previously evaluated species (mice vs. rats), 3 mouse strains, 3 routes of infection, and 5 Kp strains. We found that peroral (PO) infection of 2- to 3-day-old C57BL/6 mice with Kp B5055 produced mortality. Here we describe characterization of this model in terms of age-dependency to infection. PO infection with 108 CFU and 109 CFU, reliably produced 77- 100% mortality in 2- to 3-day-old C57BL/6 mice. 2- ,5-, and 7-day-old pups exhibited 100%, 50%, and 44% mortality following PO exposure to Kp B5055, respectively. Kp was found in the blood, spleen, liver, and intestines of infected neonates. In contrast, 10-, 15-,30- and 60-day-old C57BL/6 mice exhibited low susceptibility to PO infection with Kp B5055. 10- and 15-day-old C57BL/6 mice exhibited high bacterial colonization whereas 30- and 60-day-old C57BL/6 mice exhibited low bacterial colonization. In conclusion, we have developed a neonatal sepsis model which consists of PO infection of neonatal C57BL/6 mice with Kp B5055. Maternal immunization is being evaluated.

30. Exploring the Longitudinal Association between Parental Support and Perceived Physical Health in Adopted Adolescents

Haelim Lee

Oral Session D (Room 351)

Lee, H.

BACKGROUND: The intricate mechanism through which parental support influences the long-term physical health of adoptee adolescents remains largely unexplored. Acknowledging the pivotal role of positive

parent-teen relationships in shaping the holistic well-being of adolescents, it is essential to examine the dynamics between parental support and adolescents' health status, particularly how this relationship evolves over time. METHODS: This study utilized The National Longitudinal Survey of Adolescents to Adult Health (Add Health) at baseline, wave 2, and wave 3. The initial study sample included 404 adopted adolescents. Parental support was measured by three items from wave 2 that assessed the warmth, love, and satisfaction in the parent-teen relationship. Health status was measured by a single item asking about general health in both waves 2 and 3. To analyze the association between parental support and adopted adolescents' perceived physical health over time, a random effects model was employed. RESULTS: Most of the adolescents in the sample identified as female (53.2%), White (42.8%), and not Hispanic (91.6%). The results revealed a statistically significant positive association between parental support and adopted adolescents' perceived health ($b = 0.36$, $p < 0.001$). Notably, the time difference moderated this association ($b = -0.35$, $p < 0.001$). CONCLUSION: Social work practitioners and policymakers could employ these results to inform targeted early intervention focusing on developing positive adoptive parent-teen relationships and promoting the physical health and well-being of the adoptees in the long term.

31. Quality-of-Life and the Experience of Dyspnea Before and After Lung-Sparing Surgery for Pleural Mesothelioma: A Theory-Informed Scoping Review

Melissa Culligan

Oral Session D (Room 351)

Culligan, M., Klinedinst, N.J., Regan, M., Tod, A., Mooney-Doyle, K., Friedberg, J.S.

BACKGROUND: Pleural Mesothelioma (PM) is a rare, incurable cancer. Surgery for PM is an investigational, palliative procedure associated with increased morbidity/mortality. Dyspnea is a common symptom experienced by PM patients before and after surgery. Dyspnea contributes to patient outcomes, including quality of life (QOL). OBJECTIVE: The focus of this scoping review was to examine the evidence about the physiological, psychological, and situational factors that contribute to QOL before and after lung-sparing surgery for PM. METHODS: The methodological framework of Arksey and O'Malley was used for this scoping review. The Theory of Unpleasant Symptoms informed the framework for key findings about the physiological, psychological, and situational concepts related to QOL and dyspnea. RESULTS: The search identified 293 studies of which 15 met inclusion criteria. Most of the studies were prospective (57%), 28% were retrospective, 14% were randomized control trials. Dyspnea was quantified in 78% of the studies and individually measured in 14% of the studies. Physiological and psychological concepts were identified. CONCLUSIONS: Given the magnitude and the palliative, investigational nature of the surgery, it is critical to consider the impact the procedure has on a patient's symptom burden and QOL. While the current literature has yielded valuable information, it highlights the gap that exists regarding the patient's lived experience and perceived QOL following lung-sparing surgery. IMPLICATIONS: The findings of this review suggest future research requires qualitative and mixed method studies to gain a more in depth understanding of the PM patient's lived

experience and perceived QOL before and after lung-sparing surgery.

32. Comparing Responders and Non-Responders to a Dual Task Cognitive and Reach to Grasp Balance Perturbation Training Study in Older Adults

Nesreen Alissa

Oral Session E (Room 353)

Alissa, N., Westlake, K.W.

Reach-to-grasp is a preferred balance response strategy among older adults, yet grasping errors are frequent. OBJECTIVE: To identify differences in baseline characteristics between responders and non-responders to a dual-task cognitive and balance perturbation reach-to-grasp training intervention in older adults. METHODS: The 6-day intervention included 30 randomized slip-like and trip-like walking perturbations while performing a cognitive task. Assessment and training were conducted using a specialized treadmill, which can deliver customized balance perturbations. A single handrail was placed at wrist height on the dominant hand side. Assessment conditions included walking slip-like perturbations with and without a simultaneous cognitive task. Participants were assessed at baseline(T1), after 3 days(T2), and 6 days(T3) of training. Participants were divided into responder or non-responder groups according to improvements in reach-to-grasp movement time (i.e., >10ms reduction in at least 2/3 perturbation trials at T2 or T3). Groups were then compared based on baseline characteristics of performance on the Timed Up and Go and Four-Square Step Tests, grasp errors, subjective units of distress, Beck Anxiety Inventory, and Activities-Specific Balance Confidence Scale using Wilcoxon signed-rank test. RESULTS: Participants in the 'responder' group demonstrated statistically higher subjective units of distress scores at T1 compared to 'non-responders' ($p=0.026$). No other outcomes showed significant differences between groups ($p>0.05$). CONCLUSION: Dual-task cognitive and balance perturbation reach-to-grasp training improves reach to grasp movement time in older adults who demonstrate higher levels of distress during slip-like perturbations. These results suggest that older adults with fall-related anxiety may benefit from a 6-day dual task reach-to-grasp training intervention.

33. Exploring Loneliness in Transgender Older Adults: A Qualitative Descriptive Study

Katherine Bowers

Oral Session E (Room 353)

Bowers, K., Carpenter, J., Klinedinst, N.J., Mooney-Doyle, K., Thomas, K., Lepore, M.

Loneliness affects over one third of community dwelling older adults and is associated with poor physical and mental health, cognitive decline, and increased mortality. Transgender individuals, those who have gender expressions, identities, or behaviors that align differently from their birth sex, experience significant social, economic, and health disparities which may place them at higher risk for loneliness and its consequences, yet there is a scarcity of research on the experience and impact of loneliness in this older adult population. The purpose of this study is to examine the phenomenon of loneliness in transgender adults aged 50 and over and fill a critical knowledge gap within LGBTQIA+ aging research. Guided by the Health Equity Promotion Model, a qualitative descriptive

approach will be used to explore the lived experience of loneliness and risk factors for and protective factors against loneliness through semi-structured interviews and follow-up participant journal entries. Up to 15 transgender individuals will be recruited from gender affirming care centers and providers and transgender support groups in Maryland. A community advisory member aided in study development and piloted the data collection tools. Content analysis – an iterative methodical immersion, reduction, and interpretation of the data – will aid in summarizing the experience of loneliness in transgender older adults. Findings from this study will provide a greater understanding of the experience of loneliness among transgender older adults. These findings are critical to inform future research, improve health outcomes, and advance health and social policy to reduce loneliness in transgender older adults.

34. Effect of Ankle Foot Orthoses on Tibialis Anterior Activity during Lateral Stepping in Chronic Stroke

Shabnam Lateef

Oral Session E (Room 353)

Lateef, S., Gray, V.L.

PURPOSE: Ankle Foot Orthoses [AFOs] prescribed to people post-stroke counteract persistent ankle Tibialis Anterior [TA] muscle paresis with the purpose of enabling independent ambulation. However, the long-term effect that AFOs which limit ankle dorsiflexion range of motion have on TA function has been questioned. The purpose of this study was to identify group differences in paretic TA rate of activation during a voluntary lateral step. Secondary aims examined the role of paretic TA activation on balance and mobility. MATERIALS/METHODS: Ten people with chronic stroke [PwCS], who used AFOs for ambulation (62.59±6.98 years, 8F/2M), 10 PwCS who were able to ambulate independently without AFOs (61.42±6.67 years, 4F/6M) and 10 healthy controls (64.8±8.54 years, 5F/5M) were included. Participants were instructed to take a voluntary lateral step as quickly as possible. The in-task rate of TA activation was measured using Electromyography. Clinical measures of balance and mobility included the Timed-Up-And-Go test [TUG] and Community Balance & Mobility scale [CBM]. RESULTS: Group differences were identified using the Kruskal-Wallis test with the Dunn post-hoc test. PwCS who used AFOs had comparable rates of paretic TA activation compared to those who did not use an AFO ($p>0.05$). However, overall PwCS had reduced TA activation rates compared to healthy controls ($p<0.02$). Spearman Rho Correlations (ρ) showed an increased rate of paretic TA activation was associated with a faster TUG ($\rho = -0.47$; $p<0.01$) and higher CBM score ($\rho=0.5$; $p<0.01$). CONCLUSION: AFOs used post-stroke to limit ankle dorsiflexion range facilitates dynamic activity without compromising TA muscle function.

35. A Dps-Like Member of the Ferritin Super-Family is Involved in the Iron-Mediated Oxidative Stress Response in Pseudomonas Aeruginosa

Khady Ouattara

Oral Session E (Room 353)

Ouattara, K.O., Oglesby, A.G.

Pseudomonas aeruginosa opportunistically infects immunocompromised patients such as those with cystic fibrosis. An important facet of its persistence and survival in the human host is

its ability to acquire iron from the environment. Iron can be toxic due to its participation in Fenton chemistry. Thus, the acquisition, use, and storage of iron must be tightly regulated in response to intracellular iron levels. The ferritin super-family consists of three distinct types of proteins that contribute to iron storage (ferritin and bacterioferritin) and DNA protection from nutrient starvation (Dps). One member of this family is PA4880, a highly conserved gene in the pseudomonads and is annotated as a putative Bfr. The Bfr annotation is due to the conservation of residues corresponding to Bfr ferroxidase centers and a heme-coordinating methionine. However, sequence analysis revealed that the methionine residue of PA4880 is not conserved in other pseudomonads. Structural studies show that the ferroxidase centers of purified PA4880 are structurally like that of Bfrs, yet PA4880 purifies in the absence of heme and crystallizes as a 12-mer, indicative of Dps proteins (Mario Rivera, LSU). A series of reporter fusions and qPCR studies demonstrate that PA4880 expression is induced in high iron conditions via the PrrF small regulatory sRNAs, which are predicted to pair with and destabilize the PA4880 mRNA in iron-limiting conditions. Based on these findings, we hypothesize that PA4880 is a novel bacterioferritin-like Dps protein that is responsive to iron-induced oxidative stress.

36. Family Based Elder Abuse in Western Nepal: Prevalence and Its Associated Factors

Aman Shrestha

Oral Session E (Room 353)

Shrestha, A., Kafle, B., Ghimire, S.

Elder abuse is a public health and human rights issue rarely discussed, observed, and reported in Nepal. Traditional values promoting filial piety hinder the acknowledgment and reporting of such abuse, particularly within family settings in Nepal. This is the first provincial study on family-based elder abuse in Gandaki, Nepal. Older adults, 60 years and older, were interviewed across three districts, one each from three ecological regions in Nepal. The final analytic sample was 611. More than half of the participants were from Nawalpur-Tarai (57.2%), urban municipality (68.1%), male (57.3%), married (62.9%), not disabled (56.1%), without education (79.8%), and lived in multigenerational households (73.0%). The overall prevalence of elder abuse reported in this study was 56.4%, with caregiver neglect (50.8%) as the most prevalent sub-type. Multivariable logistic regression tested the association between elder abuse and the covariates. Gender (OR=2.56, CI: 1.64-4.01) and reluctance to disclose health issues to family members (OR=2.13, CI: 1.36-3.34) were the strongest predictors of elder abuse. Compared to those living in multigenerational households, those living in nuclear households faced 85% higher abuse (OR=1.85, CI: 1.19-2.89). Being female, living in rural areas, having formal education, having faith in traditional healers, and having good self-reported health were associated with lower odds of elder abuse. Thus, elder abuse is a critical issue that requires the immediate attention of policymakers and stakeholders, particularly with the growing older population and the changing traditional care system due to the migration of younger family members out of the country.

37. 3D Printing Polycaprolactone-Allograft Bone Constructs with Slow Releasing Osteoinductive Nanogels

Eman Mirdamadi

Oral Session E (Room 353)

Mirdamadi, E., Tang, N., Tian, H., Reynolds, M. A., Iwamoto, M., Hartman, M. J., Lowe T. L.

Critical-sized bone defects (CSBDs) affect 1 in 20 people globally. Bone allografts are commonly used during CSBD procedures but lack essential growth factors and shaping capabilities for mature bone formation. The objective of this work is to 3D-print polycaprolactone (PCL)-allograft constructs coated with bone morphogenetic protein-2 (BMP-2)-loaded nanogels (BMP-nanogel) to regenerate bone defects. A 3D extrusion printing strategy was employed to fabricate 3-6 mm-diameter constructs made of PCL and 0, 10, or 30 wt% human bone allograft with 250, 500, or 750 μm interconnected pores. BMP-2 was loaded into nanogels composed of poly(N-isopropylacrylamide)-dextran-poly(lactate-2-hydroxyethyl-methacrylate) by UV-emulsion polymerization. Dental pulp stem cells (DPSCs) survival with constructs and nanogels was evaluated by MTT. Nanogel localization and adherence on the constructs were assessed by fluorescence. BMP-2 released from nanogels was quantified by ELISA and BMP-2 bioactivity was assessed by BRE-luc reporter assay. The bone regenerative capacity of the constructs and nanogels was evaluated in rodent heterotopic ossification and critical sized calvarial defect models by histology and micro-CT 50 days post implantation. Adding 30 wt% allograft in PCL constructs increased nanogel binding affinity and DPSC proliferation by 50% after one week. Nanogels were not cytotoxic to DPSCs up to 5 mg·mL-1 concentrations. Nanogels released BMP-2 with near zero-order release kinetics for 35 days and released BMP-2 had nearly equal bioactivity as control BMP-2. Finally, allograft and BMP-2-loaded nanogels played important roles in increasing construct cellular penetration and mineralization in rodent models. The construct-nanogel hybrids have great potential as implants for patient and defect-site-specific bone regeneration.

38. Cannabinoid-1 Receptor Signaling Promotes Pavlovian Devaluation Sensitivity in Male, but not Female, Sign-tracking Rats

Catherine Stapf

Oral Session F (Room 223)

Stapf, C.A., Keefer, S.E., McInerney, J., Cheer, J.F., Calu, D.J.

Cannabinoid-1 receptor (CB1R) signaling in dorsal striatum regulates the shift from flexible to habitual behavior in instrumental outcome devaluation. Due to the considerable individual, sex and experience-dependent differences in Pavlovian behaviors we test distinct predictions for the contribution of dorsomedial striatum (DMS) CB1R signaling to sign-tracking and Pavlovian outcome devaluation in male and female rats. In particular, we predicted a role for CB1R signaling in driving sign-tracking and rigid responding in outcome devaluation. We trained rats in Pavlovian Lever Autoshaping (PLA) to determine intermediate, sign-, or goal-tracking groups then performed intracranial infusions of CB1R inverse agonist, rimonabant, in the DMS before reinforced PLA sessions. We observed no effects of CB1R inhibition on Pavlovian sign- or goal-tracking in either sex. We overtrained rats in PLA then performed intracranial infusions of rimonabant in the DMS before outcome devaluation test sessions. We used within-subject satiety-induced outcome devaluation procedure in male and female rats after extended training in PLA. We sated rats on training pellets (devalued) or home cage chow (valued) and tested responding to cues in nonreinforced autoshaping sessions. After

extended training, male sign-tracking rats were sensitive to devaluation while female sign-tracking rats were not. Inhibition of CB1R signaling in the DMS impaired Pavlovian outcome devaluation in male sign-tracking and goal-tracking rats, making their behavior more rigid, while having no effects in female rats. Our results demonstrate that endocannabinoid signaling in the DMS regulates behavioral flexibility in a sex-specific manner, suggesting differences in CB1R signaling in DMS between male and female sign-tracking rats.

39. The Impact of the COVID-19 Pandemic on Contraceptive Utilization in the United States: An Interrupted Time Series Analysis Using an ARIMA Model

Chia-Yun Hsu

Oral Session F (Room 223)

Hsu, C., Carvajal, D.N., Onukwugha, E.

OBJECTIVES: To characterize the trends in contraceptive utilization rates and unit costs of contraceptive prescriptions, and to evaluate the impact of the COVID-19 pandemic on the use of contraception. STUDY DESIGN: A quasi-experimental study using interrupted time series analysis was conducted using PharMetrics Plus database from 2018 to 2022. Females ages 15 to 44 years with pharmacy coverage were identified to estimate their monthly utilization rate of contraception (number of contraception pharmacy claims per 100,000 females) and unit cost of contraception prescription (cost per prescription). Outcomes were calculated separately for each contraceptive method. Autoregressive integrated moving average models were used to analyze the time series data. The model estimated impact parameters including level change and slope change, to ascertain the impact of the COVID-19 pandemic.RESULTS: We identified 896,761 and 696,409 females ages 15 to 44 years during the pre- and post-COVID-19 pandemic period. Implants and IUDs had a significant level change in the monthly utilization rate, with decreases of 17 and 38 utilizations per 100,000 individuals, respectively, following the onset of the pandemic. Oral EC had a significant increase of $58 in the monthly unit costs of contraceptive prescriptions. CONCLUSIONS: The immediate decrease in the utilization of long-acting reversible contraception indicates potential access barriers for individuals seeking these methods, consequently increasing the risk of unplanned pregnancies. The increase in the unit price of oral EC implies affordability challenges for individuals who lost insurance coverage post-pandemic and require oral EC.

40. Fostering Nursing Clinical Judgement in the Traditional Clinical Learning Environment

Sabrina Bielefeldt

Oral Session F (Room 223)

Bielefeldt, S. L.

Nursing clinical judgment is a complex cognitive and metacognitive process, which develop with time and experience, that integrates evidence-based practice, intuition, experiential knowledge, and a patient's situational context to inform patient care decisions. Clinical judgment is essential for nurses to deliver safe, accurate, and timely care, supporting their ability to make decisions that promote positive patient outcomes. Current evidence suggests that new graduate nurses lack the clinical judgment needed for entry to practice and compromise patient safety. There is literature supporting teaching strategies to

foster clinical judgment development in the prelicensure nursing students, but there is a gap in evidence for how to support its development in the traditional clinical learning experiences. The traditional clinical environment offers students the opportunity to gain hands-on experience and develop clinical judgment in real-world settings that reflect the current complexity of nursing and healthcare delivery. This Delphi study seeks to identify a consensus from expert clinical nurse educators on teaching and assessment strategies to foster the development of clinical judgment in prelicensure nursing students in this setting. Findings from this study will add to clinical judgment literature, inform future research into nursing clinical education, and the design of prelicensure nursing education clinical delivery.

41. Sex-Dependent Progression of the MYBPC1 E248K Myotrem Myopathy in Response to Aging

Jennifer Mariano

Oral Session F (Room 223)

Mariano, J.M., Joca, H., Kallenbach, J., Renu, N., Ochala, J., Ward, C., Kontrogianni-Konstantopoulos, A.

Dominant missense mutations in MYBPC1, the gene encoding the essential sarcomeric slow myosin binding protein-C (sMyBP-C), have been associated with the development of a congenital myopathy termed “Myotrem,” characterized by early-onset muscle weakness, hypotonia, dysmorphia, skeletal deformities, and postural tremor of myogenic origin. However, clinical manifestation of this myopathy in mid and late adulthood remains unknown. Using the MYBPC1 E248K murine model, we interrogated skeletal muscle organization and in vivo contractile performance in mid and late adulthood in both male and female myotrem mice. Our findings reveal a differential phenotypic manifestation of E248K Myotrem. At 12-months of age, both male and female knock-in (KI) animals exhibit comparable sarcomeric organization and contractile function to sex-matched wild type (WT) animals. However, by 24-months of age, KI male muscles exhibit a sharp decline in force development and altered contractility kinetics compared to sex- and age-matched WT controls, secondary to sarcomeric disorganization. In contrast, 24-month-old female KI animals are not as severely affected, with deficits in sarcomeric structure and contractile function being only present in certain muscles. Collectively, our studies reveal a sex-dependent and muscle-specific presentation of MYBPC1 E248K Myotrem in response to aging with sarcomeric disorganization being the primary driver of contractile dysfunction.

42. Peptidoglycan Recognition Protein 1 Modulates Early Pulmonary Inflammation and Pathogenesis During Bordetella pertussis Infection

David Rickert

Oral Session F (Room 223)

Rickert, D.M., Himmelberger, R., Carbonetti, N., Scanlon, K., Skerry, C.

There is an urgent need to develop therapeutics for the treatment of whooping cough (pertussis). Pertussis disease, caused by the Gram-negative bacterium Bordetella pertussis, is characterized by bouts of paroxysmal coughing and elicits severe pulmonary damage and inflammation. Our group hypothesizes that targeting the host immune response will better treat the long-term sequelae of infection,

caused by the early overactive immune response. We aim to identify determinants of host hyper-inflammatory responses to accelerate the development of novel host-directed therapeutics. B. pertussis facilitate its pathogenesis via a myriad of toxins including tracheal cytotoxin (TCT), a monomeric fragment of peptidoglycan (PGN). We have identified the PGN recognition proteins (PGLYRPs) as key players in the host response to infection. In mammals, PGLYRPs are primarily thought of as anti-microbial peptides (AMPs) but have more diverse immune signaling roles in arthropods. Recent bulk and single cell transcriptomic lung studies of pertussis challenged mice, have identified PGLYRP1 as highly upregulated during B. pertussis infection, leading us to hypothesized that host PGLYRP1 plays a critical role during B. pertussis pathogenesis. Through a combination of knockout mouse studies, single cell transcriptomics, and in vitro reporter assays, we elucidated the role of PGLYRP1 in pulmonary inflammation and pertussis pathogenesis. We discovered that PGLYRP1 limits early pulmonary bacterial load via its AMP functions and modulates pulmonary inflammation. Further, we describe a novel ability for PGLYRPs to enhance NOD1 recognition of TCT and PGN. This has important and exciting implications for PGN-mediated inflammatory disorders and development of host-directed therapeutics.

43. Investigation of OSCC Tumor and PDX Heterogeneity Using Spatial Chromatin Accessibility

Diane Terry

Oral Session F (Room 223)

Terry, D. M., Gaykalova, D.

The 5-year survival rate for Oral Squamous Cell Carcinoma (OSCC) is ~50% and has not improved in decades. To test the efficacy of new treatments, patient-derived xenograft models (PDXs) have advantages over cell line-derived xenografts as cell cultures frequently undergo genotypic drift. For PDXs, pieces of patient tumors are transplanted into immune-deficient mice. Selection pressure for PDX establishment and adaptation to the mouse host can cause genotypic drift. This study investigates heterogeneity of tumors and PDXs from 2 patients. Studies have shown chromatin structure changes play a key role in gene dysregulation in cancer. I hypothesize that chromatin structure changes in OSCC evolve and result in tumor and PDX heterogeneity. To test this, spatial chromatin accessibility data was obtained in collaboration with AtlasXomics. This spatial data shows intra- and inter-tissue heterogeneity. For example, tumors showed higher heterogeneity in the accessibility of epithelial marker genes than the PDXs. Most mesenchymal marker genes were more accessible in tumors, except for the gene for the transcription factor SNAI2 which had higher accessibility across the PDXs. UMAP merged clustering resulted in 12 accessible chromatin region clusters. Cells of two clusters were found more in the tumor than the corresponding PDX and for two other clusters cells were found more in the PDX than the tumor. Pathway analysis currently underway will provide additional insights. This data will help the understanding of OSCC tumor/PDX heterogeneity, how well PDX models retain the genetic signatures of primary tumors and potentially aid development of new therapies for OSCC patients.

44. Investigating the Molecular Pathogenesis of a Novel MYBPC1

Duplication Mutation Linked to Myopathy with Tremor (MYOTREM)

Aishwarya Iyer

Oral Session G (Room 115)

Iyer A.S., Cook, M.E., Takagi, Y., Wright, N.T., Biancalana, V., Massier, M., Spodenkiewicz, M., Poirsier, C., Boyer, F.C., Sellers, J.R., Varney, K.M., Weber, D.J., Kontrogianni-Konstantopoulos, A.

Our group identified a novel Leu266Lys267Arg268 (LKR) duplication in the MYBPC1 gene encoding the slow skeletal myosin binding protein-C (sMyBP-C), a critical sarcomeric protein that plays key structural and regulatory roles in striated muscle contraction and relaxation. Starting in infancy, the resulting clinical phenotype is associated with progressive generalized muscle weakness, skeletal deformities, and a unique myogenic tremor (MYOTREM). The molecular mechanism underlying these pathological manifestations is elusive, and currently no therapeutics exist for this emerging sarcomeric myopathy. My work aims to characterize the LKR duplication on a molecular level and delineate the structural and functional alterations that it elicits. Interestingly, the LKR duplication localizes to the highly conserved M-motif region responsible for dynamic interactions with myosin S2Δ and actin to regulate crossbridge cycling. I therefore hypothesize that the duplicated LKR residues alter the biochemical properties of the M-motif, disrupting the sMyBP-C N-terminus structure and function. In vitro motility and enzymatic assays reveal the mutant M-motif to uniquely modulate crossbridge formation by dampening actin velocity and decreasing myosin ATPase activity, respectively, compared to the wild-type. Nuclear magnetic resonance experiments suggest that the duplicated residues induce atomic-level M-motif structural changes and increase binding to S2Δ, evidenced by amide proton chemical shift perturbations and exchange patterns. Collectively, we have demonstrated that this mutation alters the skeletal M-motif domain structure and augments myosin binding. Ongoing studies will illuminate the molecular and functional basis of this novel myopathy, ultimately aiding in a better understanding of the disease pathogenesis and the development of targeted therapeutics.

45. Crowding-In Through Intergovernmental Transfers: The Case of Federal Investment in Public Transit

Arseniy Braslavskiy

Oral Session G (Room 115)

Braslavskiy, A.

Addressing environmental and energy security challenges faced by the United States, the Bipartisan Infrastructure Law of 2021 (BIL) greatly increased federal funding for transportation. Yet, the efficiency of such investments is uncertain. Previous literature has found both crowding-out of other types of funding and the opposite "flypaper effect". I contribute to this debate by analysing federal investment in public transit, which is a substantial part of BIL. Using a spike in federal transit funds due to the American Recovery and Reinvestment Act of 2009 (ARRA), I estimate their effect on local investment decisions. Since most of the monies was allocated using a pre-existing formula and local characteristics, my exogeneity assumption is transparent and consistent with multiple robustness tests. I find a particularly strong "flypaper effect": each additional $1 of ARRA grants increased total

transit expenditures on capital by $10 in the following ten years. In the first five years, the differential expenditures are majorly driven by the increased application for other discretionary federal programs. In the following five years, expenditures from state programs have the biggest effect. This suggests that additional federal funds lead to large expansionary efforts by local authorities that persist long after the initial funds are spent.

46. Angiopoietin-like 4 Increases Resistance of HNSCC to Cisplatin through Enhanced DNA Damage Response and HR-mediated DNA Damage Repair

Emmanuel Asiedu

Oral Session G (Room 115)

Asiedu E.B., Kumar, A., Montaner, S.

Head and neck squamous cell carcinoma (HNSCC) poses a significant clinical challenge, with a stagnant 5-year survival rate of approximately 50% despite considerable treatment efforts. Current therapeutic approaches involve surgical resection followed by radiation and/or cisplatin-based chemotherapy. Unfortunately, cisplatin resistance rapidly emerges, contributing to unfavorable outcomes in advanced HNSCC cases. Addressing this challenge is imperative for enhancing treatment options. Our lab studies Angiopoietin-like 4 (ANGPTL4), a pro-angiogenic factor associated with aspects of cancer progression such as proliferation, migration, invasion, anoikis resistance, metabolism, and angiogenesis. Previous work in our lab has revealed heightened expression of ANGPTL4 in HNSCC cells and patient tissues. Our investigations establish a role for ANGPTL4 in HNSCC cell migration. For this study, we hypothesize that ANGPTL4 promotes DNA repair and augments HNSCC resistance to cisplatin. Our findings demonstrate that elevated ANGPTL4 expression diminishes HNSCC cell sensitivity to cisplatin, mitigates DNA damage induced by cisplatin treatment, and enhances the efficacy of repair processes, as evidenced by extrachromosomal homologous recombination (HR) assays. Moreover, ANGPTL4 significantly elevates RAD51 phosphorylation at Y315 and Y54, events linked to enhanced RAD51 invasion and strand exchange activity in HR repair. Phosphomutant studies confirm the necessity of RAD51 phosphorylation for ANGPTL4-mediated enhancement of HR repair. Notably, our investigation implicates neuropilin 1 (NRP1) and ABL1 in this pathway. Ongoing research delves into the molecular mechanisms regulating ANGPTL4's impact on HR and cisplatin resistance and the therapeutic potential of NRP1 and ABL1 inhibition in overcoming cisplatin resistance in HNSCC and enhancing cisplatin response in HNSCC patients.

47. CaMKIIγ and CaMKIIδ May Regulate Bone Mass and Quality Through Differing Mechanisms

Heather Buck

Oral Session G (Room 115)

Buck, H.V., Leser, J.M., Stains, J.P.

Osteocytes receive and integrate mechanical, hormonal, and molecular signals in bone. They convert these messages to a wide range of signaling molecules, which act to control differentiation and activity of osteoclasts, cells that resorb existing bone, and osteoblasts, cells that deposit new matrix. By acting on osteoclastic and osteoblastic cell populations, osteocytes are able to coordinate the balance of

bone loss and formation to support skeletal maintenance and adaptation. Calcium/calmodulin-dependent protein kinase II (CaMKII) is known to influence several mediators of bone development and skeletal cell differentiation, but its specific osteocytic role in the maintenance of bone mass and quality has not been fully clarified. As Camk2 isoforms gamma and delta are able to compensate, we developed a mouse model of genetic co-deletion of Camk2delta and Camk2gamma in osteocytes and mature osteoblasts using the Osteocalcin CRE driver. Camk2 delta/gamma double conditional knock out mice express a post-development phenotype of extremely profound bone loss and fragility, with deficits in almost all measured bone parameters at eight weeks of age. To determine the individual roles of delta and gamma isoforms, we have now developed independent Camk2delta and Camk2gamma conditional knockout (cKO) models. Preliminary data suggest that CaMKIIγ and CaMKIIδ may perform some redundant and some individual functions. Both models express reduced trabecular bone relative to controls, while Camk2delta cKO may also result in increased fragility. Surprisingly, Camk2gamma cKO appears to result in increased cortical perimeter and increased estimated resistance to force. Together, these data suggest the unexpected roles of CaMKIIγ and CaMKIIδ.

48. Nurses Work Environment and Health Promotion in Relation to Psychological Distress Symptoms, and Sleep Disturbance: A Structural Equation Model

Hephzibah Edwin

Oral Session G (Room 115)

Edwin, H.S.

BACKGROUND: The healthcare work environment has numerous stressors contributing to distress, and poor health outcomes in nurses, which has not been well explored. A critical nursing shortage exists, and it is crucial to explore the work environment leading to distress symptoms. OBJECTIVE: To examine the work environment, specifically workload and the practice environment, and associations with psychological distress, sleep disturbance, and health promotion behaviors in nurses, using a structural equation modeling (SEM) approach. METHODS: A secondary analysis of the Nurse Worklife and Wellness Study (Trinkoff et al., 2022) data was done. A measurement model tested the factorial structure of the nine latent constructs using weighted least squares estimation with missing data (WLSMV) for the sample (n=1170). The structural model evaluated the relationships among the latent constructs and measured variables. RESULTS: The measurement model reported adequate model fit (CFI=0.96; TLI=0.95; SRMR=0.048 and RMSEA =0.039). The structural model showed that the workload significantly increased psychological distress (β = 1.47, p<0.001), increased sleep disturbance (β = 1.22, p<0.01) and decreased overall health (β = -1.36, p<0.01). Workload and the practice environment were associated with increased health promotion behaviors. Psychological and physical health promotion had restorative effects mediating the relationship between workload and psychological distress decreasing the impact of distress. CONCLUSIONS: Our results highlight the need to improve the nurses' work environment by decreasing their workload. Strategies to incentivize nurses' participation in health promotion behaviors can be beneficial to mitigate the symptoms of distress, promote

their wellbeing and stabilize the nursing workforce.

49. Investigation of Neuraminidase as a Target Antigen for a Universal Influenza Virus Vaccine

Cosette Schneider

Oral Session G (Room 115)

Schneider, C.G., Russell, G., Del Veliz, S., Rodriguez, A., Germain, J., Ward, A.B., Han, J., Coughlan, L.

Seasonal and emerging zoonotic influenza A viruses (IAV) have the potential to cause significant global morbidity and mortality. Next-generation vaccines are urgently needed to provide broad protection against the diversity of IAV strains and subtypes. Such efforts should prioritize the identification and targeting of broadly protective epitopes to elicit heterosubtypic and/or pan-group immunity. To date, influenza virus vaccine development has largely focused on the major surface protein, hemagglutinin (HA). However, NA, the second viral surface protein, is reemerging as a potential target of a universal vaccine, but much about NA-based immunity remains unknown.
In this study, we explore questions surrounding NA quality, mechanisms of NA-based immunity, and the immunogenicity of NA by selecting and validating a range of high-quality, stabilized NA immunogens to be incorporated into a non-replicating human adenovirus type-5 (Ad5) vector for evaluation. Our validation of soluble secreted NA constructs yielded lead candidates which are antigenically, structurally, and functionally authentic. Lead NA immunogens incorporated into Ad5, elicited cellular and humoral immunity in mice after one dose, with significantly greater magnitude and breadth as compared to matched inactivated influenza vaccine (IIV), or adjuvanted recombinant protein controls. Ongoing work will assess the in vivo efficacy of these NA-based universal vaccine candidates and generate NA-specific mouse monoclonal antibodies to improve our understanding of NA-based immunity at an epitope level. Together, this study improves our understanding of NA-based immunity and how it can contribute to the design of broadly protective “universal” influenza virus vaccines for pandemic preparedness.

50. Nursing Home Profit Status and Pain Among Residents with Dementia

Sorah Levy

Poster Session H (Room 349)

Levy, S., Holmes, S.D., Resnick, B.

Pain is highly prevalent among nursing home (NH) residents with dementia. Estimates suggest 35-80% of NH residents with dementia experience pain and 20% of residents in pain do not receive analgesics. Pain has been identified as a quality indicator to measure and monitor NH performance. There is growing attention focused on the role of NH ownership profit status in the context of quality and delivery of care. The purpose of this study was to examine whether there is a relationship between NH ownership profit status and pain management outcomes among NH residents with dementia. This was a secondary data analysis using baseline data from the Testing the Evidence Integration Triangle for Behavioral and Psychological Symptoms of Dementia (EIT-4-BPSD) study. Residents’ pain was assessed using the PAIN-AD observational measure. Opioid pharmacological pain management was obtained from chart review. Generalized linear mixed models were used to examine associations between NH profit status and pain outcomes. The sample included 553 residents in 55 NH facilities. Pain was observed in 22.6%

(n=125) of the participants and 5.1% (n=28) were receiving opioid pharmacological pain management. More than half of the residents lived in for-profit NH (56.8%, n=313). Results from the generalized linear mixed models showed that NH ownership profit status was not significantly associated with observed pain symptoms or use of pain medications. This study suggests that there were no significant associations between NH ownership profit status and pain management outcomes among residents with dementia.

51. Self-Reported Barriers to Healthy Eating and Exercise in Older Veterans with Dysmobility

Ben Friedman

Poster Session H (Room 349)

Friedman, B., Serra, M., Parker, E., Kilpela, L., Addison, O.

Sedentary behavior and mobility impairments are common in older Veterans and often accompanied by reduced dietary quality. These limitations may lead to repetitive falls, increased hospitalization rates, and higher healthcare costs. The purpose of this study was to use self-reported surveys to identify barriers to healthy eating and exercise in a population of older Veterans at two diverse VA facilities (Baltimore, MD and San Antonio, TX). 87 older Veterans (74 males; 73.9 +/- 5.9 years; BMI 28.0 +/- 5.8 kg/m2) completed a comprehensive online survey via Qualtrics. Questions covered medical history, demographics, and included several validated surveys to assess various lifestyle factors. Related to exercise barriers, 25% reported lack of equipment, 31% stated insufficient skill, 12% described issues finding a place to exercise, 24% reported lack of companions, and 9% stated lack of time. In reference to dietary quality, 6% described difficulty estimating portion sizes, 24% estimating fat content and calories, and 15% stated they were unknowledgeable about healthy food preparation. Most Veterans in this study had poor quality diets with 85% below age-matched norms. This population had a significantly high prevalence of binge eating episodes, with 55% reporting at least one episode in the past few months. Many of the reported barriers may be ameliorated via dietary and exercise education interventions and this study provides effective targets to improve the health of older Veterans. Findings from this study have been integrated into a multi-site peer-led group diet & exercise intervention targeting those typically excluded from lifestyle interventions.

52. The Association Between Pre-Hip Fracture Antidepressant Use and Length of Hospital Stay in Medicare Beneficiaries and Assessing Sex Differences

Rhea Mehta

Poster Session H (Room 349)

Mehta, R., Falvey, J. R., Chen, C., Dong, Y., Shardell, M., Yamashita, T., Orwig, D. L.

Antidepressants are the first-line treatment for depression among older adults. Their use presents important sex differences and is linked to hospital length of stay (LOS), which can affect hip fracture recovery. Given the push to deprescribe these medications among older adults, exploring the effect of antidepressant use prior to hip fracture among older adults with existing depression is important. Thus, our study examined the association between pre-fracture antidepressant use and hospital LOS among hip fracture survivors, and related sex differences. The sample included 17,936

community-dwelling Medicare fee-for-service beneficiaries with depression and a hospitalization claim for hip fracture surgery between 2010 and 2017. Ordinal logistic regression was used to estimate the association between pre-fracture antidepressant use, measured 6 months prior to fracture, and hospital LOS in days, a categorical outcome variable classified into three groups (1-4, 5-8, and 8+ days) during the 30-day post-fracture period. In the covariate-adjusted model, hip fracture survivors with depression who used antidepressants pre-fracture had 6.7% higher odds of a shorter hospital LOS compared to non-users (odds ratio [OR]=1.07; 95% CI=1.01, 1.13; p=0.03). Males had longer LOS on average (mean=6.02, standard deviation [SD]=4.07) compared to females (mean=5.43, SD=3.17), but the sex-by-antidepressant use interaction was not significant (p=0.83). Treating existing depression with antidepressants was associated with shorter hospital LOS in this sample. The findings suggest a benefit of antidepressant use prior to hip fracture which may inform clinical decision-making surrounding depression management among hip fracture survivors to optimize recovery trajectories.

53. Synthetic Biology and Metabolic Engineering of Heme Biosynthesis in C. elegans

Ran Yu

Poster Session H (Room 349)

Yu, R., Yuan, X., Hamza, I.

Heme is an indispensable cofactor for proteins in many vital metabolic processes. Because of its hydrophobicity and cytotoxicity, specific pathways are required for heme to be trafficked from its site of synthesis in the mitochondria or entry into the cell. Here we reconstructed a functional heme biosynthesis pathway in C. elegans to make this heme auxotroph into a prototroph. The engineered strains are capable of sustaining without environmental heme as they now rely on endogenous heme synthesis. We now seek to identify the molecular mechanisms for how cells and organs differentiate between intracellular versus extracellular heme. We will tackle these questions using genome-wide RNAi screens. Our ultimate goal is to deepen the understanding of how heme homeostasis is coordinated at the organismal level.

54. The Pleckstrin Homology Domain of Obscurin Acts as a Chemosensitizing Agent in Breast Cancer Cells via Regulation of the PI3K/p85 Regulatory Subunit

Kelly Griffiths

Poster Session H (Room 349)

Griffiths, K., Eason, M., Kontrogianni-Konstantopoulos, A.

Obscurin is a 720kd scaffolding protein that is richly expressed in normal breast epithelium; however, its expression is often lost in advanced stage breast cancer. Our lab has shown that when obscurin expression is lost in normal breast epithelial cells, they exhibit stem-like properties, such as increased epithelial to mesenchymal transition, cytoskeletal remodeling, and enhanced migration and invasion capabilities. Additionally, we have shown that obscurin-low breast cancer cells have a survival advantage following treatment with low doses of anthracyclines such as doxorubicin, with upregulation of the PI3K/AKT pathway being a major underlying mechanism. Relatedly, the obscurin pleckstrin homology (PH) domain binds directly to the

p85 regulatory subunit of PI3K with nanomolar affinity, while ectopic expression of obscurin-PH in breast cancer cells suppresses their migratory and invasive capabilities. Thus, the objective of this study is to determine if restoration of expression of the obscurin-PH domain in obscurin-low breast cancer cells potentiates the effectiveness of Doxorubicin, allowing the use of lower non-cardiotoxic doses. We hypothesized that the obscurin-PH domain synergizes with Doxorubicin by suppressing the PI3K/AKT cascade, leading to enhanced cell death at lower doses. Ectopic expression of obscurin-PH inhibited the PI3K/AKT cascade across all cell lines tested. Interestingly, HER2 enriched cells showed a significant synergy between obscurin-PH and doxorubicin, allowing for comparable levels of cell death at significantly lower doses of doxorubicin. These results suggest that restoring the expression of the obscurin-PH domain may lead to a reduction in toxicity when given alongside doxorubicin in patients with HER2 enriched breast tumors.

55. Immigrant Young Adults' Acculturative Stress and Psychological Distress: Exploring the Moderating Effects of Parent-offspring Open Communication

Meng-Hsuan Yu

Poster Session H (Room 349)

Yu, M.H.

Little is known about the impact of the family process among immigrant young adults. This study aimed to examine (a) the association between acculturative stress (AS), parent-offspring open communication (POC), and self-rated psychological distress and (b) the moderating effects of POC on the association between AS and psychological distress. A multiple regression model and a moderation analysis were conducted using a cross-sectional sample of 250 immigrant young adults via online questionnaires. Findings indicate that higher levels of AS and lower levels of POC are associated with higher levels of psychological distress. Moreover, POC buffers the association between AS and psychological distress. This study highlights the importance of POC during the acculturation process among immigrant young adults and provides implications for research and interventions.

56. Mechanisms of SEMA4D Mediated Blood Brain Barrier Transmigration

Anu Sunkara

Poster Session H (Room 349)

Sunkara, A.D., Koltz, R., Yu, M.

Brain metastasis presents a formidable challenge in cancer treatment due to the blood-brain barrier's (BBB) restrictive nature, hindering effective delivery of systemic therapies. Understanding the mechanisms underlying metastatic invasion through the BBB is crucial for developing targeted interventions. Previous research has identified SEMA4D, a cell surface receptor, as a potential mediator of BBB transmigration. However, its role in brain metastasis and BBB traversal remains unclear. Here, we propose investigating the hypothesis that the cytoplasmic region of SEMA4D activates the YAP pathway, facilitating BBB transmigration. Using breast cancer patient-derived circulating tumor cells (CTCs) and in vitro/in vivo BBB transmigration assays, we aim to elucidate SEMA4D's involvement in the metastatic cascade. Additionally, we will explore a novel "reverse signaling" mechanism linking SEMA4D to Yes Associated Protein (YAP) signaling. This study holds promise for

uncovering key molecular pathways driving brain metastasis and may pave the way for the development of targeted therapeutics to improve patient outcomes.

57. Methods for Measuring Structural Interactions of Antimicrobial Peptides with Lipid Bilayers

Aryan Sonawane

Poster Session H (Room 349)

Sonawane, A.B., Mihailescu E.

Antibiotic resistance is recognized as a major problem worldwide in the management of infectious disease and there is a need for new approach to tackle this problem. Antimicrobial peptides (AMPs) are small molecules that directly target microorganisms and involved in the modulation of the immune response. AMPs also known as Host Defense Peptides (HDPs) are more potent (directly targeting microorganism) than the conventional antibiotics. AMPs are known to show antimicrobial activity owing to their interaction with the bacterial cell membrane. The aim of this research is to demonstrate methods for measuring structural interactions of antimicrobial peptides with lipid bilayers. In our studies we have compared AMPs like Tilapia Piscidin 4 (TP4) isolated from Nile tilapia and Melittin with lipid bilayers of phosphatidylethanolamine/phosphatidylglycerol [POPE/POPG] and phosphatidylcholine/phosphatidylglycerol [POPC/POPG] in 3:1 ratio. To demonstrate and investigate structural interactions of these AMPs with lipid bilayers we have used X-ray diffraction (XRD) technique and Fluorescence spectrometer. Stopped flow measurements were used to estimate kinetics of the interaction and Circular dichroism (CD) for secondary structure of AMPs in presence of lipids. Overall, by studying these interactions we can design new synthetic AMPs that are more efficient than conventional antibiotics.

58. Immigration Status and Social Anxiety Symptoms and Possible Risk for Substance Use Problems

Claudia Choque

Poster Session H (Room 349)

Choque, C.

The immigration status of young immigrant adults living in the United States has potential long-term implications on the livelihoods and overall health of this group. Immigration status has been found to be linked to behavioral health problems and yet social anxiety and substance use have been under-studied with this group. The current study addresses the gap in the literature on the developmental course of young immigrant adulthood and the association between immigration status and behavioral health outcomes. In a national sample of 282 young (63.81% male, Mean_Age = 24.08) non-white immigrant adults, regression analyses will be used to examine the relationship between immigration status and co-occurring social anxiety and substance use symptoms. Regression analyses were conducted for both outcomes. Logistic regression statistical analyses revealed that participants without citizenship were at greater odds of being at risk for substance use after controlling for social support, acculturation stress, and racial discrimination (OR, 1.93 [95% CI, 1.084–3.461]). However, no significant results were found for social anxiety in this sample. The implications of the study findings may institute the need for further screening of anxiety symptoms and substance use among immigrant youth.

59. Development of a Novel Resin-Based Antibacterial Root Surface Coating Material

Nader Almutairi

Poster Session I (Room 349)

Almutairi, N., Alhussein, A., Sun, J., Weir M.D., Xu, H.H.K.

Root caries caused by cariogenic bacteria present a burden on a large number of individuals worldwide, especially the elderly. Applying a protective coating to exposed root surfaces has the potential to inhibit the development of caries, thus preserving natural teeth. This study aims to develop a novel antibacterial coating to inhibit root caries and evaluate its effectiveness using the antibacterial monomer dimethylaminohexadecyl methacrylate (DMAHDM). DMAHDM was synthesized via a modified Menschutkin reaction. incorporated into a resin consisting of 55.8% urethane dimethacrylate (UDMA) and 44.2% TEG-DVBE at a 10:90 filler: matrix mass ratio. Varying concentrations of antibacterial monomer (3%, 5%, and 7%) were tested for their impact on mechanical and physical properties, including flexural strength, modulus of elasticity, paste flowability, and polymerization degree conversion. Biofilms of S. mutans grown on resin disks were analyzed for antibacterial efficacy. The results show that including 5% and 7% DMAHDM significantly reduced biofilm formation by 8-log reduction, metabolic activity, and lactic acid production without compromising mechanical and physical properties. The incorporation of DMAHDM into a novel coating resin showed excellent physical and mechanical properties as well as a potent antibacterial reduction against S. mutans biofilms. This bioactive coating is promising to protect the exposed roots against caries activity, sensitivity, and abrasion in patients undergoing crown lengthening procedures, periodontal surgeries, or the elderly with gingival recession

60. Depression Among Older Adults Living in Senior Housing: Associated Factors and Treatment

Anne Hagan

Poster Session I (Room 349)

Resnick, B., Hagan, A.O.

BACKGROUND: Depression is high among individuals living in senior housing, with rates ranging from one-third to a quarter of individuals having depressive symptoms. Factors associated with depression include social support, the physical environment, health status, and health behaviors. This study aims to describe depression rates and differences among seniors with and without depression based on demographics, comorbidities, health behaviors, and treatment. METHODS: A total of 138 residents seen in four senior housing clinics had Annual Wellness Visits (AWV) done. The AWV included the Patient Health Questionnaire 2 to evaluate depressive symptoms, comorbidities, medications, demographics, and health behaviors. Most of these individuals were female (78%), Black (74%), not Hispanic (80%), not married (84%), had at least some high school education, college, or postgraduate schooling (95%), and rated their health as good, very good or excellent (65%). Overall, 15% were current smokers, 12% reported drinking alcohol regularly, and 64% reported doing some exercise 1 to 7 days a week at a low intensity and less than 20 to 30 minutes per day. RESULTS: Overall, 31% of the participants had depression, and 10% were taking antidepressants. Among those with depression, only 21% were receiving a pharmacologic

intervention, which was the only significant difference between those with and without depression. Consistent with prior work, the rate of depression is high among these individuals. CONCLUSIONS: To address factors associated with depression, future work may consider social supports, social isolation despite living in communities, feelings of loneliness, stressors such as financial stressors, and health-related symptoms.

61. Novel Resin-Based Antibacterial Provisional Crown Coating Material to Inhibit Gingival Inflammation and Secondary Caries

Ibrahim Ba-Armah

Poster Session I (Room 349)

Ba-Armah, I., Alhussein, A., Sun, J., Weir, M.D., Xu, H.H.K.

Provisional crowns are frequently utilized in dentistry for extended durations. Bacterial attachment and dental plaque on provisional crowns lead to gingival inflammation and secondary caries. There is a need for provisional crowns with antibacterial properties to prevent secondary caries along the margins of crowns and tooth structures. The objectives of this study were to develop a novel antibacterial coating to inhibit secondary caries and investigate the antibacterial efficacy of the resin-based coating with antibacterial monomer dimethylaminododecyl methacrylate (DMADDM). A resin-based coating was formulated by combining triethylene-glycol-divinylbenzyl-ether and urethane-dimethacrylate. DMADDM was then incorporated at mass fraction of 0%, 2.5%, 5%, 7.5% and 10%. Antibacterial properties were assessed with 48-hour Streptococcus mutans (S. mutans) biofilms grown on provisional crowns coated with the novel formulation. The colony-forming units (CFUs), metabolic activity, lactic acid production and cytotoxicity on human gingival fibroblasts (hgfs) were assessed. Incorporating 5% DMADDM exhibited strong antibiofilm activity with 4-log reduction in S. mutans biofilm CFU compared to commercial control ($p<0.01$), while the 7.5% and 10% DMADDM groups showed 5 and 8-log reduction respectively. Additionally, significant 4-5 folds of reductions were seen in biofilm biomass and lactic acid production ($p<0.01$). Furthermore, incorporating DMADDM did not increase the cytotoxicity in any of the experimental groups. The incorporation of DMADDM into a novel coating resin showed excellent antibacterial reduction against S. mutans biofilms while maintaining cell viability of hgfs. The use of this novel coating formulation on provisional crowns is a promising approach against biofilm adhesion to inhibit gingival inflammation and secondary caries.

62. Mediating Effect of Cultural Isolation on the Relationship Between Racial Discrimination and Substance Use

Jihyeong Jeong

Poster Session I (Room 349)

Jeong, J.

Non-White immigrant young adults encounter structural stressors that potentially exacerbate health outcomes such as substance use amidst ongoing societal challenges. These issues may be further compounded by cultural isolation and the dual task of identity negotiation. This study explored cultural isolation as a mediator of the association between racial discrimination and substance use among non-White immigrant young adults. A cross-sectional online survey was conducted to collect data from non-White

immigrant young adults residing in the United States. The sample was composed of individuals aged 18 to 29 and the largest racial group was Black or African American. PROCESS Macro Model 4 with bootstrapping was conducted to test the mediating effect of cultural isolation. higher levels of racial discrimination and cultural isolation were statistically significantly related to the likelihood of substance use. The indirect effect of racial discrimination on substance use through cultural isolation was statistically significant ([0.0-0.2]). Results underscore racial discrimination and cultural isolation may play crucial roles in the likelihood of substance use among non-White immigrant young adults. It can thus be suggested that preventative strategies and therapeutic approaches for substance use among non-White immigrant young adults should address both discrimination and cultural isolation. Interventions aimed at reducing substance use in racially marginalized communities should not only address direct experiences of discrimination but also consider the relevant challenges of cultural isolation. Such interventions can include community-building activities that enhance belonging and bonds within communities for those who feel culturally isolated.

63. Genomic Landscape of Murine Metabolic Associated Steatohepatitis (MASH): Unveiling Key Molecular Signatures through Meta-Analysis and Fisher's Combined Probability Test of RNA-seq Data

Victor Andrade

Poster Session I (Room 349)

Andrade, V., Shu, Y.

INTRODUCTION: Metabolic associated steatohepatitis (MASH) presents a complex and multifactorial liver disorder characterized by inflammation, hepatocyte injury, and fibrosis, representing an urgent unmet medical need. Understanding the underlying genomic architecture of MASH is crucial for elucidating its pathogenesis and identifying therapeutic targets. In this study, we conducted a meta-analysis of transcriptomics data derived from diverse murine experimental models to dissect the molecular mechanisms governing MASH progression. OBJECTIVE: This study seeks to integrate RNA-seq datasets to characterize the molecular landscape associated with MASH. Specifically, we aim to delineate dysregulated genes and pathways associated with its pathogenesis with the goal of advancing the understanding of the disease and finding therapeutic targets. METHODS: A systematic approach was employed to curate publicly available RNA-seq datasets from GEO, ensuring quality control and adherence to analytical protocols. Per-study Differential Expression Analyses using DESeq2 were conducted using established pipelines. Subsequently, Fisher's Combined Probability Test was applied to integrate statistical evidence across datasets, facilitating the identification of genes associated with MASH. RESULTS: Our meta-analysis included data from 100 samples across 10 distinct murine MASH cohorts. We identified 11 genes whose expressions exhibited significant correlations with crucial pathological mechanisms including cytokine activation, lysozyme acidification, glycemic control, and insulin resistance. Importantly, these genetic signatures were linked to the clinical manifestation of the disease. CONCLUSIONS: The meta-analysis revealed a comprehensive understanding of the genetic landscape underlying MASH. The identification

of 11 genes associated with pathological processes underscores their potential as therapeutic targets, offering promising avenues for the development of targeted interventions.

64. Targeting Chimeric Antigen Receptor (CAR)-Mediated Trogocytosis Improves CAR T Cell Expansion and Antitumor Activity

Kenneth Dietze

Poster Session I (Room 349)

Dietze, K.A., Gebru, E., Atanackovic, D., Luetkens, T.

CAR T cells have revolutionized the field of cancer immunotherapy, specifically in the treatment of hematological malignancies. CAR T cells are transgenic T cells capable of recognizing whole surface antigen with high specificity and affinity. Although CAR T cells have shown remarkable clinical success, most patients receiving CAR T cell therapy relapse within a few years of treatment. CAR-mediated trogocytosis (CMT) is a potential mechanism of relapse in which cell surface proteins transfer from tumor cells to CAR T cells. CMT results in the emergence of antigen-negative tumor cells, which can evade future CAR detection, and antigen-positive CAR T cells, which is believed to lead to CAR T cell fratricide and dysfunction. Using a system to selectively degrade trogocytosed antigen on CAR T cells, we show that the presence of trogocytosed antigen on the CAR T cell surface directly causes CAR T cell fratricide and exhaustion. By performing a small molecule screen using a custom high throughput CMT-screening assay, we identified the cysteine protease cathepsin B (CTSB) as a key driver of CMT. We show that by overexpressing cystatin A (CSTA), an endogenous human inhibitor of CTSB, we reduce trogocytosis resulting in prolonged antitumor activity in vitro and increased CAR T cell expansion in vitro and in vivo. Overall, we show that targeting CMT is an effective approach to enhance CAR T cell function, which may improve their clinical efficacy.

65. Implementation Study of the Birth Preferences Worksheet

Crystal Trent Paultre

Poster Session I (Room 349)

Trent Paultre, C., Breman, R., Brown, A.

BACKGROUND: Maternal morbidity and mortality are on the rise in the U.S. There are many indirect and direct causes, and improving communication through shared decision-making (SDM) is one recommended way to address the situation. This study aimed to use the Consolidated Framework for Implementation Research (CFIR) to evaluate the implementation of the Birth Preferences Worksheet (BPW), an intervention that facilitates SDM during the perinatal period. The study aims were 1) describe the use of the BPW from the birthing person's perspective, and 2) explore the completion and use of the BPW from the provider and nurses' perspective. METHODS: Hospital providers and nurses were surveyed about their knowledge and use of the BPW. Postpartum people were recruited by a nurse prior to their hospital discharge and surveyed on an iPad. Survey questions were matched to domains in the CFIR. Validated patient reported measures for SDM, respect, and autonomy were included in the patient surveys. RESULTS: 37 patients and 34 nurses/providers participated. Among care providers, the sample was nurses (n = 16, 47.1%), doctors (n = 13, 38.2%), and midwives (n = 5, 14.7%). 35% of patients filled out the BPW when admitted to the hospital for labor.

Clinician-reported barriers included time constraints, patient acuity, and not enough information provided on the unit about the BPW. Facilitators included familiarity with medical and non-pharmacological labor support options. CONCLUSIONS: Further research is needed to explore how the BPW and other tools for SDM can be implemented with more adoption into the system.

66. Constitutive Deletion of the Obscurin Ig58/59 Domains Induces Structural and Electrophysiological Remodeling in Atria

Annie Brong

Poster Session I (Room 349)

Brong, A., Grogan, A., Joca, H., Boyman, L., Kaplan, A., Ward, C., Greiser, M., Kontrogianni-Konstantopoulos, A.,

Obscurin is a giant cytoskeletal protein that supports muscle development, tethers intracellular compartments to the sarcolemma, and regulates contraction. In the ObscnΔIg58/59 mouse model, expressing obscurin lacking Immunoglobulin (Ig) domains 58 and 59, aging males exhibit irregular heart rhythm with prominent atrial fibrillation, atrial enlargement, and progressive remodeling of the ventricles. A mechanistic basis for the emergence of arrhythmia at 6-months could not be identified in ObscnΔIg58/59 ventricles, suggesting that the atria are preferentially impacted by deletion of the obscurin Ig58/59 module. We hypothesize that Ig58/59 deletion elicits unique structural, electrical, and functional consequences in the atria preceding ventricular maladaptation. Unlike the ventricles, ObscnΔIg58/59 atria exhibited misalignment of Z-disks in electron micrographs. Spontaneous and stimulated Ca2+ cycling behavior were differentially disrupted in atrial cardiomyocytes in 6- and 12-month ObscnΔIg58/59 males. Relatedly, atrial cells showed an age-dependent deterioration in the architecture of the transverse-axial tubules network. Finally, as a function of aging, ObscnΔIg58/59 atria displayed alterations in the expression and phosphorylation of T-cap, a Z-disk associated protein implicated in the integration of t-tubules with the sarcomeric cytoskeleton. The structural and electrical alterations that arise in ObscnΔIg58/59 atria precede ventricular dysfunction and coincide with the emergence of atrial fibrillation. Collectively, our work indicates that the atria are principally affected by Ig58/59 elimination. The ObscnΔIg58/59 mouse model has thus emerged as a proxy for atrial cardiomyopathy.

67. A Phenomenological Study of Predoctoral Dental Students' Experiences with Service-Learning

Monica Schneider

Poster Session I (Room 349)

Schneider, M.P.

The purpose of this qualitative phenomenological study is to understand predoctoral dental students' lived experiences with service-learning (SL) in general dentistry and explore how these experiences influence their perceptions of community service and future professional practice. Purposive sampling will be used to identify predoctoral students from dental schools with SL rotations that satisfy the study criteria. A SL rotation in this study is defined as an experiential learning approach that aims to encourage civic awareness and participation. The sample for this study is senior predoctoral dental students enrolled in an accredited dental school program in the United States that participate in a SL

clinical rotation during their dental education training. Data will be collected by performing virtual semi-structured interviews. Data analysis includes an iterative process and inductive approach where a thematic framework is developed to create an initial list of codes and analyze data to develop themes and descriptions of the participants' experiences and report the essence of the phenomenon. SL experiences in dental schools vary in their organization, structure, type of assessments used, length of the experience, and type of learning site. It is not clear whether students get comparable SL experiences that might impact their perspectives on community service and future professional practice. In addition, this study will expand the understanding of Mezirow's (2000) transformative learning theory and add to the base of the theoretical literature. Particularly, dental students SL clinical experiences might present a disorienting dilemma which is connected to the initiation of the transformative learning process.

68. Race and Gender Differences in Unmet Needs of Non-spousal Care Partners of People with Dementia

Gretchen Tucker

Poster Session J (Room 349)

Tucker, G.G., Gruber-Baldini, A., Samus, G., Girling, L., Eckert, J.K., Wallace, B., Orwig, D.

Research on unmet care needs of non-spousal informal care partners (ICPs) for persons living with Alzheimer's disease and related dementias (P-ADRD) is limited. A secondary data analysis using linear and logistic regressions was employed to explore non-spousal ICPs' unmet needs by gender and race using the Johns Hopkins Dementia Care Needs Assessment (JHDCNA 2.0©). The JHDCNA 2.0© includes six domains and 18 items assessing ICPs' needs. Data included 413 ICPs of P-ADRD from two community-based studies: Maximizing Independence at Home Randomized Control Trial and Maximizing Independence at Home-Health Care Innovation Award, which enrolled dyads of P-ADRD and their ICPs. Of the 413 ICPs, 143 (34.6%) were White, 270 (65.4%) Black, with 343 (83.1%) female, and 70 (16.9%) male. Gender was not significantly associated with overall percentage of unmet dementia-related care needs. However, there was a race by sex interaction ($p < .001$); Black male non-spousal ICPs had the highest mean total percent unmet needs (33.48 ± 13.87) while White female non-spousal ICPs had the lowest mean total percent of unmet needs (28.03 ± 13.75). Being a Black non-spousal ICPs was associated with having higher odds of having unmet needs in specific categories such as behaviors 73% vs 61% ($p = .015$), substitute decision-making 29% vs 8% ($p < .001$), and decision-making documents 84% vs 71% ($p = .002$) compared to White non-spousal ICPs. This study highlights the importance of understanding the unique needs of non-spousal ICPs, particularly differences by race, to ensure access to resources and assistance for persons providing care to individuals living with ADRD.

69. Experiences of Palliative Care Among Underrepresented Racial and Ethnic Groups in the United States

Elisha Oduro

Poster Session J (Room 349)

Oduro, E. B., Jackson, A., Carpenter, J. G., Fu, Y., Sorah, L.

BACKGROUND: Patients from underrepresented racial and ethnic groups

(URGs) in the United States experience disparities in accessing palliative care (PC) at the end of life (EOL). However, little effort has been made to understand the experiences of these patients who receive the available PC services. OBJECTIVES: To identify and synthesize existing literature on PC experiences among adults from URGs in nursing homes, community settings, and hospitals in the United States. METHODS: We conducted a scoping review following the Joanna Briggs Institute's methodological recommendation and Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews. We searched PubMed, EMBASE via OVID, CINAHL via EBSCO, Scopus, and gray literature sources from inception to January 2024. RESULTS: We included five studies representing Hispanic/Latino, American Indian, African/Black American, and Chinese individuals. Data were organized around two themes: navigating PC pathway and choices and practices during PC. Navigating PC pathway theme highlights that despite the several barriers URGs face when accessing PC, they seek PC services due to their limited formal family assistance in managing their chronic conditions and pain. The choices and practices during PC theme emphasize the roles URG family members play in EOL care, the patient's care preferences, and their spiritual practices and beliefs related to EOL care. CONCLUSION: This scoping review reveals limited literature and highlights the need for more studies to focus on making PC services more accessible to URG and tailoring these care services to align with their preferences and beliefs after enrollment.

70. Nurses' Point-of-Care Technology Use and Digital Health Competency: Scoping Review

Jiwon Park

Poster Session J (Room 349)

Park, J., Nahm, E.-S.

BACKGROUND: The integration of digital health technologies (DHTs) in healthcare is a pivotal shift toward enhancing chronic condition management and reducing costs. Nurses are the largest technology workforce that uses most DHTs at bedside and have to constantly learn to use emerging point-of-care (POC) technologies. Despite this, there's a lack of clarity on how their competencies impact the utilization of these tools. AIM: As the first step to filling the gap, this scoping review examined factors that influence nurses' competent use of DHTs in healthcare settings using the Unified Theory of Acceptance and Use of Technology (UTAUT) framework. METHODS: Using Arksey and O'Malley's (2005) methodological framework, we conducted a thorough search of academic databases from 2014 to 2024 for peer-reviewed studies. Keywords related to "nurses," "digital health technologies," "competency" and "UTAUT" guided the search. RESULTS: Out of 188 articles retrieved, 14 articles were reviewed. Findings showed that performance expectancy, effort expectancy, social influence, and facilitating conditions have a significant influence on the uptake and application of DHTs. Additionally, elements like digital health competency, technostress, technological anxiety, and self-efficacy were found to be crucial for nurses' interaction with DHTs. CONCLUSIONS: Enhancing these competencies is crucial to unlocking the full potential of DHTs in healthcare beyond the parameters of the UTAUT model. Future research should concentrate on interventions that support nurses' digital health competency in relation to DTHs, thereby ensuring improved

patient care through the effective integration of technology in healthcare practices.

71. Calorimetric Approaches to Study the G:T Mismatch Specificity of Thymine DNA Glycosylase

Kurt Espinosa

Poster Session J (Room 349)

Espinosa, K.B., Dow, B.J., Drohat, A.C.

Thymine DNA glycosylase (TDG) maintains genomic integrity by excising thymine from G:T mispairs that arise from spontaneous deamination of 5-methylcytosine (mC). This excision activity must be highly regulated because improper excision of thymine from proper A:T pairs can be mutagenic and cytotoxic. However, the mechanism by which TDG achieves specificity for mispairs while avoiding canonical pairs remains unknown. The current paradigm is that TDG forms contacts with mismatched guanine that are not compatible with adenine (in A:T). We are investigating an alternative mechanism; that specificity depends on the lower thermodynamic stability of G:T relative to A:T pairs, which could facilitate flipping of mismatched T into the active site. Initial work includes biophysical and biochemical studies utilizing DNA containing a purine analog (x) paired with thymine (x:T). Isothermal titration calorimetry (ITC) was used to assess stability of 13 bp x:T DNA; however, the thermodynamic parameters are likely undervalued because the single-stranded DNA could form hairpins and self-associate. We will present initial calorimetry results for a new 11 bp sequence designed to preclude secondary structure formation. Differential scanning calorimetry (DSC) was used to measure melting parameters of double-stranded DNA. Taken together, both calorimetry approaches provide a better understanding of the thermodynamic stability of x:T pairs in DNA. Our hypothesis will be tested by correlating the thermodynamic stability of x:T pairs with the catalytic activity of TDG for excising T from those x:T pairs.

72. Actin Cytoskeleton Genes in Drosophila Nephrocytes and their Roles in Structure and Maintenance

Megan Delaney

Poster Session J (Room 349)

Delaney, M.E., Zhao, Y., Lee, H.J., Han, Z.

The Drosophila nephrocyte shares striking similarities with human podocytes in the highly specialized filtration structure called the Slit Diaphragm (SD). It has been established that changes in the podocyte actin cytoskeleton affect the integrity of the SD and the overall function of the glomerular filtration barrier. Nephrotic Syndrome (NS), a disease that affects 16 in 100,000 people worldwide, can be caused by variants in the genes encoding cytoskeleton components. However, the main components of the nephrocyte cytoskeleton remain unclear. It is also not known whether the tubulin cytoskeleton plays important roles in nephrocyte of podocyte structure and function. Using single-cell RNA-seq, my lab elucidated the genes encoding the actin cytoskeleton components in nephrocytes. We then silenced each gene using a nephrocyte-specific Gal4 driver and UAS-RNAi transgenic lines. We found that Act5C is the key actin component since the silencing results in the complete abolition of the nephrocyte. For other actin genes (Act57B, Act42A, and Act87E) expressed in nephrocytes, we observed a variety of phenotypes, including decreased SD density, internalized SD proteins, and aggregation of actin or tubulin in certain

areas of the nephrocyte. We believe that the cell uses different variants of the actin monomers during each growth phase, allowing for formation, development, and maintenance of the nephrocyte. Furthermore, we were able to observe the role of an actin and tubulin dual-binding protein, Pickled eggs (Pigs), and how specific domain mutations affects the localization of each cytoskeleton and how it affects the structure and function of the nephrocyte.

73. Impact of Root Canal Disinfection on Endodontic Bacteriome

Theeb Alquria

Poster Session J (Room 349)

Alquria, A., Acharya, A., Martinho F.

AIM: To investigate the bacteriome present in teeth with primary endodontic infection (PEI) and apical periodontitis (AP) and to determine quantitatively and qualitatively the impact of chemomechanical preparation (CMP) on the bacteriome found in PEI with AP using the Illumina MiSeq platform. METHODOLOGY: Thirty-six paired samples from 18 patients were successfully sequenced and analysed. Samples were collected at two sampling times: before (s1) and after (s2) CMP. The DNA was extracted from s1 and s2 samples and quantified using quantitative PCR (qPCR). All 36 samples were sequenced and V3-V4 amplicon sequencing data were processed with the DADA2 pipeline to generate amplicon sequence variants (ASVs). Alpha and beta diversity were computed. ALDEx2 (ANOVA-like differential expression tool for high-throughput sequencing data) to investigate differentially abundant taxa between s1 and s2. RESULTS: The qPCR counts were significantly higher in s1 compared to s2 ($p = 0.0007$). Chao1 index indicated no difference in alpha diversity ($p < 0.7019$); whereas Shannon ($p = 0.0056$) and Simpson ($p = 0.02685$) indexes showed higher values in s2. The PERMANOVA test using Adonis2 showed a significant effect of CMP on community composition ($R2 = 0.0630$, $p = 0.012$). Dialister, Mogibacterium, Prevotella, and Olsenella were differentially enriched at s1, while Actinomyces, Stenotrophomonas_unclassified, Enterococcus_unclassified, and Actinomyces_unclassified were differentially enriched in s2. CONCLUSION: The bacteriome present in teeth with PEI with AP is complex and diverse. CMP showed a high quantitatively and qualitatively disinfectant impact on the bacteriome present in PEI with AP.

74. The Biological Role of Heme in Aging

Jonathan Soldemyr

Poster Session J (Room 349)

Soldemyr, J., Hamza, I.

Aging as a phenotype is a complex stochastic process influenced by various biological and environmental inputs. To fully understand aging as a phenomenon at the organismal level requires a wholistic approach by integrating physiological and molecular markers of aging. Over the last two decades, aging research on multiple model organisms has identified hundreds of genes and compounds that impact lifespan. One such compound is heme, which has been shown to decrease in synthesis as a cell or animal ages, and this decline is associated with aging hallmarks such as mitochondrial dysfunction and loss of protein homeostasis. Heme is an iron-containing porphyrin that plays a vital role as a cofactor in numerous proteins involved in various biological processes including oxygen transport, electron transfer,

circadian clock control, and signal transduction. Although it is such a vital co-factor, heme is highly cytotoxic in its labile form as the iron atom may cause oxidative damage via the production of free radicals. We utilize C. elegans as an animal model because they lack heme synthesis enzymes but acquire environmental heme for sustenance. Using C. elegans as an animal model of aging, we demonstrate that organismal nutrient heme-gene interactions promotes optimal lifespan. We now seek to identify the molecular and cellular pathways for how heme levels influence the aging process. Our ultimate goal is to comprehensively elucidate organismal heme homeostasis.

75. Inter-Organ Heme Communication and Signaling

Sandeepan Ghosh

Poster Session J (Room 349)

Ghosh, S., Dutt, S., Yuan, X., Hamza, I.

Heme, an iron-containing organic ring, acts as an essential co-factor in numerous proteins. Since heme is a hydrophobic and cytotoxic molecule, it must be transported in a well-controlled manner through membranes via specific intra- and inter-cellular pathways. However, the molecular components of heme trafficking remain poorly defined. Our previous studies in Caenorhabditis elegans uncovered HRG-7, an aspartic protease homolog, that mediates inter-organ heme signaling between the intestine and extra-intestinal tissues. Intestinal HRG-7 functions as a secreted signaling factor during heme starvation and is regulated through DBL-1, a BMP5 homolog secreted from neurons. Intestinal expression of hrg-7 is regulated via the transcription factor SMA-9. Here, we identify hrg-11a, and its paralog hrg-11b, as additional components of the HRG-7 inter-organ heme communication network. Loss of hrg-11 results in mislocalization of HRG-7 and lower heme levels in muscle and neurons. hrg-11a and hrg-11b mutants show a heme-dependent growth, phenocopying hrg-7 mutants. Depletion of either hrg-7 or hrg-11 paralogs in hrg-1 mutants results in lethality, which are rescued with heme. Knockdown of either hrg-7 or hrg-11 causes AMsh glia to over-migrate and reduces the number of GABAergic synapses, phenotypes that are rescued by heme. Collectively, these results strongly support a role for hrg-11 in regulating HRG-7 secretion, stability, and inter-organ heme signaling function.

76. The Association Between Pre-Hip Fracture Antidepressant Use and Length of Hospital Stay in Medicare Beneficiaries and Assessing Sex Differences

Rhea Mehta

Oral Session K (Room 351)

Mehta, R., Falvey, J. R., Chen, C., Dong, Y., Shardell, M., Yamashita, T., Orwig, D. L.

Antidepressants are the first-line treatment for depression among older adults. Their use presents important sex differences and is linked to hospital length of stay (LOS), which can affect hip fracture recovery. Given the push to deprescribe these medications among older adults, exploring the effect of antidepressant use prior to hip fracture among older adults with existing depression is important. Thus, our study examined the association between pre-fracture antidepressant use and hospital LOS among hip fracture survivors, and related sex differences. The sample included 17,936 community-dwelling Medicare fee-for-service beneficiaries with depression and a hospitalization claim for hip fracture surgery

between 2010 and 2017. Ordinal logistic regression was used to estimate the association between pre-fracture antidepressant use, measured 6 months prior to fracture, and hospital LOS in days, a categorical outcome variable classified into three groups (1-4, 5-8, and 8+ days) during the 30-day post-fracture period. In the covariate-adjusted model, hip fracture survivors with depression who used antidepressants pre-fracture had 6.7% higher odds of a shorter hospital LOS compared to non-users (odds ratio [OR]=1.07; 95% CI=1.01, 1.13; p=0.03). Males had longer LOS on average (mean=6.02, standard deviation [SD]=4.07) compared to females (mean=5.43, SD=3.17), but the sex-by-antidepressant use interaction was not significant (p=0.83). Treating existing depression with antidepressants was associated with shorter hospital LOS in this sample. The findings suggest a benefit of antidepressant use prior to hip fracture which may inform clinical decision-making surrounding depression management among hip fracture survivors to optimize recovery trajectories.

77. Sleep Medication Use and Falls in Older Adults with Osteoporosis

Loretta Anderson

Oral Session K (Room 351)

Anderson, L.R., Ek, S., Orwig, D.L., Wennberg, A.M.

One third of older adults take sleep medications, but they are associated with fall risk. One in four older adults experiences a fall each year, costing the U.S. $50 billion dollars annually. Osteoporosis is linked to falls, but little research has examined sleep medication use and falls risk among older adults with osteoporosis. We examined the 2011 National Health and Aging Trends Study (NHATS). Outcomes were falls in the last month, falls in the last year, multiple falls in the last year, and fear of falling. Self-reported sleep medication use dichotomized for analysis (0= once/week or less; 1= 2 or more times/week) was the exposure of interest. Osteoporosis was self-reported (yes/no). Of 8,245 participants, 58% female, 68% white, and 20.5% had osteoporosis. Multivariable logistic regression showed, sleep medication users, compared to rare- or non-users, had higher odds of a fall in the last month (O.R. = 1.64, 95% CI: 1.10, 2.47), in the last 12 months (O.R. = 1.60, 95% CI: 1.20, 2.12), multiple falls in the last 12 months (O.R. = 1.64, 95% CI: 1.08, 2.50), and fear of falling (O.R. = 1.58, 95% CI: 1.18, 2.11). Osteoporotic sleep medication users show increased risk of falls, multiple falls per year, and fear of falling. As older adults with osteoporosis are at increased risk, reducing sleep medication use may decrease this risk, thus decreasing the need for costly medical care. This study contributes to clinicians' efforts to reduce falls in vulnerable older adults and may reduce overall burden to Medicare.

78. Progressive Weighted Wheel Exercise and Effects on Murine Musculoskeletal Health, with Considerations for Supporting Metabolism

Sushrut Pathy

Oral Session K (Room 351)

Pathy, S.M., Markley, S.C., Choquette, G.M., Wilkinson, K.J., Li, Z., Ward, C.W., Riddle, R.C., Stains, J.P.

Dynamic regulation of the musculoskeletal system in response to mechanical loads is vital to maintaining functional bone and muscle mass. This is especially important in aging and

osteosarcopenic individuals. Resistance exercise improves musculoskeletal function by (1) inducing mechanical loads that prompt bone modeling to support the skeleton in resisting such forces, and (2) stimulating adaptations in muscle to generate greater forces. To better understand musculoskeletal adaptations to resistance exercise, we utilize a progressive weighted exercise model in mice, which mimics resistance exercise in humans. We hypothesize that mice in the progressive weighted exercise group will experience increased bone mass and muscle mass when compared to their unweighted exercise and sedentary group counterparts. Surprisingly, we observed both weighted and unweighted exercise groups had no significant changes to bone mass or muscle mass. We also observed that caloric intake of both exercise groups was significantly increased, but body mass and fat mass decreased over the exercise protocol when compared the sedentary group. The data suggest that the exercising mice were in a caloric deficit and may have been unable to fuel both the exercise movements and any musculoskeletal adaptations to the exercise. This finding reveals an important third factor in exercise induced bone and muscle adaptations: energy availability. This highlights an important clinical concern, as certain aging populations attempt to maintain bone mass and muscle function through exercise, but little consideration is given to adequate caloric intake and nutrition to support both activity and anabolism.

79. Roles of Nociceptors in Post-Traumatic Hyperalgesia and Condylar Degeneration After Temporomandibular Joint Injury in Mice

Ishraq Alshanqiti

Oral Session K (Room 351)

Alshanqiti, I., Son, H., Shannonhouse, J., Hu, J., Kumari, S., Parastooei, G., Wang, S., Ro, J.Y., Kim, Y.S., Chung, M.K.

Trauma to temporomandibular joints (TMJ) is a risk factor to increase the incidence of TMD. TMJ trauma might increased degeneration of TMJ structure, leading to TMJ osteoarthritis (TMJOA). The causal relationships between TMJ pain and TMJ degeneration among patients have been controversial. Recent studies suggest that nociceptive afferents modulate bone remodeling through multiple mechanisms, and it is feasible that nociceptive nerves projected to TMJ not only mediate nociception but also modulate TMJ structures. However, the roles of nociceptive afferents on TMJ pain and TMJ degeneration are not known. To address this question, we used the forced mouth opening (FMO) model in mice. Repeated forced mouth opening beyond physiological limitation produced long-lasting pain-like behaviors, consistent with clinically relevant pain conditions (i.e., spontaneous pain, mechanical pain, and function-evoked pain). In in vivo Ca2+ imaging, trigeminal ganglia neurons showed increased spontaneous and evoked responses, supporting peripheral sensitization underlying the post-traumatic hyperalgesia. FMO also caused thinning of condylar cartilage and the degeneration of subchondral bone, supporting that FMO can produce both post-traumatic hyperalgesia and TMJ condylar degeneration. Chemogenetic silencing of the TRPV1-lineage afferents using an inhibitory designer receptor exclusively activated by designer drugs, attenuated spontaneous pain-like behaviors but not mechanical hyperalgesia on skin overlying TMJ. Silencing of nociceptors modestly decreased FMO-induced subchondral bone degeneration without impact on cartilage

degeneration. Our results suggest that TRPV1-lineage afferent fibers may not be a primary contributor in condylar degeneration following TMJ injury.

80. Opposing Effects of Plasma LDL on White Matter Integrity in Older APOE4 Carriers

Zhenyao Ye

Oral Session K (Room 351)

Ye, Z., Pan, Y., McCoy, R.G., Chuan, B., Chen, C., Mitchell, B.D., Thompson, P.M., Hong, L.E., Kochunov, P., Ma, T., Chen, S.

BACKGROUND: APOE4 is a strong genetic risk factor of Alzheimer's disease and metabolic dysfunction. However, whether APOE4 and markers of metabolic dysfunction synergistically impact the deterioration of white matter integrity in older adults remains unknown. METHODS: In the UK Biobank data, we conducted a multivariate analysis to investigate the moderation effects of APOE4 on the relationship between 249 plasma metabolites (measured using nuclear magnetic resonance spectroscopy) and whole-brain white matter (WM) integrity (measured by diffusion-weighted magnetic resonance imaging) in a cohort of 1,917 older adults (aged 65.0-81.0 years; 52.4% female). RESULTS: Of the examined biomarkers, higher concentrations of LDL and VLDL were associated with a lower level of WM integrity (b=-0.12, CI=[-0.14,-0.10]) among APOE4 carriers. Conversely, among non-carriers, they were associated with a higher level of WM integrity (b=0.05, CI=[0.04,0.07]), demonstrating a significant moderation effect of APOE4 (b =-0.18, CI=[-0.20,0.15], P<0.00001). CONCLUSIONS: Altered lipid metabolism differentially affects APOE4 carriers compared to non-carriers. These findings support precision medicine approaches to mitigate impaired cognitive function among APOE4 carriers.

81. Effectiveness of Reactive Balance Training in Persons with Parkinson's Disease

Ruth Akinlosotu

Oral Session K (Room 351)

Akinlosotu, R.Y., Westlake, K.P.

OBJECTIVE: Impaired reactive balance responses after unexpected mechanical disturbances account for a five-fold increase in fall risk in persons with Parkinson's disease (PwPD). Perturbation-based training (PBT) provides a context-specific balance training paradigm in older adults, with improvements lasting up to a year. Given that PwPD have motor learning impairment, it is unknown whether PwPD can improve their reactive balance responses and reduce the related fall risk via PBT. This review explores the effectiveness of PBT for reducing falls & fall risk related to impaired reactive balance responses in PwPD. METHODS: In line with the current effort to improve the physical therapy guidelines for balance rehabilitation in the neurologic population, structured searches were conducted in PubMed, Embase, Cochrane CENTRAL Register of Controlled Trials, CINAHL, Physiotherapy Evidence Database, OTseeker, and REHABDATA. Search terms included Parkinson, Parkinson's, parkinsonism, parkinsonian; balance, fall, falls, postural control, postural stability, rehabilitation, prevention, management, intervention, physical therapy, physiotherapy, exercise therapy, exercise training & reduction. Only randomized controlled studies written in English between 2000 and 2024 were included.

RESULTS: Of the 1279 screened, 153 studies were assessed for eligibility. Only 11 studies met the inclusion criteria and were included in the review. Only a few outcome measures were specific for reactive balance impairment in PwPD. There was conflicting evidence for the effectiveness of PBT for balance improvements and fall reduction. CONCLUSION: Few RCTs presents limited evidence for the effectiveness of PBT in PwPD, Considerations of motor learning deficits may enhance effectiveness of PBT in PwPD

82. The Alzheimer's Disease-Linked Gene TPCN1 is Required for Mitochondrial Homeostasis in Human HAP1 Cells

Ryan Mayers

Oral Session L (Room 353)

Mayers, R.P., Polster, B.M.

Mitochondrial dyshomeostasis is a hallmark of neurodegenerative disorders like Alzheimer's Disease (AD). It is thought to contribute to both neuronal vulnerability and chronic pro-inflammatory microglial responses involved in disease progression. However, the mechanisms governing mitochondrial dysfunction in pro-inflammatory microglia are not yet fully understood. While modeling disease-like pro-inflammatory activation in immortalized mouse microglia, we identified reduced levels of the endolysosomal cation channel Two-Pore Channel 1 (TPC1) among the most significant changes in a mitochondria-enriched heavy membrane fraction. Interestingly, a variant in TPCN1, the gene encoding TPC1, was recently identified as a risk for AD and Lewy Body Dementia (LBD). Because microglia are difficult to genetically manipulate, we employed a human TPCN1 knockout (KO) cell line to investigate if TPC1 loss is a cause of mitochondrial dysfunction. Using Seahorse cell-based respirometry, we found that TPCN1 KO cells exhibited impaired per-cell oxygen consumption rates relative to wild-type controls. We also identified via western blot that protein levels of several mitochondrial electron transport chain (ETC) subunits are severely reduced in TPCN1 KO cells. Overexpression of TPC1 rescued ETC protein levels. These results suggest that TPC1 expression is essential for mitochondrial homeostasis. Immediate follow-up experiments are exploring the consequences of TPC1 loss on other aspects of mitochondrial biology and attempting to identify the mechanism by which TPC1 loss mediates the reduction of ETC proteins. Longer-term goals include studying the consequences of the AD/LBD-associated variant and identifying if pharmacological manipulation of TPC1 protects against pro-inflammatory microglial activation.

83. Cortical Activity During Performed and Imagined Squats in People with Chronic Patellofemoral Pain

Sarah Margerison

Oral Session L (Room 353)

Margerison, S. M., Keaser, M. L., Depintor, M., Westlake, K. P., Da Silva, J. T., Seminowicz, D. A.

Patellofemoral pain (PFP) is considered a biomechanical pathology. While recent evidence shows motor cortex reorganization in these patients, how PFP impacts cortical motor activity is largely unknown. The motor-related cortical potential (MRCP), a negative deflection measured via electroencephalography (EEG), can measure motor cortex activity. We hypothesized that movement execution (ME) of a single leg squat would create a larger deflection than movement imagination (MI)

and that MI would cause a smaller deflection on the painful versus the non-painful side. Three participants with chronic unilateral PFP performed a series of executed and imagined single leg squats during EEG collection. Data from channel Cz was filtered, artifacts were removed, re-referenced to the common average, epoched by trial, and averaged based on side and task type for each participant and condition. The ME amplitude was -5.76 mA and -7.20 mA for the uninvolved and involved sides. The MI amplitude was -0.02 and -1.61 for the uninvolved and involved sides. There was a very large effect size of task type on amplitude. (Painful: d = 2.75; Nonpainful: d = 2.87) There were medium and large effect sizes of side for each task type. (ME: T = -1.13, d = 0.66; MI: T = -1.34, d = 0.88). Overall, the MRCP amplitude generated by ME was greater than by MI bilaterally. However, amplitude generated by MI of the painful side was larger than the nonpainful side, opposing expected results. This increase may represent increased effort of performing MI on the painful side.

84. Comparison of Virtual Treatment Setup among Clear Aligner Companies

Vicente Telles

Oral Session L (Room 353)

Telles, V., Copello, F., Doughan, M.

Recently, several orthodontic companies introduced their clear aligner brands, each with unique features such as material type and thickness, gingival trim design, specific auxiliary tools, and different strategies for guiding orthodontic movement. However, little is known about how these features impact their virtual treatment setup. This study aimed to compare the virtual treatment setups among five clear aligner companies to assess their differences. The initial records of 10 patients, including extra and intraoral photos and scans, were submitted to Invisalign®, Clear Correct®, 3M™ Clarity™, Spark™, and Reveal® clear aligner systems. Each case prescription was standardized to ensure comparable treatment plans across the companies. The comparison focused on the number of aligners, number of attachments, amount of interproximal reduction per arch, planned extrusive or intrusive movement of maxillary central incisors, final canine and molar relationships, final intercanine and intermolar widths, and planned expansion or constriction of the intercanine and intermolar widths. Results indicated significant differences in the virtual treatment setups for the same patient among clear aligner companies in the number of aligners (p-value = 0.003), number of attachments (p-value < 0.001), and predicted final canine relationship (p-value = 0.013). However, no statistical differences were observed in the other variables evaluated. ClearCorrect® stands out by prescribing the fewest number of aligners and attachments, whereas 3M™ Clarity™ tends to prescribe the highest number of aligners and attachments. There is a notable deficiency across companies, particularly with ClearCorrect® and Spark™, in planning for a final bilateral canine Class I relationship.

85. A Structural and Dynamic Basis for the Interactions of the Dengue Nonstructural 5 (NS5) Protein with Stem Loop A (SLA)

Juliet Obi

Oral Session L (Room 353)

Obi, J.O., Kihn, K.C., Smith, A.K., McQueen, L., Deredge, D.J.

Dengue virus is the most prevalent arthropod-borne virus and there are no clinically approved antivirals to date. The non-structural 5 (NS5) protein is the largest protein encoded by flaviviruses including dengue, with an N-terminal methyltransferase (MTase) domain responsible for 5' RNA capping, and a C-terminal RNA-dependent-RNA-polymerase (RdRp) domain responsible for de novo RNA synthesis. Stem Loop A (SLA) is an RNA element at the 5'-untranslated region which acts as a recognition motif for the initiation of RNA synthesis by NS5. We characterized the interaction of the full length and individual domains of NS5 from dengue serotype 2 with SLA using surface plasmon resonance (SPR) studies, differential scanning fluorimetry (DSF) and hydrogen-deuterium exchange coupled to mass spectrometry (HDX-MS). Results from our SPR and HDX-MS studies show that both MTase and RdRp domains of NS5 interact with SLA which is corroborated by a recently published Cryo-EM structure of DENV3 NS5 bound to SLA. We observed that SLA binding to NS5 transiently destabilizes the RdRp domain which coincides with deprotection seen in our HDX-MS data, and suggestive of an opening of the RdRp domain upon SLA binding as shown in the Cryo-EM structure. We modelled a DENV2 NS5-SLA complex and performed HDX-ensemble reweighting (HDXer) to identify upweighted ensembles which conform the most with our HDX-MS data. Ultimately, we aim to further explore and elucidate the dynamic interactions between NS5 and SLA for therapeutic development.

86. Expanding the Space of Hydroxyl-rich Lyoprotectants through High-throughput Screening to Support the Lyophilization of Live Biopharmaceutic Products

Haixi Cui

Oral Session L (Room 353)

Cui, H., Yu, H., Yang, Z., Feng, H., Hoag, S.W.

Lyoprotectants safeguard cells during lyophilization by replacing water molecules via hydrogen bonds donated by hydroxyl groups (-OH). Currently, most research focuses on a limited number of disaccharides, including trehalose and sucrose. Thus, an efficient screening method is desired to expand the repertoire of OH-rich lyoprotectants and customize the formulation for specific strains. Herein, we propose "growth monitoring" as a novel method to enable high-throughput screening of lyoprotectants using 96-well plates for genetically modified Saccharomyces Boulardii (Sb), a probiotic yeast strain that secret therapeutic proteins to promote gastrointestinal health, slated for phase 1 clinical trials in 2024. Validating this method, we found a strong negative correlation (-0.98) between growth lag time and cell viability, and negligible edge effect risks. Through this method, we probed a larger number of OH-rich lyoprotectants beyond the common excipients, and identified 9 formulations out of 94 that outperformed standard references (20% sucrose and 20% trehalose). Additionally, we discuss the characteristics for optimal lyoprotectants, emphasizing the exploration of small-molecule sugars and polyols devoid of heteroatoms and hetero functional groups, utilized at high concentrations. Overall, this work highlights an efficient screening method to evaluate and tailor the protective formulations for live biotherapeutic products, boosting the arsenal of lyoprotectants beyond the commonly used disaccharides, and offering a deeper understanding of structure-based lyoprotectant selection.

87. Spatial Multiomics Reveal the Role of Wnt Signaling Modulators in Cleft Palate

Jeremie Oliver Piña

Oral Session L (Room 353)

Piña, J.O., Raju R., Roth D.M., Winchester E.W., Padilla C., Iben J., Faucz F.R., Cotney J.L., D'Souza R.N.

Multiple genetic and environmental etiologies contribute to the pathogenesis of cleft palate, which constitutes the most common among the inherited disorders of the craniofacial complex. Insights into the molecular mechanisms regulating osteogenic differentiation and patterning in the palate during embryogenesis are limited and needed for the development of innovative diagnostics and cures. Our recent work has defined the transcriptomic basis of murine secondary palate development using bulk, single-cell, and whole-transcriptome spatial RNA-sequencing technologies. This multimodal approach enabled the identification of several novel enriched genes at specific developmental time points. We then differentially analyzed and expanded this baselined palate development roadmap using high-throughput spatial RNA localization and single-cell multiomic technologies in comparison to a mouse genetic model organism engineered to lack the Pax9 transcription factor, critical for orchestrating Wnt/β-catenin signaling in the secondary palate, without which results a consistent phenotype of cleft secondary palate. While prior research had identified upregulation of Wnt pathway modulators Dkk1 and Dkk2 in Pax9-/- palate mesenchyme, limitations of spatial resolution and technology restricted a more robust analysis. Here, we provide evidence of a distinct relationship between Pax9+ and osteogenic populations in the developing palate. Loss of Pax9 results in spatially restricted osteogenic domains bounded by Dkk2, which normally interfaces with Pax9 in the mesenchyme. Taken together, Pax9-dependent Wnt signaling modulators influence osteogenic programming during palate formation, potentially contributing to the observed cleft palate phenotype. These modulators may prove to be viable therapeutic targets to augment palatal bone during surgical or minimally invasive interventions for cleft palate.

88. Trends in Psychotropic Polypharmacy Among Medicaid-Enrolled Youths in One US State, 2015–2020

Yueh-Yi Chiang

Oral Session M (Room 223)

Chiang, YY., Amill-Rosario, A., Lee, H., Tran, P. T.M., dosReis, S.

BACKGROUND: Polypharmacy, defined as ≥3 psychotropic classes used concomitantly, among US Medicaid-enrolled youth is a national concern. OBJECTIVES: To characterize psychotropic polypharmacy use from 2015 to 2020 among Medicaid-enrolled youth in one US state. METHODS: This study used Medicaid claims data for calendar years 2015–2020. We used a cross-sectional design to construct annual cohorts of youths ≤17 years-old, with at least 1 psychotropic claim, and had ≥90 continuous days of Medicaid enrollment. We classified youth by Medicaid eligibility group: low-income, Children's Health Program, foster care, and disabled. Our definition of polypharmacy was ≥3 psychotropic classes overlapping for ≥90 consecutive days and no >15-day gap between prescription fills, was identified in each year. Psychotropic classes included antipsychotics, attention-deficit/hyperactivity disorder medications,

mood stabilizers, antidepressants, anxiolytics, and sedatives. Polypharmacy prevalence was estimated for each year. Multivariable logistic regression fit with generalized estimating equations generated the odds of polypharmacy among Medicaid eligibility groups, adjusted for year and demographic characteristics. RESULTS: Overall across all years, 126,972 unique youths received any psychotropic medication. Polypharmacy prevalence increased from 4.2% (2015) to 4.6% (2020). Adjusting for sex, age, race, and region, the odds of polypharmacy increased by 1.06 (95% CI: 1.04–1.08) each year. The likelihood of polypharmacy was significantly higher among disabled and foster youth than low-income youth, with an adjusted OR = 3.8 (95% CI: 3.4–4.2) and 3.4 (95% CI: 3.0–3.9), respectively. CONCLUSIONS: Polypharmacy in Medicaid-enrolled youth increased over time and remained disproportionally higher among disabled and foster youth.

89. 1D on 3D: Simulating the Impact of 3D Atmospheric Structure on 1D High-Resolution Inferences of Transmission Spectra

Arjun Savel

Oral Session M (Room 223)

Savel, A.B., Kempton, E.M-R., Kennedy, T., Rauscher, E.

How does gas move and change in gas giants? For tidally locked exoplanets, we cannot know the answer without considering atmospheres as truly three-dimensional (3D) bodies. 3D variations in chemistry, clouds, and winds imprint themselves on high-resolution cross-correlation spectroscopy (HRCCS), potentially biasing inferences that assume only 1D variations. We seek to quantitatively extract these 3D effects. The first step is to understand which types of spatial variation most strongly sculpt datasets. To this end, we apply classical 1D analyses to 3D simulated atmospheres. We vary chemistry, temperature, velocity, and cloudiness to various degrees, e.g., holding altitudinal variations constant while varying atmospheres along latitude and longitude. Our simulations demonstrate that spatially varying temperature and gas motions alter inferred chemical abundances. Now, knowing the leading-order effects of spatial variation on HRCCS inference, we will be able to quantify 3D effects in data, yielding a more holistic understanding of exoplanet atmospheres.

90. Understanding Living Liver Donors in Eastern Asian Countries: A Scoping Review

Jae Lee

Oral Session M (Room 223)

Lee, J.O., Nahm, E.

BACKGROUND: Living liver donation for liver transplantation is a common practice in East Asian countries, with as high as 82.7% in Taiwan and 74% in South Korea, unlike in the United States (6.3%). Understanding the characteristics of living liver donors from East Asia is crucial for improving donor outcomes and addressing barriers to donation, particularly in the context of the growing Asian population in the United States. OBJECTIVES: To provide an overview of East Asian donors' living liver donors' characteristics in the current literature. METHODS: The scoping review included studies on liver transplantation from living donors in East Asia countries. Data extraction from the eligible studies included donor demographics, donor-recipient relationships, educational attainment, and marital status. Synthesis methods involved

summarizing key findings from each study and identifying common donors' trends and differences across studies and countries. RESULTS: In Japanese, South Korean, and Taiwanese studies, the recipients' immediate family members became living liver donors for the recipients. Most donors were between the ages of 20 and 49 years. There was inconsistency in sex, educational level, and marital status. CONCLUSIONS: The study identified distinct demographic traits among Asian living liver donors, including age and their relationships with recipients. It also emphasized the difficulties in describing living liver donors in East Asia. Despite limitations, this study revealed that Eastern Asian donors predominantly donate to their immediate families. This finding holds significance for future research and efforts to address challenges in organ transplantation, particularly with the rising Asian population in the United States.

91. Enterovirus Non-Structural Proteins Manipulate Autophagy via Unique and Novel Pathways

Noah Pollack

Oral Session M (Room 223)

Pollack N.A., Jackson W.T.

Viruses are notorious for hijacking cellular pathways during infection to both shut down host cell functions and benefit the virus. Autophagy, a basal cellular pathway utilized for increasing cellular resources during times of stress and degrading foreign molecules, is a common target of viral manipulation. During infection, viruses will often increase the presence of autophagic double membrane vesicles that can be used as sites for viral replication or facilitate release. The enterovirus family is known to manipulate and utilize the autophagy pathway to benefit both viral replication and release. In this family, multiple viruses, including polio virus (PV) and enterovirus-D68 (EV-D68), are associated with paralytic disease. Unlike PV, there is currently no vaccine available for EV-D68 and neither virus has an effective, FDA-approved therapeutic available for treatment. PV was shown to induce large numbers of autophagosomes during infection via the non-structural proteins 3A and 2BC, although the mechanism is not known. It has been reported in PV that individual expression of 2BC increases lipidation of a protein called LC3, a step which is crucial for initiating autophagosome formation. However, the function of EV-D68 2BC is currently unknown. Our data shows that individual expression of EV-D68 3A increases LC3 lipidation similarly to PV 2BC. Upon further investigation, we discovered that EV-D68 3A and PV 2BC both increase LC3 lipidation but do so by acting at different regulatory steps of the autophagy pathway. Our current data show that EV-D68 and PV manipulate the autophagy pathway by unique mechanisms.

92. Cardiomyocyte Centrosome Dynamics Following Cardiac Injury

Daniela Fuller

Oral Session M (Room 223)

Fuller, D.T., Miyamoto, M., Li, Y., Chao, W., Hong, C.C., Liu, R.

Adult cardiomyocytes (CMs) have limited regenerative or reparative capacity post injuries such as myocardial infarction, leading to high morbidity and mortality of heart diseases. Although a subset of CMs may reenter cell cycle through a serial process of dedifferentiation,

proliferation, and redifferentiation post injury, there are still large barriers to dedifferentiation, including a lack of cohesive centrosomes. In a healthy human heart, there is < 1% of CM annual turnover. Unlike non-myocytes, mature CMs have degraded centrioles and their pericentriolar matrix (PCM) is redistributed to the nuclear envelope. Therefore, we sought to interrogate how proliferation may occur in adult CMs. My preliminary data suggests that, following myocardial infarct (MI), the population of CMs with reduced centrosomes decreases, and the population with cohesive centrosomes increases. In addition, the Hong lab has previously identified a de novo mutation in RTTN that resulted in an increase of centrosome cohesion, as well as an increase in proliferation in the iPSC-CM model, suggesting an essential role of centrosome cohesion in CM renewal. We thus propose adult mitotic CMs are characterized by centrosome integrity, which would reveal a critical mechanism by which they are able to form bipolar spindles and proliferate. We hypothesize that centriole cohesion is required for CM proliferation during dedifferentiation. This research will determine if centrosome integrity occurs in proliferating post-natal CMs, which would uncover new avenues of pursuing cardiac regeneration to enhance centrosome integrity and promote proliferation.

93. Comparative Analysis of Tick-Mediated Host Immunomodulation

Luisa Valencia

Oral Session M (Room 223)

Valencia, L.M., Laukaitis-Yousey, H.J., Ferraz, C.R., Marnin, L., Cabrera Paz, F.E., Pedra, J.H.F.

Ticks are ectoparasites known for their remarkable ability to manipulate host immune responses during blood-feeding, ensuring their successful attachment and survival. Understanding the mechanisms underlying tick-mediated immunomodulation at the tick-skin interface is of great significance, not only for comprehending tick biology but also for the implications it holds for vector-borne disease transmission and host immune evasion. Our work aims to characterize the immunomodulatory strategies employed by three clinically significant tick species, Ixodes scapularis, Amblyomma americanum, and Dermacentor variabilis, during their interactions with host skin. Importantly, we seek to understand how these immunomodulatory strategies are affected during the transmission of pathogens of public health relevance. By leveraging single-cell and spatial transcriptomics, we aim to elucidate unique and shared strategies employed by these tick species to manipulate host defenses. Furthermore, we will validate our findings in an in vivo animal model to further understand the impact of species-specific immunomodulatory effects on pathogen transmission. These findings will provide comprehensive insights into the complex interplay between ticks and the host immune response at the tick-skin interface.

94. Design, Synthesis, and Biological Evaluation of Selective, Non-Hydroxamate-Based Histone Deacetylase 8 (HDAC8) Inhibitors

Brandon Lowe

Oral Session N (Room 115)

Lowe, B.D., Nordquist, E., MacKerell, A.D., Fletcher, S.

Histone deacetylases are enzymes that catalyze the cleavage of acetyl groups from lysine

residues of many proteins in the body, most particularly histone proteins. This cleavage is especially significant in the context of histones because these proteins bind to DNA and provide structure for chromosomes. After histone deacetylase activity, the chromosomes condense tightly, physically blocking the DNA contained within from undergoing replication and transcription. Overexpression of HDAC proteins can thus prevent the transcription of proteins necessary for the prevention of various types of cancer. Previous research has shown that HDAC8 over-expression is linked with melanoma, lung, colon, and cervical cancer, and is a poor prognostic marker for pediatric neuroblastoma. Subsequent RNA interference knockdown of HDAC8 has been shown to slow the growth of these cancer cell lines. Four pan-HDAC inhibitors have received FDA approval for various cancers, but they exhibit many side effects due to their pan-HDAC activities and hydroxamic acid zinc binding motif. Recently, it was reported that a strategy to acquire HDAC8 selectivity is to construct HDAC inhibitors with an "L-shaped" configuration. Accordingly, we have designed and synthesized a variety of novel, HDAC8 selective inhibitors spanning several chemotypes, all of which exhibit "L-shapes" and carry the crucial hydroxamic acid functional group to target the active site zinc ion. In addition, we aim to employ SILCS technology to accomplish further optimizations of our lead compound, which will include surveying bioisosteric replacements of the crucial hydroxamic acid motif towards the discovery of a safe and selective clinical candidate

95. Engineering Sweeping Antibodies for the Clearance of Tumor-derived, Pro-tumorigenic Cytokines

Jillian Baker

Oral Session N (Room 115)

Baker, J.B., Wang, A., Luetkens, T.

Soluble, tumor-derived, pro-tumorigenic (STP) cytokines contribute to cancer cell proliferation and drug resistance. But therapeutic targeting of STP cytokines by conventional antibodies that work by blocking the interaction of the cytokine with their receptor is limited because of the antigens' high concentrations and persistent production. We are now developing sweeping antibodies (swAbs) against STP cytokines that contain modifications. Instead of blocking the cytokine/receptor interaction, the swAbs induce efficient cytokine degradation/clearance. We hypothesize that the ability of swAbs to actively clear STP cytokines will reduce cancer cell proliferation and tumor burden. For this purpose, we are developing swAbs against four STP cytokines contributing to cancer cell proliferation, survival, migration or intra-tumoral angiogenesis: hepatocyte growth factor (HGF), vascular endothelial growth factor (VEGF), transforming growth factor-B (TGF-B) and interleukin 16 (IL-16). We selected four existing antibodies against these cytokines with available antibody-antigen binding information. To introduce pH dependency, which is needed for swAb function, we performed targeted histidine mutagenesis of contact residues in all four antibodies. So far, we have shown that replacing a single residue in the heavy chain's CDR1 in the anti-IL-16 antibody resulted in substantially increased pH sensitivity. We further show that a swAb based on this variant confers highly efficient IL-16 clearance. We are currently performing pH-sensitivity screenings for the three remaining STP-specific antibodies. Our findings indicate that mutation of contact residues is an effective method for introducing pH-dependency. This

project will answer the question whether anti-STP cytokine swAbs are an effective approach to treat patients with cancer.

96. RhoKAR Sensor Reveals Calcium-Dependent Activation of Rho-Kinase During Collective Cell Migration

Allison Mancini

Oral Session N (Room 115)

Mancini, A.E., Isaacs, D.P., Rizzo, M.A.

Collective cell migration (CCM) drives physiological processes such as embryogenesis, vascular sprouting, and wound healing, but is also a major contributor to cancer metastasis. Ras homolog family member A (RhoA) drives CCM by modulating actomyosin cytoskeletal activity. RhoA activity is tightly spatiotemporally controlled during CCM, but whether these activation dynamics are shared by its downstream effectors is unknown. To investigate the role of RhoA's downstream effector Rho-associated kinase (ROCK) in collectively migrating fibroblasts, we developed a new single color FRET-based ROCK sensor, the Rho Kinase Activity Reporter (RhoKAR) sensor. We have observed calcium-dependent activation of ROCK using the RhoKAR sensor. With a modified scratch assay, we have quantitated ROCK activity in parallel with CCM. Scratch wounding caused an increase in ROCK activity. We have also observed blunting of CCM in response to pharmacological inhibition of ROCK or depletion of intracellular calcium with 100 µM EGTA. To study the role of calcium from different sources in driving ROCK activity during CCM, carbenoxolone, a gap junction blocker, was applied to collectively migrating fibroblasts. Carbenoxolone decreased ROCK activity and intracellular calcium at corresponding time points, and slowed CCM. These results indicate that gap junction intercellular calcium signaling drives ROCK activity during collective cell migration.

97. The Role of Bifidobacterium in Neonatal Intestinal Maturation

Rebecca Collins

Oral Session N (Room 115)

Collins, R., Ma, B.

Infant mortality and morbidity rates are greatly impacted by premature birth, a critical issue in neonatal health. The frequency of preterm births and related problems like necrotizing enterocolitis (NEC) highlight how urgently effective therapies are needed. The core of these issues is the "leaky gut" phenomenon, which is characterized by weakened intestinal barrier integrity and is especially common in premature babies. This study investigates how the metabolism of human milk oligosaccharides (HMOs) by the important commensal gut bacteria Bifidobacterium supports the maturation of the intestinal barrier. Gaining knowledge of the genetic foundations of Bifidobacterium's interaction with HMOs will help improve the formation of the postnatal barrier in premature infants. This research addresses a critical knowledge gap, paving the way for novel therapeutics to mitigate the risks associated with premature births, thus improving outcomes for this vulnerable population.

98. Mechanisms of hemozoin formation and heme tolerance in mammals

Indira Bhattacharya

Oral Session N (Room 115)

Bhattacharya, I., Hamza I.

More than 90% of body iron is recycled when senescent red blood cells (RBCs) are phagocytosed by macrophages of reticuloendothelial system (RES) to release heme-iron within the phagolysosomes so that the iron can be reutilized to produce new RBCs. After erythrophagocytosis, the heme released from RBCs in the phagolysosome is transported into the cytosol by Heme Responsive Gene 1 (HRG1/SLC48A1). Correspondingly, HRG1-deficient mice accumulate large amounts of heme as hemozoin (Hz) crystals within lysosomes that are 10-100 times larger than normal. Heretofore, Hz crystals have been reported to be made only by blood-feeding parasites such as Plasmodium sp. as a heme detoxification mechanism to escape heme toxicity. Even though electron micrographs of mammalian Hz show differences in surface morphology compared to malarial Hz, the antimalarial drug chloroquine is a chemical modifier of Hz formation in mammals. Whether Hz formation in mammals is a normal biological process of heme tolerance in acute heme-loading diseases such as sickle cell and thalassemias is currently being investigated.

99. Evaluating Time to Treatment Initiation Among Black and White Patients with Multiple Myeloma at the University of Maryland Marlene and Stewart Greenebaum Comprehensive Cancer Center

Salome Ricci

Oral Session N (Room 115)

Ricci, S., Onukwugha, E., Fu, Y., Pernati, C., Yared, J., Slejko, J.F.

OBJECTIVES: Multiple myeloma (MM) is a hematologic cancer that presents challenges in terms of access to advanced treatments across demographic subgroups. Black patients exhibit lower utilization rates for autologous stem cell transplantation (ASCT) and novel therapies, which could influence patient outcomes. The study objective was to compare time to treatment initiation between Black and White patients newly diagnosed with MM leveraging a local tumor registry. METHODS: We identified Black and White individuals aged 18 and over diagnosed with MM between 2018 and 2022 in the University of Maryland Marlene and Stewart Greenebaum Comprehensive Cancer Center (UMGCCC) registry. Descriptive statistics were used to characterize the cohort. Time to treatment initiation and to ASCT were compared with the Mann-Whitney U test. RESULTS: 386 patients were included, with 188 (48.7%) identifying as Black and 198 (51.3%) as White. 93% of patients were Maryland residents, representing 22 out of 24 MD counties. 330 (85.5%) individuals received treatment for MM, with a lower proportion of Black patients (81.4%) than White patients (89.4%) ($p<0.05$). There was no statistically significant difference in median time to treatment from diagnosis between Black (33 days) and White (27 days) patients. However, median time to ASCT was significantly longer ($p<0.01$) in Black (282 days) versus White patients (253 days). CONCLUSIONS: Our analyses revealed no significant difference in the overall time to treatment initiation between Black and White patients. However, the observed difference in the time to ASCT highlights the need for a better understanding of the factors influencing this discrepancy.

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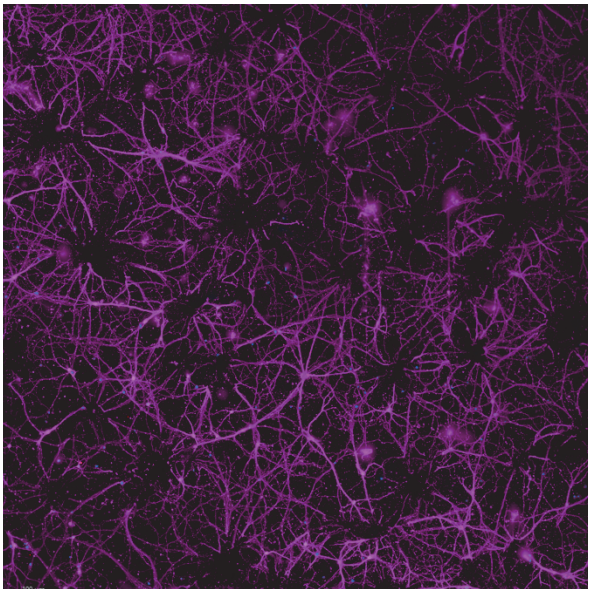
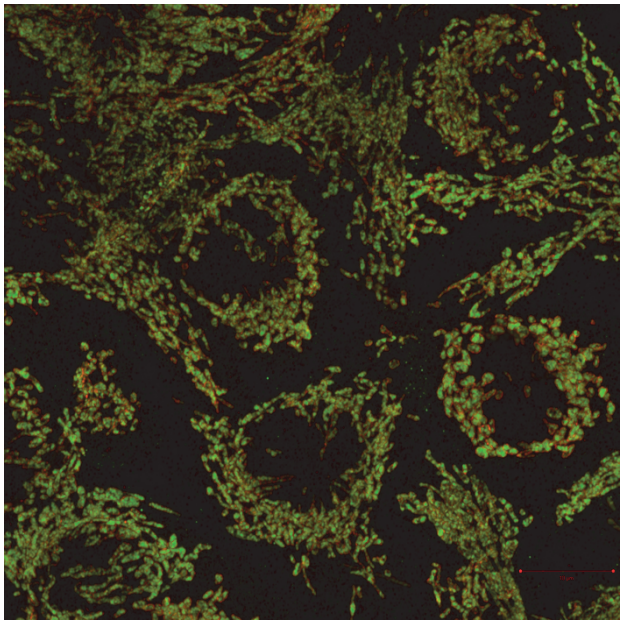
Cortical neuron network of a newborn mouse pup.
Microscope image
Soad Elziny, Neuroscience





Mitochondrial morphology in immortalized mouse microglia
Microscope image
Ryan Mayers, Neuroscience

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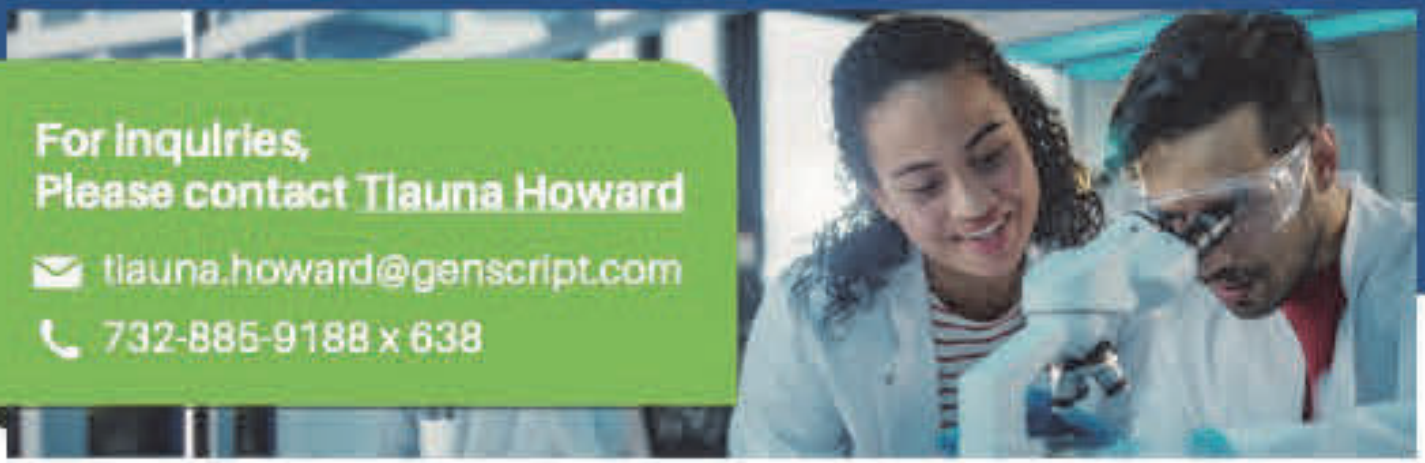

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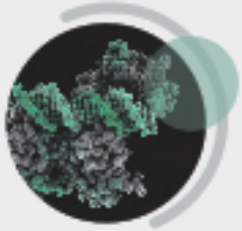

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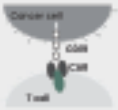

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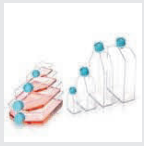

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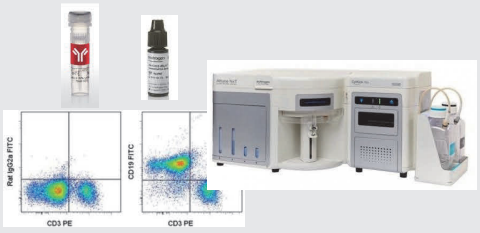

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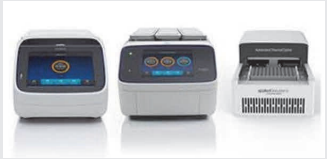

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