VANDERBILT UNIVERSITY

Vanderbilt Postdoctoral Association

18th Annual Symposium

October 14th, 2024

Program

VU Student Life Center

Sponsored by the Office of Postdoctoral Affairs

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Foreword

The Vanderbilt Postdoctoral Association (VPA) was founded in 1998 as a mechanism to support the professional, personal, and scholarly success of postdocs from Vanderbilt University and Vanderbilt University Medical Center. Since then, the VPA has organized 17 annual symposia, highlighting the works of hundreds of previous postdoctoral scholars. Over this past year, we have had a dedicated group of postdocs from both VU and VUMC working together to make our 18th Annual VPA Symposium an interactive experience for postdocs who call Vanderbilt home.

Disseminating science through conferences is a powerful way to share diverse perspectives and tackle some of humanity's most challenging problems. This symposium brings together research from various departments at Vanderbilt University - including Medicine, Earth and Environmental Sciences, Electrical and Computer Engineering, and Physics and Astronomy, fostering an environment where our postdoc community can explore different disciplines and generate innovative ideas. Such cross-disciplinary awareness is vital for addressing pressing issues in society and it is through our collective efforts that we can achieve the extraordinary.

We are immensely grateful to Dr. Patricia Clark from the University of Notre Dame for accepting our invitation as keynote speaker despite her busy schedule. We also extend our appreciation to all the Vanderbilt faculty and staff who agreed to contribute their time and expertise through workshops and lectures for this event.

This symposium would not be possible without the collective efforts of the organizing committee, the enthusiastic community of postdocs eager to share their work through poster presentations and lightning talks, and all the attendees. We hope to convey that each one of you is essential and plays a pivotal role in shaping the future. On behalf of the Vanderbilt Postdoctoral Association and the symposium planning committee, we hope this day provides ample opportunities for scientific discovery, collaboration, and networking.

Schedule of Events

09:00 am – 09:15 am	**Welcome Remarks** **Dr. André Christie-Mizell** Vice Provost for Graduate Education, Dean of the Graduate School, Director of the Office of Postdoctoral Affairs	
09:15 am – 09:45 am	**Research Talk – 2024 Postdoc of the Year** **Dr. Eric Moses Gurevitch** Postdoctoral Fellow, Collaborative Humanities Postdoctoral Program, Department of Asian Studies	
10:00 am – 10:45 am	**Poster Session A**	**Campus Resource Fair**
10:45 am – 11:00 am	**Break**	
11:00 am – 11:30 am	**Career talk on Innovation and Entrepreneurship** **Dr. Charleson Bell** Director of Entrepreneurship, The Wond'ry	
11:30 am – 01:00 pm	**Lunch Keynote Address: Protein folding in the cell: Challenges and opportunities** **Dr. Patricia Clark** O'Hara Professor of Chemistry & Biochemistry, Associate Vice President for Research, Director, Biophysics Instrumentation Core Facility, University of Notre Dame	
01:15 pm – 02:15 pm	**Workshop: Leadership and Management Skills** • **Stacey Satchell** Director, Graduate and Postdoctoral Academic Success (GPAS) • **Nick Hyer** Program Manager, Graduate and Postdoctoral Academic Success (GPAS)	**Panel: Communication and Public Engagement** • **Dr. Dusan Danilovic** Senior Lecturer/Assistant Research Professor, Dept. of Physics and Astronomy • **Dr. Annet Kirabo** Associate Professor, Clinical Pharmacology Dept. of Molecular Physiology and Biophysics • **Dr. Stephen Ornes** Writer In Residence
02:30 pm – 03:15 pm	**Poster Session B**	**Campus Resource Fair**
03:15 pm – 03:30 pm	**Break**	
03:30 pm – 05:00 pm	**Lightning Talks**	
05:00 pm – 05:30 pm	**Closing Remarks** **Award Ceremony & Social Gathering**	

Symposium Venue Overview

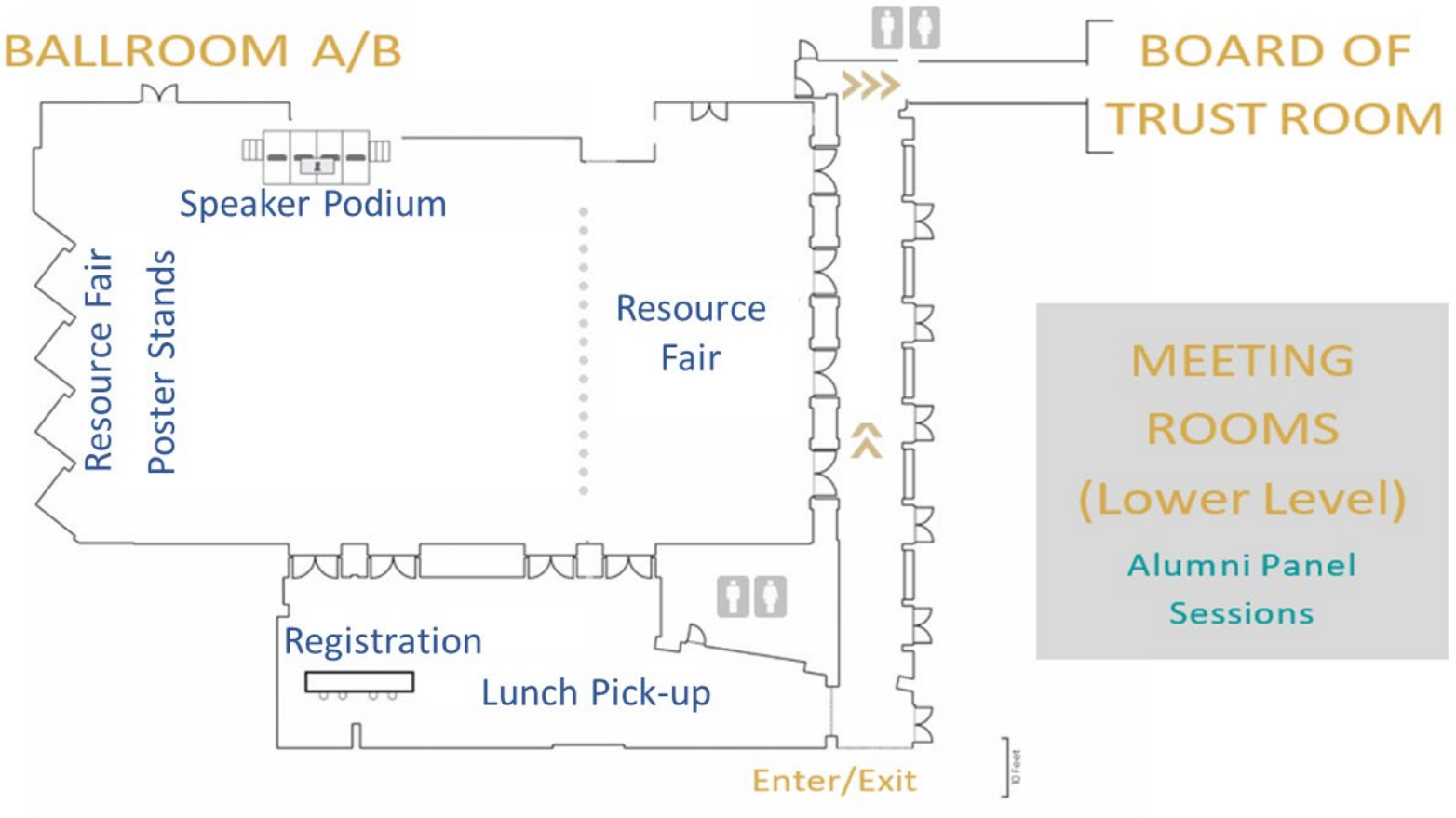
VU Student Life Center

310 25th Ave. S.

Nashville, TN 37240

Public parking is available at the 25th Ave garage,

located within walking distance



Welcome Remarks

Dr. C. André Christie-Mizell
Vice Provost for Graduate Education
Dean of the Graduate School
Director of the Office of Postdoctoral Affairs Centennial
Professor of Sociology
Vanderbilt University

Dr. C. André Christie-Mizell serves as the Vice Provost for Graduate Education, Dean of the Graduate School, and Director of the Office of Postdoctoral Affairs at Vanderbilt University. Since joining Vanderbilt's Department of Sociology in 2010, he has focused on enhancing the support and resources available to postdoctoral scholars. His leadership has led to the implementation of innovative funding models and pipeline programs aimed at diversifying the academic workforce and ensuring robust career pathways for graduate and postdoctoral students. Notably, he established the Vanderbilt-Fisk Joint Postdoctoral Fellowship Program, fostering collaboration between institutions and preparing scholars for academic careers. Christie-Mizell's unwavering commitment to equity, diversity, and inclusion is central to his mission of improving postdoctoral experiences and outcomes, ultimately shaping the next generation of academic leaders.

The postdoc community at Vanderbilt is truly fortunate to benefit from Dr. Christie-Mizell's dedicated leadership, unwavering support, and commitment to enhancing our academic and professional growth.

Postdoc of the Year

Dr. Eric Moses Gurevitch
Collaborative Humanities Postdoctoral Fellow
Department of Asian Studies
Vanderbilt University

Dr. Eric Moses Gurevitch, a National Endowment for the Humanities Postdoctoral Fellow under Professor Teresa Goddu, specializes in the history of science in early modern South Asia. His forthcoming book, Everyday Sciences: Making Knowledge Local in South Asia, is under contract with the University of Chicago Press. Known for his meticulous teaching, collegiality, and engaging conversations, Gurevitch is a valued member of Vanderbilt.

Eric Gurevitch has been working to shape his dissertation from his PhD studies into a book manuscript that explores the literate and numerate practices of artisans and other people from caste-oppressed communities in medieval and early modern South Asia. The second part of the book will focus on the social history of medicine in South Asia from 1300 to 1700, centered around medical debates, vernacular-language texts, and the collection of recipes and materia medica. The project investigates multilingual medical cultures that worked across boundaries and borders in South Asia and the Indian Ocean world. Prior to his postdoctoral role, he studied at the University of Chicago, where he received both his B.A. and Ph.D. After graduation, Eric moved to Mysore to continue his studies, teaching English at the local school in the mornings and studying with Sanskrit and Kannada pandits in the afternoons before moving back to the United States to finish his Ph.D., which eventually led him to his current role at Vanderbilt as a postdoc.

Innovation & Entrepreneurship Talk

Dr. Charleson Bell

Director of Entrepreneurship and Biomedical Innovation, The Wond'ry
Vanderbilt University

Dr. Charleson S. Bell, PhD is a modern-day polymath, pioneering and drawing from multiple fields and bodies of knowledge to solve many of the world's current problems. A multi-talented man of Faith, Dr. Bell excels in Innovation and Research and the arts, including Creative Writing and Music/Film Production.

Dr. Bell completed his PhD in Biomedical Engineering at Vanderbilt University with an emphasis in bionanotechnology. Infusing novel bionanotechnology into current medical systems, devices, and other more specified applications for an increase in point-of-care ability, efficiency, and ease of use has been his dream since adolescence. He culminated his previous studies in low analyte detection of cancer biomarkers and the fabrication of novel multilayered magnetometallodielectic nanoparticles to propel his work towards more imminent needs. Dr. Bell possesses the expertise, leadership, and motivation necessary to successfully carry out biomedical research that will improve outcomes. Unifying and uplifting others, either through innovation or art, is his passion.

Keynote Address

Dr. Patricia Clark

O'Hara Professor of Chemistry &Biochemistry
Associate Vice President for Research
Biophysics Instrumentation Core Director
University of Notre Dame

Patricia L. Clark has served as Associate Vice President for Research since 2021, leading all aspects of research development, including assisting faculty in developing a successful research portfolio, collaborating with federal and military research agency advisors, leading a team of proposal development specialists, and overseeing the development of NDR's new Center for Broader Impacts. She is also the Rev. John Cardinal O'Hara Professor in the Department of Chemistry & Biochemistry and the director of the Biophysics Instrumentation Core Facility.

Since joining Notre Dame in 2001, biochemist Patricia L. Clark has utilized various biophysical methods to study protein folding in cells. She founded and led the Biophysics Graduate Program from 2018 to 2021 and has received numerous accolades, including a National Science Foundation (NSF) CAREER Award, the Barany Award from the Biophysical Society, the Hodgkin Award from the Protein Society, and a Director's Pioneer Award from the National Institutes of Health (NIH). Additionally, she is an elected Fellow of the American Association for the Advancement of Science (AAAS).

The VPA is truly honored to have Dr. Patricia L. Clark as our keynote speaker; her remarkable leadership and dedication to research development inspire the next generation of scientists. Her contributions not only advance scientific discovery but also serve as a powerful example of women excelling in science, driving important changes in the field.

Workshop: Lead & Manage

The Graduate and Postdoc Academic Success (GPAS) program assists Graduate School students and postdoctoral scholars in their academic and professional development during their time at Vanderbilt. This workshop aims to support postdocs through collaborative consultations and group programming around effective time and stress management, resilience, conflict resolution, navigating academic relationships, and juggling work/life responsibilities.

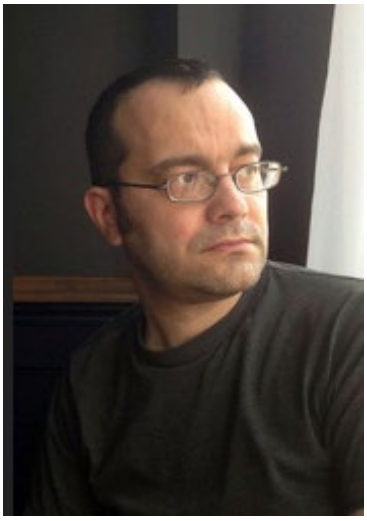
Stacey Satchell
Director
Graduate and Postdoc Academic Success (GPAS) Program
Vanderbilt University

Stacey has served as the Academic Life Coach for the last four years and is excited to expand the team to serve more graduate students and postdocs with the transition to Graduate & Postdoc Academic Success (GPAS). Stacey enjoys problem-solving and finding new strategies to help graduate students and postdocs be successful during their time at Vanderbilt.

Nick Hyer
Program Manager
Graduate and Postdoc Academic Success (GPAS) Program
Vanderbilt University

Nick has spent the last ten years of his professional career helping students navigate the landscape of higher education. He has worked for large land grant institutions, small state schools, and private faith-based institutions. His roles have included work in housing, counseling, career services, academic advising, summer bridge programs, first-year experience, orientation, academic support, and student success. Nick works with individuals to help them activate their natural talents, abilities, and ways of thinking into productive and purposeful ways of living.

Communication & Public Engagement



Dr. Dusan Danilovic

Assistant Research Professor
Dept. of Physics and Astronomy
Program of Communication Science and Technology
Vanderbilt University

With dual appointments in the Program of Communication Science and Technology and the Department of Physics and Astronomy at Vanderbilt University, he offers invaluable expertise that postdocs can learn from to enhance communication and promote public understanding of science.

Dr. Annet Kirabo

Associate Professor
Dept. of Molecular Physiology and Biophysics
Vanderbilt University

With over 30 peer-reviewed articles and extensive experience on committees and editorial boards, along with numerous national and international invited talks, she brings valuable expertise to enhance our community's communication and public engagement skills.

Dr. Stephen Ornes

Writer in Residence of Communication
of Science and Technology
Vanderbilt University

Having authored books that cover topics on math, physics, astronomy, and cancer research, his perspective on science communication and engagement will offer our postdoc community valuable insights.

Resource Fair

Please note that the resource fair is organized into two sessions

Session A: 10:00 am – 10:45 am
Session B: 2:30 pm – 3:15 pm

ORGANIZATION	WHAT THEY DO	SESSION
Field Specific		
Department of Biostatistics	Biostatistics support for biomedical research https://www.vumc.org/biostatistics/centers-and-shared-resources	A, B
CISR Core (Cell Imaging Shared Resource)	Microscopy shared resource https://my.vanderbilt.edu/cisr/	A
VANTAGE (Vanderbilt Technologies for Advanced Genomics)	One-stop genomics research resource https://www.vumc.org/vantage/home	A
VICTR (Vanderbilt Institute for Clinical and Translational Research)	Support for clinical and translational research https://victr.vumc.org/	A, B
Identity Affinity Groups		
Margaret Cuninggim Women's Center	Resources and educational programming for women and all members of the Vanderbilt community https://www.vanderbilt.edu/womenscenter/	A
Office of LGBTQI Life	Services all LGBTQIA+ students, including postdoctoral scholars - programming, space to study and hang, events, and more https://www.vanderbilt.edu/lgbtqi/	A
Professional Development		
Career Center (Grad Students and Postdoctoral Scholars)	Career support for non-biomedical postdocs https://www.vanderbilt.edu/career/graduate-students-scholars/	A, B
Biomedical Research Education and Training (BRET)	Career support for biomedical postdocs https://medschool.vanderbilt.edu/bret/	A, B
AdvancED - Office of Education Design and Development (formerly CFT)	Teaching and learning support for instructors https://cft.vanderbilt.edu/	B
Graduate and Postdoc Academic Success (GPAS)	Resources and programming to help postdocs develop into the next generation of leaders and scholars https://gradschool.vanderbilt.edu/student-resources/professional-development/gpas/	A, B
University Libraries	Access to nine libraries, print and e-collections, research-based services, and subject librarians	A

	https://www.library.vanderbilt.edu/	
Writing Studio	One-on-one writing consultations https://www.vanderbilt.edu/writing/	A
Edge for Scholars (EFS)	Resources for academic faculty research career development across basic, translational, and clinical disciplines https://edgeforscholars.vumc.org/	A
Health and Wellness		
Health, Wellbeing and Belonging (VU)	Promote holistic wellness for Vanderbilt's faculty, staff, and postdocs https://www.vanderbilt.edu/healthwellness/	B
Reproductive Health and Parenting (VU)	Resources for individuals seeking information and resources around all stages of reproductive health, women's health, and early parenting https://www.vanderbilt.edu/studentcarenetwork/reproductive-health-and-parenting/	A
The SHARE Center (VUMC)	Provide support for VUMC employees facing sexual harassment, offering confidential counseling and workshops on intervention, prevention, and support skills. https://www.vumc.org/health-wellness/share-center	A, B
Work/Life Connections (VUMC)	Provide support for personal and workplace concerns, including stress, relationships, and emotional health https://www.vumc.org/health-wellness/worklife-connections-employee-assistance-program	A, B
International Student/Scholar Resources		
International Student Scholar & Support ISSS (VU)	Advising on J-1 issues, general support for international postdocs https://www.vanderbilt.edu/isss/	A
Office of Immigration Services (VU)	Provide immigration services for postdocs on H-1B, TN, O-1, and E-3 visas https://hr.vanderbilt.edu/employee-immigration-services/index.php	A, B
English Language Center (ELC)	Support for Postdocs who speak English as an additional language https://www.vanderbilt.edu/elc/	A, B
Vanderbilt Safety Departments		
Vanderbilt University Public Safety (Vandy Safe)	Comprehensive law enforcement and security services across the VU and VUMC campus https://police.vanderbilt.edu/ https://emergency.vanderbilt.edu/	B
Other		
The Wond'ry	Makerspaces to create prototypes for research https://www.vanderbilt.edu/the-wondry/	B
Center for Technology Transfer and Commercialization	Technology Transfer Services, including invention disclosure submission and new venture support https://cttc.co/	A, B

Lightning Talks

Dr. Peter Chesney, *Department of History of Art & Architecture, Vanderbilt University*

L.A. Car Cultures: A Sensory History

Dr. B. Ilkin Safa, *Division of Diabetes, Endocrinology and Metabolism Vanderbilt University Medical Center*

The SGLT2 Inhibitor Empagliflozin Modulates Myeloid Cell Gene Expression

Dr. Keavash Assani, *Department of Urology, Vanderbilt University Medical Center*

Clinical Validation of Myprostatescore 2.0 (MPS2) Testing Using First-Catch, Non-DRE Urine

Dr. Thuraya Al-Sayegh, Division of Epidemiology, *Vanderbilt University Medical Center*

Urinary Metabolites in Association with Kidney Cancer Risk: A Pilot Study among Asian Population

Dr. Jacob Bouchard, *Warren Center for Neuroscience Drug Discovery, Vanderbilt University*

Discovery of Tool Compounds for the Exploration of PAR-4 Indicated Disease States

Dr. Kirill Zavalin, *Department of Pharmacology*, *Vanderbilt University Medical Center*

4-Phenylbutyrate Treatment for Altered GABAergic Neurotransmission in Slc6a1S295L Knock-In Mouse Model of Epileptic Encephalopathy

Lightning Talks Abstracts

L.A. Car Cultures: A Sensory History

Peter Chesney, *Department of History of Art & Architecture, Vanderbilt University*

Life in cities is valued for its intensity. The first glimpses of the skyline, the bright lights, and the bustling streets are known to please and to overwhelm arrivals. In Paris and al-Quds, visitors so often exhibit symptoms of destabilization amidst this intensity that mental health providers have identified psychological syndromes with each city: *Pari shōkōgun* and *le fièvre jérusalemienne*. Adaptations to urban life distinguish city people from others. The sociologist Georg Simmel saw the temperament of the metropolitan as indicative of a blasé attitude that empowered residents in cities to be more selective about what elements of the city held their attention. Today, we might label the capacity to wall off the senses against unwanted urban sensa as the achievement of cool.

My research addresses this dialectical relationship in the history of cities between the intensity of urban experience and the coolness of urbanites. The automobile in 20th-Century Los Angeles (L.A.), California is the platform that I selected for my case study. Car cultures added much to the intensity of urban experience in newly metropolitan L.A. prior to World War Two (1940s). Drivers, passengers, and pedestrians (as much a new category as the former two) all reported various levels of overwhelm in the face of an increasingly motorized city. Not only did they have difficulty integrating the new sights of rushing cars and the new sights from rushing cars but also the new sounds, smells, tastes, and tactile feelings of life in the Motor Age. For L.A. to become the motor monoculture that took root in the years after World War Two, the city's population had to cultivate a coolness with regard to the presence and the power of the car in the city.

Postwar L.A. was celebrated at the time and ever since for the coolness of its car cultures, but historians have not yet adequately articulated the importance of how people in L.A. became cool with cars. Motorized urban society generated amazing specimens of the car as both a work of art and an aid to the delights of musical, botanical, culinary, and erotic experience. These were the sites of intensity that helped turn everyday driving itself into a normal element of urban life that fit into the routines of commuting, patrolling, cruising, and making deliveries throughout the city for such a great majority of its growing millions of residents. Once they were blasé about almost any given vehicle or any given drive, they performed to a higher standard in a city moving at higher speeds where everyone was expected to keep up with the flow of traffic. Any drivers who were too sloppy or slow saw themselves pilloried as pathologically manic or phobic at the wheel. By the 1960s, L.A. had its motorist monoculture. The removal of the regional rail transportation network was complete. New bus routes provided residents an alternative for mobility in the city, but the city's dependence on automobility had grown to an exceptional proportion by comparison to the world's other great cities. It would be in this context that residents' coolness with the car cultures hit a number of significant potholes. Rising attention to racial injustice, shortages in gas supplies, air pollution, inebriated driving, traffic congestion, and the use of cars to commit crime led L.A. to drop its cool in favor of renewed intensity with regard to sensations of automobility.

The SGLT2 Inhibitor Empagliflozin Modulates Myeloid Cell Gene Expression

B. Ilkin Safa, *Division of Diabetes, Endocrinology and Metabolism Vanderbilt University Medical center*

Obesity is associated with chronic systemic and adipose inflammation which significantly increases the risk of cardiometabolic diseases. SGLT2 inhibitors (SGLT2is) have beneficial effects on cardiometabolic diseases in patients with type 2 diabetes. The mechanisms of this benefit are still unknown. This study tests the hypothesis that empagliflozin alleviates the inflammatory response of myeloid cells, particularly Lipid-Associated Macrophages (LAM) and their precursors (pre-LAMs), thereby reducing adipose tissue inflammation and cardiometabolic outcomes.

Eight women with obesity and pre-diabetes were treated with the SGLT2i empagliflozin (25 mg/day). Subcutaneous adipose samples were collected at baseline, after 2 and 12 weeks of treatment. Single-cell RNA sequencing analysis combined with computational single-cell metabolic modeling identified several distinct metabolic gene modules whose expression levels varied between cell types in myeloid clusters and were altered by empagliflozin treatment.

Baseline characteristics include age 61±6.1 years, weight 93±16.9 kg, and BMI 35.6±4 kg/m2. The change in weight was -1±3.4 kg at 12 weeks. Expression level of two distinct metabolic gene modules, which included genes related to glutathione synthesis and mitochondrial metabolism (M1) and ceramide metabolism (M5), were significantly increased in LAMs and pre-LAMs ($p<0.001$) upon empagliflozin treatment.In LAMs and pre-LAMs, empagliflozin upregulates genes implicated in controlling the oxidative stress response, glutathione synthesis and ceramide metabolism pathways. Further research into the potential of SGLT2i to mitigate adipose tissue inflammation and improve cardiometabolic health is ongoing

Clinical Validation of Myprostatescore 2.0 (MPS2) Testing Using First-Catch, Non-DRE Urine

Keavash Assani, *Department of Urology, Vanderbilt University Medical Center*

Background: The 18-gene MyProstateScore 2.0 (MPS2) test was developed and validated for detection of Grade Group≥2 (GG≥2) cancer using post-digital rectal examination (DRE) urine specimens. On external validation, MPS2 was shown to reduce unnecessary biopsies by 35-51% while maintaining detection of 95% of GG≥2 cancers. However, DRE is uncomfortable for patients and is now considered optional by clinical guidelines. Additionally, performing DRE is not feasible in the increasing proportion of patients undergoing telehealth consultations. As such, to increase access to and feasibility of testing, we validated the MPS2 assay using first-catch, non-DRE urine in a cohort of patients undergoing prostate biopsy.

Materials and Methods: Patients provided first-catch urine prior to biopsy. RNA extraction was performed from ≤5 mL of urine using a modified extraction method optimized for non-DRE urine (Norgen Biotek Corp). RNA was reverse transcribed to cDNA, amplified, and quantified. All samples were run in triplicate, and mean expression values were normalized to the housekeeping gene KLK3. MPS2 values were calculated using previously validated models differing only by inclusion of clinical factors: biomarkers alone (BA; no clinical data), biomarker expression and clinical factors (BA+CF; age, race, PSA, DRE findings, family history, and prior negative biopsy), and biomarker expression, clinical factors, and prostate volume (BA+CF+PV). The primary outcome was GG≥2 cancer on biopsy; GG≥3 was assessed secondarily. Overall discriminative accuracy was compared to serum PSA and the Prostate Cancer Prevention Trial risk calculator (PCPTrc). Based on a testing threshold providing ≥90% sensitivity for GG≥2 cancer, we calculated performance measures and consequences of MPS2 testing.

Results: The cohort included 273 consecutive men with median PSA 6.7 ng/mL (IQR 5.0-9.5) presenting for diagnostic biopsy. Forty-seven men (17%) underwent pre-biopsy MRI, of which 25 (53%) had a PI-RADS 3-5 lesion and underwent targeted biopsy in addition to systematic biopsy. Overall, 108 men (40%) were found to have GG≥2 cancer, of which 84 had GG2 (30.8%), 12 had GG3 (4.4%) and 12 had GG4-5 disease (4.4%). The area under the curve for GG≥2 cancer was 58% for PSA, 63% for PCPTrc, and 71% for the MPS2 BA model, 74% for the BA+CF model, and 77% for the BA+CF+PV model (Figure). Negative predictive values (NPV) were 92%-96% for GG≥2 cancer and 96% for GG≥3 cancer. Clinical use of the MPS2 threshold 11.5 to select patients for biopsy would have avoided 38%-43% of unnecessary biopsies (i.e. 38%-43% specificity) while maintaining detection of 91%-94% of GG≥2 cancers (i.e. 91%-94% sensitivity) (Table).

Conclusions: Using urine obtained without DRE, MPS2 testing provided very high sensitivity and NPV for ruling out GG≥2 cancer. Importantly, the baseline (i.e. biomarker-only) MPS2 model demonstrated clinically significant improvement in diagnostic accuracy relative to PSA-based testing, with further improvements observed with inclusion of optional clinical data. This non-DRE approach provides a convenient, highly accurate testing option to reduce the need for further evaluation with imaging or biopsy in men with elevated PSA.

Urinary Metabolites in Association with Kidney Cancer Risk: A Pilot Study among Asian Population

Thuraya Al-Sayegh, Division of Epidemiology, *Vanderbilt University Medical Center*

Kidney cancer incidence has increased worldwide over the recent decades and has become among the top 10th most common cancers in the United States. While metabolomic studies have shown promise in unveiling mechanisms underlying development, few studies have investigated pre-diagnostic urinary metabolites and the risk of kidney cancer, especially among non-white populations. We conducted a matched case-control study nested within two large Chinese population cohorts (Shanghai Women's and Men's Health Study) to investigate the association between urinary metabolites and primary kidney cancer incident. Two hundred kidney cancer cases were ascertained by ICD-O codes of C64/65/66.9. Two hundred density-sampling selected controls were matched to index cases on age, urine sample collection (including time, fasting, and availability in other samples), recent antibiotics use, and postmenopausal status (female only). A total of 1,410 metabolites from baseline urine samples were assayed and 67 metabolites were found nominally associated with kidney cancer using conditional logistic regression. After adjusting for metabolites correlations, eleven urine metabolites were associated with kidney cancer: the majority were lipids (e.g., picolinoylglycine, odds ratio (OR) and 95% confidence interval (CI): 2.01 [1.44, 2.79]) and nucleotides (e.g., allantoic acid, OR and 95% CI: 0.71 [0.54, 0.92]). Our findings agree with a previous study established in the European population and suggest that lipids and nucleotides disturbances may be indicative of a high kidney cancer risk among the Asian population. Future metabolomics studies with sufficient sample sizes are needed to further validate our findings.

Discovery of Tool Compounds for the Exploration of PAR-4 Indicated Disease States

Jacob Bouchard, *Warren Center for Neuroscience Drug Discovery, Vanderbilt University*

Protease-activated receptor-4 (PAR-4) is a G protein-coupled receptor present on platelet cells. It is activated by thrombin through the cleavage of an extracellular domain, which reveals a tethered ligand. Due to its lower bleeding risk compared to PAR-1, it has been extensively studied for the treatment of thrombosis. However, PAR-4 is not only found in platelets. It is also present in a multitude of other cell types including endothelial cells. Increasing evidence suggests that PAR-4 may play a role in other disease states such as traumatic brain injury, acute kidney injury, and neurodegeneration. However, a lack of specific and potent probe molecules has hindered the exploration of these roles. Specifically, there is an unmet need for mouse-specific probes since many of the best disease models available are murine based. Development of a potent and selective probe molecule has the potential to lead to the elucidation of PAR4's role in disease states beyond thrombosis.

To support this goal, we embarked on an SAR campaign of several small molecule scaffolds. These scaffolds were based on novel chemical entities as well as previously reported PAR-4 active structures. The synthesized compounds were then tested in both mouse and human platelet cells for PAR-4 potency and selectivity. This effort led to the discovery of two compounds, VU6074969 and VU6074970, which both possess low nanomolar potencies (9.0 nM and 1.9 nM, respectively) and selectivity for the mouse PAR-4 receptor over the human variant (23-fold and 16-fold selective, respectively). Not only do these compounds exhibit favorable in vitro attributes, initial DMPK data suggests that they could be promising in vivo tools as well. These compounds represent a large step forward towards uncovering PAR-4's potential roles in disease states beyond thrombosis.

4-Phenylbutyrate Treatment for Altered GABAergic Neurotransmission in Slc6a1S295L Knock-In Mouse Model of Epileptic Encephalopathy

Kirill Zavalin, *Department of Pharmacology*, *Vanderbilt University Medical Center*

Rationale: Pathogenic variants of SLC6A1, encoding GABA transporter 1 (GAT-1), are a common etiology of developmental and epileptic encephalopathies (DEE), debilitating childhood epilepsies with drug-resistant seizures and severe cognitive co-morbidities for which few treatments exist. Severe nature of these neurologic pathologies stems from the essential brain function of GAT-1 as the main transporter of ɣ-aminobutyric acid (GABA), the primary inhibitory neurotransmitter in brain. Previously, we showed significant pathologies in GAT-1 trafficking, expression, and ability to uptake GABA in cell and animal models of various SLC6A1 variant disorders, including the severe loss of function S295L variant. In Slc6a1+/S295L knock-in mice, these pathologies underlie absence seizures and other behavioral comorbidities similar to the patient phenotype. We showed that treatment with chemical chaperone 4-phenylbutyrate is able to rescue seizures and molecular pathologies, and it is currently showing promise in an ongoing clinical trial in patients with SLC6A1-variant disorders (NCT04937062). Here, we test our hypothesis that Slc6a1+/S295L exhibit significant pathologic changes in GABAergic neurotransmission, which are rescued when 4-PBA treatment is able tocorrect the molecular pathologies.

Methods: Male and female Slc6a1+/S295L mice (Shanghai Model Organisms, NM-KI-190014) in C57BL/6J background were used. Acute ex vivo brain slices were prepared per Ting et al, 2018. Evoked and spontaneous inhibitory postsynaptic currents (eIPSCs and sIPSCs) were recorded at 32 C or room temperature in whole cell patch clamp configuration in presence of glutamatergic blockers 50 µM AP5 and 10 µM NBQX. Tonic current was distinguished with 30-100 µM bicuculline washon. 4-PBA treatment was administered as daily i.p. (7-day) or oral in peanut butter (28-day) at 100 mg/kg body weight.

Results: GABAergic synaptic responses - both evoked and spontaneous inhibitory postsynaptic currents (eIPSCs and sIPSCs) - were greatly prolonged in Slc6a1+/S295L and Slc6a1S295L/S295L mice compared to wildtype siblings. Moreover, duration of responses in wildtype mice significantly depended on GAT-1 activity, since application of GAT-1 blocker tiagabine greatly prolonged events. In comparison, GAT-1 function was greatly reduced in Slc6a1+/S295L mice, where tiagabine affected eIPSCs significantly less and did not affect sIPSCs (Figure 1). In Slc6a1+/S295L mice treated with PBA for 28 days, these differences in sIPSC decay and tiagabine sensitivity were restored to levels similar to wildtype, and showed a trend in this direction with 7 day treatment. However, differences in eIPSCs persisted in Slc6a1+/S295L mice for both 7-day and 28-day treatment regiments.

Conclusions: We found a profound pathology in GABAergic neurotransmission in Slc6a1+/S295L and Slc6a1S295L/S295Lmice associated with timely clearance of synaptic GABA, which is in line with prior studies showing robust prolongation of eIPSCs when GAT-1 is knocked out or blocked, though only one study found such changes in sIPSCs (Jensen et al., 2003;Keros and Hablitz, 2005;Bragina et al., 2008;Yu et al., 2013). Although PBA treatment results in dramatic improvement in patient and animal model seizure phenotype, its effect on this synaptic pathology appears more moderate, selectively rescuing sIPSC and only with a longer treatment. These findings pose further important questions regarding significance of this synaptic pathology in SLC6A1 disorders and the mechanism by which PBA rescues seizures.

Poster Session Abstracts

Poster Session A (odd numbers)
10:00 – 10:45 am
Ballroom 3

1. Probabilistic Prediction of Corrosion Fatigue Life in Buried Steel Pipelines

Ramesh Babu Jangala, *School of Engineering, Vanderbilt University*

This research investigates a methodology for probabilistic life prediction of buried steel pipelines subjected to external corrosion. A unified methodology is developed considering multiple stages of degradation related to external corrosion (due to soil) and fatigue. These stages include corrosion pit nucleation, pit growth, transition from pit to short crack, short crack growth, transition from short to long crack, stable long crack growth, and unstable fracture. The methodology is useful in obtaining stage-specific forecasts for the fatigue life of buried steel pipelines subjected to external pitting corrosion fatigue. State of the art computational models are used to predict damage initiation and evolution at each stage. The variability in environmental, loading, and material parameters is propagated through these models to obtain a probabilistic estimate of the remaining service life (RSL) of the pipe. Insights from probabilistic RSL prediction highlight the influence of soil type and pipe coating material on corrosion fatigue life. Local and global sensitivity analyses are then employed to quantify the relative importance of environmental factors such as pH, pipe/soil potential, chloride concentration; material properties like the threshold stress intensity factor; and the range of cyclic stress experienced by the pipe.

3. Characterization of plasma proteome perturbations to distinguish thrombotic myocardial infarction from non-thrombotic myocardial injury and chronic coronary artery disease

Shubham Tomar, *Division of Cardiovascular Medicine, Vanderbilt University Medical Center*

Background:
The significance of differentiating Thrombotic Myocardial Infarction (TMI) from non-thrombotic myocardial injury (nTMi) is evident from their respective treatment therapies. Lack of a standardized definition for nTMi in clinical research leads to varied prevalence rates and adds complexity to distinguishing TMI from other myocardial injuries. In this study, we compared plasma proteome of TMI, nTMi and chronic coronary artery disease (cCAD) group.

Methods:
We enrolled individuals suspected of TMI, nTMi or cCAD from two hospitals in Kentucky between 2014 to 2020 based on a predefined enrollment criterion. Blood samples were collected during angiography (acute time/ T0) and average 3 months post-procedure (quiescent time/ Tfu). Mass spectrometry-based proteomic analysis was conducted on these samples. Initially, we assessed temporal change from T0 to Tfu in proteomic profile in TMI group to identify proteins elevated during acute thrombosis. Subsequently, we compared these proteins' levels

at the acute phase across all groups to find differentially expressed proteins. We used hierarchical Bayesian models to analyze protein abundances, considering study group, time-point, and their interaction, with random effects for individual variability. Statistical significance was determined using Bayesian factor analysis with a threshold of BF > 150.

Results:
We enrolled 173 patients with 84 in TMI, 36 in nTMi, and 51 in cCAD group. Patient in TMI and nTMi group had mean age of 58 years while those in cCAD of 64 years. Proteomic profiling of plasma samples quantified 1,756 proteins after excluding those not meeting abundance criteria. In TMI, 141 proteins varied significantly between acute and quiescent phases. Proteins with function such as platelet activation, hemostasis, cell adhesion, tissue remodeling were elevated while those with extracellular matrix remodeling, cell adhesion, receptor signaling, and growth factor binding were reduced. Among these, six proteins showed notable differences when comparing TMI to nTMi. Specifically, DCN, MB, and CRP levels were elevated during the acute phase, while the others were decreased in TMI group. Comparing TMI to cCAD, 47 proteins differed significantly (Figure 1A).

Conclusion:
Proteins linked to hemostasis and platelet aggregation are significantly increased during acute thrombotic events, whereas proteins involved in fibrosis and wound healing show a reduction. This distinct proteomic signature offers a promising set of noninvasive biomarkers for differentiating between TMI and nTMi groups.

5. Role of Pdx1 and Oc1 in development of pancreas

Shilpak Bele, *Division of Diabetes, Endocrinology and Metabolism, Vanderbilt University Medical Center*

Diabetes progression is characterized by a reduction in functional insulin-secreting beta cells, illustrating that investigating molecular pathway regulating the formation, growth, and function of cells has translational value. Islet enhancers, super enhancers, and active promoters that organize into 3D hubs orchestrate the transcriptional networks crucial for the appropriate growth, differentiation, and division of cells. The homeodomain transcription factor Pdx1 plays a crucial role in the development and postnatal functioning of the beta cell transcriptional network. Pdx1 plays a major role in early pancreatic specification, organ size regulation, and beta cell formation, proliferation, and identity. Importantly, variants in Pdx1 are associated with Type 2 diabetes and monogenic forms of human diabetes. Modulation of Pdx1 level can change the chromatin conformation leading to altered gene expression during embryogenesis and postnatal period. According to our early findings, when developing cells progress through the cell cycle, Pdx1 protein levels are decreased and its subnuclear location is altered.

Additionally, ectopically raised levels of Pdx1 stop the progression of the cell cycle, indicating that dynamic regulation of expression is necessary for efficient beta cell proliferation. The Pdx1 C-terminus facilitates interaction with the one cut homeodomain transcription factor Oc1 and both factors are transiently co-expressed in multipotent pancreatic progenitor cells (MPCs). Our lab has shown that Pdx1 and Oc1 cooperate to activate the endocrine gene program, with long-term effects on postnatal islet function and beta cell compensation. As both factors are critical for normal endocrine development, it is worth investigating whether they can activate the endocrine program in adult human ductal cells. Thus, we hypothesize that Pdx1/Oc1 cooperativity changes the epigenetic landscape allowing for endocrine fate specification in receptive cells. The findings from Pdx1/Oc1 single and double heterozygosity model as well as Pdx1/Oc1 overexpression model of our research will guide efforts to maximize beta cell differentiation and growth for cell-based therapeutics.

7. Mapping Metabolites in the Human Eye: Integrating High Spatial Resolution MALDI IMS for Insights into Ocular Health

Ali Zahraei, *Cell & Developmental Biology, Vanderbilt University*

Introduction:
Metabolite distributions and their alterations in tissue microenvironments are essential to understanding biology. This extends to the human eye, where diverse cell types play a key role in ocular pathologies such as age-related macular degeneration and cataracts. For example, elevated glucose levels can lead to structural changes in the eye's lens that can accelerate the development of cataracts. MALDI imaging mass spectrometry (IMS) faces challenges in analyzing low molecular weight ions due to limitations in sensitivity and spatial resolution, hindering their comprehensive characterization. Here, we present a high spatial resolution MALDI IMS method for mapping the primary metabolites in the human eye. Future integration with multimodal imaging workflows will allow eye metabolism to be defined at cellular resolution.

Methods:

Three human ocular globes of 38-, 50- and, 65-year-old donors, were frozen using liquid nitrogen vapor in 15% fish gelatin. The globe was then dissected into anterior and posterior portions. Both regions were sectioned and thaw-mounted onto indium tin oxide-coated glass slides coated with poly-Lysine.

N-(1-Naphthyl) ethylenediamine dihydrochloride matrix was applied using an HTX M5 Sprayer. IMS data were acquired with a 10 µm pixel size in negative ion mode, covering a mass range of m/z 100-900 on a Bruker timsTOF Flex. SCiLS (Bruker Daltonics) and in-house software were applied to facilitate data visualization and analysis. In addition, LC-MS/MS was used to validate compound annotation. Autofluorescence microscopy combined with histological stains aided in annotating the tissue.

Preliminary Data:

Utilizing high spatial resolution IMS technologies, a diverse range of tissue metabolites were imaged across the 10 human eye tissues. Data from the posterior segment show that endogenous fatty acids have specific localizations to several anatomical features, including the unmyelinated nerve fibers, the neural retina (m/z 327.23, docosahexaenoic acid), and the myelinated nerve (m/z 281.24, oleic acid). These data revealed metabolite heterogeneity within the layers of the neural retina. Taurine (m/z 124.00) was found to be the most abundant peak in the posterior segment. This metabolite plays a critical role in retinal health, effectively improving stress damage, especially oxidative stress damage, arising in the retina. Hexose monophosphate (m/z 259.02), a product of the carbohydrate metabolism pathway, was also detected. Additionally, spatial localizations of signals in the anterior segment, including glycerol monophosphate (m/z 171.00), ophthalmic acid (m/z 288.11), and glutathione (m/z 306.07); were observed throughout the lens, primarily in the outer cortex. Fatty acids species, including linoleic acid (m/z 279.23) and arachidonic acid (m/z 303.23), were found in ciliary body, iris, and cornea. The different molecular compositions of the layers may reflect the different functionality of each layer.

Current work provides highly multiplexed spatial distributions for various endogenous compounds in the lens, ciliary body, iris, and cornea, and enables the differentiation between multiple retinal layers and the optic nerve on the same section. The resulting method enables untargeted metabolite imaging with significantly improved spatial resolution creating new possibilities for multimodal data integration and mining. These findings

significantly contribute to our understanding of metabolic dynamics within the normal eye. In summary, this study established a reliable methodology for mapping metabolites with a high spatial resolution while preserving their localization in ocular tissue.

Novel aspect:
A new method for high-resolution MALDI IMS in human eye tissue provides insights into localized metabolism.

9. Fragment-based Discovery: Small Molecule Inhibitors of XPA-RPA

Hannah Daniels, *Department of Biochemistry, Vanderbilt University*

Nucleotide excision repair (NER) is the primary pathway used to repair bulky DNA adducts, which are caused by diverse exposures ranging from UV light to certain chemotherapeutic agents. Although NER is necessary for protecting human cells from DNA damage, the pathway can significantly reduce the efficacy of cancer therapeutics that damage DNA, such as cisplatin. Cisplatin is a front-line treatment for a variety of cancer types; however, many patients develop resistance to the drug. Our long-range goal is to develop strategies to improve treatment response. This proposal investigates the hypothesis that small molecules inhibiting the interaction between two critical NER proteins, Xeroderma Pigmentosum Complementation Group A (XPA) and Replication Protein A (RPA), will lead to reduced NER capacity and increased Pt-agent sensitivity. The Chazin lab has previously (i) mapped the interaction between XPA and RPA, (ii) determined that XPA mutations known to disrupt binding with RPA decrease NER activity, and (iii) shown that disruption of the NER pathway seems to correlate with increased Pt-agent response. The objectives of this proposal are to generate small molecule inhibitors of the XPA-RPA interaction (Aim 1) and test their ability to diminish NER efficacy and sensitize cells to Pt-agents. Aim 1 will utilize a fragment-based discovery approach, screening a highly curated library of small molecular fragments. NMR will be used to identify fragment hits that bind within the XPA-RPA interface. These will be elaborated and optimized, and hits occupying different sites in the interaction interface will be linked to generate higher affinity compounds. Fragments and linked compounds will undergo multiple rounds of optimization so that the most promising inhibitor candidates will be developed. Aim 2 will determine the effect of candidate inhibitors on physical interaction of XPA and RPA, NER activity and Pt-agent sensitivity. The mode of action and binding affinity of the inhibitors will be characterized with techniques including NMR and fluorescence-based competition assays to confirm their ability to inhibit the interaction. Select inhibitors will then be tested in a variety of cellbased assays to determine if they diminish NER efficiency and increase sensitivity to Pt-agents. These aims will generate valuable tool compounds that provide detailed insight into the correlation between NER activity and response to Pt-based agents and serve as a foundation for testing the potential therapeutic value of inhibiting NER to improve the response to Pt-based anticancer therapies.

11. Impact of Anatomic Location on the Detection of Clinically Significant Prostate Cancer Via Targeted MRI/Ultrasound Fusion Biopsy

Keavash Assani, *Department of Urology, Vanderbilt University Medical Center*

Background:
Prostate cancer arises in several locations throughout the prostate. Traditional biopsy approaches were limited to sampling of the posterolateral peripheral zone of the base, mid, and apex of the gland bilaterally. With increasing use of magnetic resonance imaging (MRI) to identify regions of interest (ROI), targeted samples are now routinely obtained from additional anatomic regions, including the transition zone and anterior prostate. We sought to determine the detection rate of clinically significant prostate cancer (csPCa) by anatomic location after adjustment for lesion size, PI-RADS score, and other clinically pertinent variables.

Methods:
The study cohort included patients with elevated PSA that underwent positive MRI (PI-RADS 3-5) and subsequent transrectal MRI/US fusion diagnostic biopsy at a single institution from May 2015 through February 2024. ROI locations were categorized by anatomic zone (peripheral, central, transition), hemisphere (right, left, midline), proximal/distal (base, mid, apex), and anterior/posterior regions. Multivariable logistic regression was used to determine the relative odds of csPCa detection by ROI location after adjustment for age, race, digital rectal examination, previous biopsy status, PSA, prostate volume, lesion size, PIRADS score, and number of targeted cores obtained.
Results:
The study cohort included 478 patients of median PSA 6.62 (IQR 4.8-9.8) that underwent initial biopsy (N=290, 61%) or repeat biopsy (N=188, 39%). Overall, there were 609 ROIs of median size 1.2 cm (IQR 0.9-1.5), including 220 PI-RADS 3 lesions (36%), 269 PI-RADS 4 lesions (44%), and 120 PI-RADS 5 lesions (20%). The detection rate of csPCa was 12.3%, 30.9%, and 53.3% for PI-RADS 3, 4, and 5 lesions, respectively. On multivariable analysis, age, PSA, prostate volume, previous biopsy status, and the number of targeted cores obtained were significantly associated with detection of csPCa, in addition PI-RADS score was significant (Table 1). The odds of detecting csPCa were significantly higher for ROIs located in the apex (OR 1.98, 95% CI 1.08-3.63, p=0.028) relative to the base and for ROIs located in the peripheral zone (OR 1.83, 95% CI 1.11-3.02, p=0.019) relative to the transition zone.
Conclusions:
In a cohort of patients undergoing targeted fusion biopsy, we found that csPCa was significantly more likely to be detected in lesions of the apex relative to the base and the peripheral zone relative to transition zone, after adjustment for lesion size, PI-RADS score, and other pertinent clinical variables. If corroborated, these findings can be used to inform and refine biopsy practices, such as adjusting the number of targeted cores obtained based on lesion size and location. Such an approach stands to optimize csPCa detection while minimizing potential morbidity.

13. Associations Between Social Determinants of Health and Multiple Myeloma Risk

Anna Junkins, *Molecular and Genetic Epidemiology of Cancer, Vanderbilt University Medical Center*

Background: Multiple myeloma is the second most common hematologic malignancy in the United States. Multiple myeloma incidence differs by race and sex; but its etiology is poorly understood. We sought to evaluate the role of social determinants of health (SDoH) in multiple myeloma incidence in Black and White Americans with low socioeconomic backgrounds in the Southern Community Cohort Study (SCCS).

Methods: The SCCS is a prospective cohort study with participants recruited from the Southeastern U.S. from 2002-2009. Participants' residential addresses were collected at enrollment, geocoded, and linked to data on SDoH and other geographic measures at the census tract or census block level. Incident cancer was ascertained through linkage with state cancer registries. Using multivariable Cox proportional hazard modeling, we evaluated the association between three SDoH factors, population density, social vulnerability, persistent poverty, and multiple myeloma risk along with sociodemographic characteristics and other known multiple myeloma risk factors.

Results: During 19 years of follow up, 175 incident multiple myeloma cases were diagnosed (145 Black and 30 White cases). Black participants had a greater than two-fold increased risk (HR 2.43, 95% CI 1.60-3.70) for

multiple myeloma compared to White participants with Black men having the highest incidence. Increasing BMI was strongly associated with multiple myeloma risk (P-trend=0.0002) among Black participants (HR 2.39, 95% CI 1.39-4.11), but not among White participants. None of the SDoH factors were associated with multiple myeloma risk among Black participants. Living in an area with persistent poverty based on geocoding was significantly associated with multiple myeloma risk among White participants (HR 2.33, 95% CI 1.08-5.03).

Conclusions: We are the first to show that living in an area with persistent poverty based on geocoding was significantly associated with greater risk of multiple myeloma among White participants, after adjusting for individual income. Interestingly, none of the SDoH factors were associated with multiple myeloma risk among Black participants.

Impact: Obesity is a strong risk factor for multiple myeloma. Maintaining a healthy weight can help reduce risk. SDoH factors were not associated with multiple myeloma risk among Black participants. More research is needed to evaluate the role of environmental exposures and multiple myeloma risk.

15. Changes in Plasma and Fecal Metabolites after Bariatric Surgery

Yulu Zheng, *Division of Epidemiology, Vanderbilt University Medical*

Background: The differences between early and late post-bariatric surgery changes in plasma and fecal metabolites remain incompletely understood.

Aim: To investigate intra-individual metabolite changes among patients who received bariatric surgery, both in the early and late post-surgery periods.

Methods: 62 patients who received the first-time Roux-en-Y gastric bypass or sleeve gastrectomy were enrolled and provided plasma and stool samples before, 3 months, and/or 12 months after surgery. Global metabolite profiling and targeted short-chain fatty acid profiling were performed using liquid chromatography with tandem mass spectrometry. Paired Wilcoxon signed-rank tests and fold change (FC) were applied to evaluate metabolite differences between any two timepoints. Metabolites exhibited significant changes (false discovery rate [FDR]<0.1 and FC>1.5 or <1/1.5) were classified as four subtypes: early post-surgery specific change (exhibited a significant change uniquely in the comparison of 3 months vs. pre-surgery), late post-surgery specific change (exhibited a significant change uniquely in the comparison of 12 months vs. 3 months), sustained change (exhibited significant changes under both early and late post-surgery periods and in the same direction), and reversed change (exhibited significant changes in reverse directions).

Results: Included were 49 women (79%) and 13 men, with a mean age of 47 (standard deviation [SD]: 9) years and a mean body mass index of 44.7 (5.5) kg/m2 before surgery. A total of 1,602 and 1,640 metabolites were detected in plasma and stool samples, respectively. Using our categorization scheme outlined above, 274 plasma metabolites (74 were early post-surgery specific, 131 were late post-surgery specific, 2 were sustained, and 67 were reversed) and 204 fecal metabolites (125 were early post-surgery specific, 33 were late post-surgery specific, 5 were sustained, and 41 were reversed) exhibited significant changes, many of which were amino acids and lipids. Additionally, significant changes in plasma metabolites related to xenobiotics and nucleotide metabolism were observed in the late post-surgery period. However, none of the fecal metabolites related to nucleotide metabolism indicated significant late post-surgery specific changes. Plasma metabolites with the largest FC at 12 months vs. pre-surgery include xenobiotics (e.g., betonicine and 3-hydroxy-2-methylpyridine sulfate), bile acids (e.g., glyco-beta-muricholate and glycohyocholate), benzoate metabolites (4-

vinylphenol sulfaccte and 3-(3-hydroxyphenyl) propionate) and branched-chain 14:0 dicarboxylic acid. Pathway overrepresentation analysis suggested that the caffeine metabolism was significantly enriched at 12 months.

Conclusions: Our study identified significantly changed fecal and plasma metabolites among patients who underwent bariatric surgery and revealed different patterns of changes in metabolites from pre- to 3 months to 12 months post-surgery. Further studies are warranted to explore the metabolites' changes and their associations with metabolic outcomes after bariatric surgery.

17. Examining the role of semantic and phonological mechanisms during morphological processing in seven-year-old children

Marjolein Mues, *Brain Development Laboratory, Vanderbilt University*

Introduction: Morphology refers to the smallest units in language with meaning, e.g., the word "cats" has two morphemes: "cat" and plural marker "s". The mechanisms underlying this remain unclear, but phonology and semantics likely play a role. Phonology seems especially important as children must segment auditory streams into phonemes, allowing for the processing of morphemes. Children with lower language have difficulties with this, potentially negatively impacting morphological processing (e.g., Georgiou & Theodorou, 2023).

Research questions:

1. Is language skill related to reliance on phonological mechanisms when processing morphological markers in sentences?

2. Is language skill related to reliance on semantic mechanisms when processing morphological markers in sentences?

We hypothesize that higher language performance is associated with a reliance on phonology and lower language skill is associated with greater reliance on semantics during a morphological task.

Methods: This study is pre-registered (https://osf.io/juzcm). We examined the dorsal pathway for phonology, specifically the left posterior superior temporal gyrus (STG) and the inferior frontal gyrus opercularis (opIFG) and the ventral pathway for semantics, specifically the left posterior middle temporal gyrus (pMTG) and ventral left inferior gyrus triangularis (trIFG). Within these regions, we selected the top 500 voxels that were activated during an fMRI phonology or semantic task and were correlated with scores on a behavioral phonology or semantic task, respectively. We then examined activation in these 500 voxels during a morphology task in the scanner consisting of a grammaticality judgement task in which there are grammatical sentences and sentences with a finiteness error (e.g., "everyday she walk the dog"). Language skill is behaviorally examined through the Sentence Repetition test (a measure of general language) and the word structure test (a measure of morphology) of the CELF-5.

Results: We find significant activation in both phonological regions (pSTG and opIFG) during the morphology task, but only in one of the semantic regions (vIFG). We did not observe a significant correlation with language skill.

Conclusion: Both phonology and semantics appear to be involved during morphological processing, but there seems to be a greater reliance on dorsal regions of interest, which is in line with our hypothesis that children rely more on phonological skills for morphological processing. Our results indicate a greater role for frontal than temporal regions, supporting the notion of an emerging frontal language network providing effective access to

phonological and semantic information compared to having to rely on retrieval of representations stored in temporal regions alone (Wang et al., 2021). We did not find relations of brain activation to language skill, but perhaps our data did not have enough variability to fully examine this hypothesis.

19. Chronic active lesions preferentially localize in watershed territories in multiple sclerosis

Ahmad Toubasi, *Neurology Department, Vanderbilt University Medical Center*

Background: Paramagnetic rim lesions (PRLs) are a biomarker of chronic active lesions (CALs), and an important driver of neurological disability in multiple sclerosis (MS). The reason why some acute lesions evolve into CALs is not known. Here we ask whether a relatively lower oxygen content is linked to CALs.

Methods: In this prospective cross-sectional study, 64 people with multiple sclerosis (PwMS), clinically isolated syndrome (CIS) and radiologically isolated syndrome (RIS) underwent a 7.0 Tesla (7T) brain magnetic resonance imaging (MRI). The scanning protocol included a T2-w fluid-attenuated inversion recovery (FLAIR), and a single echo gradient echo (SE-GRE) from which susceptibility-weighted imaging (SWI) was derived. WM lesions (T2-lesions hereafter) were identified on the T2-w-FLAIR whilst PRLs were identified on the SWI sequence. T2-lesions were classified as PRLs and rimless lesions (PRLs-). We registered a universal vascular atlas to each subject's T2-w-FLAIR and classified each T2-lesions according to its location into watershed- (ws), non-watershed- (nws), and mixed-lesion (m).

Results: Out of 1,975 T2-lesions, 88 (4.5%) were PRLs. Ws-regions had a higher number ($p=0.005$) and proportion ($p<0.001$) of PRLs- compared to nws-regions. Ws-PRL- were larger compared to nws-ones ($p=0.009$). The number ($p=0.043$) and proportion ($p<0.001$) of PRLs was higher in ws-regions compared to nws-ones. ws-PRLs tended to be larger than nws-ones ($p=0.195$) but this difference was not statistically significant.

Conclusions: We propose the novel concept of a link between arterial vascularization and chronic activity in MS by demonstrating a preferential localization of CALs in ws-territories.

21. Cerebrospinal Fluid Delivery of a siRNA-Conjugate for Therapeutic Targeting in the Aged Brain

Alexander Ligocki, *School of Engineering, Vanderbilt University*

Drug delivery to the brain remains a major obstacle for treating neurodegenerative disorders due to the presence of the highly restrictive brain barriers. Direct delivery into cerebrospinal fluid (CSF), however, bypasses this limitation. CSF is an aqueous solution produced primarily by the choroid plexus, functioning to cushion the brain, remove waste products and deliver nutrients vital for the optimal functioning of central nervous system (CNS) tissues. These functions require CSF to bathe the CNS tissues, penetrating the brain through perivascular spaces, making it an ideal medium to deliver therapeutics to deep brain regions. The impact of age-related changes in CSF flow dynamics, including reduced production, flow, and efflux, presents a major challenge for the effective distribution and efficacy of therapeutics delivered via CSF.

Gaining clinical interest, short-interfering RNA (siRNA) therapies allow for targeted and robust silencing of disease-driving genes, however current siRNA technology is hindered by poor uptake and inability to penetrate deep brain regions. To combat this, we previously engineered a lipid conjugate capable of reversibly binding to albumin, penetrating deep into CNS parenchyma through perivascular spaces, displaying potent gene silencing in 3-month-old animals. Biodistribution studies revealed that the lipid conjugate, termed L2-siRNA

demonstrated enhanced transport into perivascular spaces compared to both free siRNA and Cholesterol conjugated siRNA. Furthermore, temporal efficacy was evaluated at one, three, and five months post injection, establishing improved and durable gene silencing ability of L2-siRNA compared to free and cholesterol conjugated siRNA, without overt toxicity. These findings highlight L2 siRNA as a promising therapeutic platform for treating CNS disorders. However, further studies in animal models relevant to these disorders are necessary. Given that aging is a major risk factor for a wide range of CNS disorders, we aim to investigate the biodistribution, efficacy, and toxicity of L2-siRNA in aged animals.

Building on prior studies we assessed biodistribution and efficacy between young (3 month) and aged (21 month) C57BL/6 mice following intracerebroventricular (ICV) injection of L2-siRNA. To assess biodistribution, we injected Cy5 labeled L2-siRNA and assessed delivery 48 hours post infusion. We identify comparable delivery in aged mice to young, with prominent perivascular delivery to deep brain regions. Further, gene silencing was evaluated two weeks post L2-Htt ICV injection to compare efficacy between young and aged animals. Efficient knockdown was confirmed in various brain and spinal cord regions. In addition, we examined distribution to canonical sites of CSF efflux (lymph nodes, dura) as well as peripheral nerves, a newfound site of CSF flow.

Future investigations will establish cell type specific uptake and knockdown, as well as the duration of gene silencing capabilities through assessing knockdown efficiency at later (3 month) timepoints in the aged brain. Moreover, we aim to assess both acute (48 hours) and chronic (2 week and 3 month) toxicity of L2-siRNA in the aged brain. Overall, L2-siRNA overcomes major hurdles for delivery in the aged brain, providing a versatile and effective therapeutic platform for the treatment of CNS disorders.

23. Cell cycle-regulated tug-of-war between microtubule motors positions major trafficking organelles

Avishkar Sawant, *Cell & Developmental Biology, Vanderbilt University*

Rapidly dividing cell populations must maintain efficient membrane trafficking while constantly remodeling their interior in preparation for cell division. Efficient protein processing and sorting in the mammalian Golgi apparatus relies on the integrity of this organelle. The integral Golgi is assembled around the centrosome by microtubule minus end-directed molecular motor cytoplasmic dynein. However, the Golgi must dissociate from the centrosome to allow for unperturbed centrosome separation in mitosis, which we have previously shown to occur as early as the G1/S transition. In addition, the Golgi exists in a constant membrane exchange with the Endoplasmic Reticulum (ER) through ER exit sites (ERES), which are also transported by microtubule molecular motors. Cell cycle signaling and molecular mechanisms that coordinate Golgi-centrosome and Golgi/ERES association still need to be understood. Here, we apply live cell imaging and loss-of-function approaches to show that cell cycle signaling tunes tug-of-war between the plus-end and minus-end-directed molecular motors, resulting in differential positioning of Golgi and ERES in the interphase sub-stages. Specifically, we find that in G1, the Golgi and ERES are brought to the centrosome by the minus-end-directed action of dynein and KIFC3, respectively. On the onset of the S-phase, kinesin-1-dependent activity at both the Golgi and ERES overpowers minus-end directed motors, driving the Golgi away from the centrosomes and spreading ERES throughout the cytoplasm. Out of known kinesin-1 motors (KIF5s) and kinesin light chains (KLCs), we have identified KIF5B and KLC1 as drivers for Golgi translocation in S/G2. In contrast, our preliminary data suggest that kinesin-dependent ERES transport in S/G2 is driven by KIF5C and KLC3 rather than KIF5B and KLC1. Interestingly, CDK1 inhibition in S-phase reverses the ERES and Golgi transport toward the minus end-directed motor activity, leading to a compact ERES/Golgi configuration around the centrosome, similar to G1. An acute kinesin-1 inhibition at this

stage causes similar retrograde repositioning of the Golgi and ERES. This suggests that CDK1 activity in the S phase rises sufficiently to facilitate the switch of molecular motors favoring kinesin-1-dependent transport of these organelles. Our data indicate that CDK1 likely regulates KLCs, enhancing recruitment of respective kinesin-1 variants to the Golgi and ERES in S/G2. Overall, we conclude that CDK1 signaling regulates Golgi and ERES positioning via kinesin-1 recruitment to the membranes and that the differential positioning of these two organelles reflects the association of these organelles with different sets of molecular motors.

25. The mechanism of PPARγ transcriptional repression by potential urothelial cancer therapeutic FX-909

Zane Laughlin, *Biochemistry Department, Vanderbilt University*

Peroxisome proliferator-activated receptor gamma (PPARγ) is a ligand-responsive nuclear receptor (NR) transcription factor that plays a role in cell differentiation and metabolism. PPARγ activity is regulated by endogenous fatty acids and lipids, including dietary and fatty acid metabolites, as well as synthetic ligands including FDA-approved antidiabetic drugs that activate transcription of gene programs involved in adipogenesis and insulin sensitization. Recent studies have implicated ligand-induced repression of PPARγ transcription in the treatment of advanced urothelial cancer where PPARγ signaling is hyperactivated. In this project, we investigated the mechanism of action of a clinical candidate compound FX-909, currently in phase 1 clinical trials, using biochemical, structural biology, and cellular methods. We show that the inverse agonist function of FX-909 for PPARγ is similar to previously-characterized compounds. Additionally, we determined the crystal structure of FX-909 covalently bound to the PPARγ ligand binding domain (LBD) with corepressor peptide, revealing that FX-909 covalently binds within the orthosteric ligand binding pocket almost identically to other PPARγ inverse agonists. However, in cellular assays, FX-909 appears to be more potent in repressing PPARγ than other inverse agonists with similar or higher capacities for repression in biochemical assays, suggesting FX-909 may possess some structural quality which allows it to be more active within cells. With these and other data comparing the efficacy FX-909 to other structurally related compounds, we hope to provide insight into the mechanism of small-molecule transcriptional repression of PPARγ, which could guide drug design of future bladder cancer therapeutics.

Poster Session B (even numbers)
2:30 – 3:15 pm
Ballroom 3

2. Context specific cell-cell communications reveal Aβ-related signals in human microglia for Alzheimer's disease

Yuting Tan, *Molecular Physiology and Biophysics, Vanderbilt University*

Microglia play a dominant role in the genetics of Alzheimer's disease (AD). Microglia communicate with nearly all brain cell types to maintain homeostasis and keep the brain healthy, while abnormal cell-cell communications (CCCs) involving microglia can contribute to the pathogenesis of AD. Besides, microglia are central players in the brain's response to amyloid-beta (Aβ), the hall marker of AD. Nevertheless, specific interactions between microglia and other brain cells, such as astrocytes and neurons, in the pathogenesis or clearance of Aβ, remain largely unknown.

In this study, we aim to identify microglia-centered CCCs associated with Aβ in AD to reveal how microglia influence disease progression through their interactions with other cell types. As the dissection of CCC requires modeling the signaling pathways, we generate a cell type-specific prior knowledge of ligands on their effects on the receiver cell for AD to better model cell type-specific functions. We integrate single-cell RNA sequencing (scRNA-seq) data with the cell-specific prior knowledge and calculate context-specific communication scores to identify CCC and the involved ligands and receptors associated with Aβ burden. Specifically, we define a communication score as the product of the mean expression of a ligand in the sender cell type and the mean expression of a receptor in the receiver cell type. We observe that cell type-specific CCCs from excitatory neurons to microglia, involving the ligands COL10A1 and the receptors ITGB1, are positively associated with the increased levels of Aβ. For astrocytes and Oligodendrocyte cells (Oli), we observe ligand-receptor pairs of GDF11-BMPR2 and NLGN1-NRXN3, respectively. We further investigated the ligand activity using NicheNet and replicated the CCC involving ligands GDF11 and NLGN1 whose activities are significantly associated with Aβ. We are exploring the context-specific communication scores at the single-cell level to dissect the fine-scale CCC implicated in AD and map their downstream signaling and regulatory impact in microglia.

4. Bilirubin regulates classic Liver Receptor Homolog-1 target genes

Pratima Chapagain, *Division of Diabetes, Endocrinology and Metabolism, Vanderbilt University Medical Center*

The nuclear receptor Liver Receptor Homolog-1 (LRH-1, NR5A2) binds to plant-based phospholipids that regulate important LRH-1 functions in the liver. Our compound screening identified bilirubin as a possible ligand for LRH-1. In addition, our computational docking predicts bilirubin interacts to the ligand binding site of LRH1. We hypothesized bilirubin regulates gene expression in human HepG2 cells, an established model cell line to study endogenous LRH-1 target gene regulation. Polyclonal SLCO1B1 HepG2 cell line were treated with unconjugated bilirubin for 24 hours. Our transcriptome profiling predicts bilirubin selectively regulates transcripts from endogenous LRH-1 ChIP-seq target genes. In addition, to investigate bilirubin-binding to LRH-1 was required for bilirubin-regulation of HepG2 gene expression, we used RJW100 chemical ligand competitor

and study transcriptome analysis. Further, genetic downregulation of LRH-1 approach was also used to determine if this approach could attenuate bilirubin regulation of the HepG2 transcriptome. Interestingly, LRH-1 chemical competitor almost completely prevented bilirubin regulated gene in HepG2 transcriptome, and genetic downregulation of LRH-1 also results in 12-fold attenuation of bilirubin induced gene expression in HepG2 cells. Gene set enrichment analysis determines the pathways associated with cholesterol metabolism and lipid efflux. This study overall indicates bilirubin directly regulates LRH-1 target genes in human HepG2 cells.

6. Unraveling the role of polarity remodeling during apical cell intercalation

Aishwarya Venkataravi, *Department of Cell and Developmental Biology, Vanderbilt University*

Morphogenesis involves the constant remodeling of sheets of cells, which expand, elongate, invaginate and fold to form an organ. Deciphering the mechanisms underlying these cellular rearrangements is critical to understanding morphogenesis. The mammary gland has been long appreciated as a model for studying epithelial behaviours during development. The key events of mammary gland development occur postnatally during puberty and throughout repeated cycles of pregnancy. The terminal end bud (TEB) orchestrates the formation of the ductal tree by giving rise to mature cell types. The TEB is a multilayer cluster of body cells that must resolve into a single luminal layer as the duct elongates and invades the surrounding fat pad. The precise mechanism of this process is poorly understood.

Previous work from the lab (Pfannenstein & Macara, Dev Cell 2023) identified a unique process of apical cell intercalation as the driving force behind resolving the multilayered TEB structure into the single luminal layer of the duct. An in vitro intercalation assay using either Eph4 mammary epithelial cells or primary luminal epithelial cells found that the tight junction (TJ) protein ZO-1 is critical for intercalation. ZO-1-depleted cells fail to intercalate into a WT epithelial monolayer, a result that was confirmed in vivo by mammary gland intraductal injections. Surprisingly, however, depleting ZO-1 in the monolayer enhances the in vitro intercalation of wild-type cells. Although ZO-1 is an abundant tight junction component, its depletion does not inhibit TJ formation, which suggests another role of ZO-1 during intercalation. Actin dynamics at the interface of the incoming cell and the monolayer was found to be essential for intercalation.

We are further investigating the function of ZO-1, other TJ proteins, and actin dynamics. Evidence from previous studies and preliminary data suggest that ZO-1-actin interactions might be crucial for intercalation. We are also addressing another aspect of the mechanism, by examining how apicobasal polarity is remodeled during intercalation. Preliminary data indicate that the apical compartment of the incoming cell faces the apical surface of the monolayer and is reorganized as the incoming cell attaches and begins to penetrate at intercellular junctions.

8. Activator protein 1 (AP-1) Complex in Antigen Presenting Cells contributes to Salt-Sensitive Blood Pressure in Humans

Taseer Ahmad, *Division of Clinical Pharmacology, Vanderbilt University Medical Center*

Salt-sensitivity of blood pressure (SSBP) is an independent risk factor for cardiovascular morbidity and mortality. The exact mechanism by which salt intake increases blood pressure is complex and not fully understood. We previously found that sodium entry into antigen-presenting cells (APCs) via the epithelial sodium channel (ENaC) activates proinflammatory cytokines to activate T cells and modulate salt-sensitive hypertension. The activator protein 1 (AP-1) transcriptional factors (FOS/JUN) have been implicated in activating the pro-inflammatory

pathway, but its role in SSBP is unknown. We hypothesized that high salt activates the AP-1 signaling pathway and inflammation in APCs and contributes to SSBP. Our bulk RNA-sequencing data in human monocytes, demonstrated that high salt increases the expression of the AP-1 gene family, FOS (2,378.1 ± 480.7 vs 6,494.0 ± 945.5, p= 0.0009), and JUN (7,313.9 ± 984.9 vs11,370.0 ±1,286.3, p= 0.0015) compared to normal salt-treated monocytes. In additional experiments, we enrolled patients with hypertension and phenotype them for SSBP using an established inpatient protocol of salt-loading/depletion and performed single-cell transcriptomic analyses on peripheral blood mononuclear cells (PBMCs). We observed expression of the e FOS (r= 0.5041, p= 0.0464) and JUN (r= 0.7083, p= 0.0021) genes changes in concert with blood pressure in salt-sensitive (SS) but not in salt-resistant (SR) patients. To confirm whether genes expression translates to protein expression, we cultured total splenocytes from salt-sensitive SV/129 mice for 24 hours in either normal (150 mM) or high salt media (190 mM) and performed flow cytometry. Compared to normal salt, high salt-induced a significant increase in the expression of FOS-JUN genes in monocytes of the spleen. We also adoptively transferred PBMCs from salt-sensitive (SS) and salt-resistant (SR) hypertensive individuals into immunodeficient NSG mice, treated with the high salt diet for three weeks and performed flow cytometry on immune cells of the kidney, aorta, and spleen. We found that immune cells from SS people demonstrated a higher propensity to infiltrate mouse tissues with increased expression of FOS-JUN genes than immune cells from SR people. These preliminary findings disclose the role of the AP-1 gene family in salt-sensitive hypertension and may provide a potential therapeutic target for the treatment and diagnosis of SSBP.

10. Elevated Circulating T Cell-Monocyte Complexes in Long COVID-19 Tachycardia Syndrome: Implications of Immune Dysregulation, Inflammation, and Disease Progression

Marwa Mohamed, *Division of Clinical Pharmacology, Vanderbilt University Medical Center*

BACKGROUND:
Postural orthostatic tachycardia syndrome (POTS) is a common complication in Long-COVID. Long-COVID POTS (LCP) is characterized by abnormal orthostatic tachycardia, symptoms of orthostatic intolerance, and persistent inflammation.

HYPOTHESIS:
Novel parameters of immune activation exist in and likely contribute to the pathogenesis of LCP.

METHODS:
We enrolled 15 LCP patients and 5 subjects who recovered from COVID-19 infection without lingering effects as controls. Hemodynamic parameters were measured at baseline and during a 10-minute 75° head-up tilt. Flow cytometry was used to detect circulating T cells, monocyte subsets, and their cytokines. Immune synapse formation between T cells and monocytes was detected using Forster Resonance Energy Transfer (FRET) between T cell receptors (TCR) and human leukocyte antigens (HLAs). Intracellular staining was used to detect the cytokines IL-17A, IFNg and IL-6.

RESULTS:
Subjects with LCP exhibited a greater increase in heart rate (HR) during 10-min upright tilt compared with controls (50.23± 4.6 vs. 20.33 ± 3.17 bpm, p<0.01, Figure). Circulating monocyte/T cell complexes were increased in LCP vs controls and these exhibited high TCR/HLA FRET (p<0.005), suggesting immune synapse formation. Importantly, complexed T cells demonstrated higher levels of IL-17Aand IFN-ɣ, compared to non-complexed T cells and a profound increase in intracellular IL-6 compared to non-complexed monocytes

($p<0.005$). Notably, the percent of IFN-ɣ+ and IL-17A+ T cells in the monocyte/T cell complexes of LCP subjects positively correlated with their increase in HR (ΔHR) in 10 min active standing test (Figure).

CONCLUSION:
Circulating T cell-monocyte complexes are markedly increased in humans with LPC, and exhibit evidence of functional and dynamic cellular interactions. We propose that these contribute to persistent inflammation and the pathogenesis of autonomic dysfunction in these subjects.

12. RIG-I Activating Nanoparticles for Glioblastoma Immunotherapy

Alexander Kwiatkowski, *Vanderbilt Institute of Chemical Biology, Vanderbilt University*

Glioblastoma (GBM) is a rare form of brain cancer with over 13,000 new cases each year and a dismal outlook for patients who face a mean survival time of 12-18 months post-diagnosis. The current standard of care – comprising surgical resection followed by radiation and chemotherapy – has not advanced significantly over the past 20 years, creating a need for new therapies. To this end, leveraging pattern recognition receptor (PRR) activation to elicit strong innate immune responses shows promise for cancer immunotherapy. RIG-I is one such PRR, and higher levels of RIG-I are associated with improved survival outcomes. At the preclinical level, RIG-I activating therapies have shown promise for treating various solid tumors, yet pharmacological activation of RIG-I has not yet been explored for GBM immunotherapy. The clinical utility of 3pRNA RIG-I agonists is currently limited by significant drug delivery barriers, including poor intracellular uptake, nuclease degradation in the endosome/lysosome, and an inability to reach the cytosol to bind RIG-I. To realize the promise of RIG-I, we will use RIG-I activating nanoparticles (RANs) to treat a mouse model of glioblastoma.

Di-block polymer nanoparticles were formed via Reversible Addition Fragmentation Chain Transfer (RAFT) polymerization and consisted of a first block of 10 kDa methoxy-polyethylene glycol (mPEG) and a second block of Pyridyl disulfide ethyl methacrylate poly[(DMAEMA-c-butyl methacrylate (BMA)) (PDB). Ribogreen quantified RNA loading and dynamic light scatter (DLS) quantified size. Various cell types were treated with RANs; 24 hours later, supernatants were collected for ELISA, and cells were stained for flow cytometry. In vivo Experiments: Mice were inoculated with 1,000,000 GL261 or CT2A cells on the right flank. When tumors reached ~50 mm3, mice were treated intratumorally with RANs, with additional injections on days 3 and 6 later. Orthotopic tumors were engrafted using 200,000 CT2A-luciferase cells at coordinates of 1.00 mm anterior, 2.00 mm lateral, and 3.00 mm deep. Mice were treated intratumorally.

In vitro experiments: DLS showed that RANs were ~70 nm in diameter and activated A549-Dual (Fig.1A) and THP1-Dual (Fig. 1B) reporter cells to produce more type one IFN than control RANs (cRANs) with inactive RNA. Additionally, we show that glioblastoma cell lines GL261 (Fig. 1E) and CT2A cells (Fig.1F), along with bone marrow-derived macrophages and dendritic cells produced significantly more interferon beta and had increased MHC I expression following RAN treatment compared to cells treated with cRANs. Macrophages took on a pro-inflammatory phenotype with less CD206 and increased CD80, CD86, and MHC II. In vivo experiments: RANs significantly delayed tumor growth and prolonged survival in both GL261 (Fig. 1G) and CT2A (Fig. 1H)) flank tumors compared to cRANs and vehicle treated mice. Initial dose finding studies in the orthotopic GBM model suggest that a 5 μg dose of RANs can delay tumor growth, but it will require further studies to see if these changes are significant compared to cRANs. Herein, we show that RANs can effectively activate antigen presenting cells and cancer cells in vitro, delay growth of flank tumors, and find a maximum tolerated dose in the brain. Overall, RANs display preclinical promise to combat a deadly cancer.

14. Computer-Aided Design and Biological Evaluation of Diazaspirocyclic Dopamine Receptor 4 Antagonists

Daniel Schultz, *Warren Center for Neuroscience Drug Discovery, Vanderbilt University*

Parkinson's disease (PD) is a debilitating neurodegenerative disorder affecting nearly one million people in the US today. PD is characterized by the progressive loss of dopaminergic neurons in the substantia nigra, which results in motor dysfunction. Current treatments are primarily centered around enhancing dopamine signaling or providing dopamine replacement therapy, but these face significant drawbacks, such as unreliable long-term efficacy and medication-induced dyskinesias. Dopamine receptor subtype 4 (D4R) has arisen as a putative target for the treatment of levodopa-induced dyskinesia due to its role in modulating dopamine signaling.

Therefore, we have pursued the development of selective D4R antagonists as potential adjuvants for PD management. In the present study, virtual high-throughput screening, artificial neural network quantitative structure−activity relationship (QSAR) modeling, and experimentally-driven library design led to the identification of a novel class of diazaspirocyclic D4R antagonists, the most prominent of which exhibited potent (IC50 = 210 nM, Ki = 59 nM) and selective D4R antagonism (<12% D1-3R inhibition at 10 μM). In vitro and in vivo drug metabolism and pharmacokinetic (DMPK) analysis, however, demonstrated that this compound is highly cleared (CLP = 123 mL/min/kg), indicating that additional development is required in order to mitigate its DMPK liabilities prior to further advancement in vivo. Despite its undesirable DMPK properties, however, this lead D4R antagonist is a useful in vitro tool compound with excellent potency and selectivity, providing a great starting point for further research in this field.

16. A Large Animal Model of Pulmonary Hypertension-Right Ventricular Failure with Mechanical Circulatory Support During Exercise

Victoria Simon, *Department of Cardiac Surgery, Vanderbilt University Medical Center*

OBJECTIVE:
The effects of exercise on pulmonary hypertension-right ventricular failure (PH-RVF) patients remain poorly understood, especially severe PH. Our group previously established a large animal model of PH-RVF. We combined this model with an exercise platform to improve our understanding of exercise on PH-RVF and the impact of mechanical circulatory support (MCS) on exercise tolerance.

METHODS:
A 67-kg healthy sheep was acclimated to a livestock treadmill. Following our previously published protocol for sheep PH-RVF model, we ligated the left pulmonary artery, placed an inflatable adjustable silicone band on the main PA, and inserted an indwelling catheter in the RV outflow tract. The pressure in the adjustable silicone band was increased weekly an average of 100-150 mmHg to create a progressive model of PH-RVF over the course of 8 weeks. During this period, the sheep completed a weekly exercise routine on the treadmill. Treadmill speeds ranged from 0-1.1 m/s. Mixed venous oxygenation (SvO2) and RV pressure were measured during each treadmill session. Following the 8-week period of progressive cuff inflation and exercise regimen, a re-operative thoracotomy was performed, and the sheep was placed on a right atrial to left atrial (RA-LA) ECMO circuit at a blood flow ranging from 2 L/min to 3.5L/min. The sheep completed the full exercise routine 3 days post op. The same parameters including SVO2 and RV pressure were measured during this exercise routine with the MCS circuit.

RESULTS:

As the PH-RVF model progressed, the sheep experienced more difficulty completing the exercise routine as evidenced by clinical appearance (gait ataxia, increased respiratory rate, pallor) and decreasing SVO2. At rest, the week 1 SVO2 and RV systolic pressure (RVSP) were 84.2% and 80 mmHg respectively, compared to week 9 resting SVO2 and RVSP of 73.4% and 59 mmHg. By week 8, the sheep was unable to complete the exercise routine. The sheep was able to complete the entire routine after the attachment of extracorporeal circuit. MCS support resulted in a 18.8% increase in SVO2 at the same speed, from 52.1% to 70.9%. RVSP during exercise while on MCS support ranged from 45 to 83 mmHg with a mean of 60. Total distance traveled during exercise was 1197 meters week 8 of the model without MCS versus 3600 meters with MCS implant, a >200% increase.

CONCLUSIONS:

Intervention with RA-LA MCS during exercise is feasible in a large animal model of PH-RVF and improves physiologic performance of a protocolized exercise routine.

18. Nurses' Role in Transitional Care Planning During ICU Family Meetings

HyunBin (Binnie) You, *School of Nursing, Vanderbilt University*

Introduction:
After the intensive care unit (ICU), patients with prolonged mechanical ventilation (PMV) and their families are likely to experience multiple transitions in the location or level of their care. Nurses play a crucial role in planning these transitions, particularly during family meetings. Yet, there are no ICU transitional care (TC) standards in the United States, and research to guide TC planning is limited. Despite their clinical expertise, nurses feel their perspectives are not fully recognized in these family meetings and their significant time and support for families are often unrecognized. The purpose of this study was to describe nurses' role related to TC planning in ICU family meetings.

METHODS:
We used a qualitative descriptive design with secondary data purposively sampled from a trial of a decision aid about PMV. Among the 19 unstructured ICU family meeting transcripts where nurses were involved, we explored nurses' role and nurse engagement related to TC using directed content analysis. Predetermined codes were developed from the literature on nurse-family communication during ICU family meetings, including strategies and characteristics of nurse engagement.

RESULTS:
The transcripts from 19 family meetings of 19 unique patients and their 19 primary family members, along with 12 nurses, were analyzed. In only 25% of family meetings in which TC topics were discussed, nurses engaged in the discussion beyond their introduction. Three themes were identified describing the roles nurses served: 1) information and communication facilitators (e.g., moderating family meetings, facilitating family understanding, serving as communication intermediaries), 2) family support providers (e.g., providing emotional support, describing expectations, advocating for patients/families), and 3) TC liaisons (e.g., introducing next levels of care, identifying/engaging family members, providing patient/family education, and more) (Figure 1).

CONCLUSIONS:
The findings of this study have practice implications for increasing nurse engagement in TC planning during family meetings providing information and coaching to help patients/families navigate care transitions early in the treatment continuum. Future research and development of TC standards are essential to guide nurses' role in ICU TC planning.

20. Immune checkpoint inhibitors increase immunosuppressive M2-like tumor-associated macrophages and decrease T cells in the bone

Madeline Searcy, *Division of Clinical Pharmacology, Vanderbilt University Medical Center*

Immune checkpoint inhibitors (ICIs) target immune checkpoint proteins including programmed cell death protein 1 (PD-1), programmed death ligand (PD-L1), and cytotoxic T-lymphocyte antigen 4 (CTLA-4), thereby enabling T cells to kill cancer cells; this can lead to complete regression of relapsed and metastatic tumors. Patients receiving ICIs have an elevated risk of skeletal related adverse events, and we previously reported that genetic or pharmacologic PD-1 blockade significantly reduces bone mass.

In addition, patients with bone metastatic breast cancer and non-small-cell lung cancer do not benefit from ICI therapy in comparison to patients without bone metastases, but the mechanisms involved are unknown. We hypothesize that the lack of efficacy in treating bone metastatic tumors with ICIs is caused by PD-L1 blockade-induced activation of immunosuppressive cell types in the bone, which primes the bone microenvironment for tumor cells and reduces the ability of T cells to target and kill bone metastases. To test this, we treated 12-week-old female WT mice with IgG or α-PD-L1 (n=10/group) for four weeks and determined changes in bone microarchitecture by microCT, bone remodeling by qPCR and ELISA, and the immune component by flow cytometry.

In contrast to PD-1 inhibition, which decreases bone volume, α-PD-L1 does not alter trabecular bone volume or bone remodeling. These data are consistent with clinical reports that bone and joint injuries are less frequent in patients treated with α-PD-L1 compared to patients treated with α-PD-1 therapy. However, patients with bone metastatic cancer do not respond to either ICI therapy, suggesting disrupted bone remodeling is not the sole mechanism for persistent bone metastases. Here, we show that inhibition of PD-L1 increases an immunosuppressive M2-like CD206+/CD68+ tumor-associated macrophage (TAM) population, which are associated with a worse prognosis in multiple cancer types, by 21.2% in tumor naïve bone marrow (p=0.0456).

Additionally, α-PD-L1 decreases CD3+ T cells in tumor naïve bone marrow by 25% compared to IgG (p=0.0057) which may reduce T cell mediated killing of bone metastatic tumor cells and explain in part why patients with bone metastases do not benefit from α-PD-L1 therapy. Digital spatial profiling of bone metastases in α-PD-1-treated mice also shows an enrichment of immunosuppressive M2-like CD163+ TAMs in the endosteum compared to the bone marrow (>3-fold, p=0.0006), suggesting that ICI therapy may promote formation of a pre-metastatic niche in bone. Together, these data indicate that ICI therapy increases immunosuppressive M2-like TAMs and decreases the number of T cells in the bone marrow, which may prime the bone for metastatic spread and prevent T cell mediated killing of tumor cells.

22. Reactivation of Gli2 in Liposarcoma Tumors Induces Microenvironment Remodeling and Alters Tumor Differentiation

Erik Beadle, *Center for Bone Biology, Vanderbilt University Medical Center*

Sarcomas are a rare classification of tumor derived from tissues of mesenchymal origin including bone, fat, muscle, cartilage, and blood vessels. These tumors often rapidly grow and have limited therapeutic options that have not made significant advancement in decades. Liposarcomas (LPSs) are derived from adipose progenitors that have undergone an adipogenic lineage commitment compared to their multipotent counterparts. Interestingly, the grade of differentiation within LPS can vary highly within an individual tumor, suggesting that

there can be high variability amongst cell populations within the tumor mass. In turn, this can drastically affect prognosis and likelihood of metastasis, making tumor differentiation a potential mechanism to target in liposarcoma development, the most common soft tissue sarcoma malignancy. Here we show that reactivation of the hedgehog transcription factor, Gli2, in LPS cells represses adipogenic differentiation, while simultaneously activating markers of osteoblast differentiation in vitro. In addition, we observed marked changes in cytokine secretion, prompting us to perform orthotopic inguinal fat pad injections of control and Gli2 overexpressing LPS cells. Interestingly, tumors overexpressing Gli2 showed noticeable increase in size compared to control. Using flow cytometry and immunohistochemistry, we observed distinct changes of M2 macrophage populations, as well as increased surface expression of CD47 on the surface of LPS tumor cells overexpressing Gli2. Taken together, we find that overexpression of Gli2 in LPS cells alters differentiation capacity, increases tumorigenicity, and alters interactions between tumor cells and macrophages highlighting a novel role for this developmental transcription factor in LPS formation.

24. USPSTF 2017 Guideline Change Incorporating Share Decision Making Improves PSA Testing Awareness, but Still Leaves Gaps in Care for Those Most in Need: Disparities in Income, Education, and Race

Keavash Assani, *Department of Urology, Vanderbilt University Medical Center*

Background:
Prostate cancer is the most diagnosed cancer in men and has the second highest mortality rate in all cancers for men. Black patients are two times more likely to die of prostate cancer compared to their White counterparts. Shared decision making is an important aspect of making sure patients are well educated and have the resources they need to make an informed decision. In 2017, the United States Preventative Services Task Force (USPSTF) changed the guidelines against routing PSA testing, issuing a grade C recommendation for men age 55-69 years that the decision to undergo PSA-based screening and that it also incorporate shared decision making. The purpose of this study is to investigate whether changing these guidelines has impacted screening rates, while also looking to see how patients in various socioeconomic have been affected.

Methods:
Data was obtained from the Behavioral Risk Factor Surveillance System (BRFSS), which is a public database for health-related behaviors in the US. Data was compared between 2016 and 2018. Descriptive statistics were calculated for both groups and chi-square test were used to compare categorical variables, and student-t tests were used for continuous data. Multivariable logistic regression analysis was performed with outcome of interest being if a patient had ever had a PSA test or not.

Results:
Overall, 54,877 men in 2016 and 66,766 men in 2018 over the age of 45 who were eligible for PSA screening were identified. In 2018, 32,096 (58.5%) of patients compared 33,446 (50.1%) in 2016 had a PSA test ($p<0.001$). Interestingly, patients were 23% more likely to have never been recommended for PSA testing in 2016 compared to 2018 (OR =0.76, 95% CI: 0.76-0.76, $p<0.001$). Additionally, there were no significant differences in patients who were informed of the advantages of PSA testing, but there was a 5% increase in patients informed of the disadvantages in 2018 compared to 2016 (OR=1.05, 95%CI: 1.04-1.05, $p<0.001$).

There were significant differences ($p<0.001$) on chi-square analysis for the proportion of white patients of White patients (77.4%-78.7%), Black patients (7.4%), Hispanic patients (7.7%), and other races (0.2-1.9%). However,

there were no significant differences in if a patient had PSA testing between Black patients and White patients after weighted multivariable analysis. On multivariable analysis, education and income level were inversely correlated with having a PSA test, with lower levels of education and income being associated with up to a twofold lower likelihood of having a PSA test ($p<0.001$)

Conclusion:
The guidelines change in 2017 to add shared decision making and increase the grade recommendation for PSA testing is an important guideline change that improves informed decision making for patients. The improvement in recommendations of PSA testing, as well as the increased information of disadvantages of PSA testing shows policy can make a difference. However, there are still large gaps in access to PSA testing that need to be addressed based on income, education level, and race.

26. From Lab to Farm and Back Again: Using a Rural-Urban Partnership to Innovate Research Tools

Kelly Richardson, *Department of Chemistry, Vanderbilt University*

A specific mutation in the PPP2R5D gene has been identified as the cause for the neurological disorder Jordan's Syndrome (JS). This change dysregulates protein phosphatase 2A's (PP2A's) activity, leading to various developmental delays in JS patients. In order to expand its research tools beyond standard antibodies, the Wadzinski group has partnered with a local farm to immunize alpacas against Jordan's Syndrome biomarkers. This work has resulted in the identification and production (Figure 1) of both unique polyclonal antibodies as well as camelid "nanobodies" to better study the disease. These specialized antibodies are only a tenth of the size of their human counterparts and oTer many distinct advantages. Not only do they possess better tissue penetration and easier recombinant production, they also appear to be more sensitive to Tyr phosphorylation sites. By combining these aspects, we can develop reagents that allow observation of specific phosphorylation within living cells as well as their in vitro eTects. Preliminary data has already demonstrated the potential for this application in PP2A systems. In the coming months, we will apply these same principles to study the mitogen-activated protein kinases (MAPKs) to gain broader insight into cellular signaling and regulatory pathways while at the same time constructing a universal approach suitable for studying other protein phosphorylation events.

28. Why are Biological Clocks Self-Sustained? Exploring links to Seasonal Changes

Chitrang Dani, *Department of Biological Sciences, Vanderbilt University*

Most organisms on Earth have internal biological clocks that help predict daily environmental changes on a 24-hour scale. Circadian clocks are characterized by the self-sustenance of an oscillation in absence of time-cues, temperature compensation of the period of this oscillation, and entrainment to time-cues with a stable and reproducible phase-angle. Of these, the adaptive advantage of a self-sustained non damping oscillation under constant conditions is unclear, given that most environmental conditions on Earth have time-cues and hence may not require exhibition of self-sustained rhythms. If the primary function of circadian timekeepers was to anticipate recurring temporal events such as dawn or dusk, hourglass timers that are temperature-compensated and resettable by dawn or dusk may have been sufficient. In the context of environmental factors that could have driven the evolution of circadian systems, existing research comprises only modeling approaches which have focused on the challenge posed by annual variation in photoperiod.

This study explores if having a clock that can keep time by itself might be beneficial, especially when considering the changing lengths of days throughout the year. To experimentally validate this hypothesis, we made use of the cyanobacterial clock system which has a built-in clock mechanism made up of three key proteins – Kai A, B and C. Mutations in kaiA and deletion of the kaiABCcluster in Synechococcus elongatus PCC 7942 give rise to damped circadian oscillator and arhythmic phenotypes respectively. To compare their relative fitness, we competed arhythmic, damped and self-sustained circadian oscillator strains in long and short photoperiods. Our results on the competition dynamics, phase relationships and growth rates of these strains shed light on some intricacies that may determine adaptive advantages that self-sustained circadian oscillators have over damped circadian oscillators. Overall, this study will help in gathering and evaluating evidence for the essentiality of self-sustained circadian clocks and selective pressures that led to their evolution.

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Dr. Shubham Tomar

5: Role of Pdx1 and Oc1 in development of pancreas
Dr. Shilpak Bele

7: Mapping Metabolites in the Human Eye: Integrating High Spatial Resolution MALDI IMS for Insights into Ocular Health
Dr. Ali Zahraei

9: Fragment-based Discovery: Small Molecule Inhibitors of XPA-RPA
Dr. Hannah Daniels

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19: Chronic active lesions preferentially localize in watershed territories in multiple sclerosis
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Dr. Madushika Wimalarathne

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Dr. Ankita Samaddar

36: Understanding the Interactions Between Lactobacillus spp. and Group B Streptococcus in the Vaginal Tract
Dr. Jéssica da Conceição Mendonça

40: Differentiation and characterization of bacteria using high-wavenumber Raman spectroscopy
Dr. Alec Walter

42: Major bleeding events comparing anticoagulants among patients with inflammatory bowel disease
Dr. Sue Hyun Kwon

44: Investigating antibiotic failure in Staphylococcus aureus osteomyelitis
Dr. Brittney Gimza

46: Augmenting anti-cancer immunity by targeted activation of MHC class I
Dr. Xin Sun

Please note that this list also includes posters submitted post-deadline.

THANK YOU

We extend our deepest gratitude to **Annie Evans** and **Faith Bishop** from the OPA office for their exceptional skills in helping us organize this symposium while also enhancing our communication and social abilities. Special thanks go to **Dr. C. André Christie-Mizell**, Director of the Office of Postdoctoral Affairs, for his unwavering commitment to advocating for postdoc welfare and support.

We thank our keynote speaker, **Dr. Patricia L. Clark** from the University of Notre Dame, for accepting our invitation. She embodies the balance between leadership and dedication to research, serving as an inspiring role model for women in science and driving essential changes in the field.

We appreciate the numerous **faculty, staff, and organizations** across campus for accepting our invitation and contributing to the development of postdocs through their presence at the symposium, whether through workshops, lectures, or judging posters.

We sincerely thank our president, **Dr. Tor Nasci, for her guidance and for leading us** and all the **committee members** (listed in the next section in detail), who, despite their demanding research workloads, volunteered to bring this symposium to life. **This event is a testament to their dedication to the welfare and advancement of their peers.** Lastly, we thank you for attending this conference and making our efforts worthwhile despite your busy schedules.

Academic Co-Chairs –
Dr. Mithun Nag and Dr. Ashima Chopra

Organizing Committee 2024

VPA President & Registration Committee

Dr. Tor Nasci

Postdoctoral Fellow
Division of Nephrology and Hypertension
Vanderbilt University Medical Center

Dr. Tor Nasci has been an exceptional president, providing exemplary leadership throughout the symposium's planning and execution. She played a pivotal role in every aspect of the symposium, ensuring a smooth and organized experience for committee members. Additionally, she took on the critical task of managing and overseeing the registration and poster abstracts subcommittees, while also offering essential support in various other organizational aspects, demonstrating her dedication and multitasking abilities.

2024 Academic Co-Chairs

Dr. Ashima Chopra

Postdoctoral Fellow
Department of Biochemistry
Vanderbilt University

Dr. Ashima Chopra, the 2024 co-chair, demonstrated remarkable leadership, taking on numerous responsibilities in a short span of time. She skillfully coordinated all aspects of the symposium's planning, efficiently assigning tasks to team members and ensuring everything came together seamlessly. In addition, she took on several responsibilities as needed, demonstrating that she is truly an exceptional leader.

2024 Academic Co-Chairs & Presenter Committee

Dr. Mithun Nag Karadi Giridhar

Postdoctoral Fellow
Department of Biochemistry
Vanderbilt University

Dr. Mithun Nag, 2024 co-chair- It has been a great pleasure to put this program book together and work alongside such a talented and committed group of committee members. Every member has played a crucial role, and I am deeply grateful for the chance to learn from each of them. I also look forward to connecting with and learning from the broader postdoc network at Vanderbilt. I am particularly grateful to Dr. Patricia Clark for accepting our invitation to be the keynote speaker and for her unwavering commitment to advancing the careers of younger scientists.

Communications Committee

Dr. Kanchana Devanathan

Postdoctoral Scholar
Vanderbilt Biophotonics Center
Vanderbilt University

Dr. Kanchana Devanathan effectively drove the symposium's outreach efforts by designing compelling flyers and implementing strategic communication plans targeting campus departments and newsletters. Her meticulous management achieved broad visibility, notably enhancing messaging clarity. As a result, she successfully extended the event's impact to a wider audience. She also took the time to edit sections of the program book, contributing to its overall improvement and ensuring it was polished and cohesive.

Poster and Lightening Talk Committee

Dr. Karan Arora

Postdoctoral Scholar
Chemical and Biomolecular Engineering
Vanderbilt University

Dr. Karan Arora showcased his strategic efficiency by successfully engaging faculty members to compile a robust list of judges for the poster presentations. As the event neared, he proactively communicated with the judges, sending timely reminders to confirm their participation. His consistent involvement in all VPA symposium planning meetings further highlighted his commitment to ensuring the event's success.

Dr. Vinay Menon

Postdoctoral Scholar
Department of Chemical Bioengineering
Vanderbilt University

Dr. Vinay Menon’s calm demeanor and problem-solving skills were instrumental in approaching faculty judges effectively. As the event drew near, he prioritized communication, staying in touch with judges and sending reminders to confirm their attendance. His active participation in all VPA symposium planning meetings further demonstrated his commitment to the event's success.

Supplementary Session Committee

Dr. Naome Mwesigwa

Postdoctoral Fellow
Division of Clinical Pharmacology
Vanderbilt University Medical Center

Dr. Naome Mwesigwa effectively organized and coordinated our Innovation and Entrepreneurship talks as well as our leadership and management workshop with GPAS. She joined the committee at a critical planning juncture and effortlessly took the lead on these tasks. Her crucial efforts have played a significant role in effectively inviting faculty to participate in these sessions, benefiting our postdoc community.

Dr. Eman Desoky

Postdoctoral Fellow
Division of Cardiovascular Medicine
Vanderbilt University Medical Center

Dr. Eman Desoky graciously helped organize the supplementary communication and public engagement panel. She eagerly took the lead in identifying faculty for the panel and inviting them to participate. Her dedication and eagerness to put forth an excellent panel reflected wonderfully in the excellent faculty group we were able to recruit.

Resource Fair Committee

Dr. Mahima Sharma
Postdoctoral Scholar
Vanderbilt Biophotonics Center
Vanderbilt University

Dr. Mahima Sharma led the outreach efforts for the resource fair committee, successfully engaging various campus organizations and assembling a vibrant resource fair. Through her strategic outreach and proactive initiative, she adeptly invited numerous organizations, demonstrating her exceptional communication skills to bring together all organizations for the resource fair. Her exceptional ability to connect with so many groups has significantly enriched the resource fair. She also dedicated time to refining parts of the program book, adding her input to enhance its overall quality and ensure everything was well-organized and clear.

Academic Co-Chairs 2023

Dr. Madeline Searcy

Research Fellow
Division of Clinical Pharmacology
Vanderbilt University Medical Center

Dr. Madeline Searcy, the Academic Co-Chair for 2023, played a crucial role in initially leading the team and mentoring the 2024 co-chairs with her positive and motivating spirit. She has demonstrated that effective leadership is not just about guiding others but also about inspiring and motivating them to unlock their full potential. Her exceptional ability to engage with team members in an uplifting manner while maximizing their contributions has set a remarkable example for all.

Dr. Madushika Wimalarathne

Research Fellow
Division of Diabetes, Endocrinology and Metabolism
Vanderbilt University Medical Center

Dr. Madushika Wimalarathne played a vital role in the transition of the co-chair position, demonstrating exceptional skills in leadership while also dedicating herself to mentoring the next generation of co-chairs. Her guidance has been instrumental in fostering growth and collaboration within the team, making her a key figure in the process.

Office of Postdoctoral Affairs – The Engine Behind the Team

Faith Bishop

Associate Director
Office of Postdoctoral Affairs
Vanderbilt University

Faith Bishop has been an invaluable mentor to our team, excelling in communication, motivation, and community service. Her timely contributions and insightful guidance have been instrumental in enhancing our communication efforts, framing invites for keynote speakers and others, and ensuring we convey our message effectively. She has been a guiding light for this symposium in all aspects, providing invaluable support from the initial planning stages through to the execution of the event.

Annie Evans

Program and Communications Manager
Office of Postdoctoral Affairs
Vanderbilt University

Annie Evans has been indispensable for this event and our community, with her sweet and cheerful demeanor playing a crucial role in keeping everything organized. Her unwavering commitment to the betterment of our postdoc community is evident at every event. She adeptly guided us whenever we veered off course, managed important details with diligence, coordinated critical facilities and administrative tasks, and provided support in every aspect of the symposium.

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Vanderbilt Postdoctoral Association