Creighton University

St. Albert's Day

University Research Week

March 26-27, 2024
Harper Center

Creighton
UNIVERSITY

HISTORY OF ST. ALBERT'S DAY AT CREIGHTON UNIVERSITY

In 1997, faculty from the health science schools, as well as from the College of Arts and Sciences, expressed an interest in promoting the interaction between faculty scientists and students at Creighton University at both the undergraduate and graduate level. A series of discussions resulted in the first St. Albert's Day celebration, which was held on November 24, 1997. Since 1997, the St. Albert's Day poster session has been an annual event at Creighton University. In 2008, the event was expanded to include oral (platform) presentations as well as posters. Awards will be presented for the 'best poster' in three categories, as well as for the 'best presentation.'

St. Albert the Great was born in 1205 or 1206, and as a youth was sent to pursue his studies at the University of Padua. He joined the Order of St. Dominic in 1223. He completed a doctor's degree at the university in Paris, which was celebrated as a school of theology. In 1254 Albert was elected Provincial of his Order in Germany. He resigned this office in 1257 in order to devote himself to study and to teaching. He was canonized in 1931. He is the patron saint of scientists and was the mentor of St. Thomas Aquinas. He was called the "Doctor Universalis" (Universal Doctor), in recognition of his extraordinary genius and extensive knowledge. He composed a veritable encyclopedia that contained scientific treatises on almost every subject. He was proficient in every branch of learning cultivated in his day, including physics, mathematics and metaphysics, and his writings did not distinguish between the sciences and philosophy.

CREIGHTON ST. ALBERT'S DAY
SCHEDULE OF EVENTS

Tuesday March 26

8:45-10:45 AM

Poster Presentations	Harper Ballroom
Oral Platform Presentations	Harper 2045/2046

11:00-1:30 PM

Medical Student Luncheon and Abstract Awardee Presentations	Harper 4068/4069

1:45-3:45 PM

Poster Presentations	Harper Ballroom
Oral Platform Presentations	Harper 2045/2046
Virtual Presentations	Links in Index

Wednesday March 27

8:45-10:45 AM

Poster Presentations	Harper Ballroom
Oral Platform Presentations	Harper 2045/2046

11:30 AM- All Welcome to Attend

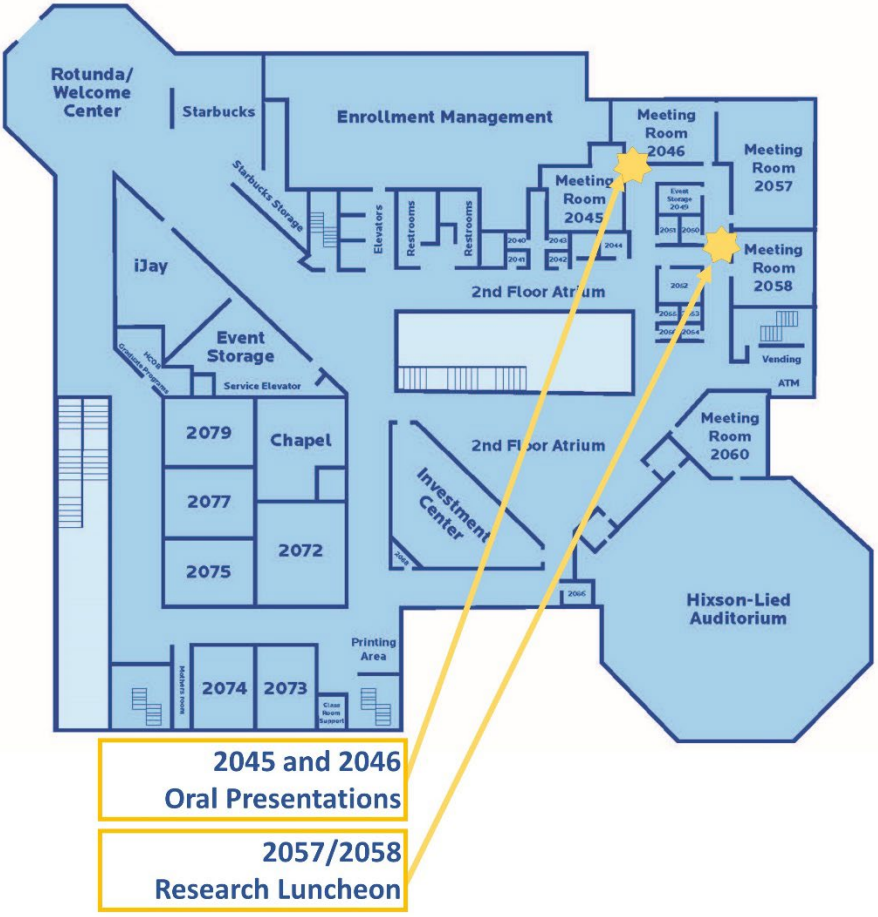
Research Award Luncheon Harper 2057/2058

Can't Attend the Luncheon

https://creighton.zoom.us/j/99717084927

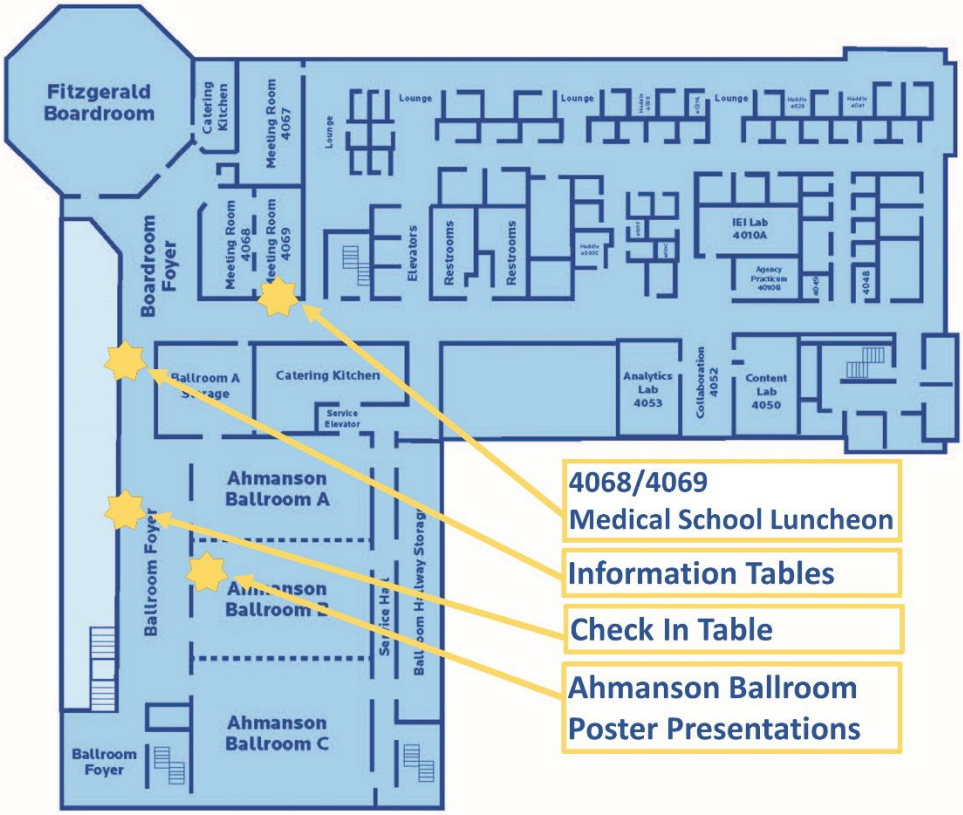
Mike and Josie
Harper Center

Second Floor



Mike and Josie
Harper Center

Fourth Floor



INDEX OF MORNING POSTER PARTICIPANTS
8:45-10:45 AM
TUESDAY, MARCH 26, 2024

Poster:	Presenter/s:		Poster:	Presenter/s:	
1	Madeline	Soyer	**23**	Nathan	Pucel
2	Cleo	Zagurski	**24**	Zach	Onyszchuk
3	Katie	Huisman	**25**	Isaac	Gart
4	Seraphine	Kamayirese	**26 Group**	Kate	Ellis
5	Morgan	Newman	**27 Group**	Kaitlin Eva	Smith Doescher
6	Elizabeth	Alberts	**28**	Samadhi	Kulasooriya
7 Group	Alessandra	Kakish	**29**	Katelyn	Grzelak
8	Ayden	Chavez	**30 Group**	Anya	Ortiz
9	Md Jobair Hossen	Jony	**31**	Isaiah	Tabbert
10	Elise	Gooding-Lord	**32 Group**	Zoe	Bruno
11	Troy	Belleville	**33**	Lexie	Tonnemacher
12	Maddie	Thill	**34**	Shreya	Kannan
13	Grace	Dirks	**35 Group**	Austin	Charles
14	Emily	Cronin	**36**	Trevor	Haugen
15	Neha	Devi	**37**	Hunter	Tavares
16	Mikayla	Grocki	**38**	Lukas	Erickson
17	Patrick	Kuwong	**39**	Nick	Wright
18	Hannah	Ladwig	**40**	Sannidhi	Poojary
19	Alex	Payne	**41**	Balaji	Yadav
20	Moynul	Islam	**42**	Pulkit	Sahai
21	Siddhesh	Pansare	**43**	Aditi	Charak
22	Sri Sai Nikitha	Kota	**44**	Fabiola	Alanoca Rugel

INDEX OF MORNING POSTER PARTICIPANTS

Medical Students

8:45-10:45 AM

TUESDAY, MARCH 26, 2024

Poster:	Presenter/s:		Poster:	Presenter/s:	
47	Marco	DiBlasi	**77**	Keegan	Koeneman
48	Branden	Chamberlain	**78**	Joseph	Lee
49	Suhail	Sidhu	**79**	Trevor	Hu
50	Claire	Knowlan	**80**	McKayla	Deisz
51	Troy	Belleville	**81**	Adrianna	Glisan
52	Olivia	Foley	**82**	Paul	Wilkinson
53	Nicole	Rud	**83**	Taylor	Billion
54	Ashley	Tuin	**84**	April	Cooke
55	Zachary	Brandt	**85**	Emma	Thomsen
56	Eva	Holland	**86**	Noah	Wilson
57	Jacqueline	Theil	**87**	Taylor	Carlson
58	Hannah	Rud	**88**	Connor	Lanoue
59	Sarah	Robinson	**89**	John	McCarthy
60	Ricky	Rana	**90**	Makenzie	Maroney
61	Walter	Crum	**91**	Daniel	Murillo Armenta
62	Alexandra	Van Cleave	**92**	John Paul	Braun
63	Christy	Heimbrecht	**93**	Ivanna	Tang
64	Ravishankar	Madhu	**94**	Martha	Koenig
65	Kiley	Nelson	**95**	Mack	Tempero
66	Corinna	Brown Ton	**96**	Gina	Marcuzzo
67	Lavanya	Uppala	**97**	Maria	Arroyo
68	Samantha	Draves	**98**	Henry	Weresh
69	Jay	Hrdlicka	**99**	Luke	Baxter
70	Clare	Wieland	**100**	Sowmya	Kolluru
71	Mustafa	Beidas	**101**	Brendan	Carmody
72	Peter	Halloran	**102**	Jack	Catoe
73	Brenna	Hartman	**103**	Mariah	Fleischman
74	Geetika	Guturu	**104**	Joseph	Davidson
75	Nansea	Ji	**105**	Mohammed	Al Kurnas
			106	Eli	Blaney

INDEX OF AFTERNOON POSTER PARTICIPANTS
1:45 – 3:45 PM
TUESDAY, MARCH 26, 2024

Poster:	Presenter/s:		Poster:	Presenter/s:	
200	Emma	Stenner	**229**	April	Krywe
201	Julian	Garcia	**230**	Charlotte	Block
202	Eva	Brucciani	**231**	Joshua	Taylor
203	Prerna	Tiwari	**232**	Dylan	Bui
204 Group	Christopher	Krall	**233**	Devon	Stoffel
205	Isabel	Kidd	**234**	Cole	Krudwig
206	Lauren	Barbush	**235**	Katherine	Cunningham
207	Alec	Brown	**236**	Jenny	Grissom
208	Shayla	Edwards	**237**	Quinn	Carlson
209	Caroline	Jachino	**238**	Matthew	LeMay
210	Cassie	Kallhoff	**239**	Daniel	Kohl
211	Ameera	Naif	**240**	Andrew	Sheppard
212	Tianzhou	Xing	**241**	William	Culp
213	Hannah	Reynolds	**242**	Amit	Pant
214	Hannah	Sealock	**243**	Jennifer	Omann
215	Kaylen	Lathrum	**244**	Anupama	Nair
216 Group	Sophia	St Marie	**245**	Benjamin	Brockmann
217	Logan	Buchanan	**246 Group**	Daylen	Kalhberg
218	Ameya	Joshi	**247**	Maise	Laughlin
219	Grace	Stegeman	**248**	Jack	Vandenbussche
220	Philip	Richardsen	**249**	Thomas	Hare

… continued on next page

Poster:	Presenter/s:		Poster:	Presenter/s:	
221	Aliya	Haas	**250 Group**	Sanford	LeGrand
222	Nick	Lovick	**251 Group**	Andrew	Schlundt
223	Jonathan	Fleegel	**252**	Aidan	Nguyen
224	Chance	Persons	**253**	Ben	Budesheim
225	Jacqueline	Austin	**254 Group**	Steven	Fernandes
226 Group	Natasha	Ratnapradipa	**255**	Marcos	Gonzalez
227	Dylan	Nill	**256**	Patrick	Young
228 Group	Jayce	Hughes			

INDEX OF MORNING POSTER PARTICIPANTS
8:45-10:45 AM
WEDNESDAY, MARCH 27, 2024

Poster:	Presenter/s:		Poster:	Presenter/s:	
300	Kate	Hessman	**320**	Andree-Zeid	Kakish
301	Nicole	Strom	**321**	Connor	Price
302	Camille	Vigil	**322**	Carina	Cook
303	Bridget	Orr	**323 Group**	Lily	Calvin
305	Caitlin	Sousley	**324**	Brianna	Johnson
306	Leilani	Hung	**325**	Rodaina	Hazem Monieb
307	Madeleine	Britto	**326**	Parisa	Rafiei
308	Emma	Reed	**327 Group**	Ty	Monson
309	Shea	Corwin	**328**	Renju	Pun
310	Ava	Monte	**329**	Olivia	DeBoer
311	Emily	Atamov	**330**	Shruthi	Iyer
312	Mary	Said	**331**	Mahesh K	Nayak
313	Amy	Wenzel	**332 Group**	Colin	Welsh
314	Emily	Carpenter	**334**	Zachary	Pendola
315	Lauren	Ross	**335**	Jack	Bertagnolli
316	Sarah	Jones	**336**	Beck	Vires
317	Ryan	Ward	**337**	Beck	Vires
318 Group	Shannon	Hagen	**338 Group**	Ashley	Homecgoy
			339	Jeanne	Gearity

INDEX OF ORAL PLATFORM PARTICIPANTS
TUESDAY, MARCH 26, 2024
8:45-10:45 AM

Presentation:	Presenter/s:		Time	Room:
108	Hannah	Graff	8:45-9:00 AM	Harper 2025
109	Evanjalina	Matoy	9:05-9:20 AM	Harper 2025
110	Abby	Jordan	9:25-9:40 AM	Harper 2025
111	Kellen	McDonald	9:45-10:00 AM	Harper 2025
112	Jocelyn	Plowman	8:45-9:00 AM	Harper 2026
113	David	Doss	9:05-9:20 AM	Harper 2026
114	Nathan	Jobalia	9:25-9:40 AM	Harper 2026
115	Kaden	Luellman	9:45-10:00 AM	Harper 2026

INDEX OF ORAL PLATFORM PARTICIPANTS
TUESDAY, MARCH 26, 2024
1:45 – 3:45 PM

Presentation:	Presenter/s:		Time	Room:
257	Thomas	Ward	1:45-2:00 PM	Harper 2025
258	Ivy	Williams	2:00-2:15 PM	Harper 2025
259 Group	Natalie	Gonzalez	2:15-2:30 PM	Harper 2025
260	Brianna	Blake	2:45-3:00 PM	Harper 2025
261	Sophie	Ciechanowski	1:45-2:00 PM	Harper 2026
262	Rachael	Urquhart	2:00-2:15 PM	Harper 2026
263	Adam	Burr	2:15-2:30 PM	Harper 2026
264	Lukas	Kocher	2:45-3:00 PM	Harper 2026

INDEX OF ORAL PLATFORM PARTICIPANTS
WEDNESDAY, MARCH 27, 2024
8:45-10:45 AM

Presentation:	Presenter/s:		Time	Room:
342	Angelia	D'Souza	9:0-9:15 AM	Harper 2025
343	Vignesh	RA	9:15-9:30 AM	Harper 2025
344	Richard	Lutze	9:30-9:45 AM	Harper 2025
345	Cameron	Brookhouser	9:45-10:00 AM	Harper 2025
346	Liana	Chinen	10:00-10:15 AM	Harper 2025
347	Timothy	Pfannenstiel	10:15-10:30 AM	Harper 2025
348	Daniel	Afolabi	8:45-9:00 AM	Harper 2026
349	Philip	Richardsen	9:0-9:15 AM	Harper 2026
350	Shreshtha	Dash	9:15-9:30 AM	Harper 2026
351	Jillian	Hinman	9:30-9:45 AM	Harper 2026
352	Collin	Jackson	9:45-10:00 AM	Harper 2026
353	Nik	Johnson	10:00-10:15 AM	Harper 2026
354	Tucker	Knaak	10:15-10:30 AM	Harper 2026

DISTANCE PRESENTATIONS
STUDENT ABSTACTS

ROOM 1 ZOOM LINK:

https://creighton.zoom.us/j/93947121017

Presentation:	Presenter/s:		Time:
356	Megan	Anderson	1:45PM
358 Group	Jessica	Scherer	2:00PM
359	Jess	Frantz	2:15PM
360	Carrie	Miller-Conley	2:30PM
361	Michelle	Bridgeman	2:45PM

SUMMER FACULTY FELLOWSHIP RECIPIENTS

Dr. Angela Devlin, Department of Chemistry and Biochemistry
Study of conductivity enhancement effect in metal-organic frameworks

Dr. Carol Fassbinder-Orth, Department of Biology
Can declining honeybee colonies be saved? Exploring the use of vibroacoustics to predict colony decline and the use of supplements to prevent decline.

Dr. Faith Kurtyka, Department of English
Writing, Revising, and Re-Humanizing the Medical School Personal Statement

Dr. Makenzie Long, Department of Chemistry and Biochemistry
Computational Modeling of Alkaline Earth Metal Ion Binding to a Carboxylate-Terminated Monolayer

Dr. Britta McEwen, Department History
Memory Interrupted: Para-fascism in Austria, 1933-1938

Dr. Sherri Weitl-Harms, Dept. of Computer Science, Design, and Journalism
Creating a Tool for Sentiment Analysis of User Experiences (SAUX)

Dr. Amber Witherby, Department of Psychological Sciences
Can Making Judgments of Learning Directly Improve Learning of Educational Material?

DR. HADDIX PRESIDENT'S FACULTY RESEARCH FUND RECIPIENTS

Manuel Cevallos, Department of Medical Education (Phoenix) and Steven Fernandes, Department of Computer Science, Design & Journalism
TAKAI: Teaching Human Anatomy with Artificial Intelligence

Brenda Coppard, School of Pharmacy and Health Professions
Significant Student Debt: Creighton Occupational and Physical Therapists Alumni Debt Context

John Cote, Department of Obstetrics & Gynecology (Omaha)
Creighton Women's Health Initiative

Rosalind Heckman, Department of Physical Therapy (Omaha)
The Influence of Stroke on the Preparation and Initiation of Shoulder Movement - Evidence from STARTLE

Rashelle Hoffman, Department of Physical Therapy (Omaha)
Cognition, Brain, and Intensity Outcomes Associated with High-Intensity Interval Training in Older Adulthood

Jiwon Kim, Department of Education
Development of Nice Counselor Syndrome Scale

David Mullins, Department of English
The Houndsman, A Novel-in-Progress

Elham Rastegari, Department of Accounting & Business Intelligence & Analytics
Longitudinal Assessment of Simulated Surgical Training using Similarity Network Models

Kimberley Scott, Department of Physical Therapy (Omaha)
Quantifying Upper Extremity Motor Performance for Infants with Unilateral Cerebral Palsy to Define Intervention Dose-Response Relationships

Surabhi Shukla, Department of Pharmacy Sciences
Development of Lipid-Polymer Hybrid Nanoparticles of HDAC Inhibitors for Treatment of Retinitis Pigmentosa

Mark Siracuse, Department of Pharmacy Sciences
The Experience of Pharmacist Burnout: Explaining Impacts of the COVID-19 Pandemic and Theory Development

Peter Steyger, Department of Biomedical Sciences
Mechanism of Aminoglycoside Transport into the Vestibular System

Trina Walker, College of Nursing
Implementation of Pharmacogenomic Testing to Improve Mental Health Outcomes: An Interdisciplinary Team Approach

Kelsey Witherspoon, Department of Medicine (Omaha)
Infectious Disease Department PCN Skin Testing

MAGIS! Investigatio RESEARCH AWARDEES

Dr. Andrew Ekpenyong, Department of Physics
Science in Space to Cure Disease on Earth: Using Simulated Microgravity for Cancer Tissue Engineering

Dr. Rosalind Heckman, Department of Physical Therapy
The Influence of Sit-to-Stand Initiation Strategy on Movement Timing and Force

Dr. Martin Hulce, Department of Chemistry and Biochemistry
Preparation of Chalcogenophenethiocarboxylic Acids for Metal-Organic Framework Synthesis

Dr. Christopher Krall, Department of Theology and Neuroscience
The Theology and Neuroscience of Suffering: Implications, Complexities, and Conversions

Dr. Jason D. Marshall, Department of Marketing & Management
Redefining Strategic Leadership to Bridge the Research-Practice Divide

Dr. Peter S. Steyger, Department of Biomedical Sciences
Assessing Tau Deposition, Synaptic Integrity and Myelination in the Midbrain after Cisplantin Treatment

CLARE BOOTHE LUCE RECIPIENTS

Sophie Claudine Ciechanowski
Darby Durbin
Aliya Li Yuan Haas
Grace Jaworski
Margaret Elizabeth Laughlin
Jennifer Ann Omann
Elyssa Pereyra
Rebekah Mary Vires

CLARE BOOTHE LUCE UNDERGRADUATE RESEARCH SCHOLARSHIP

Sophie Maia Cayo
Ivy Williams

COLLEGE OF ARTS AND SCIENCES DEAN'S SUMMER UNDERGRADUATE RESEARCH SCHOLARS

Ben Budesheim, *Revolutionary Rhetoric in 19th Century Literature*
Faculty Mentor: Dr. Simon Appleford

Emily Cronin, *How Reinforcing is Vaped Delta-8? Investigating the Self-Administration of Vaporized Delta-8 in Rats*
Faculty Mentor: Dr. Dustin Stairs

Angelia D'Souza, *Beyond the Color Lines: An Autoethnographic and Literary Analysis of South Asian American Femininity in Popular Culture*
Faculty Mentor: Dr. Surbhi Malik

Kate Hessman, *Self-Concept and Urgency: The Impact of Identity and Purchase Urgency on Consumer Decision-Making*
Faculty Mentor: Dr. Joshua Fairchild

Abby Jordan, *Weaving the Narrative: An Exploration of Personal Identity Through Fiber Arts*
Faculty Mentor: Amy Nelson, MFA

Stephanie Meisterling, *Flyover State of Mind: Painting Nebraskan Poets*
Faculty Mentor: Rachel Mindrup, MFA

Emma Stenner, *Tiles, Themes, and Thermae: Mosaics in the Roman Colony of Antiochia and Cragum as Cultural Clues*
Faculty Mentor: Dr. Erin Averett

Nicole Storm, *Investigating the Traits of Male Black Swallowtail Butterflies while Engaging in "Hill Topping" Behavior in A Nebraska Prairie*
Faculty Mentor: Dr. Theodore Burk

Ava Szatmary, *How We Share: Exploring the Development of Distributive Justice Strategies in Children in Namibia, Southern Africa*
Faculty Mentor: Dr. Jill Brown

Emma Tight, *Women and their Destiny: Literary Influences and Realities in Emilia Pardo Bazán's Short Stories at the fin de siècle.*
Faculty Mentor: Dr. José McClanahan

Rebekah (Beck) Vires, *Non-destructive Analysis of Polychromy and Studies in Archeological Research in Cyprus*
Faculty Mentor: Dr. Erin Averett

COLLEGE OF ARTS AND SCIENCES HONORS PROGRAM SUMMER UNDERGRADUATE RESEARCH FELLOW

Amy Wenzel, *Intentional Horrors: The Appeal of Horror Film as a Coping Mechanism to Fans with Anxiety*
Faculty Mentor: Dr. Faith Kurtyka

DR. AND MRS. RANDOLPH FERLIC SUMMER UNDERGRADUATE RESEARCH FELLOWS

Julian Garcia, *Fluctuating Asymmetry in Turtle Limbs – A Deeper Analysis of Proximal and Distal Bones: Do Different Bones Develop Differently?*
Faculty Mentor: Dr. Gabriel Rivera

Elise Gooding-Lord, *The King of the Hill: Observing Hilltopping in Male Papilio Polyxenes*
Faculty Mentor: Dr. Theodore Burk

Trevor Haugen, *Control of Cochlear Amplification by Cellular and Acellular Elements of the Mammalian Cochlea*
Faculty Mentor: Dr. Sarath Vijayakumar

Alessandra Kakish, *Analysis of Bacterial Viability in the Presence of glmS Riboswitch Ligand Analogs*
Faculty Mentor: Dr. Juliane Strauss-Soukup

Maisie Laughlin, *Genomic Location of a Putative Male Determining Gene in Black Flies*
Faculty Mentor: Dr. Charles Brockhouse

Joseph Poggi, *Behavioral Fever and Humidity Preference of Crickets Experimentally Infected with Horsehair Worms*
Faculty Mentor: Dr. John Shea

Connor Price, *Triazole chelators for Pb(II) Chemosensing*
Faculty Mentor: Dr. James Fletcher

Ellie Quattrocchi, *Choroid Plexus and the Cerebrospinal Fluid in Healthy Brain Aging*
Faculty Mentor: Dr. Gwendalyn King

Landon Reichmuth, *Characterization of Spc42 in the Spindle Pole Body of S. Cerevisiae and K. Lactis*
Faculty Mentor: Dr. Ann Cavanaugh

Lauren Ross, *Inhibition Kinetics of Novel Anti-Tuberculosis Compounds*
Faculty Mentor: Dr. Lynne Dieckman

Megan Rysko, *Characterization of Candida Albicans Microtubule Organizing Center*
Faculty Mentor: Dr. Ann Cavanaugh

Madeline Soyer, *Fatty Acid Composition of Zebrafish Modeling Carnitine Palmitoyltransferase II Deficiency*
Faculty Mentor: Dr. Eric Haas

Devon Stoffel, *The Influence of Age and Gender on the Load Velocity Profile*
Faculty Mentor: Dr. Mitchel Magrini

Nicholas Tobin, *Efficacy of 3D-Printing Silica Glass Printing by Varying Qualities and Procedures*
Faculty Mentor: Dr. Joel Destino

ARCHIVES & SPECIAL COLLECTIONS RESEARCH FELLOWSHIP

Adele Varley, *An American Homecoming: A Novel Exploring How Family, Secrecy, and Immigration in the Early 20th Century Impacts the Present*
Faculty Mentor: Dr. Faith Kurtyka

SUREN AND MADVI GUPTA ENDOWED FELLOWSHIP

Cole Salgado, *Pesticides Degrading the Environment: Triazicide's Effect on the Reproductive Cycle of P. Varius*
Faculty Mentor: Dr. John Shea

POSTER PRESENTATIONS: 8:45-10:45 AM
TUESDAY, MARCH 26, 2024
STUDENT ABSTRACTS

1 *Fatty Acid Composition of Spodoptera Frugiperda to Investigate CPTII Deficiency*

Department of Chemistry and Biochemistry

Madeline Soyer, and Eric Haas

Fatty acid oxidation disorders are a complex set of metabolic deficiencies with a wide variety of causes. Carnitine palmitoyl transferase II deficiency is one such disorder which ranges in severity from a lethal neonatal form to a myopathic form. The CPTII protein is a transport protein located on the inner membrane of the mitochondria, so deficiency results in poor transport of fatty acids into the mitochondria for Î²-oxidation. Our lab is studying this deficiency in Spodoptera frugiperda by investigating how alterations in splicing and translation of the CPTII protein affects levels of various long chain fatty acids present in the whole organism. The Spodoptera frugiperda are homogenized then the lipids are saponified and converted to methyl esters using the method of Folch as modified by Bligh and Dyer. These samples are spiked with heptadecanoic acid methyl esters in order to determine absolute quantities of lipids. Gas chromatography-mass spectroscopy (GC-MS) is used for separation and analysis of long chain fatty acids. Samples are compared by instar of the insect to investigate how fatty acid composition changes throughout the larval stages of the insects. Preliminary data suggests that relative abundance of the common lipids remains consistent throughout development. Continued work on this project will confirm or refute these initial findings in wild type Spodoptera frugiperda. We have also designed morpholinos to block splicing and translation of RNA for the CPTII protein. Future work will include introducing these morpholinos to the insects to discover how alterations in the CPTII protein effects metabolism of the fatty acids of interest.

2 *The Nebraska Women's Bill of Rights: An Interpretive Policy Analysis*

Honors Program, Department of Cultural and Social Studies

Cleo Zagurski

During the 2023 Nebraska legislative session, Legislative Bill 574 (LB574), the "Let Them Grow Act", was passed, banning gender-affirming care for minors and surgical abortion after 12 weeks. This law was followed by an executive order titled "The Women's Bill of Rights", defining various gender and sex-related terms that were used in LB574. Introduced by Governor Jim Pillen in August 2023, the primary artifact had the goal of preserving female-only spaces such as locker rooms and sporting teams. National and historic trends of power, minimizing rights of the marginalized, and alt-right policies have been exemplified through the policy situation related to the primary artifact. An interpretive policy analysis was used to analyze the primary and secondary artifacts. I analyzed the language used in this artifact and its implications in the currently opened policy window. Various themes such as biased definitions related to identity are identified. Gender has been defined strictly along the binary, directly impacting non-cisgendered people. The constructed issues of abortion and transgender rights are identified at both the state and federal levels. The polarization of the Nebraska legislature and the timing of the publishing of the primary artifact culminated in a successful political situation. State-funded data collection, schools, and prisons are direct avenues of blocking and affirming efforts to the primary artifact. Future implications include various levels of policy related to autonomy, gender, and marginalized populations. Other concerns related to policy development, the polarization of Nebraska's unicameral, and the act of defining by a non-expert warrant further investigation.

3 *Synthesis and Structures of Novel Lanthanide Mixed Phosphite-Sulfate Structures Formed via in-situ Ligand Reactions*

Department of Chemistry & Biochemistry

Katie Huisman, and Eric Villa

Phosphorous acid (H_3PO_3) is a water-soluble acid and reducing agent. In solution, it easily deprotonates to become phosphite (HPO_3^{2-}), which will bind to metals. Phosphites are used as plant fertilizers and can double as a fungicide and pesticide against various pathogens. Likewise, sulfamic acid (H_3NSO_3) can also be used as an herbicide and a generalized cleaning agent. The presence of either or both within soil matter allows for potential complexation to various metal ions, which greatly influences their stability and mobility within the environment. With an interest in understanding the ways metals and these ligands can interact, we continue our lanthanide phosphite studies by incorporating a secondary ligand in sulfamic acid. Interestingly, sulfamic acid hydrolyzes during these reactions to form bisulfate and ammonium cations, the latter of which become the charge balancing cations for the anionic lanthanide phosphite-sulfate network. In this presentation, we will present the syntheses and structures in this unique system.

4 *CDC25A-Derived Phosphopeptides Bind 14-3-3 in With High Affinities*

Department of Biomedical Sciences

Seraphine Kamayirese, Sibaprasad Maity, Laura A. Hansen and Sandor Lovas

14-3-3 is involved in various types of malignancies, in cutaneous squamous cell carcinoma (cSCC), 14-3-3 is overexpressed and mislocalized from the nucleus to the cytoplasm where it interacts with the cell division cycle 25 A (CDC25A) to suppresses apoptosis. Thus, inhibition of the 14-3-3 - CDC25A interaction is a promising target for the development of therapeutics for cSCC. Previously, this group developed a novel peptide; pS corresponding to a binding region of CDC25A to 14-3-3 proteins. The pS peptide

binds 14-3-3, and induces cell death of cSCC cells, at a high IC50 (29 Î¼M). In the current work, we optimize the pS to improve its affinity for 14-3-3. The pS peptide was truncated to obtain its 9 amino acid residue analog, pS (174-182). Then, computational Ala-scanning was used to identify residues of the peptide that are crucial for 14-3-3 pS (274-182) interactions. Based on the binding motifs of 14-3-3 proteins and Ala-scanning results, pS (174-182) was modified at various positions. Free energies of binding of the peptides to 14-3-3 were determined using steered molecular dynamics. Binding of synthetic peptides to recombinant 14-3-3 was determined by differential scanning fluorimetry and surface plasmon resonance. Our results show that the peptides bind 14-3-3. Shortening the pS peptide from 14 to 9 amino acid residues reduced its affinity for 14-3-3, however, the affinity was restored by introducing Phe or Tyr in position 176. The ability of the peptide analogs to induce apoptosis will be studied in cSCC cells.

5 *Mortality in Operative vs. Non-Operative Management of Pediatric Gun Shot Wounds*

Physician Assistant Program

Morgan Newman

In recent years, pediatric fatalities from firearm incidents have surpassed those caused by motor vehicle crashes. Existing treatment protocols are largely derived from adult based data which overlook the unique anatomy and physiology of the pediatric population. Historically, emergent laparotomy was favored in penetrating injuries like gunshot wounds (GSW), while non-operative management (NOM) was reserved for blunt trauma.
This research focuses on 0-18-year-olds in 2009-2021 with intra-abdominal and intra-thoracic injuries. Hemodynamic instability, peritonitis and CT findings aided the distinction of solid organ vs. hollow-viscous injuries (HVI) while the Injury Severity Score (ISS) and pH were predictors of mortality. A combination of these factors played a key role in the decision for surgery. In a case study discussed, there

was an effectiveness to a hybrid approach. Many of the multisystem injuries were managed operatively, though the perinephric kidney injury was successfully treated without surgical intervention.
Given that timely intervention is performed, we can avoid entering a resuscitation cycle that will significantly lessen the chances for survival. A decision for surgery is contingent on patient status and the location of damage but there is an evolving paradigm toward NOM. HVI's mandate surgery due to infection risk, however, many solid organ injuries can be controlled medically.
As medicine continues to advance, we are moving toward more conservative routes of treatment; pediatric GSW's are no exception. A deeper look into population specific management is crucial in improving patient outcomes and mitigating the public health crisis posed by firearm-related trauma.

6 *SHAPE ANALYSIS OF CRASSOTREA GIGAS OAZ-PK RNA*

Department of Chemistry and Biochemistry

Elizabeth Alberts, and Juliane Strauss-Soukup

A riboswitch is a non-coding RNA that functions in controlling downstream gene expression when bound to a metabolite that can induce a structural change in the RNA. When a riboswitch interacts with its specific metabolite, it undergoes a conformational change that affects the expression of genes downstream to its binding site. The downstream gene is involved in synthesis the riboswitch metabolite, so these unique RNAs use feedback control of the associated metabolic pathway. The Soukup lab is researching a potential eukaryotic riboswitch in the Ornithine Decarboxylase Antizyme pseudoknot (OAZ-PK) RNA segment of a variety of genes. Known riboswitches in bacteria have a significant effect on various metabolic pathways, providing a way to develop new antibiotic treatments. Identification of similar non-coding RNAs in eukaryotic species may provide a possible way to develop novel antibiological agents. This project focuses on studying a potential riboswitch in Crassostrea gigas, a species of

oyster, involved in polyamine biosynthesis. Specifically, Selective 2Â¢'-Hydroxyl Acylation analyzed by Primer Extension (SHAPE) experiments are being used to analyze structural changes of this non-coding RNA segment when it interacts with various natural and non-natural polyamines. Analyzing these structural changes will aid in identifying this RNA segment as a riboswitch that could open the possibility of developing novel antibiological agents.

The project described was supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under Grant # 5P20GM103427.

7 *Analysis of Bacterial Viability in the Presence of glmS Riboswitch Ligand Analogs*

Group Department of Chemistry and Biochemistry
Alessandra Kakish, Gigi Fong, Katherine Timboe, Alex Van Cleave, and Juliane Soukup

Antibiotics are becoming more ineffective as bacteria adapt to drugs that were devised to kill them, threating public health systems. However, researchers have identified riboswitches, non-coding segments of mRNA that affect the expression of downstream genes, as a new target for antibacterial agents, one of which is the highly extensive glmS riboswitch.

The glmS riboswitch controls the gene expression of fructose-6-phosphate amidotransferase, which synthesizes glucosamine-6-phosphate (GlcN6P) in bacterial cells. GlcN6P is a precursor in bacterial cell wall biosynthesis, and therefore, its synthesis is essential. The glmS riboswitch is also a catalytic ribozyme, which self-cleaves upon binding to GlcN6P. This cleavage degrades the mRNA, inhibiting glmS gene expression and preventing bacterial cell wall synthesis. Because the glmS riboswitch can control cell viability, it's a potential target for new antibiotics.

This project focuses on identifying analogs with similar resemblance to GlcN6P that can affect the riboswitch as an agonist or antagonist. To determine whether GlcN6P ligand analogs can inhibit bacterial growth, assays are performed to monitor Bacillus subtilis and Staphylococcus aureus

growth in the presence or absence of potential GlcN6P analogs. Preliminary data suggests that L-serine decreases bacterial growth at concentrations of ~31.3 mM for B. sub and 62.5 mM for S. aur. Optimization of RT-PCR is also being conducted to verify whether the glmS gene and glmS riboswitch RNAs are downregulated. Future studies will verify that the analogs are decreasing growth via interaction with the glmS riboswitch and will investigate the effects of L-serine on mutant strains of B. sub and S. aur.

8 *Klotho and the Stria Vascularis*

Creighton University Biology Department- Neuroscience

Ayden Chavez, and Gwendalyn King

Klotho-deficient mice rapidly develop premature aging-like phenotypes which shortens lifespan. Originally the phenotype was labeled as “aging-like” because the combination of disorders is not seen together outside of older humans. Subsequently klotho-deficiency was shown to induce hearing loss although no mechanistic information explains why. The presence of klotho plays an important role in transporter protein expression within the brain’s choroid plexus. To determine whether a common mechanism might cause hearing dysfunction in both tissues, we are looking at the cochlea’s stria vascularis. Stria vascularis secretes the endolymph fluid needed for hearing. Stria vascularis functional measurement showed no change between genotypes however H and E stain detected increased thickness of the klotho-deficient cochlea. Since klotho-deficient mice die early in life, what we first observe in thickness could lead to long-term loss of function. In seeking more evidence to why the stria is thicker, we are examining protein expression of cochlea at different ages to determine whether these might explain loss of hearing.

9 *Formulation of Chitosan Nanoparticles for Delivering the PRPF31 Gene to Retinal Cells*

Department of Pharmacy Sciences
Md Jobair Hossen Jony, Erik Dean Moore, Alekha Dash, and Surabhi Shukla

Retinitis Pigmentosa (RP) leads to vision loss due to photoreceptor cell degradation, with treatments only offering symptom relief. PRPF31 gene mutations play a significant role in the autosomal dominant form of RP. Gene therapy emerges as a potential solution, yet delivery challenges limit its efficacy. This study proposes using biocompatible chitosan nanoparticles (NPs) to develop a delivery system for the PRPF31 gene, aiming to address these challenges.

The pDNA was cloned and extracted according to the manufacturer's protocol. The Chitosan NPs loaded with plasmid DNA (pDNA) were prepared through a complex coacervation process. The NPs were characterized for particle size, zeta potential, and surface morphology. Additionally, the loading capacity and encapsulation efficiency of the nanoparticles, as well as their protective effect on the plasmid, were evaluated.

The average particle size, polydispersity index, and zeta potential were 284.52± 9.46 nm, 0.316± 0.08, and +45.47± 4.58 mV, respectively. Scanning Electron Microscopy images confirmed the formation of nanoparticles and their spherical morphology. Gel electrophoresis results indicated that the chitosan nanoparticles effectively protected the pDNA.

We have successfully prepared chitosan nanoparticles for PRPF31 gene delivery in nano-size range. Gel electrophoresis affirmed the similarity between the cloned plasmid and the original plasmid. The gel retardation assay helped determine the optimal chitosan-to-plasmid ratio for effective DNA encapsulation. The integrity of encapsulated plasmids within NPs was confirmed by their intact recovery following the enzymatic cleavage of the NPs.

10 *King of the Hill: Hilltopping in Male Black Swallowtails*

Department of Environmental Science and Biology
Elise Gooding-Lord, Nicole Strom, Hana Griffin, and Theodore Burk

The Black Swallowtail butterfly is a common member of the Papillionidae family found throughout North America in prairie and agricultural ecosystems. This study focuses on a population of Papilio polyxenes found on Glacier Creek Preserve which has one pronounced hill on the southeast side. The Black Swallowtails use this hill to perform their unusual mating behavior called hilltopping. Hilltopping involves one male dominating the desirable hilltop territory and fighting off any intruders that attempt to approach. This creates a mating space for the butterflies where the females can approach when ready to mate and easily find a fit partner. This behavior has been previously observed by Dr. Burk, Hana Griffin, and Sydney Hiatt in a preliminary data collection last summer. We extended these observations on Glacier Creek and captured butterflies for individual tagging and measuring. Butterflies' interactions were observed and recorded based on length, intensity, and victory. These data help determine the operational sex ratio within the Black Swallowtail species. Operational sex ratio is the number of mate-seeking males to number of mate-seeking females which provides insight to the mating system that the Swallowtails utilize. A species mating system is important for conservation biology when considering the heterogeneity of the gene pool. The lower genetic diversity a population has, the less able it will be to respond well to environmental changes. Thus, the more susceptible the species is to extinction. These data will be used to help promote conservation of natural habitats and the species within.

11 *Effect of GYY4137 on IOP and Retinal Neurons in Carbomer-Induced OHT Rabbits, in vivo*

Department of Pharmacy Sciences
Anjali Rai, Susmit Mhatre, John Borgmeier, Christina Howe, James Grunkemeyer, Laura Hansen, Mbye Ya Fatou Njie, SE Ohia, Singh Somnath, and Catherine Opere

Purpose: There is evidence that the slow-releasing hydrogen sulfide compound, GYY 4137 (GYY) can lower intraocular pressure (IOP) in normotensive rabbits (Salvi A et al. Ocul Pharmacol Ther. 2016) and protect retinal ganglion cells (RGC) from glaucomatous loss in rats (Liu H et al., IOVS, 2017) in vivo. In the present study, we investigated the pharmacological actions of GYY on IOP and retinal degeneration in carbomer-induced ocular hypertensive (OHT), male New Zealand albino rabbits, in vivo. **Methods:** OHT was induced by bilateral intracameral injection of carbomer (100µL; 0.3%) into rabbit eyes. Acute studies: GYY (2%; 50 Î¼L) was topically instilled into one eye while the contralateral eye received normal saline (control). IOP was assessed hourly using a pneumotonometer (Model 30 classic) until baseline IOP was attained. Chronic studies: 15 animals were divided into 3 groups (n=5 each) and treated twice daily as follows: Group I: normotensive, saline-treated; Group II: OHT-saline treated; Group III: OHT-GYY-treated. IOP was measured daily for up to 25 days post-OHT induction. Animals were then humanely euthanized, and retina isolated for morphological (H&E) and cell death (TUNEL) assays. **Results:** Intracameral injection of carbomer into rabbit eyes induced OHT that was sustained for up to 25 days (maximum elevation of 123.62± 19.25% ($p>0.001$) 9 days post-OHT induction). Acute: GYY (2%) reduced IOP up to 9 h, with a maximum reduction of 29.27± 5.23 % ($p>0.001$) observed after 5 h. Chronic: GYY reduced IOP in the treated eye, producing a significant ($p<0.05$) reduction of 31.85± 1.47% 9 days post-OHT induction. Moreover, OHT-induced loss in RGC (18.51%; $p<0.05$) and Photoreceptor: Outer Nuclear Layer ratio (37.66%; $p<0.001$) was reduced by GYY. **Conclusion:** GYY reduced IOP and protected the retina from OHT-induced damage in rabbit eyes, in vivo.

12 *Predictors and Adverse Outcomes Associated with Blood Culture Contamination: A Retrospective Cohort Study*

Department of Pharmacy
Maddie Thill, Ryan Dull, Meagan Funasaki, Sara Goldsmith, Erin Kajihiro, Karlyn Tse, and Kylie Wong

Background: Blood culture contamination (BCC) poses a challenge to patient outcomes and healthcare system efficiency. Despite evidence-based interventions, minimizing BCC remains challenging in some hospitals, partly due to the uncertainty in cost-benefit relationships. This study aims to identify predictors and adverse outcomes associated with BCC to inform strategic resource allocation.
Methods: A retrospective cohort study was conducted on adult patients at CHI Health Lakeside Hospital between February and March of 2023. Data on blood culture collection practices, adverse outcomes, and associated costs were collected from medical records. BCC predictors were analyzed using logistic regression, and outcomes were compared using appropriate statistical tests.
Results: Of 895 blood culture specimens from 404 subjects, 3.6% met organizational standards and none had BCC. Phlebotomist collection (OR 0.35, 95% CI 0.12-1.0) and initial specimen diversion device use (OR 0.19, 95% CI 0.07-0.56) significantly reduced BCC odds. Subjects with BCC had higher odds of adverse drug events (OR 2.6, 95% CI 1.2-5.7) and incurred 291% higher total costs ($p < 0.001$). BCC management required more labor (17.3 vs. 1.1 hours, $p < 0.001$).
Conclusion: BCC impacts multiple hospital departments, complicating cost and outcome assessments. Adherence to collection policies, use of initial specimen diversion devices, and phlebotomist collection could mitigate adverse events, reduce costs, and enhance care efficiency at CHI Health Lakeside Hospital.

13 *Photon Correlation Spectroscopy in Polymeric Sodium Phosphate Glass Melts*

Department of Physics

Grace Dirks, Jack Pereira, and David Sidebottom

Photon correlation spectroscopy performed on polymeric sodium phosphate glass melts (ranging from 50% - 56% Na) reveals a relationship between the glass structure and dynamics. Specifically, as sodium percentage increases (and the polymer chains shorten), the fragility of the glass decreases.

14 *Investigating the Reinforcing Effects of Vaporized Delta-8 Tetrahydrocannabinol in a Rodent Self-Administration Paradigm*

Department of Psychology

Emily A Cronin, Harrison J Witmer, Darby J Durbin, Beth Anne A Drobny, Maddy Pulliam, Jordan L Keith, Claire L Wellendorf, and Dustin J Stairs

Delta-8 Tetrahydrocannabinol (THC) had the largest growth in sales in the 2021 cannabinoid market. This, combined with an increased interest in delta-9 THC due to its legalization and decreasing perceptions of harm associated with use, makes the need to better understand the reinforcing effects of cannabis and its derivatives paramount. While an intravenous (I.V.) self-administration paradigm is the gold standard for studying reinforcing effects in a rodent model, there are limitations when looking at I.V. cannabis drugs. The development of a vapor self-administration paradigm may overcome some of these limitations and be more relevant to humans. The current study was designed to determine if response-contingent vapor deliveries of delta-8 THC results in reinforcing effects using a rodent self-administration procedure. Eight male Sprague Dawley rats (PND 21) had daily 75-minute sessions to lever press for vaporized concentrations of delta-8 THC (2.5, 5, 10, 15, 30, 45mg/,300ml) and vehicle (ethanol). Standard operant conditioning chambers were retrofitted with a custom vapor nozzle on the front wall, through which vapor entered the chamber when the ratio requirement was

completed on the active lever. A vaporizer then aerosolized the drug and pushed a 3.6-second “puff” of vapor into the chamber. Animals had a maintenance dose of 10mg/.300ml on an FR2 schedule for 12 sessions. The dose was then varied every four days to establish a dose-effect curve. Results indicated that relative to vehicle substitution, the 5mg/,300ml dose of delta-8 THC resulted in significantly greater active lever responding. The current results indicate that vaporized puffs of delta-8 THC can result in reinforcing effects and vaporized self-administration may be a viable preclinical model for studying the reinforcing effects and abuse potential of cannabis drugs.

15 *UPGRADING eSTARLIGHT TO SIMULATE ELECTRON-ION COLLISIONS*

Department of Physics

Neha Devi, and Janet Seger

The Electron-Ion Collider (EIC), currently under development, represents a groundbreaking endeavor at Brookhaven Lab to delve into the inner workings of atomic nuclei, protons, and neutrons. The EIC will employ two intersecting accelerators to generate intense beams of electrons and protons or heavier atomic nuclei, steering them into head-on collisions. These collisions trigger photonuclear interactions, where incident photons fluctuate to quark-antiquark pairs and interact with ions, resulting in the production of a diverse array of particles, including vector mesons. Vector mesons play a crucial role in understanding the dynamics of electron-ion collisions. eSTARlight, originally derived from the STARlight Monte Carlo generator, models the numbers and characteristics of particles produced in these interactions. My research focuses on updating the charge distribution models for light nuclei within eSTARlight, incorporating the latest advancements in charge density distribution modeling. Results showcase the significant impact of these updated models on the cross-section of vector meson production reactions. Furthermore, my work implements the production and decay of excited Rho mesons within

eSTARlight. Overall, my research contributes to the ongoing efforts to enhance the accuracy and reliability of eSTARlight in simulating electron-ion collisions at the Electron-Ion Collider, paving the way for a deeper understanding of nuclear physics phenomena.

16 *Effects of a High-Intensity Interval Training Program on Functional Outcome Measures in Older Adults.*

Department of Physical Therapy
Mikayla Grocki, Blake Murphy, Devon Stoffel, Kelley Hammond, Mitchel Magrini, and Rashelle Hoffman

Purpose: Physical exercise is known to have favorable effects on age-related declines in strength and balance in older adults which can lead to increased fall risk. High Intensity Interval Training (HIIT) is an approach to exercise that addresses one of the most notable barriers to exercise – time. The purpose of this study was to examine the effects of a 12-week HIIT exercise circuit on the performance of the strength (five times sit-to-stand; 5STS) and balance (functional gait assessment; FGA) outcome measures in older adults.
Methods: Older adults between the ages 65-95 from the Greater Omaha Area were recruited for this study. The study was conducted as a repeated measures design with baseline and post-intervention assessments following the 12-week HIIT intervention. Paired sample t-tests were used to compare baseline and follow-up 5STS and FGA scores.
Results: Eight older adults (73.8±4.7 years, F=4) were included in the study. 5STS was significantly faster following training (Pre=8.35±0.82, Post=6.67±1.12, r=-0.83, p=.04). However, there was no difference in FGA score from pre- to post- training (Pre=26.25±2.25, Post=27.75±2.05, r=0.49, p=0.10).
Conclusions: Twelve weeks of HIIT successfully improves scores on outcome measures that are used to assess fall risk in older adults. Further research is needed to assess the clinical relevance of these findings and the clinical importance of HIIT exercise selection.

17

Human Flower Deletion Reduces Terminal Differentiation in Human Cutaneous Squamous Cell Carcinoma Xenografts but Does Not Impact Tumor Growth

Department of Biomedical Sciences
Patrick Kuwong, Justin Rudd, Greer Porter, Peter Halloran, James Grunkemeyer, and Laura Hansen

Skin epidermis is a stratified epithelium that forms a protective barrier between humans and the environment. It consists primarily of keratinocytes that stratify into basal, spinous, granular layers and the topmost cornified layer. Epidermal stratification occurs as keratinocytes differentiate by undergoing a series of biochemical and morphological changes. Aberrant differentiation causes multiple skin pathologies, yet the mechanisms that regulate this process are poorly understood. Flower (hFWE) encodes a putative calcium channel with unknown function. Given the putative role of hFWE and the known role of calcium in epidermal differentiation, we questioned whether (1) hFWE modulates keratinocyte tumor growth and (2) whether it regulates keratinocyte differentiation, in xenograft models. We hypothesized that CRISPR/Cas9-mediated hFWE knockout in human squamous cell carcinoma cell lines (SCC-13) would increase tumor growth and impair differentiation. To test this, wild-type and knockout clones (n=3) were inoculated subcutaneously into immunocompromised mice (n=4) and monitored for 4 weeks. After euthanasia, tumors were collected, weighed, and assessed for proliferation (PCNA) and terminal differentiation (Filaggrin and Loricrin) via immunofluorescence and immunoblotting. No significant differences were observed in tumor growth of hFWE knockout xenografts compared to wild-type controls. This was consistent with proliferation data obtained via PCNA immunofluorescence and immunoblotting. However, immunofluorescence data for filaggrin and loricrin revealed a significant decrease in hFWE knockout xenografts compared to wild-type controls. These findings were consistent with immunoblotting data for both markers. Together, these data indicate that loss of hFWE in SCC-13

xenografts impairs terminal differentiation but does not affect tumor growth.

18 *Structural and Functional Analysis of Crassostrea gigas OAZ-PK RNA*

Department of Chemistry and Biochemistry

Hannah Ladwig, Rhiannon McCracken, and Juliane Soukup

Riboswitches are a type of non-coding RNA that regulate downstream gene expression upon metabolite binding. When a riboswitch interacts with its ligand, it undergoes a conformational change resulting in a change in gene expression. This change in gene expression operates as a feedback mechanism, affecting the same metabolic pathway in which the ligand functions. The Soukup Lab research potential eukaryotic riboswitches within the Ornithine Decarboxylase Antizyme pseudoknot (OAZ-PK) RNA. One such potential riboswitch is found in the OAZ-PK RNA of a species of oyster, Crassostrea gigas, which is believed to interact with various natural and non-natural polyamines. In-Line Probing (ILP) experiments can be used to analyze the structural changes of this RNA segment upon binding to differing concentrations of these polyamines. Preliminary data from ILP experiments with Crassostrea gigas OAZ-PK RNA indicate that the binding of spermine results in a structural change to the RNA segment, but not other polyamines. Current experiments aim to examine the presence of a structural change upon binding of a closely related polyamine, spermidine. Riboswitches have demonstrated significant impacts on the regulation of metabolic pathways in bacteria, and thus are being used as a target of possible antibiotic treatments. Identification of similar riboswitches in eukaryotic species will provide an opportunity for the development of novel antibiological agents.

The project described was supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under Grant # 5P20GM103427.

19 *17O-NMR Studies of the IMo6O245- Ion in Aqueous Solution*

Department of Chemistry and Biochemistry

Alex M. Payne, and Eric M. Villa

Polyoxometalate ions are an enormous class of charged metal-oxide clusters with extensive applications (such as antiviral/antitumor activity, water oxidation catalysis, MRI contrast agents and luminescent materials); however, the aqueous solution reaction dynamics of these ions are heavily unexplored, and many fundamental questions concerning their reactivity remain unanswered. These ions are predominately anionic metal-oxide clusters usually composed of Group IV or Group V transition metals and oxygen. We have been investigating the chemistry of the versatile Anderson-type polyoxometalate ions in solution. In particular, some of our initial studies focused on the titration and oxygen exchange kinetics of the IMo6O245- ion in aqueous solution. However, this data left many questions about overall stability; to that end, we have begun experiments looking the stability and speciation by reacting 17O-enriched IMo6O245- in 17O-enriched water and following the reactions with 17O-NMR. This new and exciting data will be discussed and evaluated along with the oxygen exchange, titration, and crystal structure data.

20 *IDENTIFICATION OF NOVEL TARGETS FOR THE TREATMENT OF CUTANEOUS SQUAMOUS CELL CARCINOMA*

Department of Biomedical Sciences

Moynul Islam; Justin Rudd, Louise Monga, James Grunkemeyer, and Laura Hansen

Cutaneous squamous cell carcinoma (cSCC) is a form of skin cancer which affects approximately 1.8 million people annually in the US and the number is progressively increasing each year. Exportin 1 (XPO1) is responsible for transporting approximately 400 cargoes including tumor suppressor proteins and growth regulators from nucleus to cytoplasm. XPO1 is overexpressed in many cancers including actinic keratosis (pre-malignant lesion) and cSCC. We found

that Selinexor (FDA approved Exportin 1 inhibitor) is effective to cause cellular toxicity and increased apoptosis in a panel of cSCC cell lines.
However, the challenges of limited effectiveness, and potential toxicity to normal cells are some of the concerns of chemotherapeutics including Selinexor.
Our hypothesis is that Genome-wide CRISPRi screening in combination with Selinexor treatment will identify targets with potentials to increase the sensitivity of cSCC cells to Selinexor.
SCC-13 dCas9-KRAB cells, developed for CRISPRi, were lentivirally transduced with Dolcetto Set A genome-wide CRISPRi guide RNA library. Successfully transduced 120,000,000 SCC-13 dCas9-KRAB cells were split into two groups: one treated with vehicle and the other with Selinexor for two weeks. Guide RNA abundance in Selinexor versus vehicle treated group was analyzed by MAGeCK followed by pathway analysis.
We have identified 316 targets that appear to increase the sensitivity of cSCC to Selinexor treatment. These targets are significantly enriched in pathways including telomere maintenance, RNA processing, response to DNA damage stimulus, cell cycle, regulation of biosynthetic processes, and cellular response to stress. The identified targets may also have utility for combinatorial treatment in other cancers.

21 *Enhancing Aqueous Solubility and Dissolution Profile of BCS Class II Drugs through the Dual Approach of Salt Formation and Amorphous Solid Dispersion*

Department of Pharmacy Sciences

Siddhesh Pansare, Alekha Dash, and Justin Tolman

Purpose: Numerous pharmaceutically active drug molecules have recently been discovered owing to molecular modeling and high-throughput screening. However, their formulation and commercialization has been a major task due to their poor aqueous solubility and low bioavailability. Combining salt formation and amorphous solid dispersions (ASDs) is an emerging strategy that utilizes the benefits of crystal lattice

energy depletion (by the amorphous form) and enhanced solvation energy and pH buffering effect (by salt formation), leading to improved aqueous solubility and dissolution rate. This study aims to optimize this dual approach for BCS Class II weakly acidic drugs and potentially create formulations with enhanced aqueous solubility, dissolution profile, and physical stability.

Methods: Three model BCS Class II drugs were used and combined with four basic counterions to form salts by solvent evaporation process using rotary evaporator. The prepared salts were thermally characterized by differential scanning calorimetry (DSC) and thermogravimetric analysis and structurally characterized using Infrared spectroscopy (IR) and Raman spectroscopy. Solubility studies were performed on the formed salts in deionized water following the WHO protocol for equilibrium solubility. The drug-counterion pair with the highest solubility was further selected for ASD preparation using HME. In vitro release studies were done using a modified Wood's apparatus on prepared salt solid dispersions and compared with their salts and amorphous solid dispersion forms.

Results: Shift in melting point using DSC combined with Raman and FTIR peaks confirmed salt formation for all drug-counterion pairs. All the salt solid dispersions were amorphous, confirmed by Powdered XRD.

Conclusion: The dual approach of salt formation and amorphous solid dispersions resulted in higher solubility and intrinsic dissolution rate than the individual approaches alone, suggesting synergetic action between the two techniques.

22 *Formulation and Characterization of Aerosolizable Chitosan Nanoparticles for Pulmonary Delivery of mRNA*

School of Pharmacy - Pharmaceutical Sciences

Sri Sai Nikitha Kota, Erik Moore, and Alekha Dash

Purpose: This study investigates using aerosolized Chitosan (CS) nanoparticles to encapsulate mRNA for effective lung gene therapy. By leveraging CS's biocompatibility and protective properties, this approach aims to shield mRNA from degradation, boost cellular absorption, and achieve targeted delivery to lung tissues, facilitating direct and sustained gene delivery. **Methods:** Using the ionotropic gelation method, CS-mRNA nanoparticles (NPs) were synthesized through the interaction of CS amino groups with mRNA and Sodium Tripolyphosphate (TPP), yielding 50-800 nm particles. Low molecular weight CS dissolved in 4.6 mM HCl (pH adjusted to 7) was combined with luciferase mRNA from A549 cells. After agitation and TPP (0.1%) addition, NPs were stabilized and characterized for size, zeta potential, and encapsulation efficiency, followed by nebulization. Characterization involved a Zetasizer, Quant-iT RNA Assay Kit, and SEM. Two preparation methods with varied CS concentrations (0.038%-0.1%) and CS:mRNA in weight ratios. Post-nebulization, particle size, and transfection efficacy were assessed via luciferase assay and SEM, demonstrating the formulation's potential for targeted lung gene delivery and highlighting the importance of CS concentration and mRNA ratios in optimizing NP properties for effective aerosolized delivery. **Results:** Luciferase assay indicates successful gene expression within cells, as evidenced by increasing fluorescence between 11 to 21 minutes and specific absorbance at 570 nm confirming luciferase activity (Figure 1). Particle size analysis reveals that both blank and mRNA-loaded CS-TPP NPs increase in size with higher CS concentrations, with mRNA-loaded particles being consistently larger. This trend, however, becomes inconsistent when considering the w/w ratio of CS to mRNA; particle size initially rises with the ratio until 2:1, before declining, showing more variability (Figures 2A and 2B). Encapsulation efficiency also fluctuates with CS

concentration and w/w ratios, peaking at 0.085% CS concentration and at 1:5 CS: mRNA ratio but decreasing as the ratio increases, except for a rise at a 5:1 ratio (Table 1A and 1B). Nebulization affects the NPs by increasing their size across all CS concentrations, suggesting an alteration in their physical characteristics (Figure 4). After nebulization, a notable decline in transfection efficiency is observed across all NP concentrations, with 0.069% CS-TPP NPs maintaining the highest efficiency despite the process. This comprehensive analysis underscores the nuanced effects of CS concentration, mRNA ratios, and nebulization on nanoparticle behavior and efficiency in gene delivery applications. (Figure 5). **Conclusion:** The studies demonstrate the potential of aerosolizable Chitosan-mRNA NPs for targeted lung gene therapy, showing that chitosan concentration and CS:mRNA ratios significantly affect nanoparticle properties like size and encapsulation efficiency. Despite nebulization altering size and efficiency, certain concentrations, notably 0.069% CS, preserve transfection effectiveness. This underscores CS-mRNA NP's promise for non-invasive lung delivery, suggesting a notable advancement in respiratory disease treatment.

23 *Comparison of Dye Injection Spread in Halstead, Gow-Gates, Vazirani-Akinosi Techniques: A Cadaveric Study*

Oral Biology - School of Dentistry
Nathan Pucel, Matthew Kling, Todd Rajchel, Jon Wagner, and Cara Fisher

Introduction: Mandibular anesthesia is essential to numerous dental procedures. The standard inferior alveolar nerve block (IANb) or Halstead technique, is utilized to anesthetize mandibular structures; however, this approach fails in ~15-30% of cases. The Gow-Gates and Vazirani-Akinosi techniques are alternative approaches to the IANb, yet their success rate remains inconsistent in the literature. Low success rates are attributed to human error and anatomical variation. Dye spread has been evaluated for the IANb to determine the extent of sensory nerve staining but not for other techniques. This study compared the range of dye spread between the traditional IANb, Gow-Gates and

Vazirani-Akinosi techniques. **Methods**: Preliminarily, three fresh-frozen cadaver heads were injected bilaterally (n=6) with 2% methylene-blue dye utilizing a different nerve block technique for each head. Dissection of cadavers evaluated the extent of dye spread and nerve involvement within the infratemporal fossa. **Summary**: Assessment of dye spread revealed that the Vazirani-Akinosi technique stained the origin of IAN. These findings suggest the extent of dye spread using the Vazirani-Akinosi technique accounts for variation in sensory innervation attributed to failure rates. **Conclusion:** The impact of this study suggests that alternative approaches need to be considered to increase mandibular nerve block success rates and patient comfort. Future studies will investigate the incidence of anatomical variation of IAN and accessory sensory nerve innervation, further characterizing underlying factors that contribute to IANb high failure rates.

24 *Photodeprotection Studies of 3,4-diaryl-1-PPG-1,2,3-Triazolium Salts*

Department of Chemistry and Biochemistry

Zach Onyszchuk, and James Fletcher

Antimicrobial resistant pathogens have cemented themselves as a crucial threat to human health. Quaternary ammonium compounds (QACs) have been used for a multitude of antimicrobial products such as sanitizers, herbicides, soaps, shampoos, cosmetics, and more. The degradation of the most commonly used QACs like benzalkonium chloride (BAC) is slow and gradual due to its stability, which leads to unwanted environmental accumulation and potential induction of antibiotic resistance. Developing new antiseptics that share the potency of commercial QACs such as BAC but can be controllably decomposed could address this issue. The goal of my project is to study 1,3,4-trisubstituted-1,2,3-triazolium salts containing photolabile groups in order to define their antiseptic and photoreactive properties. Target molecules were synthesized via click chemistry and characterized by HNMR. Aryl groups at the N3 and C4

positions of the triazole ring varied among phenyl, 4-tert-butylphenyl, 4-chlorophenyl and 2-naphthyl units. PPG groups at the N1 position of the triazole ring varied among acetophenone and 4-methoxyacetophenone units. Antiseptic properties were studied by minimum inhibitory concentration assays against Gram-positive and Gram-negative bacteria. The relative rates of photodeprotection using a photoreactor with 365 nm light were studied by HNMR in multiple solvents. Following light-induced direct photodeprotection, inert 1,5-diaryl-1,2,3-triazole byproducts are formed. The impact of the triazole arene group and PPG group identities on both antiseptic properties and photodeprotection rates will be presented.

25 *Synthesis of Fused-Ring 1,5-diaryl-1,2,3-triazoles Containing 5-quinoline and 5-isoquinoline Subunits*

Department of Chemistry and Biochemistry

Isaac Gart, and James Fletcher

There are many useful properties that quinoline rings can provide for bioorganic molecules. One is the ability to disrupt bacterial cell machinery, thereby serving as a potent antimicrobial. Because of the therapeutic relevance that these molecules have, we conducted a synthesis of different quinoline- and isoquinoline-containing triazole compounds to investigate the deviation of properties among them. Our primary focus was on incorporating these quinolines into triazole groups at their 5 positions to form many different analogs. Our synthesis consisted of beginning with commercially available starting materials of quinolines, isoquinolines, and benzenes with either bromo or amine groups, allowing attachment of alkyne and azide functionality, respectively. The attachment of these arene groups to the 1,2,3-triazole ring using click chemistry was iterated between the N1 and C5 positions of the triazole ring. By also using 2-bromophenyl groups in our click synthesis, fusion reactions could later be used to create a second bond between the arene rings. This allowed the bridged diaryl arrangement of rings to be compared with their matching fused-ring expanded systems, where

matching arene components are displayed in very different three dimensional shapes. We used column chromatography to purify our products and HNMR to analyze our products. Our research provided insight into the successful synthesis of novel structures incorporating quinoline and isoquinoline rings into triazole compounds. Future studies will focus on testing the antimicrobial properties of these compounds using antiseptic assays.

26

Spectroscopic Study of Metal-Organic Framework Composite Materials

Group

Department of Chemistry and Biochemistry

Kate Ellis, Ann Obiesie, and Angela Devlin

Metal-organic frameworks (MOFs) are a class of porous, crystalline materials that have drawn much attention for applications such as gas storage and separation because of their high internal surface area. However, MOFs are attractive candidates for electronic devices because the pores of the MOF could serve as a conduction pathway. In this work, we explore host-guest behavior between a series of semi-conducting organic guest molecules and two MOFs with open-metal sites, HKUST-1, a copper MOF, and MOF-808, a zirconium MOF. Using vibrational spectroscopy, we analyze how organic guest molecules interact with the MOFs and explore the effects of the metal cluster on the interaction strength with the guest. This work contributes to the understanding of the conduction mechanism of MOF composite materials, which is important in the exploration of MOFs in electronic devices.

27

Solving the Structure of the PCNA-CAF-1 Protein Complex Using X-ray Crystallography

Group

Department of Chemistry and Biochemistry
Eva Doescher, Kaitlin Smith, Emily Ekstrum, and Dr. Lynne Dieckman

Within each eukaryotic cell, DNA must be packaged accurately and efficiently to fit inside the nucleus. To do this, DNA wraps around histone proteins forming nucleosomes. Replication-coupled nucleosome assembly is the process of DNA replication immediately followed by the deposition of histones on the newly synthesized DNA. Two major proteins involved in replication-coupled nucleosome assembly are proliferating cell nuclear antigen (PCNA) and chromatin assembly factor 1 (CAF-1). PCNA is a sliding clamp protein that surrounds DNA at the replication fork and recruits replication proteins, including CAF-1. CAF-1 is a histone chaperone protein that deposits histones on DNA, specifically on silenced regions of the genome. While it is known that the direct interaction between PCNA and CAF-1 is crucial for proper gene expression, exactly how these two proteins interact is not fully understood. The goal of our lab is to understand the interaction between PCNA and CAF-1 and their function in replication-coupled nucleosome assembly. Because the structure of a protein determines its function, the goal of our project is to determine the structure of the interaction between PCNA and CAF-1 through X-ray crystallography. We have purified a PCNA-CAF-1 complex and identified crystallization conditions that promote formation of microcrystals of this complex. We are currently optimizing crystallization conditions to generate larger crystals for structural determination. Solving the structure of the PCNA-CAF-1 complex will provide valuable information about the mechanism of the interaction and will help our understanding of how PCNA and CAF-1 work together during replication-coupled nucleosome assembly to maintain gene silencing.

28

Age-Related Cellular and Molecular Changes Associated with Vestibular Sensory Epithelium

Group Department of Biomedical Science
Samadhi Kulasooriya, Huizhan Liu, Sarath Vijayakumar, Celia Bloom, Mi Zhou, Li Tao, and David He

Age-related vestibular function loss (ARVL) or Presbyastasis is the gradual loss of bilateral vestibular function accompanied by interruptions to visual and proprioceptive inputs leading to an increased risk of imbalance. It is characterized by an exponential increase in geriatric dizziness, and injurious falls which can be fatal. In adults older than 70 years, there is a 40% decrease in hair cell (HC) density in the cristae of the canals, 24% in the saccule, and 21% in the utricle. In addition to HC loss, morphological and functional changes have also been demonstrated in the remaining HCs. While many studies have focused on age-related hearing loss and cochlear degeneration, age-related vestibular degeneration and its contribution to ARVL remain elusive. Hence, we focused our study on the age-related alterations in vestibular sensory epithelia at the cellular and molecular levels using cutting-edge techniques. Our functional analysis shows vestibular functional decline with aging. Our morphology analysis by histology, high-resolution confocal imaging, and scanning electron microscopy show signs of degeneration in hair cell stereocilia bundle, soma, and presynaptic structure. At the molecular level, our single-cell-RNA-seq analysis shows that vestibular HC and supporting cell aging are associated with global hallmarks of aging. Importantly, we also observed changes in genes that are only related to hair cell specialization and supporting cell functions. Our findings will shed light on potential underlying mechanisms and driving factors of aging of the vestibular sensory epithelia which may be conducive to developing targeted treatment strategies and delaying the onset of ARVL.

29

Photodegradation of Antiseptic 1,3,4-trisubstituted-1,2,3-triazolium Salts with Photolabile Subunits at the 1- and 3- positions

Department of Chemistry and Biochemistry

Katelyn Grzelak, and James Fletcher

Quaternary ammonium compounds (QACs) are commonly used antiseptics that are effective against both Gram-positive and Gram-negative bacteria. QACs such as benzalkonium chloride are chemically stable and therefore can accumulate in the environment, which can promote bacterial resistance. Antiseptic QAC analogs able to be degraded in a controllable manner after their point-of-use could address this issue. Prior work in the Fletcher lab has shown that triazolium salt QACs can be as potent as current commercial compounds, depending on the substituents used. The goal of this project is to develop new triazolium salts containing photolabile substituents that display antiseptic properties but can be deactivated by a light-driven photodeprotection reaction. A variety of bromoacetophenone photolabile groups (4-methyl, 4-hydroxy, 4-methoxy, 4-chloro, 4-fluoro, 2-methyl) were introduced to the 1-position of 1,4-disubstituted-1,2,3-triazoles using click chemistry synthesis. These compounds were reacted again with the same bromoacetophenone group at the N3 position to produce symmetrical 1,3,4-trisubstituted-1,2,3-triazolium bromide salts. Compounds were characterized by HNMR spectroscopy, and antiseptic properties of triazole and triazolium salt analogs were measured using microdilution minimum inhibitory concentration assays against Gram-positive and Gram-negative bacteria. Photodegradation rates upon illumination at 365 nm were monitored by HNMR spectroscopy. Synthesis, characterization and the impact of acetophenone subunit identity on antiseptic properties and photodegradation rates will be presented.

30

Group

Insect Flower Visitors to a University Native Plant Pollinator Garden and an Ornamental Flower Bed

Department of Biology

Anya Ortiz, Maria Sheshter, and Theodore Burk

Over an 8-week period from August 19 to October 18, 2023, we conducted daily surveys of insect flower visitors at two locations on the campus of Creighton University. One site was a newly created native plant pollinator garden, while the other was a traditional ornamental flower bed, the total areas of the two sites being similar. We recorded a total of 3, 291 visitors of 33 types in the pollinator garden, but only 1,045 visitors of 19 types in the ornamental flower bed. We recorded 2,020 bumblebees in the pollinator garden, but only 662 in the ornamental bed. 127 migrating Monarch butterflies visited flowers in the pollinator garden, but only 3 visited flowers in the ornamental bed. The only visitor type that was noticeably more common in the ornamental bed were skipper butterflies. The most visited flowers in the pollinator garden were purple coneflowers and goldenrods, while in the ornamental bed they were marigolds and sages. Our results indicate that a native plant pollinator garden in a university campus can attract an impressive number and variety of insect pollinators, substantially more of each than a traditional ornamental flower bed.

31 *Synthesis and Catalytic Activity of Scorpionate Ligand Metal Complexes in ATRA Reactions*

Department of Chemistry and Biochemistry

Isaiah Tabbert, and Kayode Oshin

Atom Transfer Radical Addition (ATRA) reactions have emerged as a valuable synthetic methodology, instrumental in the formation of new carbon-carbon bonds and cardinal reagents. Tris-(2-pyridylmethyl) amine (TPMA) has represented one of the prominent ligands utilized in the formation of complexes for ATRA; however, its configuration poses structural hindrances that reduce its functionality. This research project endeavored to construct novel ligand motifs conducive to the production of improved complexes for ATRA reactions, while alleviating the structural impediments existing in TPMA.

We hypothesized that eradicating one of the ligand arms in the tripodal TPMA structure could expose a greater portion of the active site of complexes formed with this ligand. To achieve this objective, we intend to open the coordination site of the ligand through the exchange of one of its aromatic rings with an aliphatic straight chain, expecting an increase in potency as a result.

This experiment involved the synthesis of two ligands, iso-bpmen-3c and LÂ¹OH-2C, followed by their subsequent complexation with FeBr3 and CuBr2 salts. Catalysis results revealed that complexes fabricated with our proposed ligands elicited higher ATRA yields for certain reactions compared to complexes made with TPMA.

Our study has shown the potential for enhancing ATRA reactions with our ligand design, which could serve as a pivotal precursor in a wide range of future addition transformations.

32

Group

Perceived Effect of Hallucinogen Use for Relief of Depression and Anxiety Symptoms

Department of Exercise Science

Zoe Bruno, Isabella Brown, and Jacob Siedlik

This study investigated the perceived impacts of micro doses and full doses of hallucinogenic drugs (i.e. psilocybin or LSD) on mental health and wellbeing among individuals who self-report use of these substances. Survey data were utilized to analyze participants' responses regarding changes in various mental health indicators and lifestyle habits. Chi-square tests were employed to compare the frequencies of reported outcomes between individuals who reported current microdosing and full doses. Seven females (mean age: 36.6± 9.7 yrs), sixteen males (34.0± 11.2 yrs), and one person identifying as non-binary (age 23 yrs) participated in this survey. There were no significant differences in either Kepler Distress ($p = 0.16$) or Generalized Anxiety Disorder (GAD) scores ($p = 0.17$) between gender identities. Additionally, no statistically significant differences in GAD scores across those currently taking full doses of hallucinogens ($p = 0.08$) nor was there a difference in Kepler Distress scores ($p = 0.27$). Microdosing revealed a similar lack of significant effects with no differences in GAD ($p = 0.78$) nor Kepler Distress scores ($p = 0.75$) observed. While a number of participants self-reported decreases in anxiety and/or depression severity associated with the use of hallucinogens, none of these perceived effects reached the threshold of statistical significance. We anticipate future research will also struggle to attain large sample sizes as individuals may be reluctant to disclose current hallucinogen use but remain hopeful that research to quantify perceived effects of hallucinogens will continue.

33

Communication Error: Relationship Between Neural Cell Adhesion Molecule Expression and Muscle Activation in Parkinson's Disease

Department of Exercise Science and Pre-Health Professions
Alexis M. Tonnemacher, Mitchel A. Magrini, and Kelley G. Hammond

Background: Neural cell adhesion molecule (NCAM) is expressed by myofibers when they are denervated and need reinnervation. If a myofiber fails to be reinnervated, it will undergo apoptosis which may influence muscle activation. However, the relationship between NCAM expression relative to myofiber type (rT1, rT2) and muscle activation is unknown. **Purpose**: The purpose of this pilot study was to investigate the relationship between relative NCAM expression and muscle activation in persons with Parkinson's Disease (PD). **Methods**: Muscle biopsies of the vastus lateralis were collected from six persons with PD (F=4; 67Â±9 yrs). Immunohistochemistry was used to analyze relative NCAM expression in PD. Muscle activation was measured using surface electromyography (EMG) of the vastus lateralis and torque was assessed during a maximal voluntary isometric contraction. Pearson correlation coefficients (r) were used to determine relationships between dependent variables. Significance was set at $p<0.05$. **Results**: rT1/NCAM+ was negatively correlated with pRERn ($r=-0.94$, $p=0.005$) and pEMG ($r=-0.88$, $p=0.02$). rT2/NCAM+ was negatively correlated with peak torque ($r=-0.96$, $p=0.002$). There we no significant correlations between all other variables. **Conclusion**: Our pilot data suggests that greater rT1/NCAM+ expression is associated with a slower rate (i.e., pRERn) and reduced amplitude (i.e., pEMG) of muscle activation. Increased denervation of T2 myofibers (i.e., greater T2/NCAM+) is associated with decreased peak torque, suggesting a contractile consequence of NCAM expression. Overall, higher NCAM expression may be indicative of compromised communication between the nervous system and skeletal muscle.

34 *The Impact of Tactile Feedback on Shoulder Abduction Movement Variability*

Department of Physical Therapy
Shreya Kannan, Brianna Johnson, Christina Thomas, Emma Baillargeon, and Rosalind Heckman

Sensory information influences goal-directed upper limb movements. Tactile and proprioceptive information inform the preparation and execution of motor commands. Vision increases movement accuracy. We investigated the preparation and execution of shoulder abduction movements and found high movement variability in young adults. A lack of vision in frontal plane movement may explain this. However, it is unknown if tactile information can reduce shoulder abduction movement variability. Our purpose was to determine if tactile information reduces variability in the execution of shoulder abduction movements. 20 participants (21±2 years, 12 females, 8 males) were trained to perform 30° shoulder abduction movements in the frontal plane from two starting positions (45°, 75°) that were blocked and randomized. Auditory cues guided motor preparation and execution. Two training conditions were used for tactile feedback: continuous with a physical target (n=8), intermittent from the experimenter (n=14). Tactile feedback was removed during testing, but the physical target remained visible for the continuous condition. Displacement was measured using an electrogoniometer. Displacement mean (t-test) and variance (F-test) were statistically analyzed to determine the effect of tactile feedback. Evidence that tactile feedback reduced movement variability was not found. Average displacement did not differ from 30° for either starting position or training condition ($p>0.23$). The variances were not statistically different between training conditions ($p>0.14$). Although improving the training experience, tactile feedback did not reduce variability in the execution of shoulder abduction movement. Future work will investigate the influence of tactile information on movement preparation to interpret high variability in shoulder abduction movement.

35

A Deep-Learning Analysis of the Molecular Interactions Between the Native Prion Protein and Prion Aggregates

Group Department of Physics

Austin Charles, Samuel Ellerbeck, and Patricia Soto

Misfolding and aggregation of the prion protein is the hallmark molecular-level process of prion diseases. Prion diseases are fatal neurodegenerative disorders that affect mammals, including humans. Prion diseases can develop from two mechanisms: spontaneous misfolding or aggregate-templated misfolding. The most accepted hypothesis in the latter case proposes that an endogenous or exogenous prion aggregate interacts directly with the physiological form of the prion protein. The protein then misfolds and attaches to the aggregate. Although the model is supported by indirect evidence, there is no molecular level picture that illustrates the pathways of protein recognition and misfolding. Recently, high-resolution 3D structures of prion aggregates have been created experimentally; however, how an aggregate interacts with the folded prion protein remains to be elucidated. Our goal is to investigate the distribution of recognition modes between the native prion protein and prion aggregates. In our project, we use molecular docking and deep learning techniques to map the sites of protein-aggregate binding. We generated directed binding poses of the native protein and aggregate using a docking software, then analyzed the probability of each binding mode using a deep-learning technique. Our preliminary results indicate that the most probable binding surface corresponds to the fourth loop of the native prion protein structure. We will discuss the driving forces that dictate recognition and binding, how the sites of docking may initiate misfolding, and the hot spots that represent druggable molecular targets against prion diseases.

36 *Control of cochlear amplification by cellular and acellular elements of the mammalian cochlea*

Department of Biomedical Sciences
Trevor Haugen, Yuju Li, David He, Jian Zuo, and Sarath Vijayakumar

Background/Introduction: The cochlea, in the inner ear, gives mammals the ability to hear through the hair cells. Hair cells are able to bend due to the sound vibrations. Then hair cells are damaged, they die causing hearing loss. This research used three different genotypes of mice to look at hearing. HOP and COP mice have progressive hearing loss due to the cadherin 23 mutation. CBA/CaJ mice have the CBA gene which does not allow for hearing loss. The purpose of this research is to produce HOP and COP mice that express the CBA gene and send them to Brighton and Sussex University Hospitals for further testing. **Methods:** Backcrossing was used to eliminate the Cdh23 mutation from the HOP and COP mice. PCR and gel electrophoresis were used to extract DNA from the mice and examine the different DNA fragments. During the auditory brainstem response (ABR) test, mice were anesthetized, and three probes were placed with a TDT MF1 driver placed 10 cm away from the left ear. A series of sound stimulus levels from 100 dB to about 10 dB were presented, and the response signals was amplified to find the ABR thresholds. The distortion product otoacoustic emissions (DPOAE) test used an ultrasensitive microphone to pick up sounds that were produced by the outer hair cells contracting. They were contracting due to two different tones of different frequencies and sound levels being played at the same time. This was used to find the DPOAE thresholds. Dissected pieces of mice cochlea were decalcified, permeabilized, and incubated with two antibodies for immunolabeling. After immunolabeling, the samples were imaged using a Zeiss LSM 700 confocal laser scanning microscope. **Results:** Immunolabeling and confocal microscopy show that HOP-EYFP-expressing Deiters' and Pillar cells were found in treated mice. ABR and DPOAE methods show that thresholds for ABR and DPOAE were similar across the three genotypes. The ABR response waveforms at 100 dB SPL stimulus level for 16, 32, and 45.2

kHz frequencies were again very similar. The ABR wave amplitudes for three functions were very similar across the three strains of mice. The mean slopes at 32kHz were 0.04 (COP), 0.033 (HOP), and 0.036 (CBA/CaJ). **Conclusion:** In conclusion, there is robust and specific expression of channel rhodopsin. HOP was found in the Deiters' and Pillar cells in the cochlea. The N2 generation of HOP and the N3 generation of COP showed an increase in frequency hearing around 3 months of age. Due to this, it suggests reduction of hearing loss.

37 *Does Upper Extremity Use Affect Velocity and Power During the Sit-to-Stand task?*

Department of Physical Therapy
Hunter Tavares, Allison Nelson-Matute, Mitchel Magrini, and Rosalind Heckman

Introduction: Upper extremity (UE) use during the sit-to-stand (STS) task is common among older adults, and there has been an increased emphasis placed on movement velocity and power. While published literature and data collected from our laboratory has shown UE use decreases force generated by the lower extremities, it is unknown how UE use affects velocity and power during STS.

Purpose: To determine if UE use alters velocity and power achieved during STS.

Methods: A previously collected data set (17 participants, 68±8 years, 10 females) was analyzed to calculate STS velocity and power. Five STS movements were recorded for each participant from three chair heights. Vertical forces were measured from sensors on the chair (seat, armrests) and beneath the feet. Velocity and power were calculated between seat off and standing using height and weight constants based on participant anthropometry.

Results: Three participants used their UE to stand with lower peak vertical force through the lower extremity (100.9±1.1% body weight) versus non-use (121.9±2.0% body weight). STS velocity was similar with (0.54±0.12 m/s) and without (0.50±0.11 m/s) UE use. STS power was greater with UE use (281.9±66.5 W) versus non-use (268.64 ± 95.04 W).

Conclusion: STS velocity and power calculated using constants based on participant height and weight do not reflect differences in lower extremity force with and without UE use and cannot be applied to assess power through the UE. Additional measures accurately quantifying velocity and power may be evaluated for potential to identify functional decline with age.

38 *Exploring the Linkage between Ubiquitin-dependent Degradation and RAG1 Cellular Localization*

Medical Microbiology and Immunology

Lukas Erickson, and Patrick Swanson

V(D)J gene recombination is initiated by the endonuclease RAG1 and occurs during lymphocyte development to create a diverse repertoire of B-cell and T-cell receptor variable regions. This allows the adaptive immune system to recognize an array of antigens and mount specific responses to pathogens. RAG1 is regulated to restrict recombination events and is rapidly degraded in a manner dependent on activated CRL4, the substrate adaptor DCAF1, and the 26S proteasome. RAG1 has been shown to localize to the nucleolus of lymphocytes not undergoing recombination and non-lymphoid HEK293-T and HeLa cells, and this pattern of nucleolar sequestration and conditional egress is thought to play a role in regulating RAG1 degradation. Nucleolar sequestration, egress, and DCAF1 association are all dependent on the N-terminus of full-length RAG1. This may suggest a role for DCAF1 and ubiquitination in regulating RAG1 localization and degradation. The role of ubiquitination was tested by transfecting HEK293-T and HeLa cells with EGFP-fused RAG1 expression constructs to constitutively express fluorescent RAG1 and treating them with inhibitors for different steps in the ubiquitin-proteasome pathway. The potential role of DCAF1 in regulating RAG1 was investigated with co-transfections of DCAF1 with RAG1. Inhibitors of the ubiquitin-proteasome pathway failed to induce any changes in subcellular RAG1 localization, remaining nucleolar. Co-transfection with DCAF1 significantly changed the localization of RAG1 from

nucleolar to pan-cellular when compared to RAG1 alone or other co-transfections. These preliminary results may indicate a role for DCAF1 in regulating RAG1 independent of its function as a substrate adaptor for the CRL4 ligase.

39 *The Influence of Rotational Movement Strategies on Sub Maximal Distance Control in Recreational Golfers*

Department of Exercise Science and Pre-Health Professions

Nick Wright, and Leland Barker

Introduction: Research studying golf swing biomechanics for maximal distances is plentiful, but research studying submaximal swings and distance control is nearly nonexistent. Therefore, the purpose of this study is to analyze how various golfers structure their rotational movement strategies and techniques when aiming for submaximal distance targets. **Methods:** 10 healthy recreational golfers (1.69 ± 0.18 m, 96 ± 29 kg, 53 ± 14 yrs, 16 ± 10 GHIN) were equipped with inertial measurement units (IMU) on their thoracic and lumbar spine and performed 15 7-iron swings for maximum distance, followed by 15 trials for each target distance of 70, 50, and 30 yards. Means and standard deviations for the xF and carry distance variation were correlated. Swing speed and xF mean for the shots with a 7-iron were also correlated. **Results:** There was a significant negative correlation between distance variability and xF mean at 30 yards ($r = -0.641$, $p < 0.05$), 50 yards ($r = -0.291$, $p < 0.05$), and 70 yards ($r = -0.457$, $p < 0.05$). There was a significant negative correlation ($r = -0.457$, $p < 0.05$) between mean swing speed and xF mean with a 7-iron. There was a significant positive correlation between distance variability and xF variability at 30 yards ($r = 0.723$, $p < 0.05$) and 50 yards ($r = 0.405$, $p < 0.05$). There was no significant correlation ($r = 0.041$, $p < 0.05$) between distance variability and xF variability at 70 yards. **Conclusion:** The results of this preliminary study suggest the use of the modern X-Factor golf swing used to maximize distance may be ineffective when targeting submaximal distances. Maintaining synchronization of the hips and chest, therefore, may be more accurate.

40 *Preparation of PEGylated PLGA Nanoparticles with Polysorbate 80 Coating for Brain and Neuronal Delivery and Their Physical Stability*

Pharmaceutical Science

Sannidhi Poojary, and Alekha Dash

Purpose: The blood-brain barrier (BBB) serves as a barrier for the free entry of drug molecules to the brain from blood circulation. This creates the biggest challenge in drug delivery for neurological disorders, demonstrating selective permeability that significantly constrains the passage of therapeutic agents. It is also a challenge to further deliver drugs into neuronal cells. To overcome these difficulties, PLGA nanoparticles with a surface coating of polysorbate-80 and PEG modification were prepared. We hypothesize that the surface modifications with Polysorbate 80 and PEGylation will aid in crossing BBB, and subsequently, the uptake of nanoparticles in the neuronal cells will be high. In this study, the preparation and the physical stability of these surface modified nanoparticles over time were investigated.

Methods: A modified nanoprecipitation method was used to prepare the PLGA nanoparticles. PLGA (50:50) was used as a biodegradable polymer. The organic phase consisted of PLGA (5mg/mL) and 1, 2-Distearoyl-sn-glycero-3-phosphoethanolamine-Poly (ethylene glycol) [DSPE-PEG] (1.5mg/mL) in Acetone. The aqueous phase contained water and Polysorbate-80 (0.5mg/mL). The organic phase was slowly added into the aqueous phase with stirring. The particle size, zeta potential and poly dispersity index (PDI) of the nanoparticle were determined using zeta sizer (Brookhaven Instruments). For physical stability studies, nanoparticles were kept at 37â„ƒ for 7 days and particle size, surface charge, and PDI were measured over a period of 7 days.

Results: The average hydrodynamic diameter of the Polysorbate-80 coated PLGA nanoparticles was found to be 124 nm± 1.00 on day 0 and it increased to 127nm± 4.49 on day 7. The average hydrodynamic diameter of PEGylated PLGA nanoparticles was found to be 141.81 nm± 4.69 on day 0 and, on day 7, increased to 153nm± 5.4. The zeta

potential of polysorbate-80 coated nanoparticles was -22.57± 0.77 on day 0 and increased to -16.27 mV± 3.30 after 1 day. The zeta potential of PEGylated nanoparticles was found to be -27.75± 2.7 and increased to -22mV± 0.77 after day 1. The average PDI of the Polysorbate-80 coated PLGA nanoparticles was found to be 0.058Â± 0.007 and the average PDI of PEGylated PLGA nanoparticles was found to be 0.083Â± 0.05.
Conclusion: Both polysorbate-80 coated PLGA nanoparticles and PEGylated PLGA nanoparticles could be prepared by the nanoprecipitation method. These nanoparticles showed good physical stability over a period of 7 days.

41 *Overcoming Gastrointestinal Irritability and Stability Hurdles with Enteric Coated Capsules*

Pharmaceutical Sciences
Balaji Yadav, Siddhesh Pansare, Alec Moore, and Alekha Dash
Purpose: Some of the orally administered drugs often cause stomach irritation and chemical instability in the acidic environment of the stomach. Enteric coating of tablets with materials like cellulose acetate phthalate (CAP) which is insoluble in acidic pH and dissolves in a basic environment can help overcome these challenges. While technically possible, enteric-coated capsules are less common due to challenges in achieving consistent coating on their gelatin shells. This is because, the surface of hard gelatin capsules is usually smooth and nonporous, which limits their coating efficiency. The objective of this study is to develop an enteric coating capsule formulation, utilizing Eudraguard™ Control which meets the regulatory requirements for use in dietary supplements in the European Union (E 1206) and the United States (GRAS). It is a neutral methacrylic copolymer that safeguards the drug in the capsule from acidic environments and provides controlled release at a basic pH. **Methods:** Size 0 hard gelatin capsules of surface area 5.0 cm2 were filled by hand with each containing 450mg Caffeine. Caffeine was used as a model drug to optimize the coating process. Eudraguard™ Control (Evonik) spraying solution was prepared with 22%

(w/w) solid content. Capsule coating was carried out in an oblate spheroid-shaped pan coater (Erweka AR 403) with a batch size of 100 grams using a spray gun. Various batches of capsules were coated at increasing time intervals to get a weight gain of 2%, 5%, and 10%. In vitro dissolution studies of the enteric-coated capsules were carried out using USP apparatus I. The in vitro release medium consisted of 0.1 N HCL (pH 1.2) for 1 hour followed by 0.05M phosphate buffer (pH 6.8) for 6 hours. Caffeine concentrations were determined using a UV-vis spectrophotometer. The release profile of caffeine from three different capsule formulations (empty gelatin capsules, marketed empty enteric-coated gelatin capsules, and empty gelatin capsules coated with Eudraguard™ Control) were compared. **Results:** Immediate release was seen with empty gelatin capsules with 100% drug released within 45 mins in gastric media. No release was observed with Eudraguard™ Control coated empty gelatin capsules and marketed empty enteric-coated gelatin capsules in the gastric media. However, in the intestinal environment, the Eudraguard™ Control coated capsules showed sustained action (15% drug release within 6 h) whereas the other two formulations showed immediate release within 2 h. **Conclusion:** Eudraguard™ Control self-coated capsules remained intact in the gastric environment and released their content in a controlled fashion at pH 6.8. This approach offers a means to protect the drug from being exposed to acidic conditions and degradation in gastric environment.

42 *Potential of Hydrogen Sulfide in Mitigating Retinal Excitotoxicity and Oxidative Stress: An Ex Vivo Bovine Retinal Tissue Study*

Pharmacy Sciences
Pulkit Sahai, Anjali Rai, Susmit Mhatre, Gagandeep Kaur, John Borgmeier, John Auden, Cole Chandler, James Grunkemeyer, Laura Hansen, Ya Fatou Njie Mbye, Sunny Ohia, Somnath Singh, and Catherine Opere
Purpose: Exogenously given hydrogen sulfide (H_2S)-releasing chemical compounds have been shown to reduce excitatory amino acid neurotransmission in bovine isolated

retina (Opere CA et al., JOPT, 34:10, 2018) and oxidative stress (Rai et al., IOVS, 64(8):3247, 2023). In this present study, we examined the neuroprotective efficacy of diallyltetrasulfide (DATTS), an H_2S-releasing chemical compound, against damage caused by hydrogen peroxide (H_2O_2) and N-methyl-D-aspartate (NMDA) in the isolated retina, ex vivo. **Methods:** Freshly extracted bovine eyes were incubated for 0.5 or 1 hour at 37° Celsius in oxygenated Kreb's buffer solution. This was followed by an intravitreal injection of either NMDA (10^{-4} M) or H_2O_2 (10^{-5} M) in the presence and absence of DATTS (10^{-12} M to 10^{-6}M). Following an additional half-hour or one hour incubation time, eyes were dissected, and retinas were separated and preserved in formalin for studies on their morphology (using light microscopy) and neuroprotective (using TUNEL) and antioxidant (using glutathione and GSH) tests. **Results:** Treatment with H_2O_2 (10^{-5} M) and NMDA (10^{-4}M) induced significant ($p < 0.05$) loss in RGC count by 38.78±5.1% (n=3) and 36.57±4.54% (n=3), respectively, in comparison to controls. DATTS (10^{-10}M) significantly ($p<0.05$) reversed both H_2O_2 (10^{-5} M) and NMDA (10^{-4}M)-induced RGC loss from 61.21± 5.52% (n=3) and 78.41±5.24 % (n=3) to 91.25 ± 0.84% (n=3) and 111.71± 3.11% (n=3) respectively, thereby increasing RGC survival. H_2O_2 (10^{-5} M) induced a decrease in endogenous GSH content from 40.88 ± 0.80 µmoles/gram to 34.50 ± 2.10 µmoles/g. DATTS (10^{-10}M and 10^{-8}M) significantly ($p<0.001$) reversed the H_2O_2-induced inhibitory response by 215% and 167%, respectively. Conversely, NMDA (10^{-4}M) significantly ($p<0.001$) enhanced GSH levels by 612.35 ± 56.81% (n=3). In this case, DATTS (10^{-8}M) reversed the NMDA-induced response to 34.97±7.88 µmoles/g (close to control level, 29.42 ± 7.29), thereby achieving a 192.8±9.28% reduction in GSH content. **Conclusion:** We can conclude that DATTS, H_2S releasing compound, protects the retinal neurons from the oxidative stress induced by peroxide and excitotoxicity induced by NMDA, ex vivo.

43 *Identification of Essential Genes Involved in Aberrant Subcellular Localization of Proteins in Cutaneous Skin Cell Carcinoma*

Department of Biomedical Sciences
Aditi Charak, James A. Grunkemeyer, Moynul Islam, and Laura A. Hansen

Background and Significance – Cutaneous squamous cell carcinoma (cSCC) is the second most prevalent type of cancer in the United States. Approximately 90% of reported cases can be ascribed to UV-induced mutations in the basal keratinocyte cells in the epidermis. Aberrant subcellular localization of proteins can lead to altered function and has been shown to lead to cSCC. To understand the mechanism(s) behind aberrant localization of proteins, we have been focused on protein trafficking mediated through the nuclear pore complex (NPC). Understanding the molecular pathways and interactions between the NPC proteins and their cargo can lead to the identification of novel therapeutic approaches in the future. **Methods** – We conducted a genome-wide CRISPRi screening experiment in the patient-derived cSCC cell line, SCC13. After infection with the sgRNA library, the cells were cultured for two weeks to allow selective pressure due to knockdown to exert its effects. DNA was collected and the sgRNA sequences in the surviving cells were sequenced to identify genes whose diminished expression was toxic to the cells. Results were analysed using the MAGeCK package. **Results** – NPC components (NUP93, NUP62, NUP98, NUP214 and XPO1) were found to be significantly depleted after 14 days in culture implying these are critically important in cSCC cell survival. **Conclusions and Future Directions** – Our aim is to validate the role of these genes by way of overexpressing them in normal cells and eliminating them in cancer cells. This approach will provide valuable insights into the subsequent ramifications of these genes in cancer progression.

44

Determining the Contribution of the PhoPQ Two-Component Regulatory System to Salmonella Antioxidant Defenses

Medical Microbiology and Immunology

Fabiola Alanoca Rugel, Meerah Cao, and Travis Bourret

Nontyphoidal *Salmonella* is one of the four leading causes of diarrheal illnesses globally, with *Salmonella enterica serovar Typhimurium* being the most common strain. The PhoPQ two-component regulatory system coordinates the response of *Salmonella* to diverse environmental challenges encountered during infection of hosts, including changes in Mg2+ concentrations, pH, and antimicrobial peptides. This project tested the hypothesis that PhoPQ promotes the antioxidant defenses of *S. Typhimurium* by regulating the expression of the magnesium transporter MgtA. Strains grown overnight at 37 °C in Lysogeny Broth (LB) broth +/- hydrogen peroxide were subcultured 1:100 in fresh LB and allowed to grow to logarithmic phase (Optical Density at 600 nm = 0.5). The bacteria were then diluted in Hepes-Sodium Chloride buffer (HN buffer, pH 7.6) to 105 cells/ml incubated in the presence or absence of hydrogen peroxide for 0, 0.5, 1, or 2 hours. At each time point, the bacteria were serially diluted in HN buffer and aliquots plated on LB agar plates. Plates were incubated overnight at 37 ˚C and colony-forming units were counted to determine percent survival. Experiments were carried out in triplicate. Collectively, these data suggest that the PhoPQ two-component regulatory system plays an essential role in defending *Salmonella* against oxidative and nitrosative stresses encountered during infection.

MEDICAL SCHOOL PRESENTATIONS: 8:45-10:45 AM
TUESDAY MARCH 26, 2024
STUDENT ABSTACTS

47

Pseudomonas aeruginosa Fusion Protein Vaccines Containing the Th17-Stimulating Antigen PopB Improve Mucosal IgA Responses and Protective Efficacy in Mice After Intranasal Immunization

Creighton School of Medicine
Marco DiBlasi, Mohammad Omar Faruk Shaikh, Matthew Schaefers, Fan Zhang, Robert Malley, and Gregory P. Priebe

Pseudomonas aeruginosa is an opportunistic pathogen with growing antibiotic resistance and no available vaccine. Previous work showed that P. aeruginosa protein, PopB, elicits a protective Th17 response after intranasal immunization, but provides insufficient protection. We investigated if fusing PopB with PcrV, a protein that elicits protective antibodies, would enhance efficacy.

Novel fusion protein to rhizavidin (Rhavi) was constructed for multimeric antigen presentation. This fusion protein of Rhavi to PcrV and PopB (RVB) was purified from E. coli via ion chromatography. Recombinant Rhavi-PcrV, PcrV, and PopB/PcrH were prepared by published methods. Mice were immunized intranasally using curdlan as adjuvant. IgA titers were assayed from bronchoalveolar lavage fluid (BALF), and Th17 responses were measured via IL-17 in splenocytes stimulated with antigens in vitro. Protective efficacy was evaluated in a murine pneumonia model using P. aeruginosa strain, N13.

Results show significantly higher IgA titers to PcrV in BALF of mice immunized with RVB when compared to mice immunized with either PcrV or Rhavi-PcrV, where IgA titers were undetectable. Th17 responses to PopB were significantly higher in RVB-immunized mice compared to PopB/PcrH-immunized mice. In the P. aeruginosa pneumonia model, RVB-immunized mice displayed 100% survival, whereas PcrV and Rhavi-PcrV-immunized mice had approximately 60% survival (logrank P=0.06 compared to RVB), all significantly higher than curdlan-immunized mice (0% survival).

These results suggest that integrating PopB with PcrV into the

same rhizavidin fusion protein elicits improved IgA titers to PcrV while maintaining a robust Th17 response to PopB, conferring broad and potent protection against P. aeruginosa lung infection.

48 *Assessing the Effectiveness and Overall Quality of a Two-Week Elective of Anesthesiology Through the Eyes of Medical Students*

Creighton School of Medicine
Branden Chamberlain, Nikita Baral, Alexander Hall, and Mark Reisbig

Despite the significant rise in interest in anesthesiology, Creighton University School of Medicine does not currently offer a residency program. With hopes of establishing one in the future, the anesthesiology department offers a two-week elective to third year medical students with aims of acquiring early exposure to the field. In this study, we collected quantitative and qualitative data from those who took the elective and assessed their understanding of anesthesiology and areas of the elective that students felt could be improved. Based on the results, recommendations were made and discussed with the department's faculty to implement for the following year.

49 *Serum Bicarbonate and Anion Gap do not Improve Prediction of Acute Pancreatitis Severity when Added to BISAP Score*

Creighton School of Medicine
Rees Checketts, DO, **Suhail Sidhu, BS**, William S. Reiche, DO, Ryan W. Walters, PhD, and Haitam Buaisha, MBBCH

There is a need for a simple and reliable test to predict severity of acute pancreatitis (AP) in the first 24 hours. Some studies suggest that metabolic acidosis can be a prognostic marker for severity of AP. Many studies show that venous bicarbonate can reliably and accurately be substituted for arterial base deficit to detect metabolic acidosis. Since serum bicarbonate level is routinely performed in nearly every patient presenting to the emergency department with AP, we conducted a retrospective and prospective analysis of a 443-patient cohort, we evaluated

routine metabolic lab values collected in the first 12 hours of presentation on predicting secondary outcomes including admission to the intensive care unit (ICU), ICU length of stay (LOS), and total hospital LOS. In-hospital death (n=12) was too small to be determined as a secondary outcome. We found that the inclusion of serum bicarbonate levels, anion gap (AG), and corrected anion gap (CAG) in the first 12 hours significantly improved the predictive capabilities of the BISAP score for these secondary outcomes. Corrected anion gap had the largest effect on predicting ICU admission and hospital LOS, respectively (1.12 (1.06-1.19), p <.001); (1.02 (1.01-1.04) and p <.001). The ICU LOS was not impacted by these laboratory values.

50 *Impact of Coronal and Sagittal Malalignment on Patient Reported Outcome Measures in Primary Anterior Cruciate Ligament Reconstructions*

Creighton School of Medicine
Claire Knowlan, Jace Otremba, Luke Tollefson, Morgan Homan, Nicholas Kennedy, and Robert LaPrade

Both coronal and sagittal malalignment have been reported to contribute to increased anterior cruciate ligament (ACL) tears and graft failure rates. However, it has not been reported how these malalignments contribute to overall patient satisfaction and lifestyle in patients who undergo a primary ACL reconstruction (ALCR). The purpose of this retrospective case series was to determine if there was a correlation between patient reported outcomes and increasing coronal and sagittal malalignment for patients with ACL tears. Patients who underwent primary ACLR surgery reported their responses to the International Knee Documentation Committee Survey (IKDC), Knee Injury and Osteoarthritis Outcome Score (KOOS), Tegner Activity Scale, and the Lysholm Knee Scoring Scale. Patient self-reported scores were compared between varus, neutral, and valgus alignments, as well as patients with a posterior tibial slope (PTS) ≥12° or PTS <12° to determine if there was a significant difference between the group scores. For all self-reported outcomes in the coronal and sagittal malalignment groups, there was no significant difference in any outcome scores. There was also no significant regression

between increasing coronal alignment deformity and poor outcome scores. Patient self-reported outcome scores after primary ACLR did not significantly change due to coronal and sagittal malalignment. These findings suggest that patients may not require a concomitant osteotomy procedure with a primary ACLR due to positive patient self-reported outcomes regardless of alignment, and concomitant bony malignment surgeries should be considered on a patient specific basis.

51 *Survival Outcomes for Adjuvant Radiation Therapy in Patients Diagnosed with Distant-Stage Merkel Cell Carcinoma: An Analysis of 2000 - 2020 SEER Database*

Creighton School of Medicine
Troy Belleville, BS; Mitchell A. Taylor, BA; Anjali Mishra, BS; and Divya Sharma, MD

Merkel cell carcinoma (MCC) is a rare and aggressive cutaneous malignancy associated with Merkel cell polyomavirus and chronic UV exposure. While surgical excision is the standard treatment, the efficacy of adjuvant radiation therapy remains uncertain. This retrospective cohort study, spanning 2000-2020 and utilizing the SEER database, aimed to compare disease-specific survival (DSS) in advanced-stage MCC patients treated with and without post-surgical adjuvant radiotherapy. 658 patients were identified as having been diagnosed with distant-stage MCC. The majority of patients identified as male (68.7%), White (86.3%), ages 75 and older (54.1%), married (61.7%), living in urban counties (87.5%), making greater than $70,000 annually (54.0%), and with primary tumors located on the head and neck (45.1%). 48.0% of patients received surgical treatment, and 31.5% of patients received radiation treatment following surgery. Patients who received post-surgical radiation demonstrated enhanced disease-specific 5- and 10-year survival (27.0% and 22.0%, respectively) compared to patients not receiving post-surgical radiation (13.0% and 11.0%) ($p<0.001$). Post-surgical radiation was independently associated with enhanced disease-specific survival compared to those not treated with post-surgical radiation (reference: no post-surgical radiation; hazard ratio 0.76; 95% confidence interval 0.60-0.97; $p<0.026$). This study aligns with some previous studies finding improved survival with adjuvant radiotherapy, particularly in

larger tumors. Discrepancies with other studies underscore potential patient selection biases. Overall, this study contributes evidence to the ongoing debate on the role of adjuvant radiotherapy in MCC treatment.

52 *Impact of Gestational Age on Exclusive Breastfeeding in a Normal Newborn Nursery*

Creighton School of Medicine

Olivia Foley, Tiffany Keller, and Terence Zach

Background: Breastfeeding is a crucial to an infant's development, providing numerous health benefits for both mother and child. Complemented by its nutritional benefits, breastfeeding enhances the immune response in various disease states. Current literature guidelines emphasize that infants be exclusively breastfed (EBF) until at least 6 months of age. Despite this recommendation, however, the number of infants in the United States that are breastfed to any degree before 6 months of age remains low. Many factors influence a mother's likelihood to breastfeed, and this study investigates the role that gestational age plays on EBF rates in a normal newborn nursery. **Methods**: This retrospective study gathered data from infants in the normal newborn nursery at Creighton University Medical Center – Bergan Mercy Hospital from March to June 2023. Gestational age, EBF status and formula supplementation was recorded during their stay. **Results**: In total, 907 infants were identified, with 59% of infants being EBF overall. 39 weeks gestational age had the highest rates of EBF (65%), while 36 weeks had the lowest (41%). These two values were compared utilizing a two-tailed t-test with $p<0.05$, which indicated that gestational age plays a significant role in the likelihood of an infant being EBF. **Conclusions**: The results of this study demonstrate a need to focus more effort on EBF among infants of younger gestational ages. Late pre-term babies are at higher risk for infections, and breastfeeding would convey substantial benefits to this group.

53 *Quantification of Hearing Function in Mice Exposed to Tobramycin and Lipopolysaccharide*

Creighton School of Medicine
Nicole Rud, Alyssa Burd, Jonathan Fleegal, and Sarath Vijayakumar

Tobramycin (TM), an essential drug used for treating bacterial infections, is associated with severe adverse effects, including irreversible hearing loss. Despite their efficacy against multidrug-resistant bacteria, aminoglycosides pose significant health risks to the patients who take them, including nephrotoxicity and irreversible cochlear and vestibular toxicities. Preventable causes of hearing loss have profound implications for individual and society. This study aimed to assess the impact of TM and lipopolysaccharide (LPS) co-treatment on auditory function in Cdh23 strain mice. Baseline auditory tests were conducted before a two-week TM treatment protocol, coupled with lipopolysaccharide administration to stimulate infection. Five treatment groups, including TM + LPS (low), TM + LPS (mod.), LPS (low), LPS (mod.), and TM only, were compared to an age-matched control group. Follow-up tests revealed significant threshold shifts in auditory brainstem response (ABR) and distortion product otoacoustic emission (DPOAE) at specific frequencies (16, 22.6, 32, 45.0, and 64 kHz) in the moderate dose LPS + TM group. Other groups showed no significant changes in ABR or DPOAE testing. These findings underscore the potential ototoxic effects of TM, particularly in combination with LPS, emphasizing the need for further investigation into the impact of TM on hearing health.

54 *The Relationship Between Engagement Time in Case-Based Learning and Performance on Preclinical Exams*

Creighton School of Medicine

Ashley Tuin, Cassie Eno, and Thomas Schechter

Case- and team-based learning activities are increasingly popular in medical education and have been shown to improve exam performance and academic success. Our institution utilizes a novel approach of using case-based learning (CBL) as prework for team-based learning (TBL) in preclinical medical

education, which is largely unstudied. The purpose of this study was to evaluate the relationships between time spent completing CBL and subsequent performance on individual and team readiness assurance testing (IRAT and TRAT, respectively) and associated final exam questions. Historical data was analyzed from the Class of 2025 M2 students and variables included time spent completing each CBL case, IRAT performance, TRAT performance, and final exam performance on questions related to the CBL. Analysis included hypothesis tests, correlation, and linear regression. Positive relationships were found between IRAT and final exam performance. This data supports previous research showing a strong correlation between TBL performance and final exam performance when compared to other learning methods. Time spent completing CBL was not found to be related to TBL or final exam performance. The lack of relationship between time spent on cases and subsequent performance provides valuable data and insight to medical educators indicating that protocols relating to time may not provide any direct benefit to student academic performance. Future research could help to refine the understanding of the relationship between time and performance considering the contribution of individual studying in addition to group discussion.

55 *Cholecystoenteric Fistulas Case Series*

Creighton School of Medicine
Zachary Brandt, Walter Crum, Brayden Jensen, and Johanna Schubert, MD

Cholelithiasis, the presence of precipitated stones within the gallbladder, presents in approximately 15% of the U.S. population. A rare complication of cholelithiasis is a cholecystoenteric fistula (CEF), in which an abnormal connection forms between the gallbladder and the gastrointestinal tract. The most common types of CEF are cholecystoduodenal (79.3%), cholecystocolonic (13.8%), and cholecystogastric (3.4%). Any CEF can result in gallstone ileus, a life-threatening mechanical obstruction of the intestine due to the passage of calculous through the fistula. Fistulas to the proximal duodenum or stomach can result in gastric outlet obstruction, (Bouveret syndrome). Although symptoms are

usually nonspecific, CEFs are clinically significant in that they are associated with increased morbidity and mortality and are managed differently than cholelithiasis with or without cholecystitis. Preoperative diagnosis of CEFs remains a challenge and controversies exist in their appropriate surgical management. Presented here are 4 cases of cholelithiasis-related fistulizing disease.

56 *An Interesting Case of Ehlers-Danlos and Vascular Management*

Creighton School of Medicine

Eva Holland

Introduction Ehlers-Danlos describes a group of hereditary connective tissue disorders. PLOD1 Kyphoscoliotic Ehlers-Danlos (EDS VI) is one form characterized by kyphoscoliosis and skin, vessel, and ocular fragility. Its estimated incidence is 1/100,000 (1). Management of EDS varies by severity of disease manifestation.

Case We present a case of a 32-year-old male with known EDS VI. He presented to a Midwest hospital with vague right-sided lower abdominal pain. Computed tomography (CT) scans at this institution reported an intramural hematoma in the lower abdominal aorta with extension into both common iliac arteries. He was transferred to our institution for management by vascular surgery. Left common iliac artery stent placement was performed. Surgeons reported fragile vessels with arterial thickening. However, the patient continued to have lower abdominal pain and CT angiography showed widespread abdominal arterial dissections. Patient underwent inferior vena cava filter placement given the risks of anticoagulation with stent placement. The decision was made to manage blood pressure to prevent further dissection and vessel weakening. He remained stable and was discharged with no changes on follow up imaging.

Discussion Surgical management of vascular dissection in EDS is not without risk. A 1996 review supported nonoperative management and simple vessel ligation over reconstruction (2). As surgical technology has advanced, a 2009 retrospective study found good outcomes among endovascular interventions for EDS patients (3). For our patient, each subsequent

angiogram seemingly weakened the vessels leading to conservative blood pressure management. Further studies on EDS vascular management with surgery versus blood pressure control are needed.

57 *Comparing Patient Education Material Efficacy between English and Spanish Speaking Caregivers*

Creighton School of Medicine
Jacqueline M Theil, Alexia G Gagliardi, Patrick M Carry, Harin B Parikh, and Tessa N Mandler

Introduction: Since United States healthcare serves an increasing Spanish-speaking population, patient/caregiver education must accommodate accordingly to optimize health outcomes (2). The purpose of this study was to do a secondary analysis of a previously published RCT that investigated print versus media-based education materials (EMs) given to caregivers of young patients discharged from surgery with a peripheral nerve catheter and pain pump and compare EM eRcacy between English and Spanish speaking study participants. **Methods:** We performed a secondary analysis of data from a previously published RCT (1) to compare discharge readiness scores (10-question evaluation), EM satisfaction, comfort level managing the medical equipment, level of preparedness, and preference for EM type among caregivers who reported English versus Spanish as their primary language. Multivariable logistic regression models were used to compare differences in the following variables: proportion of caregivers who scored a 10/10 on the readiness evaluation, who were "Satisfied/Very Satisfied" with the EM, who indicated they were "Pretty Comfortable/Very Comfortable" managing the pain pump, who felt "Very Well Prepared" based on the EM, and who preferred the media-based EM. Health literacy experts standardized EM content, which was translated to Spanish by a licensed interpreter. **Results:** Level of education and primary insurance type were significantly different between the two language groups (Table 1). The proportion of caregivers who scored a 10/10 on the discharge readiness evaluation was significantly higher in the English language group compared to the Spanish language group (odds ratio: 3.84, 95% CI: 1.56 to 9.43, $p<0.001$). No other significant differences in outcome

variables between groups were found. **Discussion:** Spanish-speaking patient populations in the United States demonstrate lower healthcare literacy than English-speaking counterparts (2). Although the availability of Spanish language EMs is improving, there should be greater focus on assessing patient comprehension of Spanish language patient education materials to improve health outcomes (3). **Conclusions:** In this study, Spanish speaking caregivers demonstrated decreased understanding of the outpatient management of a peripheral nerve catheter and its pump compared to English speaking caregivers. Further research should be done to assess the effectiveness of existing Spanish-language EMs and to improve Spanish- language EMs.

58 *Fibroblast Phenotypes and Their Effect on Impaired Wound Healing in Incisional Hernia*

Creighton School of Medicine

Hannah Rud, Max Koss, Swati Agrawal, and Robert Fitzgibbons

Introduction: Incisional hernia (IH) is a known complication of a laparotomy, with incidences ranging from 10 to 20% to as high as 70% post operatively. Prior research suggests the presence of impaired wound healing in IH formation; however, the exact molecular abnormality is poorly understood. Due to their numerous phenotypic expressions, fibroblasts perform many diverse roles in the healing process. Consequently, dysregulation of fibroblast phenotypes has been suggested as a marker of improper healing. To investigate the role of disordered wound healing in the pathogenesis of IH, we studied the expression of fibroblast phenotypes in incisional hernia fascia samples in comparison to fascia samples of control patients.

Methods: IH fascia samples were collected at the time of IH surgical repair and control fascia samples were collected from organ donors with no previous history of abdominal surgery. Known cellular markers for various fibroblast phenotypes were used in immunofluorescence staining and RT-PCR of the fascia samples to determine gene expression quantitatively and qualitatively.

Results: Preliminary immunofluorescence staining suggests decreased expression of all cellular markers in IH fascia in

comparison with control fascia. This suggests inadequate wound healing in IH patients. Analysis of PCR data shows that there is a significant decrease in factors promoting wound healing in patients with IH.
Conclusion: Dysregulated expression of fibroblasts in IH patients may cause impaired wound healing and may increase patient susceptibility to IH. Understanding the mechanisms behind impaired wound healing provides a therapeutic target for treatment.

59 *Exploring the Role of Lipid Droplet and BTN2A2 in the Proliferation of Thymic CD4+ T Cells*

Creighton School of Medicine

Sarah Robinson, and Anil Bamezai

Lipid droplets (LDs) are small molecular entities found in almost all eukaryotic cells. Intracellularly, they play a vital role in storing neutral lipids as a source of nutrients. Their extracellular presence, however, is not widely reported or understood. We report the presence of extracellular LDs in the mouse thymus, lymph nodes, and in tumor tissue. The origin and function LDs serve in these immune organs remain largely unknown. We have investigated their protein expression and lipid composition, as well as the functional role of LDs in the interaction between CD4+ T cells and antigen presenting cells. We report that thymic LDs are heterogeneous in size (5 to 100µm) and in their expression of surface proteins. LDs from the thymus express many immune molecules, including T cell receptor Î±Î² in significant amounts. A qualitative ELISA has shown the presence of BTN2A2 in the LDs, a protein in the butyrophilin family which is known to have inhibitory effects on CD4+ T cells. Lipidomic analysis revealed that LDs are enriched in saturated, specifically palmitic and stearic fatty acids, as well as multiple unsaturated fatty acids. When LDs are included in antigen presenting assays, they significantly inhibit the CD4+ T cell responses. We propose that this inhibition may have to do with the presence of BTN2A2 in the LDs. These findings shed light on the nature of extracellular LDs, the functional presence of BTN2A2, and offer preliminary implications regarding their role as a regulator of T cell responses and immune tolerance.

60 *Methimazole Induced Parotitis in a Patient with Hyperthyroidism - An Unusual and Rare Presentation of Thyroid Storm*

Creighton School of Medicine

Ricky Rana, and AbubakarTauseef

A 56-year-old female with past medical history of unspecified hyperthyroidism and recent thyroid storm, presented with tachycardia, hypertension, and bilateral, enlarged parotid glands. She recently began methimazole for managing unspecified hyperthyroidism. Laboratory tests revealed low TSH, and TSH-receptor antibodies. Autoimmune and viral workup was unremarkable. Laboratory findings suggest Grave's Disease with thyroid storm. CT scan revealed no calculi, but extensive fatty replacement of parotid glands, possibly related to methimazole use. Treatment with propranolol and IV hydrocortisone improved thyroid function, and she transitioned to reduced methimazole dosage for Graves' disease, due to suspicion of methimazole-related parotitis.

Methimazole, the standard initial treatment for Grave's Disease, is generally well tolerated. It can cause some adverse reactions; however, parotitis is very rare, documented in only a few case reports. Due to limited reports, incidence is currently unknown. Here, we present a case of methimazole-induced parotitis as an unusual presentation of thyroid storm.

Once common causes of parotitis such as viral infection, obstruction, and autoimmune disease are ruled out, drug-induced reactions can be considered. Treatment involves dosage adjustment and supportive care. Due to lack of reported cases, methimazole-induced parotitis is easily misdiagnosed and overlooked. This necessitates future research into the reaction's mechanisms and optimal treatment.

61 *West Nile Virus Encephalitis Presenting with Opsoclonus-Myoclonus Ataxia*

Creighton School of Medicine

Walter Crum, Tiffany Tsao, MD., and Jaya Gupta, MD

West Nile Virus (WNV) is a single stranded positive sense RNA virus of the Flaviviridae family. It primarily infects mosquitos and birds with mammals serving as dead-end hosts. WNV is the leading cause for arboviral infections in the United States with incidence peaking in the warmer months. It is estimated that 1 in 4 human hosts develop West Nile Fever, which presents clinically with rapid-onset headache, malaise, fever, myalgias, fatigue, chills, vomiting, rash, and eye pain. The incubation period for WNV is 2 to 14 days. The human immune response to WNV relies heavily on type I interferons and pro-inflammatory cytokines followed by an adaptive immune response.

Less commonly, 1 in 150-250 hosts develop neuroinvasive disease, which typically presents nonspecifically with sudden-onset fever, headache, meningeal signs, and photophobia. In 2020, there were 559 reported cases of neuroinvasive WNV disease with a national incidence of 1.7 cases per 1,000,000. Neuroinvasive WNV ranges in severity from mild self-limited confusion to severe encephalomyelopathy culminating in coma and death. Development of a course postural tremor mostly affecting the upper extremities is relatively common. The pathogenesis of neuroinvasion is not fully elucidated. Predisposing factors include old age, male sex, diabetes, hypertension, alcohol abuse, renal disease, and history of cancer.

Opsoclonus-myoclonus ataxia is an uncommon manifestation of WNV encephalitis that has been previously reported to be associated with a good prognosis. Here, we present a case report of opsoclonus-myoclonus ataxia associated with positive CSF studies for WNV and an otherwise negative workup.

62 *Investigation into Ability for Supplemental Instruction to Impact Medical Student Anxiety and Imposter Syndrome*

Creighton School of Medicine
Alexandra Van Cleave, Amanda Karl, Alexander Hall, and Jeff Lang

Attending the first year of medical school can be very stressful between academics and the transition to a new stage of life. Supplemental Instruction (SI) was used to build healthy relationships and create a supportive learning environment. SI, offered in a variety of formats, was investigated to determine its impact on student anxiety and imposter syndrome using first year medical students at a large Midwestern medical school. The GAD7 and Clance IP Scoring Systems were used to measure student anxiety during SI instruction. These surveys were offered to first year medical students in both the Class of 2026 and Class of 2027. For the Class of 2026, there was a significant positive association between GAD7 and Clance IP Scores. Moreover, there was a low anxiety level overall and on average, students agreed that SI lowered anxiety, academically and generally, improved understanding of material, and created a comfortable environment to ask questions. The results from Class of 2027 are being analyzed. These primary results demonstrate the possibility that an environment similar to SI can have on reducing anxiety among medical students and increasing understanding of medical knowledge. Creighton University School of Medicine's SI program could provide an example for medical school educators to design similar programs to address anxiety and imposter syndrome along with increasing understanding of medical knowledge.

63 *Astrogliosis in the Brainstem of a Preclinical SUDEP Model: Impact of Ketogenic Diet Treatment*

Creighton School of Medicine
Christy Heimbrecht, Reid Morrissey, Danny Rendon, Emma Neesen, Shruthi Iyer, Stephanie Matthews, Timothy Simeone, and Kristina Simeone

Rationale: Epilepsy is a chronic neurological condition that is characterized by unprovoked seizures. Sudden unexpected death in epilepsy (SUDEP) is a poorly characterized phenomenon that is more prevalent in approximately 35% of

epilepsy patients who have refractory epilepsy, resulting in 4.2 cases of SUDEP per 1000 patients. Evidence from previous studies suggests that patients with these refractory seizures may have damage in the brainstem's respiratory centers, leading to a series of events promoting hypoxic and hypercapnic fluctuations in blood gasses, including generalized convulsive seizures and apnea, from which they were unable to autoresuscitate, ultimately leading to terminal apnea. Data indicate astrogliosis in respiratory centers in the brainstem of the Kv1.1 KO mice, a preclinical model of SUDEP, suggesting that this increased gliosis could lead to respiratory problems in epileptic mice. The ketogenic diet (KD) consists of a diet of high fat and low carbohydrate and has historically been utilized for those patients with refractory seizures unresponsive to pharmacotherapy. This study aims to examine whether KD treatment attenuates brainstem astrogliosis. **Methods:** Kv1.1 and WT control mice were treated with either a standard or ketogenic diet for two weeks. Following transcardial perfusion, brainstem sections were immunolabeled with GFAP to assess astrogliosis using immunohistochemistry. **Results:** Previous studies found widespread astrogliosis in brainstem regions of mice that have had chronic seizures for multiple months. Here, we assessed an early timepoint and found selective astrogliosis in injury-susceptible brainstem regions, including the locus coeruleus, nucleus ambiguous, and raphe obscurus. Treatment with the ketogenic diet for two weeks attenuated astrogliosis in the locus coeruleus, but not the other regions. **Conclusions:** Ketogenic diet treatment attenuated astrogliosis in select brainstem regions. Future studies will investigate whether long-term treatment will benefit additional brainstem regions.

64 *Impact of Income on Survival Outcomes in Carcinoid Tumor of the Pancreas: An Analysis of the National Cancer Database*

Creighton School of Medicine

Madhu Ravishankar, and John Paul Braun

Background: Carcinoid Tumors of the Pancreas are neuroendocrine tumors of the gastrointestinal system composed of hormone secreting cells. While carcinoid tumors are rare, they have a better prognosis than many of the more

common pancreatic cancers. Despite this, there is little research on how socioeconomic factors such as race, income, and insurance status contribute to patients' long-term survival. Addressing this gap, this study analyzes data from the National Cancer Database (NCDB) to compare long-term survival rates between patients below and above the federal poverty level. **Methods:** The National Cancer Database (NCDB) was used to identify patients diagnosed with Carcinoid Tumor of the Pancreas from 2004 to 2019 using the histology code 8240 as assigned by the Commission on Cancer Accreditation program. Kaplan-Meier, ANOVA, and Chi-Square tests were performed. Data was analyzed using SPSS version 27 and statistical significance was set at Î± = 0.05. **Results:** In this analysis of 10021 patients, 8432 (43.7%) were classified as moderate income, while 1589 (56.3%) were classified as low income. This classification was based upon a cutoff of $38,000 (corresponding to the federal poverty level for a family of 4). Individuals with moderate income had a significantly higher mean overall survival of 130 months compared to 110 months for those classified as low income. ($p<0.05$). Additionally, moderate income patients were more likely to be insured, undergo surgical interventions, and be initially diagnosed at a different facility ($p<0.05$). Conversely, low income patients were more likely to be black, female, and live in rural communities ($p<0.05$). However, there was no significant association between treatment at academic centers, treatment via surgery, or chemotherapy selection($p>0.05$). **Conclusion:** This study revealed that individuals with Carcinoid Tumor of the Pancreas whose income level was below the Federal Poverty Line exhibit significantly worse survival outcomes than those whose income was above the Poverty Line. Interestingly, these differences were not associated with medical treatment discrepancies, like being seen at an academic institution, receiving surgery, or receiving chemotherapeutic treatment. While these results are based on correlational data, they underscore the necessity for further investigation to establish a causal link.

65 *Nurse-led Medical Emergency Response Reduces Code Blue Team Activations in Non-hospitalized Patients*

Creighton School of Medicine
Kiley Nelson BS, MPH; Melissa Brooks, RN, M.S.N; Carolyn Mead-Harvey, MS; Janae Quill RN, M.S.N.; Brigid Kiley MS, RN; Charles Peworski RN, M.S.N.; Adrienne Ritchie RN, M.S.N.; and Ayan Sen MD, M.Sc., FCCM

Objective: We describe the creation of a two-tier emergency response system with a nurse-led first responder program titled "MET-RN" (Medical Emergency Team-Registered Nurse) created for ambulatory settings supported by a critical care code blue team for escalation of care. This observational study evaluated the clinical characteristics and effects of a MET-RN program on the code blue response. **Methods:** A retrospective review of the MET-RN response data was assessed from January 2016-June 2021. Data collected included time of call, call location, patient comorbidities, triage category (minor, urgent, or emergent), activation trigger, interventions performed, duration of the event, and patient disposition. In instances where the patient was admitted to the hospital, the discharge diagnosis and emergency department (ED) triage score were collected. Differences were tested using analysis of variance (ANOVA) F-tests, with Tukey post-hoc testing where applicable. **Results:** MET-RN responded to 6,564 encounters from January 2016-June 2021. The most frequent trigger call was dizziness/lightheadedness, with a prevalence of 12.0%. 33.9% of the patients seen by MET-RN were transported to the ED for further evaluation. Establishing a MET-RN system led to an estimated median of 58.3% reduction in code blue events per quarter. **Conclusion:** The creation of MET-RN first responder system enabled the ambulatory areas to receive minor, urgent, and emergent patient care support, leading to a decrease in code blue events for the hospital. A two-tiered response system resulted in an improved allocation of hospital resources and kept critical care team in high-acuity areas while maintaining patient safety.

66 *Optimization of Immunoassays for the Characterization of Opioid Vaccines*

Creighton School of Medicine

Corinna Brown Ton, Sammy King, and Michael Raleigh

Illicit opioid use has caused substantial personal and public health issues in numerous countries. While various treatment options are available for individuals diagnosed with opioid use disorders (OUDs), limitations to existing therapies suggest that alternative treatment options could be advantageous. Recently, biological treatments, including vaccines and monoclonal antibody therapies, have constituted a more nontraditional and relatively novel approach to the treatment of OUDs. These immunotherapies, which utilize a pharmacokinetic as opposed to a pharmacodynamic approach to therapy, have demonstrated potency in some clinical studies, such as those against nicotine and cocaine. However, opioid vaccines have yet to migrate to the clinic. An oxycodone conjugate vaccine (OXY-sKLH) is in development and being prepared for clinical studies. When scaling up production for clinical testing, assurance tests are vital to ensure quality production. Enzyme-linked immunoassays (ELISAs) have previously been used to detect and verify the presence of hapten (opioid plus linker) and protein conjugate in solution. However, the technique is time consuming, tedious, and more appropriately suited for quantitative applications. The goal was to use simpler methods to evaluate the identity of OXY-sKLH components in solution. Results demonstrated that both Oxycodone and sKLH could be selectively detected, while off-target opioids and other proteins (such as bovine serum lbumin) displayed minimal detection. These results demonstrate that the dot blot technique could be used as a more immediate and less ambiguous approach to characterize opioid vaccines than the ELISA method.

67 *Molecular Inversion Probe (MIP) Optimization to Identify Hereditary Cancer Risk Genotypes*

Creighton School of Medicine
Lavanya Uppala, Samantha Draves, Cynthia Watson, and Holly Stessman

Henry Lynch postulated that family history or early onset of neoplasia will predispose immediate family to developing similar conditions. While mutations such as BRCA1 and BRCA2 often come to mind for such a phenomenon, there are many other lesser known and easily identifiable conditions for which early detection and subsequent prophylactic treatment would drastically improve patient outcomes. However, with the diversity of genes and pathways involved in cancer pathogenesis, it is often difficult to identify at-risk patients. Novel strides in high throughput technology, such as gene sequencing, have now made it more affordable and accessible to screen many individuals, while simultaneously including sequences of areas not well known or considered technically challenging to sequence.

Molecular inversion probes (MIPs) provide one such method of investigation. MIPs, or single-stranded DNA molecules, target SNPs of interest, allowing them to be amplified using PCR. These are designed with individual sample and molecule identifiers, which together allow many genes and multiple samples from separate individuals to be analyzed at once. Using families without confirmed diagnoses but high suspicion for hereditary cancer from the Lynch Cancer Collection, a panel of 55 genes and 3624 MIPs was designed. Baseline performance allowed for the assessment of underperforming and overperforming MIPs, of whose concentrations were then altered to balance the MIP library. Initial runs support the hypothesis that MIP-based panel sequencing is a cost, time, and resource efficient method to identify and support clinical diagnoses of patients at high risk of hereditary cancer syndromes.

68 *Pedigree and Genetic Analysis for Mutations in Families with a History Suggestive of Hereditary Cancer*

Creighton School of Medicine
Samantha Draves, Lavanya Uppala, Cynthia Watson, and Holly Stessman

Familial history is the leading factor in genetic testing for causes of hereditary cancer. However, the discernment of cancer origins is complicated by age of presentation, and may lead to questions of etiology, whether somatic or germline. Therefore, current advances in panel-based sequencing allow the assessment of multiple genes using a single patient sample, increasing both efficiency and affordability. One such strategy involves molecular inversion probes (MIPs), which by creating a mega pool of amplicons, allows for multiple genetic samples to be run at once, while maintaining the identity of who the genetic sequence belongs to.

We hypothesize that a combination approach of pedigree, chart, and MIP sequencing analysis will increase the yield of information related to genes and associated cancers to allow further understanding of cancer risk. 134 families were initially selected based on characteristics of hereditary cancer, from the Biorepository at Creighton University. MIP sequencing with coverage of 55 genes with known associations for cancer was utilized and confirmed via Sanger sequencing. Families with available chart information were examined for information related to cancer, including type, age of onset, treatment, prophylactic procedures, and age of last known contact in at risk individuals. Altogether, these helped identify those with hereditary cancer, those at high-risk for cancer in the future, and variants that need further studies for classification of pathogenicity. Initial review suggests this approach provides constructive information about sporadic and hereditary cancer, lineage of mutations associated with cancer risk and potential risk in future generations.

69 *Evaluation of Real-time Quaking-induced Conversion for Prion Strain Discrimination and Infectivity Determination*

Creighton School of Medicine

Jay Hrdlicka, Qi Yuan, and Jason Bartz

Chronic wasting disease (CWD) is a prion disease that affects cervids, is inevitably fatal, highly contagious, with an unknown host range. Real-time quaking-induced conversion (RT-QuIC) has proven as a reliable assay in detecting amyloid fibril formation and diagnosing prion diseases, but there is limited information about the use of RT-QuIC to quantify prion infectivity and strain discrimination. While animal bioassay remains the gold standard in assessing these metrics, it is burdensome with respect to animals, time, and cost. Evidence supporting the emergence of distinct CWD prion strains, has heightened the need for a more practical method capable of quantifying said metrics. We hypothesize RT-QuIC can quantify prion infectivity and discriminate prion strains. To investigate the ability of RT-QuIC in assessing prion infectivity, we compared the intracerebral bioassay lethal dose (LD_{50}) to the RT-QuIC seeding dose (SD50) value that is defined as the dose of prions resulting in a positive signal in RT-QuIC for 50% of tested samples. To investigate the ability of RT-QuIC to discriminate strains, we compared the SD_{50} difference and LD_{50} difference between the two hamster-adapted prion strains hyper transmissible mink encephalopathy (HY TME) and drowsy transmissible mink encephalopathy (DY TME). We found RT-QuIC accurately assessed infectivity for HY TME but not for DY TME. Further comparison of SD_{50} values to LD_{50} values, demonstrated the ability of RT-QuIC to discriminate between the two distinct hamster-adapted prion strains, exemplifying the potential for RT-QuIC as a valuable tool in discriminating emerging CWD prion strains.

70 *Readmission Rates in HIV-associated Burkitt Lymphoma Patients in the USA: A Nationwide Readmission Database (NRD) Analysis.*

Creighton School of Medicine
Clare Wieland, Ashley Tuin, Elizabeth Dort, Danielle Dilsaver, and Velagapudi Manasa

Background: People with human immunodeficiency virus (HIV) have an increased risk of developing AIDS-defining malignancies including Burkitt lymphoma (BL). Survival outcomes in HIV-associated BL remain worse than non-HIV-associated Burkitt lymphoma, despite widespread implementation of antiretroviral therapy. We aimed to determine the association between HIV status and risk for 30-day and 90-day readmission in the US after index hospitalization for Burkitt lymphoma.
Methods: Data were abstracted from the 2010-2020 Nationwide Readmissions Database; hospitalizations included patients with a primary BL diagnosis and were stratified by comorbid HIV. The primary outcome was all-cause readmission (30-day and 90-day). Secondary outcomes were in-hospital mortality, length of stay (LOS), and hospital cost. Between-HIV differences were evaluated via logistic and log-normal regression; multivariable models adjusted for comorbid kidney disease, hypertension, fluid and electrolyte disorders, and sepsis.
Results: Overall, there were 8,453 hospitalizations for BL and 6.0% carried an HIV diagnosis. Of BL hospitalizations, 68.4% were readmitted within 30-days post index BL hospitalization and 6.8% carried a HIV diagnosis. HIV-associated BL was associated with 43% higher adjusted odds of 30-day readmission (aOR 95% CI: 4% higher to 97% higher, p = 0.026). For 90-day readmission, 76.0% of BL patients were readmitted and 7.0% carried a HIV diagnosis. HIV-associated BL was not statistically associated with all-cause 90-day readmission (aOR 1.46, aOR 95% CI: 0% higher to 115% higher, p = 0.053).
Conclusions: HIV-positive status is associated with an increased risk for 30-day readmission after index hospitalization for Burkitt lymphoma.

71 *Case Report of a Newborn with Chest Teratoma and Middle Cerebral Artery Infarct*

Creighton School of Medicine

Mustafa Beidas, Eric Pederson, and Terence Zach

We report the clinical experience of a female infant born at 33 weeks gestation presenting with a chest teratoma who subsequently developed a stroke. Teratomas are tumors that are derived from the three germ cell layers, ectoderm, mesoderm, and endoderm. The incidence of teratomas is approximately 1 in 4000 live births. Mediastinal tumors originate from pluripotent embryonic cells. Mediastinal teratomas represent 10% of congenital teratomas. In our case, a premature infant developed respiratory distress after birth. Chest x-ray revealed a mediastinal mass. An echocardiogram on day 1 revealed a moderately dilated right ventricle with depressed function and bidirectional flow at the ductus arteriosus. On day 2, she developed seizures. A brain MRI revealed an acute large stroke in the distribution of the right middle cerebral artery. On day 11 she had a resection of the mediastinal mass which was determined to be an immature teratoma. Post-operatively she was poor feeder with severe gastroesophageal reflux. On day 64, she had placement of a gastrostomy tube and was discharged on day 69. This case describes the unusual occurrence of a congenital immature teratoma of the mediastinum complicated by an acute stroke in the distribution of the middle cerebral artery.

72 *Knockout of Keratinocyte Flower Protein in Cutaneous Squamous Cell Carcinoma*

Creighton School of Medicine

Peter Halloran, Patrick Kuwong, Greer Porter, Justin Rudd, James Grunkemeyer, and Laura Hansen

Studies have suggested that cellular fitness markers are used as communication between competing cells to direct cellular growth and elimination (1). One such class of these fitness fingerprints is the human flower isoform proteins (hFWE), which are thought to influence the progression of cutaneous squamous cell carcinoma (cSCC). In humans, hFWE encodes four isoforms, hFWE1-4, however current research suggests

that within skin, predominantly hFWE 3 and 4 are expressed. Research surrounding Flower isoform proteins' role in skin cancer tumor growth is limited yet may have therapeutic potential. Consequently, the aim of our research was to investigate how knockout of Flower proteins in cSCC affected proliferation and differentiation of keratinocytes. This research utilized three clonally expanded hFWE knockout (KO) and control (WT) cell populations derived from cSCC13 cell lines using CRISPR editing. One million cells from each cell line were implanted subcutaneously into each of four NCG mice. The mice were euthanized after enlargement and the tumors were collected, fixed, and stained. Genetic deletion of hFWE in cSCC13 xenografts resulted in reduced keratinocyte differentiation in the tumor epithelium, as shown by diminished loricrin and aberrant K10 localization within KO tissue compared to WT samples. Although both WT and KO showed similar patterns of Ki67 expression, overall intensity was putatively higher in WT cSCC. These results suggest that hFWE may play a significant role in keratinocyte differentiation in cSCC and normal epidermis.

73 *Who Chooses Water Births?*

Creighton School of Medicine

Brenna Hartman, and Zach Terence

Introduction: The increasing popularity and potential benefits of water immersion during the second stage of labor prompted a demographic analysis of patients electing water births at Immanuel Hospital in Omaha, Nebraska.

Methods: Patients who delivered via water birth at Immanuel Hospital between May 2019 and February 2022 were identified. Controls were randomly selected from a population of women who delivered vaginally within two days of each water birth. Data on age, marital status, gravidas, race/ethnicity, BMI, and preferred language were collected for each participant from the EMR and analyzed.

Results: 70 water birth patients were matched to 70 controls. Water birth patients were older than control patients (29.38 vs. 27.19 years, $p=0.010$) and more frequently married (64.3% vs. 32.9%, $p<0.001$). Primigravidity was lower in the water birth group (15.9% vs. 35.7%, $p<0.001$). Women in the water birth

group were 83.8% white and 10.3% black, whereas women in the control groups were 39.7% white and 44.4% black ($p<0.001$). The average BMI in the water birth group was lower than in the control group (29.73 vs 30.97, $p=0.20$). All water birth patients were English-speaking compared to 87.1% of control patients($p=0.11$).
Conclusion: Patients who elected water births at Immanuel Hospital were older, more likely to be married, multiparous, and white compared to vaginal delivery patients. No significant differences existed regarding BMI and preferred language.

74 *Cryptococcus and Stroke in an Immunocompetent Host*

Creighton School of Medicine
Geetika Guturu, Corey Yeates, Julie Jerabek, Faran Ahmad, and Manasa Velagapudi
Cryptococcus neoformans is known to cause meningitis in immunocompromised patients, the infrequency in immunocompetent individuals makes it a diagnostic challenge. A previously very active and independent 89YO female presented to the ED with symptoms of frequent falls, weakness, 15lbs weight loss, and confusion. Two months prior, she was admitted for COVID-19 requiring dexamethasone therapy that was complicated by a PE. PMH was significant for hypertension, CAD, and vaginal prolapse. Her home medications included apixaban, aspirin, losartan, and atorvastatin. On arrival, she was confused without focal deficits. Meningitis/encephalitis panel detected Cryptococcus neoformans. Patient was treated with 2 weeks of intravenous amphotericin B, oral flucytosine, and maintenance fluconazole. A brain MRI performed during the admission revealed subacute lacunar infarctions within the posterior left frontal lobe and bilateral cerebellum. After improvement, she was discharged to a nursing facility. One month later, she was readmitted for gastrostomy tube malfunction. Repeat serum cryptococcal antigen titer was again >1:2560. A second course of intravenous amphotericin B was initiated. Her encephalopathy worsened, prompting a repeat brain MRI which showed several small new foci of embolic strokes and posterior fossa leptomeningitis. Her mentation continued to worsen despite maximum therapeutic measures and was transitioned to

hospice care.
This illustrates the potential for cryptococcal meningitis in immunocompetent individuals with less commonly reported complication of stroke, predominantly detected in the basal ganglia, internal capsule, and thalamus. Prompt recognition and evaluation for cryptococcal meningitis as a cause of stroke is crucial for timely therapeutic intervention and a better prognosis.

75 *Vaccine Disparities in a System Lacking Financial and Access Barriers*

Creighton School of Medicine
Nansea Ji, Kelsey Witherspoon, Marvin Bittner, Amanda Yeates, Raul Isern, and Jennifer Zimmerman
Despite the benefits of vaccines in preventing infectious diseases, vaccine uptake is suboptimal, particularly in marginalized racial and ethnic groups. A quality improvement project at Omaha primary care clinics of the Veterans Health Administration Nebraska-Western Iowa Health Care System found no racial/ethnic disparity in uptake of the initial COVID-19 vaccine, whereas uptake of the zoster vaccine in this population did have racial/ethnic disparities. Our study of patients from the project sought to identify reasons why disparities in vaccine uptake were present for one vaccine but not the other. The electronic health records of 400 patients from this population were examined for factors including age, address, race/ethnicity, vaccination status against COVID-19 and zoster, provider characteristics, and number of visits with their provider. Our study was consistent with the quality improvement project in demonstrating that there were racial/ethnic disparities in uptake of zoster vaccine (50% for non-Hispanic White patients versus 22% for non-Hispanic Black patients) that disappeared for uptake of the COVID-19 vaccine (86% for non-Hispanic White patients versus 91% for non-Hispanic Black patients). Our results showed that length of the patient-provider relationship, number of visits, and patient-provider racial concordance did not have an association with uptake of either vaccine (57% regardless of concordance). Patients with Omaha addresses were less likely to receive zoster vaccine than other patients (40% versus 53%) but were

almost as likely to receive the COVID-19 vaccine (79% versus 84%). Further study of other determinants such as age, provider demographics, and geographic factors is ongoing.

77 *State and Regional Trends and Disparities in Malignant Melanoma Mortality from 1999-2022*

Creighton School of Medicine

Keegan Koeneman, Joseph Bettag, and Trevor Hu

Background: Melanoma is the fifth leading cancer in the United States. The objective of this study is to analyze geographical trends in melanoma-related mortality in the US before and during COVID-19.

Methods: The CDC Wonder database was used to collect data on melanoma-related mortality rates in the US from 1999-2022. Age-adjusted mortality rates (AAMR) per 100,000 and annual percentage change (APC) using Joinpoint regression were used to analyze state and regional trends.

Results: From 1999 to 2019, the states with the largest increase in AAMR were Idaho (0.91) and Colorado (0.63) while Oklahoma (-1.07), Nevada (-0.94), and Texas (-0.92) saw the largest decreases. During COVID-19 (2019 to 2021), the states with the largest increase in AAMR were South Dakota (1.42), Oregon (1.09), and Montana (1.08) while Vermont (-1.02), Minnesota (-0.45), and Connecticut (-0.38) had the largest declines. From 2006-2022, except 2020, the Northeast consistently had the lowest AAMR. From 2008-2012 the West consistently had the highest AAMR. From 2013-2022, except 2015, the Midwest had the highest AAMR. From 2009 onwards, all 4 regions have seen an overall decline in AAMR with their lowest values being in 2022.

Conclusion: Idaho had the highest AAMR before COVID-19 while Oklahoma had the lowest. During COVID-19, South Dakota saw the highest AAMR while Vermont had the lowest. AAMRs have been trending downwards across all 4 regions since 2009 and the Northeast has fared the best over that period.

78 *KMT5B Haploinsufficiency and its Effect on Circulating Insulin-like Growth Factor*

Creighton School of Medicine

Joseph Lee, Cynthia Watson, Jodi Hallgren, and Holly Stessman

Autism spectrum disorder (ASD) is a well-known neurodevelopmental disorder, but full comprehension of its pathogenesis is still lacking. The lysine methyltransferase 5B (KMT5B) gene is known for its association with ASD, and previous studies have shown that KMT5B haploinsufficiency can cause macrocephaly, global developmental delay, and skeletal muscle development deficits. KMT5B has also been shown to have some regulation over the expression of insulin-like growth factors 1 and 2 (IGF-1 and IGF-2 respectively), which stimulate cell growth and proliferation. This study's purpose is to investigate the effects of KMT5B haploinsufficiency on the expression of IGF-1. Additionally, the expression of growth hormone (GH) was also measured due to GH's stimulatory effect on IGF generation. Sandwich ELISAs were used to measure the concentrations of IGF-1 and GH in wild type (WT) and KMT5B haploinsufficient (HET) mice serum over developmental time. Results demonstrated that KMT5B haploinsufficiency causes decreased weight in mice, supporting previous research that indicated skeletal muscle development deficits. IGF-1, however, was not significantly decreased in these mice. In HET mice, GH was significantly increased without a subsequent rise in IGF-1, indicating that there may be a downregulation of GH receptors to stimulate IGF-1 release. Further studies should be done to investigate the interaction of GH and IGF-1 in KMT5B haploinsufficient mice.

79 *Demographic Trends in Malignant Melanoma Mortality from 1999-2020: A CDC Wonder Study*

Creighton School of Medicine

Trevor Hu, Joseph Bettag, and Keegan Koeneman

Background: Melanoma is a malignant type of skin cancer and is the fifth most common type of cancer in the United States. From a clinical standpoint, melanoma can be characterized by its asymmetry as well as its irregular shape and color. To date, no previous studies have analyzed epidemiological trends in

melanoma mortality using the CDC Wonder database.
Methods: CDC Wonder is a database that contains mortality and demographic information for various pathologies. During the analysis, mortality rates were generated based on gender, race, and state. Melanoma cases were specified using the ICD-10 code C43.
Results: When looking at race, several differences in the age-adjusted mortality rate were observed. In particular, the White group had the highest mortality rate, whereas all other races had similar rates. Similarly, when analyzing both race and gender, it appears that White males have the highest rate in mortality. The second highest rate belonged to the White female group, and all other racial and gender combinations had similar mortality rates. The trends in mortality rates did not fluctuate much from the years 1999-2020.
Conclusion: The mortality rate for melanoma may vary by race and gender. More specifically, White people may be susceptible to higher mortality rates compared to other races. Moving forward, more research should be done regarding how this group is treated and how management processes can be improved.

80

Recognize, Inform, Support, and Empower (RISE): A Strategy to Combat Gender-based Mistreatment of Students, Faculty, and Staff in an Academic Medical Center

Creighton School of Medicine
McKayla Deisz, Xinxin Wu, Ronn Johnson, Rachel Jones, Jaya Raj, Jessica Seaman, Poonam Sharma, and Cassie Eno
Background: Gender-based mistreatment is problematic in medicine. According to the National Academies of Sciences, Engineering, and Medicine up to 50% of female medical students report experiencing sexual harassment. The AAMC Graduation Questionnaire collects data on discrimination reported by medical students. This study explored the reports of gender mistreatment to better characterize issues experienced by students and utilized a development series to inform response to gender-based mistreatment.
Methods: 155 students completed a learning environment survey. Respondents with interest were invited to answer more

detailed questions in person interviews or focus groups about their experience. Interviews were transcribed and evaluated via thematic analysis. The data was used to inform a development series on gender-based mistreatment.

Results/Discussion: 24.7% of women students reporting experiencing offensive sexist remarks or names. Additionally, of students who reported experiencing mistreatment, only 30% reported it to faculty or administration. Common reasons for this included:

- unsure of process -confidentiality concerns
- fear of retaliation -anticipating no change in outcome

To address these issues, work towards supporting victims, and eliminate mistreatment, the research team developed the "R.I.S.E. (Recognize, Inform, Support, and Empower) Up against Mistreatment"model. The initial phase of the model includes recruiting and educating faculty "Champions" in the hopes of creating a safe environment. Champions undergo a 5-session, workshop designed to educate faculty on the mistreatment happening within the school, the resources available, and problem-solving techniques. The goal of RISE is to simplify the process of how to support those who have experienced mistreatment and reduce mistreatment rates.

81 *The Use of Transesophageal Echocardiogram in Hemodynamically Unstable Non-Cardiac Patients: A Case Report*

Creighton School of Medicine

Adrianna Glisan, Christian Horazeck, and Joseph Davidson

This case report discusses the diagnosis and management of an incidentally found atrial thrombus in a postpartum patient. A 34 year old female presented with excessive, bloody drain output after cesarean section, prompting exploratory laparotomy. Transesophageal echocardiography (TEE) was used to monitor volume status and resuscitation response during the procedure. TEE revealed a pedunculated, mobile mass of approximately 4 centimeter diameter in the right atrium, the stalk of which reached into the inferior vena cava (IVC). Following completion of the exploratory laparotomy and hematoma evacuation, the patient was taken for emergent thrombectomy during which a 20 centimeter-long thrombus

originating in the intrahepatic IVC was retrieved. Following thrombectomy, the patient recovered well without complications. This case highlights the utility of using TEE in non-cardiac cases for patients at high risk for hemodynamic instability or fluid shifts to detect previously unknown and life-threatening problems.

82 *The Effects of Diabetes Mellitus on the Musculoskeletal Dynamics of the Hand*

Creighton School of Medicine

Paul Wilkinson, Aidan Gaertner, and Thomas Knoedler

Diabetes mellitus is a metabolic disease that results in chronic hyperglycemia. Among the many long-term complications associated with diabetes, manifestations in the hand include Dupuytren's contracture, trigger finger, compressive neuropathies, and infections. These conditions can have a profound impact on a patient's quality of life, highlighting the importance of timely recognition and treatment of these manifestations. This review aims to provide updated information regarding the incidence and outcomes of these clinical manifestations in the diabetic vs non-diabetic population.

A systematic review based on the PRISMA checklist was performed. The literature search included the use of PubMed and Ovid databases in order to find relevant articles that were then selected based on an inclusion criterion that required level 4 evidence.

Diabetes mellitus results in an increased incidence of Dupuytren's contracture, trigger finger, carpal tunnel syndrome, cubital tunnel syndrome, and hand infections. It was found in Dupuytren's contracture there was a modest link between incidence in the diabetic population as well as the difference in efficacy of treatment when compared to non-diabetics. Contrary to past studies, most data points toward diabetes mellitus being an independent risk factor for carpal tunnel syndrome. Dupuytren's, trigger finger, and carpal tunnel syndrome all had similar outcomes while diabetics had worse outcomes related to infections. There was a lack of data regarding the effect of diabetes on cubital tunnel syndrome. Future studies should be performed to analyze the effects of

diabetes mellitus on hand manifestations, particularly regarding the outcomes of diabetic patients with cubital tunnel syndrome.

83 *Contemporary Trends and Disparities in Psychoactive Substance Use-related Behavioral and Mental Disorder Related Mortality in the Midwest United States*

Creighton School of Medicine
Taylor Billion, Hannah Manion, Ali Bin Abdul Jabbar; Abubakar Tauseef, Bradley DeVrieze, and Mohsin Mirza

According to a CDC survey, in 2020, 40.3 million Americans suffered from substance use disorder (SUD). US societal costs were estimated at $700 billion a year. This study is a serial cross-sectional study using the Center for Disease Control's Wide-ranging Online Data for Epidemiologic Research (CDC Wonder) to collect data on psychoactive substance use-related behavior and mental disorder mortality rates in the Midwest from 1999-2021.Mortality was presented as age-adjusted mortality rates (AAMR) per 100,000 residents and as crude rates. Average Annual Percent Change (AAPC) in mortality from 1999-2021 was calculated, as well as Annual percentage change (APC) for individual periods of change from 1999-2021. A total of 56,994 psychoactive substance use-related behavior and mental disorder deaths were identified in the Midwest from 1999-2021. Males and the Black population in the Midwest had higher AAMR. Ages 45-54 had the highest mortality rates from 1999-2010, while ages 55-64 had the highest from 2011-2021. Deaths have increased in the Midwest since March 2020 (average deaths January 2018- February 2020: 271 per month; average deaths March 2020- December 2021: 389 per month), disproportionately more for males and black populations than other demographic groups. This study identified key demographic and regional differences in psychoactive substance use-related behavior and mental disorder mortality and demonstrates an overall worsening in contemporary mortality trends which further increased since the beginning of the COVID-19 pandemic, disproportionately affecting demographically disadvantaged groups more than others.

84 *Enterobacter Cloacae Sepsis in a Premature Newborn Infant*

Creighton School of Medicine

April Cooke

Neonatal sepsis is a major cause of mortality and morbidity in neonates that are preterm (<34 weeks) and of very low birth weight (VLBW). Late onset sepsis (LOS) as seen in this case report refers to sepsis occurring over 72 hours after birth. The risk of LOS increases with decreasing gestational age up to 32 percent for neonates born prior to 23 weeks. Risk of LOS also increases with decreasing birth weight up to 43% for neonates weighing less than 750 grams. LOS presents with a larger variety of pathogens compared to early onset sepsis, the most common being coagulase-negative staphylococci (CoNS). This can be acquired at birth or from environmental horizontal transmission. Neonatal sepsis with Enterobacter species is a rare event, and one that can be difficult to treat and is associated with high mortality. We report a case of Enterobacter cloacae sepsis in a very low birth weight 28 week neonate. The patient developed respiratory distress in delivery room and was intubated. Ampicillin and Gentamicin were started initially and stopped after negative blood cultures. Several days later following increased apnea alarms, blood cultures were drawn and grew Enterobacter Cloacae. Patient treated successfully with two days meropenem followed by cefepime after negative meningitis workup. This case helps expand awareness of a rare cause of neonatal sepsis to increase the chance of early diagnosis and appropriate antibiotic usage to improve patient outcomes.

85 *Optimal Filling Solution for the Double Balloon Urinary Catheter: A Laboratory Analysis*

Creighton School of Medicine

Emma A Thomsen, Clare M. Wieland, Sankalp Vinayak, Claire S. Malhotra, Peter S. Palencia, Joel F. Destino, and Michael P. Feloney

For patients with neurologic bladder injury, long-term indwelling catheterization (LTIC) is a necessary part of care. Duette Double Balloon Catheters (DDBC) were developed for

LTIC to reduce risk of catheter associated urinary tract infections (CAUTI). However, when filled with standard sterile water, they are prone to deflate within the bladder, leading to complications such as hematuria, urinary tract infections, and bladder mucosal injury. Titrated glycerin solutions have been proposed as filling alternatives. Our study aims to determine the glycerin concentration that best maintains the volume of DDBC balloons.

DDBCs were inflated using normal saline, sterile water, 10% glycerin, 20% glycerin, 30% glycerin and 40% glycerin solutions, placed in sterilized beakers containing synthetic urine, and maintained at 37 C for 28 days. Balloon diameter was measured with photo analysis using the Tracker software. Final balloon volumes were recorded.

ANOVA analysis revealed a significant difference in the mean final volumes among the different solution groups in the 5cc balloon ($F(5,12) = 89.305$, $p =<.001$) and in the 10cc balloon ($F(5,12) = 847.778$, $p =<.001$).

30% glycerin solution and 20% glycerin solution demonstrated the least amount of change in the 5cc balloon volume and 10cc balloon volume over 28 days, respectively. The sterile water solution experienced the greatest relative volume change for both the 5cc and 10cc balloon. Using 30% filing solution for 5cc balloon and 20% filing solution for 10cc balloon could help minimize DDBC balloon deflation and its associated complications. Further in-vivo studies are needed to validate these results.

86 *The Effect of Fascial Suture Type on Postoperative Outcomes following Gastrostomy Tube Placement*

Creighton School of Medicine

Noah Wilson, Nell Weber, Noah Keime, Nicole Becher, Suhong Tong, Connor Prendergast, Ann Kulungowski, Jose Diaz-Miron, and Shannon Acker

Introduction: There are a variety of surgical techniques to secure the stomach to the abdominal wall during gastrostomy tube (GT) placement. Previous data demonstrate increased risk of cellulitis related to fascial suture type. We investigated whether fascial suture choice impacted rates of common complications after GT placement. **Methods:** We conducted a

single-center retrospective review of children who underwent GT placement from 1/2018 - 5/2023. Patients with a concomitant procedure of wound class II or greater were excluded. Subjects were matched 2:1 by suture type. Data collected included patient characteristics and clinical course. Outcomes included: cellulitis, tube dislodgement, granulation tissue, ED visits, readmission, and reoperation. Comparisons were based on type of fascial suture used (braided suture or monofilament). Suture choice was determined by surgeon preference. **Results:** 184 patients were included; 122 in the braided group (66%). Rate of granulation tissue at 2 weeks ($p = 0.88$) and 6 months postoperatively ($p = 0.53$) did not differ. Number of granulation tissue events were similar (median 1, IQR 0-1.5; $p = 0.63$). No difference in rates of cellulitis ($p = 0.49$) or tube dislodgement ($p = 0.55$) at 2 weeks. There were no differences in number of postoperative clinic phone calls within 2- and 8-weeks post op. ED visits and readmissions within 30 days and 8 weeks did not differ. Clinical course, rate of GT removal, and need for subsequent gastrocutaneous fistula closure were similar. **Conclusions:** Fascial suture type does not significantly impact the rate of postoperative complications following GT placement in pediatric patients.

87 *Community Initiatives to Prevent Blindness: Free Vision Clinics in Omaha, Nebraska*

Creighton School of Medicine

Taylor Carlson, and Hannah McIntosh

The Magis Clinic is Creighton University's student-run free clinic, an organization that provides free healthcare to the community of Omaha, Nebraska. The Magis Clinic's Preventative Health team is a group that creates healthcare opportunities with a focus on preventable diseases. One of our roles includes providing vision-related healthcare initiatives with a goal to decrease the prevalence of blindness in our community. The vision clinics, held several times a year, provide coupons for patients to receive their prescription glasses at no charge. This clinic is made possible by our volunteer ophthalmologist, Dr. Carol Drake, and a collaboration with the Prevent Blindness organization. During the fall semester of 2023, the Preventative Health team held two vision

clinics at the Magis Clinic. As part of our efforts to better understand the population we serve, we asked patients questions from a standardized survey. We saw a total of 28 patients at the clinics with an average age of 51 years, most of whom were males. Of the patients we saw at these clinics, 22 people were seeking prescriptions for glasses, and 14 people needed reading glasses. Notably, 25% of patients lacked health insurance and only 18% had access to an ophthalmologist. For 86% of attendees, this was the only ophthalmologist they would have access to this year. This demonstrates the need for vision-related healthcare in our community and guides our continued preventative health efforts. We appreciate our volunteer physician and the Creighton University students who help make these services possible.

88 *An Approach to Surgical Management of Chronic Colocutaneous Fistula Complicated by Abscess*

Creighton School of Medicine

Connor Lanoue, Emily Krier, and Michael Yeradi

Background: Colocutaneous fistulas can occur as the result of complications from diverticular colon surgery. Enterocutaneous fistula is a type of fistula that accounts for about 88.2% of all fistulas. In this report, we describe a case report of the management of colocutaneous fistula with laparoscopic surgery. ***Case presentation:*** In this case reports, both patients complained of increased amount of abdominal discharge after surgery. In Case 1, a 43-year-old female patient complained of a lump in her lower abdomen which had been there for three months. After removal of the lump, there was blood in the drainage tube. After three months, her surgeon advised to close the stoma. In Case 2, a 47-year-old male patient lived with colocutaneous fistula for a year. He had been involved in a traffic accident and underwent laparotomy sigmoidostomy. Both patients experienced pain, and there also were feces and bad odor coming out from the surgical incision. Then, both patients underwent colonoscopy, which revealed coloncutaneous fistulas. Laparoscopic surgery was conducted and there was adhesion between the sigmoid colon and ileum in the ventral abdomen wall. After the laparoscopic procedure, the patients were discharged 3 days later without any

complaints. ***Conclusions:*** Laparoscopic colectomy has recently replaced open resection as standard surgery. This procedure is safe, feasible, and effective for diverticular disease.

89 *Impact of Legal Infractions on Residency Selection as Perceived by General Surgery Program Directors: A National Focused Internet Survey*

Creighton School of Medicine

John McCarthy; Paul Schenarts, MD; and Brett Waibel, MD

Background: Substance abuse and drug use are common among college and medical students. Ayala et al in 2017 found 91% of medical students drink alcohol and 26% use marijuana annually. These habits may also cause legal consequences. This project quantified consequences of legal infractions on general surgery residency applicants as determined by program directors (PDs). **Methods:** An internet questionnaire surveyed surgery residency PDs using non-proportional quota sampling. Collected PD demographics included gender, age, duration as PD, residency type, geographic location, and state marijuana legalization status. Likert scales quantified consequences to drug-related situations. Fisher's Exact tests with Holm's method and ANOVA tests evaluated the statistical significance. **Results:** Response rate was 81% (61 PDs). PD demographics included 67% male, 60% age 55 or younger, and 50% were PD for 5 years or less. 61% of residencies were university-based. Geographical distribution was 30% Northeast, 28% Southeast, 28% Midwest, and 15% West. 49% had state marijuana legalization. Comparing demographics found PDs in states with legal marijuana were less harsh to medical school possession of marijuana infractions ($p<0.002$). PDs ages 35-45 responded harsher than PDs ages 56-65 for college methamphetamine infractions ($p=0.022$). University-based PDs responded harsher compared to university-affiliated/community-based PDs for college cocaine infractions ($p=0.042$). Northeast PDs were more lenient on college marijuana and methamphetamine compared to other regions ($p=0.002$). **Conclusions:** Demographics of PDs like age, program university-affiliation, marijuana legalization status, and geography impacted infraction consequence. Further investigation is needed to guide consistent PD decision-making.

90 *The Collaborative Care Model and Adolescent Depression Outcomes*

Creighton School of Medicine
Makenzie Maroney, Nicholas Morgenstern, Remmy Rocha, Shannon Kinnan, Melanie Menning, and Ryan Walters, Ryan

Background: The collaborative care model (CoCM) is an evidence-based model of integrated care in which a behavioral health care manager works with the primary care provider and a psychiatric consultant. This model has shown to improve the quality of and access to mental health care in adolescent populations.

This study aims to evaluate the influence of the CoCM on depression treatment outcomes and access to healthcare in adolescents at OneWorld Community Health in Omaha by comparing the CoCM with usual care, in which treatment is directed by primary care. It is expected that the use of the CoCM will decrease PHQ-9 scores at a greater rate, correlating with an improvement in depression symptoms, and increase patient contact with mental health providers.

Methods: The data was collected via a retrospective chart review through OneWorld's electronic health record. 36 unique patient charts were identified and assigned to one of two groups: usual care (17) or CoCM (19). PHQ-9 scores were analyzed using mixed-effects negative binomial regression.

Results: Results showed that every 30 days, CoCM group PHQ-9 scores decreased by 3.0% ($p = .003$), while usual care group scores decreased by 9.4% ($p < .001$). Additionally, patients in the CoCM group were seen an average of 15 times throughout their treatment compared to three times with usual care ($p < 0.001$).

Conclusion: Despite increased mental health contact, the CoCM group showed a smaller decrease in PHQ-9 scores. It is hypothesized that this results from patients in the CoCM group having more severe, treatment-resistant disease at baseline. Nonetheless, the study highlights CoCM's efficacy in improving treatment access for depressed adolescents.

91 *Impact of Treatment Setting on Survival Outcomes in Carcinoid Tumor of Pancreas: An Analysis of the National Cancer Database*

Creighton School of Medicine

Daniel Murillo Armenta, and John Paul Braun

Background: Carcinoid Tumor of the Pancreas (CTD) is a rare form of pancreatic cancer characterized by serotonin-secreting cells. Existing research indicates that patients treated at academic facilities experience increased overall survival compared to those treated elsewhere. However, there is no specific research regarding Carcinoid Tumor of Pancreas and patient outcomes at academic centers versus non-academic centers. Therefore, this study utilizes data from the National Cancer Database (NCDB) to compare long-term survival rates between patients treated at academic institutions and those at non-academic facilities with CTD.

Methods: The National Cancer Database (NCDB) was used to identify patients diagnosed with undifferentiated carcinoma of the pancreas from 2004 to 2019 using the histology code 8240 as assigned by the Commission on Cancer Accreditation program. Kaplan-Meier, ANOVA, and Chi-Square tests were performed. Data was analyzed using SPSS version 29 and statistical significance was set at $\alpha = 0.05$.

Results: In this analysis of 10,892 patients, 6,306 (57.9%) received care at academic centers, while 4,586 (42.1%) were treated at non-academic institutions. Patients cared for at academic centers had a statistically significant survival rate after 200 months than those treated at non-academic facilities ($p<0.05$). Patients who received care at academic facilities were also more likely to have private payer insurance, receive surgical intervention, and have a lower Charlson-Deyo Comorbidity score ($p<0.05$). Patients treated at academic facilities were also more likely to travel larger distances to receive care, over 39 39-mile difference in travel ($p<0.05$). There was no statistical connection between patients' race, income, or chemotherapeutic therapy received at academic facilities versus non-academic facilities ($p>0.05$).

Conclusion: This study revealed that individuals with CTD of the pancreas receiving treatment at academic centers exhibited a significantly improved overall survival rate compared to those

treated at non-academic centers. This disparity may be attributed to the higher prevalence of private payer insurance, increased surgery, or difference in the Charlson-Deyyo score. While these observations are based on correlational data, they underscore the necessity for further investigation to establish causality.

92 *Impact of Income on Survival Outcomes in Pancreatic Endocrine Tumor: An Analysis of the National Cancer Database*

Creighton School of Medicine

John Paul Braun, Chris Bine, and Peter Silberstein

Background: Pancreatic endocrine tumors are a rare form of pancreatic cancer with a highly variable survival rate. While existing cancer research indicates that high income patients experience improved survival outcomes compared to low-income patients, there is little research on this topic in the context of pancreatic endocrine tumors. To address this gap, this study analyzes data from the National Cancer Database to compare long-term survival rates between high- and low-income patients with pancreatic endocrine tumors.

Methods: The National Cancer Database (NCDB) was used to identify patients diagnosed with undifferentiated carcinoma of the pancreas from 2004 to 2019 using the histology code 8150 as assigned by the Commission on Cancer Accreditation program. High income patients were classified by a household income greater than $38,000, while low-income patients had a household income of less than $38,000. Kaplan-Meier, ANOVA, Cox regression, and Chi-Square tests were performed. Data was analyzed using SPSS version 27 and statistical significance was set at $\alpha = 0.05$.

Results: In this analysis of 2129 patients, 1816 (85.3%) were high income, while 313 (14.7%) were low income. High income patients experienced a significantly increased mean survival rate of 117.0 months following diagnosis compared to the 102.7-month survival rate of low-income patients ($p<0.05$). After controlling for insurance status, race, facility type, and treatment type, low-income patients demonstrated a significant increase in hazard score (HR=1.615, $p<0.05$). Additionally, low-income patients were more likely to undergo

chemotherapy, have a higher Charlson-Deyo Comorbidity Index, and live farther from their treatment facility ($p<0.05$). Conversely, high income patients were more likely to be white, have private insurance, be treated at academic facilities, and undergo surgery ($p<0.05$). Patients' 30 day and 90-day survival rate and sex did not differ significantly.
Conclusion: This study showed that high income individuals with pancreatic endocrine tumors exhibit a significantly improved overall survival rate and decreased hazard score compared to low income patients. This disparity may be attributed to differences in rates of surgical intervention, facility type, or insurance status, among other factors. These observations are based on correlational data, and they underscore the necessity for further investigation to establish causality.

93 *Clinical Implications of a Rare Type 4 Hiatal Hernia Involving the Stomach and Transverse Colon Complicated by Stercoral Colitis*

Creighton School of Medicine
Ivanna Tang, Victoria Johnson, Noorhan Monther, and Maria Arroyo

Hiatal hernias are classified according to the degree of abdominal viscera that herniates through the diaphragm into the chest cavity. Type 1 and type 2 hiatal hernias, which are associated with acid reflux, are relatively common; however, type 4 hernias occur very rarely and may have an extensive range of presentations. Some cases can be asymptomatic, whereas other cases can extend beyond gastrointestinal disease processes and can be potentially life-threatening. We report a case of a 79-year-old male with an unusually large type 4 hiatal hernia involving an intrathoracic stomach and transverse colon complicated by stercoral colitis. We also discuss the impact of his hernia on his health and hospital course and potential future complications.

94 *How Does Perception of Risk Influence Flood Preparatory Behaviors? Case Study Iowa and Nebraska*

Creighton School of Medicine
Martha Koenig, DT Ratnapradipa, Danielle Hotalling, Kevin Boes, Amy McGaha, Jack Taylor, and Timothy Guetterman

We are examining the influence perceived susceptibility to flooding has on the preparatory behaviors across households in Iowa and Nebraska. Increased atmospheric temperatures triggered by climate change increases flood risks via heavier precipitation, stronger storms, and rising sea levels. The impacts flooding has on health can be detrimental. Potential risk includes immediate injury or loss of life. In addition, flooding can also have long-term health implications secondary to increased harmful environmental exposures. It is important to investigate the factors (i.e., risk perception) that influence flood preparatory behaviors of households within communities to minimize the consequences of flooding. Using Health Belief Model (HBM) styled questions, a survey was designed and distributed to Iowan and Nebraskan households (n = 271) located within floodplains. HBM is a behavioral model prediction tool that analyzes the likelihood of engagement in a health behavior if individuals both value the health outcome of the action and believe the action will result in the desired outcome. A Likert scale was utilized to quantitatively analyze differences in risk perception and flood preparatory behaviors across households. Individuals who considered their household more at risk for flooding were more likely to participate in flood preparatory behaviors. Higher perceived susceptibility was a significant predictor of currently having a household flood plan. Perceived flood risk seems to be indicator for preparing for a flood. Ensuring that households across Iowa and Nebraska understand their susceptibility to becoming a flood victim is a significant way to increase flood preparatory behavior and combat health consequences.

95 *Sex Differences on the Outcomes in Carcinoid Tumor of the Pancreas: An Analysis of the National Cancer Database*

Creighton School of Medicine

Mack Tempero, and John Paul Braun

Background: Carcinoid tumors of the pancreas (CTP) are rare neoplasms of the pancreas that arise from serotonin-secreting cells. While existing research suggests that individuals affected by CTP experience a poor prognosis and classically present with carcinoid syndrome, no research has been performed comparing the differences between sexes on survival outcomes. This study analyzes data from the National Cancer Database (NCDB) to compare long-term survival rates between sexes among individuals with CTP.

Methods: The National Cancer Database (NCDB) was used to identify patients diagnosed with carcinoid tumors of the pancreas from 2004 to 2019 using the histology code 8240 as assigned by the Commission on Cancer Accreditation program. Kaplan-Meier, ANOVA, and Chi-Square tests were performed. Data was analyzed using SPSS version 27 and statistical significance was set at $\alpha = 0.05$.

Results: This study included 6,291 male and 5,482 female patients with CTP. In this sample, female patients were more likely to survive longer, be black, receive surgery, and have a lower Charlson-Deyo Comorbidity Index ($p<0.001$). Male patients had a greater 30 and 90-day mortality rate ($p<0.05$). Male and female patient populations did not differ statistically across living in an urban or rural area, receiving chemotherapy, or class of case ($p>0.05$).

Conclusion: This study revealed that among patients with carcinoid tumors of the pancreas, female patients lived significantly longer than males. It is unclear what this disparity is attributed to, but it is likely multifactorial. While these observations are based on existing data from NCDB, further investigation is necessary to establish causality.

96 *Synovial Sarcoma Presenting as a Chest Mass in a 16-Year-Old Girl with Tuberculosis*

Creighton School of Medicine

Gina Marcuzzo

In this case, a 16-year-old female returning from Mexico presented to the emergency room with an 8-month history of right sided back pain and a 4-month history of dyspnea. Imaging revealed a large 11.5 centimeter right lower lobe pleural-based mass with overlying atelectasis. Extensive infectious disease workup was conducted and yielded a positive Quantiferon-TB Gold Plus test, a negative PPD test, and three negative sputum samples. Given her potential exposure history and the threat of missing a tuberculosis diagnosis, the patient was started on Rifampin, Isoniazid, Pyrazinamide, and Ethambutol (RIPE) therapy. The patient's lung mass was surgically resected and subsequent histopathological examination demonstrated synovial sarcoma. This case posed numerous complexities due to the patient's age, travel history, and positive tuberculosis test that all suggested infectious etiologies for her lung mass.

Synovial sarcoma is a rare soft tissue cancer typically found in the large joints of the arm and leg, with one third of patients diagnosed under the age of thirty. This cancer is primarily diagnosed using needle biopsy and pathology examination. Surgical resection is the first-line treatment for this cancer, but adjuvant radiation and chemotherapy may be required if complete resection is not possible. For this patient, PET CT was planned for staging, along with port placement, with a treatment plan for chemotherapy following ARST0332 arm C (ifosfamide and doxorubicin) plus pazopanib.

97 *A Case of Guillain Barre Syndrome Complicated by Previous Spinal Cord Injury with Positive T. Pallidum Screen Following IVIg Infusion*

Creighton School of Medicine

Maria Arroyo, Noorhan Monther, Victoria Johnson, and Ivanna Tang

Guillain Barre Syndrome (GBS) is a rare neurological disorder in which the body mounts an immune response against the

peripheral nervous system, often following a respiratory or gastrointestinal infection. This results in numbness, tingling, weakness, and potential paralysis that is classically ascending in nature.

This report will present a case of GBS in a patient with a past medical history of severe back pain secondary to a previous motor vehicle accident. The patient had additional symptoms typical of GBS, but confounding symptoms from her previous incomplete spinal cord injury may have contributed to a delay in initial diagnosis. Additionally, this patient experienced another rare event during her hospital course. Following administration of one dose of IVIg, she had a reactive Treponema pallidum antibody screen with a negative Syphilis RPR, requiring further workup for neurosyphilis versus passively acquired antibodies from IVIg. This passive acquisition of antibodies to syphilis following IVIg infusion is a rare occurrence that has been documented in few case reports and requires further research.

98 *Factors that Predict and are Associated with the Receipt of Surgery in Native American Chondrosarcoma Patients*

Creighton School of Medicine
Henry Ryne Weresh, Christopher R. Bine, and Peter T. Silberstein

Background: Native American populations show higher rates of developing cancer compared to non-Hispanic white people in the US. The reasons are multifactorial, however disparities like increased poverty rates and lower literacy levels are thought to play a role. Chondrosarcoma is a cancer of cartilage cells. The preferred treatment of chondrosarcoma is surgery. Using the National Cancer Database (NCDB), we aimed to evaluate differential survival between Native Americans who received surgery for chondrosarcoma and those that did not. Different variables were assessed that could contribute to the receipt of surgery.

Methods: NCDB identified Native American patients diagnosed with chondrosarcoma from 2004 - 2019 using histology code 9220 and race code 03. Kaplan-Meier, ANOVA, and Chi-Square tests were performed. Data was analyzed using SPSS version 29 and statistical significance was set at $\alpha = 0.05$.

Results: Of the 30 Native Americans queried, 4 did not receive surgery. Surgical patients experienced improved mean survival (118.5 month difference, $p < 0.05$). Patients receiving surgery reported larger tumors (521.8 mm difference, $p < 0.05$) and shorter duration between diagnosis and initial treatment (84.9 day difference, $p < 0.05$). There were no significant differences in age, income level, or insurance status between surgical and non-surgical patients.
Conclusions: Native Americans who received surgery survived longer than those who did not. Surgery was more common in patients with large tumors, and treatment began sooner after diagnosis. In future studies, we would like to increase sample size to uncover other significant factors and increase the validity of our findings.

99 *Human Metabolic Responses of the ACL Extensor Autografts to the ACL Remnant and the Synovium*

Creighton School of Medicine
Luke Annin, Kelsey Atteberry, Chance Strickler, **Luke Baxter,** Gillian Hark, Maria Hinkamp, Hailee Coleman; Richard Ma, MD; James Cook, DVM, PhD, OTSC; and Aaron Stoker, PhD

Anterior Cruciate Ligament (ACL) reconstruction (ACLR) using a quadriceps tendon (QT) or patellar tendon (PT) autograft is a common treatment for patients with a ruptured ACL. While ACLR failure rate is relatively low, it is important to identify factors that contribute to poor outcomes in patients, including arthrofibrosis and graft laxity. The inflammatory and degradative environment of the ACL injured joint may have a negative effect on the metabolic responses of the tendon autograft used for ACLR. This study was designed to determine how the injured ACL remnant and synovial (SYN) tissue recovered from patients undergoing ACLR effect the metabolic response of the tendon autograft used for ACLR. It was hypothesized that QT and PT autograft tissues co-cultured with ACL or SYN recovered from ACL injured joints would have significantly higher concentrations of pro-inflammatory and pro-degradative proteins in the tissue compared to QT and PT tissues cultured alone. Given the higher incidences of arthrofibrosis after QT ACLRs, we also hypothesized that QT autografts would exhibit greater pro-inflammatory and pro-

degradative metabolic responses when co-cultured with the ACL remnant and SYN tissues when compared to the PT autograft tissues.

With IRB approval and informed patient consent, excess tendon autografts (QT and PT), ACL remnant, and SYN tissues were collected from patients undergoing ACLR surgery (n=45, 23.33 age, 21F). Tissue explants were created from the excess tissues, and tissue explants (PT, QT, ACL, SYN) were cultured alone (MONO) or co-cultured with the ACL remnant (COA), SYN (COS), PT (COP), or QT (COQ) explants. The explants were cultured for 6 days in supplemented DMEM media then stored at -80˚C for protein extraction. Tissues protein content was extracted using the T-PER Tissue-Protein Extraction Reagent with protease inhibitors using a mini-bead beater. The tissue extract was centrifuged and the supernatant stored at -80˚C for analysis. The protein content of the tissue extracts were determined using the BCA assay. Tissue extracts were analyzed for a host of inflammation related, degradative enzyme related, and growth factor proteins using commercially available Luminex assays. Differences between culture groups (mono vs. co-culture) within tissue types (QT, PT, ACL, SYN) and between QT and PT tissues within culture groups (mono, COA, or COS) were determined by Mann-Whitney or Kruskal-Wallis test with Bonferroni correction depending on the number of groups in the analysis. (Significance at $P<0.05$.)

PT and QT autograft tissues appear to have a different response when co-cultured with ACL remnants and SYN. PT tissues cocultured with the ACL remnants exhibited greater levels of specific inflammatory and degradative proteins response when compared to PT tissues alone and QT tissues co-cultured with the ACL remnant. SYN tissues co-cultured with the PT resulted in lower concentrations of specific inflammatory and degradative proteins compared to SYN tissues co-cultured with the QT. Determining if these differences have an effect on patient outcomes could help develop decision-making based on the graft tissue's biologic activity in patient-specific graft selection algorithms.

100 *Implications of Income Level on Survival and Outcomes in Native American Patients with Hepatocellular Carcinoma*

Creighton School of Medicine
Sowmya Kolluru, Lauren Dentinger; Peter Silberstein, MD; and Christopher Bine

Background: Hepatocellular Carcinoma (HCC) is the primary malignancy of liver cells (hepatocytes). HCC is often diagnosed in advanced stages, leading to an 18% survival rate. Clinical and socioeconomic variables can affect HCC prognosis, and Native American patients experience poorer outcomes than others. Using the National Cancer Database (NCDB), this study considers the association between income level and HCC health outcomes in Native American patients.

Methods: The NCDB was used to identify Native American patients diagnosed with HCC from 2004 to 2019 using the histology code 8170 and race code 03 as assigned by the Commission on Cancer Accreditation program. Kaplan-Meier, ANOVA Chi-Square, and Cox Proportional Hazards tests were performed. Data was analyzed using SPSS version 28, with statistical significance at $\alpha = 0.05$.

Results: Of the 1349 patients, 198 (26.8%), 686 (22.6%), and 465 (20.0%) were from high-, middle-, and low-income brackets, respectively. High-income patients experienced longer mean overall survival (44 months), than middle- and low- (37 months) income patients ($p<0.05$). High-income patients were more likely to receive care from an Academic Facility, have private insurance, and travel further for care. No significant differences were seen in comorbidity number, surgical margins, and tumor grading/staging across income levels.

Conclusion: Aligning with prior trends, this study concluded that high-income patients with HCC had increased mean survival and pursuit of care at academic facilities, then middle- and low-income groups. Further HCC research can examine the impact of income level on post-surgical outcomes and patient quality of life.

101 *Increased Prevalence of Hypothyroidism Among Patients with Scoliosis*

Creighton School of Medicine

Brendan Carmody, BS; Tiffany Chu, BS BA; and Omar Akbik, MD

Introduction: A direct relationship between hypothyroidism and scoliosis has not been previously studied. Here, we evaluate whether there is an increased prevalence of scoliosis in a population of patients with hypothyroidism.

Methods: Electronic medical records were used to perform a retrospective analysis of patients at Bergan Mercy hospital in Omaha, Nebraska. Patients included were ≥65 years of age and had an MRI lumbar spine with "scoliosis" indicated in the report (2013-2023). Hypothyroidism was defined as patients with a hypothyroidism diagnosis and/or on thyroid replacement medication.

We also reviewed literature utilizing "hypothyroidism and scoliosis" on PubMed. Excluding animal model studies or those not pertaining to degenerative spine disease.

Results: 974 patients were included, having an MRI lumbar spine with scoliosis. 29.0% (N=282) of those patients were found to have hypothyroidism; 81.9% (N=231) had both a hypothyroidism diagnosis while concurrently taking Levothyroxine, 11.0% (N=31) had a hypothyroidism diagnosis alone, and 7.1% (N=20) were taking Levothyroxine without a formally listed diagnosis. 4.8% (N=47) had no formal diagnosis or thyroid replacement medication but had a TSH value greater than 4mU/L.

The literature search revealed no direct relationship has been established between hypothyroidism and scoliosis. Rather, symptoms within different disease processes would report the two occurring individually or simultaneously.

Conclusions: Our study describes an increased prevalence (33.8%) of hypothyroidism in patients with adult scoliosis. The prevalence is higher than previously reported values in the adult population (11.7% amongst adults, 6.9% amongst those ≥65 years of age). Further studies are required to establish a causative relationship.

102 *Hypertrophic Lichen Planus: A Rare Diagnosis and Atypical Presentation*

Creighton School of Medicine

Jack Catoe

Lichen planus is a chronic dermatologic condition of unknown cause affecting the skin and mucosal surfaces. The classic appearance of cutaneous lichen planus is characterized by the "Six P'sâ€: planar, polygonal, pruritic, purple, plaques and papules. However, there are numerous subtypes of lichen planus with distinct presentations. A particularly rare subtype is hypertrophic lichen planus, also known as lichen planus verrucous. Here we present the case of a 48-year-old African American woman with an unusual presentation of hypertrophic lichen planus affecting the shins; this case is particularly remarkable for the height and mound-like morphology of the shin lesions, which to our knowledge have not been documented in other case reports.

103 *An Analysis of Hospital Cost and Reimbursement for Burn Care: Are We Keeping Up?*

Creighton School of Medicine

Maria Fleischman, and Grace Jean

Background: Hospital based care for burn patients is very resource intensive. Care of large surface area burn patients involve prolonged ICU stays, numerous surgeries, routine use of costly skin substitutes, almost daily wound care, longitudinal rehabilitation services. Discrepancies between hospital-related burn care costs and reimbursement can negatively impact financial health of burn centers. In this study, we evaluated trends in cost of burn care and reimbursement.
Methods: We reviewed available data from Center for Medicare and Medicaid Services (CMS) for years 2013-2021. The information obtained included submitted total hospital charges, total payments, and hospital payment for DRG (disease related group) codes 9127, 928, and 929 (related to burn care). Additionally, same data was collected for DRG codes related to Bronchitis, Heart Failure, and skin ulcer. Burn associated cost of care and reimbursement was compared against skin ulcer wounds, heart failure, and bronchitis to

determine funding variance between different diagnoses. Rate of increase in cost of providing burn care and CMS reimbursement were compared. These changes were also compared to annualized inflation data available through Department of Labor.
Results: We observed trend of increasing burn care costs as evidenced by submitted charges from 2013-2021. Reimbursement for burn care increased over the same period too though this increase lagged the increase in cost of care. Increase in CMS reimbursement was comparable to the inflation numbers. Reimbursement data for Skin ulcer, but not Bronchitis and Heart Failure, followed similar trend. Results are tabulated in attached graph.
Conclusions: Cost of providing burn care has increased significantly over the observed period of 2013-2021. Though reimbursements have increased and have corresponded with inflation during this time, they have not kept up with increase in cost of care. This discrepancy suggests burn centers may be experiencing worsening financial stress. While healthcare costs increase annually due to inflation, the greater incremental increase in burn and skin ulcer wound care compared to other conditions reflects a financial demand that cannot be due to inflation alone.

104 *The Use of Ultrasound Guided Arterial Line Placement in Patients with Vascular Malformations: A Case Report*

Creighton School of Medicine

Joseph Davidson, Adrianna Glisan, and Terry Huang, MD

This case report presents a patient with intracranial vascular abnormalities who developed compartment syndrome after unsuccessful arterial line placement. After undergoing a right intracranial blister aneurysm repair with pipeline embolization, a 25-year-old female required an arterial line for post-procedure hemodynamic monitoring. The anesthesia team made several attempts to place a left radial arterial line using landmark guided palpation. These attempts were unsuccessful, as were further attempts made in the proximal forearm. Eventually, a non-invasive monitor showed left radial artery occlusion. During this time, the patient developed a tense forearm, paresthesias, and cool digits. Emergency

thrombectomy and fasciotomy with arterial repair to the ulnar and radial arteries were performed successfully with restored flow confirmed via doppler ultrasound. Following these procedures, the patient continued to experience paresthesias in a median distribution of her left hand and required eventual skin grafting due to delayed fasciotomy closure. This case highlights the potential complications of arterial line placement and the benefits of using ultrasound guidance in patients with known vascular abnormalities.

105 *Wound Infection Caused by Helcococcus Kunzii in a Patient with Poor Wound Healing*

Creighton School of Medicine
Mohammed Al Kurnas, Auisjo Kaul, Anna Rice, Perry Smith, and Joseph Thirumalareddy

Helcococcus is a facultatively anaerobic, non-motile, Gram-positive coccus that has been isolated as part of the human skin microbiota. There have been rare occurrences of invasive infections by the Helcococcus species. We present a case of Helcococcus infection.

A 57-year-old male presented to our service with a right lower extremity wound with dishwater drainage concerning for necrotizing infection. Samples were taken for culture, and an X-Ray was ordered showing no subcutaneous emphysema. Physical exam revealed no palpable crepitus. Labs were ordered and showed no lactate elevation (1.2 mmol/L) and no leukocytosis (9,800/Î¼L). With necrotizing fasciitis being ruled out, empiric coverage with cefepime, vancomycin, and metronidazole was started awaiting culture results.

Initial cultures revealed a polymicrobial infection, and he was subsequently started on Ampicillin/Sulbactam and Levofloxacin. Subsequent culture results revealed the growth of Helcococcus kunzii. Due to its slow growth, Helcococcus kunzii was identified three days after initial cultures results were reported. Antibiotic susceptibility testing was performed revealing sensitivity to Ampicillin with an MIC <= 2. The patient underwent three irrigation and debridement procedures and was discharged on a 4-week course of Levofloxacin and Amoxicillin/Clavulanate.

Our case provides further evidence of the ability of Helcococcus

species to cause opportunistic infections of wounds. Prolonged incubation time made it possible to recover this organism. Providing longer incubation times in patients more likely to have opportunistic Helcococcus infections increases the likelihood of recovering this organism. This can lead to better characterization of Helcococcus infections and thus contribute to the proper management of these patients.

106 *Molecular Dynamics Simulation of Binding Chlorotoxin Fragments to Matrix Metalloproteinase-2*

Creighton School of Medicine

Eli Blaney, Tobin Shea, Charles Watts, and Sandor Lovas

Aggressive tumors like glioblastoma express matrix metalloproteinase-2 (MMP-2) to facilitate tissue invasion, leading to poor survival rates. Therefore, effective inhibition of MMP-2 is a desirable target for treatment. Chlorotoxin (Ctx) polypeptide from the scorpion *(Leiurus quinquestriatus)* controversially interacts with human MMP-2. We employed three molecular docking methodologies followed by molecular dynamics simulations to find consensus binding and calculate the binding energy of these peptide ligands to MMP-2.
In addition to the Ctx itself, four peptide fragments were chosen for study from various segments at its C-terminal regions: Ac-[Ser^{35},Cyc(28,33)]Ctx(24-36)-NH_2; Ac-[Cys^{26},$Ser^{28,33}$,Cyc(26,35)]Ctx(24-36)-NH_2; Ac-[Cys^{24},$Ser^{28,33}$,Cyc(24,35)], and Ac-[Cyc(28,33)]Ctx(27-34)-NH_2. Ctx and its fragments were submitted to molecular docking using HPEPDOCK, HADDOCK, and AlphaFold2 methods. Subsequent poses underwent 500 ns molecular dynamics simulations. Peptide binding on MMP-2 and final binding energies (ΔE_b) were calculated using the Molecular Mechanics Poisson-Boltzmann Surface Area method.
Root-mean square deviation analyses showed stable peptide-protein complexes during each of the 500 ns simulations. Ctx and its peptide fragments frequently bound to regions on MMP-2 other than the catalytic site. All docking methods showed large negative ΔE_b, indicating favorable interaction between Ctx and its analogs with MMP-2.
While Ctx and its C-terminal analogs bind to MMP-2, there is no

consensus on which region is bound or which peptide binds strongest. Interactions with the collagenase-1 and hemopexin-like regions of MMP-2 may suggest an allosteric inhibition of its activity. To confirm our *in silico* results, enzyme inhibitory activity *in vitro* and cell migration inhibition *in vivo* against glioblastoma cell lines will be determined.

POSTER PRESENTATIONS: 1:45-3:45 PM
TUESDAY MARCH 26, 2024
STUDENT ABSTACTS

200 *What's in The Frig? Uncovering the Small Bath Complex at Antiochia Ad Cragum*

Department of Art History

Emma Stenner and Erin Averett

Ancient Roman communal bathing provided important public architecture for the well-being of citizens, acting as spaces for hygiene, socialization, and exercise. As communal bathing customs faded, the architectural structures were often repurposed for industrial use. My project seeks to understand how the physical structures of the baths were efficiently transformed from bath to industry. Because Roman bathing customs spanned the empire for centuries, my research uses a case study of the city of Antiochia ad Cragum in Southern Turkey to provide a microanalysis of changing bathing usage. New excavations on the Small Bath complex revealed how less elite bathing structures went out of use at the end of the empire and were adapted for industrial use. Such microanalysis contributes to understanding local differences in reuse and bathing practices. Excavations exposed that a "cold room" in the Small Bath, termed Frigidarium 3, consisted of a circular cement structure used as a cold dipping pool in the bath complex, which was then likely converted for wine fermentation as evidenced by comparison to similar structures at other sites and other proof of wine production within the Small Bath complex. The circumstances surrounding the end of communal bathing traditions have recently been a subject of debate as new evidence reveals more nuanced chronological and local circumstances that defy a single explanation. My research focused on Frigidarium 3 provides key evidence for how the elements of baths were reused with minimal change to the original bathing structure and illuminates local needs.

201 *Fluctuating Asymmetry in Red-Tailed Hawks: An Analysis of Proximal and Distal Limb Bone Segments*

Department of Biology

Julian Garcia, and Gabriel Rivera, PhD

The functional performance of an organism's limbs is largely impacted by their anatomical structure. However, as limbs function in sets, one often overlooked factor affecting limb performance is known as fluctuating asymmetry (FA), defined as small, random deviations from perfect symmetry. The morpho-functional hypothesis of symmetry predicts that more important structures within an individual should show lower levels of FA. Many studies have tested this hypothesis in a wide range of vertebrate taxa by comparing forelimb and hindlimb FA; in all of these studies, the more functionally important set of limbs displayed lower levels of FA. Additionally, these studies have found no correlation between humeral and femoral asymmetry, suggesting that asymmetry is under different developmental control in each limb set. However, these studies have focused almost exclusively on the long bones of each limb (forelimb: humerus; hindlimb: femur), whereas limbs are comprised of several segments. This study tests the morpho-functional hypothesis in the limbs of the Red-Tailed Hawk (*Buteo jamaicensis*), while including analysis of FA in distal limb segments. This study also offers insight into what extent developmental processes controlling asymmetry are integrated within a limb. Consistent with previous studies, we found no correlation between humeral and femoral asymmetry. Furthermore, limb elements had more similar symmetry within limbs than between them. Interestingly, we found increasing levels of FA within increasingly distal segments.

202 *Green Governance: Factors Shaping US Cities' Sustainability Initiatives*

Department of Political Science/International Relations

Eva Brucciani

This study addresses the causes of variation in the implementation of sustainability policies across US cities. It aims to quantitatively study the effects of demographic composition, institutional factors, climate vulnerability,

financial resources, and the presence of the fossil fuel industry on their contributions to US cities' implementation of carbon emission reduction plans. This study concludes that the presence of an environmental coordinator and cities that voted for Democrats in congressional and state-wide elections have increased likelihood of implementing sustainability policies.

203

N^4-(Amino-Substituted)-N-Substituted-Benzenesulfonamide Scaffold to Design and Synthesize Novel Trem-1 Inhibitors Against Neuroinflammation

Department of Pharmacology and Neuroscience
Prerna Tiwari, Vanessa Caldwell, Hyunha Kim, Rachael Urquhart, Jee-Yeon Hwang, Peter Abel, and Gopal Jadhav

A neurological event (e.g., ischemic stroke), causes defensive neuroinflammation, but it protracts neuroinflammation to a dangerously high level. Global ischemia is a severe form of stroke caused by heart arrest that affects 200,000 Americans each year and is associated with neurodegeneration and cognitive abnormalities. Current treatments aim primarily at alleviating symptoms rather than treating the condition. As a result, there is an unmet need for new targets for identifying novel molecules as a viable therapeutic for global ischemia induced neurodegeneration and cognitive deficits. The triggering receptor expressed on myeloid cells-1 (TREM-1), the immunoglobulin superfamily surface receptor primarily expressed on monocytes, macrophages, and neutrophils, has been found to be upregulated in the development of neuroinflammatory diseases, with inhibition providing protection. In our preliminary results from a global ischemia rat model, there is TREM-1 upregulation at both mRNA and protein levels in post-ischemic hippocampal CA1 region. TREM-1 inhibition by known LR12 peptide and novel GJ079 molecule showed neuroprotection in ischemic insult. Thus, TREM-1 inhibition can be a new therapeutic approach to treat Global ischemia. We identified N^4-(amino-substituted)-N-substituted- benzenesulfonamide scaffold molecule, GJ079 as a hit from molecular docking of 80K molecules in hTREM-1 (PDB: 1SMO) crystal structure. We verified GJ079 affinity to TREM-1 by surface plasmon resonance (SPR) analysis with Kd = 14.3uM. However, we witnessed some-solubility issue with

GJ079.
Notably, PLT137, a fluoro-analog of GJ079 showed ~350 folds (Kd= 4.8nm) affinity to TREM-1 and better solubility. Thus, we hypothesized that structural modifications in GJ079 molecule can develop non-toxic, bioavailable, and potent TREM-1 inhibitors.

204

Forged by Faith in the Face of Suffering: A Neurological Reframing of Suffering

GROUP Department of Theology/Neuroscience
Christopher Krall, S.J., PhD., **Augustin Jean-Joseph Calini, Annie Dawson, Jonathan Fales, Faith Geis, Patrick Grindey, Xzavier Ethan Gutierrez, Jordan Keith, Catherine McGarry, Emily Meister, and Mariska Suwanda**

Religion can offer a healing remedy to address, reduce, and persevere through suffering. Suffering is the inevitable absurdity of human life leaving people lingering in the empty and unanswerable "why." In suffering, people lash out, propagating the phrase "hurt people hurt people" in micro and macro ways repeatedly and universally throughout human history. Can religion take away suffering? - Of course not. Can religion provide a remedy to suffering? - To answer this question requires a careful exploration into what precisely suffering is and what religion reveals to us both about God and our human nature. Such a bold and daunting task is the thrust of the research of my team of theology and neuroscience students here at Creighton University, supported by the CURAS MIRA grant. This poster encapsulates nine tracks of research currently involved in this theological and neurological investigation into suffering: 1) "The Neurological Signaling of Pain and the Development of the Person," 2) "It's Only Human to Weep: Exploring the Importance of Jesus's Expression of Emotions in the Gospel of John," 3) "PTSD and Prayer: An Odd Pair That Can Help Each Other," 4) "Building Community and Belonging through Prayer: Against the Suffering of Isolation," 5) "The Broken Mirror Theory: Why we need to choose to be more Compassionate," 6) "Inside their mind: Understanding and assessing risk factors and commonalities between mass shooters," 7) "The Love Hypothesis: The Power of Love Over the Suffering of Grief," 8) "Suffering: The Innermost Pathway to

the Fibers of Our Soul," 9) "Suffering: A Liturgical Mastery of Absurdity Through the *Imitatio Christi.*"

205

Utilizing Copper Complexes of the Ligands (2-aminoethyl)bis(2-pyridylmethyl)amine and N,N-bis(2-pyridylmethyl)aminobutanol as Catalysts in ATRA Reactions

Department of Chemistry and Biochemistry

Isabel Kidd, and Kayode Oshin

Atom Transfer Radical Addition (ATRA) is an organic reaction that functionalizes olefins. Products from this reaction can be used to make important starting reagents. The goal of this project was to design new catalysts that efficiently facilitate ATRA. Currently, the most active catalyst used in ATRA incorporates a tripodal design. This configuration can lead to structural crowding of the active site during catalysis, reducing the efficiency of the reaction. We hypothesized that developing a catalyst that alleviates this structural issue, by increasing access to the active site, could result in increased efficiency, conversion, product yield, and turnover frequency. Two catalysts were synthesized that maintained the important tripodal motif while reducing crowding by modifying its ligand structure. The ligands (2-aminoethyl)bis(2-pyridylmethyl)amine and N,N-bis(2-pyridylmethyl) aminobutanol were synthesized and analyzed using various spectroscopy techniques to confirm their structure. The ligands were reacted with copper bromide to generate our desired catalysts. Catalyst structures were confirmed with spectroscopy techniques and single-crystal X-ray diffraction. ATRA reactions were performed using our catalyst and various olefins (alpha-olefins, aromatic-olefins, and branched olefins incorporating terminal C=C functional groups). Proton NMR spectroscopy was used to measure catalyst activity at various concentrations and results were compared to known catalysts. Results indicate that catalysts made with N,N-bis(2-pyridylmethyl) aminobutanol produced better yields when compared to catalysts made with (2-aminoethyl)bis(2-pyridylmethyl)amine. These results showed that mixed-donor catalysts perform more effectively when compared to same-donor catalysts. Compared to known catalysts, our catalysts made with N,N-bis(2-pyridylmethyl) aminobutanol were more

efficient when using alpha olefins compared to aromatic or branched olefins.

206 *Hear Today, Gone Tomorrow: Exploring Quinoxaline Derivatives as a Treatment for Noise-Induced Hearing Loss*

Department of Biomedical Sciences
Lauren Barbush, Marisa Zallocchi, Xianhong Liu, Santanu Hati, and Jian Zuo

According to the World Health Organization, there are 1.3 billion people around the world living with some degree of noise-induced hearing loss (NIHL) and 1 billion young adults at risk of developing NIHL. Currently, there are no FDA-approved drugs that protect the inner ear against NIHL. To address this need, my study aims to investigate the therapeutic potential of five quinoxaline derivatives (Qx3, Qx17, Qx23, Qx34, and Qx62) in an *in vivo* mouse model for synaptopathy. Following exposure to 94dB SPL, 8-16kHz octave-band for 2h, animals were treated via IP injection with either corn oil or one of the five Qx derivatives.

Their therapeutic effects were quantified using auditory brainstem responses (ABR), distortion product otoacoustic emissions (DPOAE), and morphological analysis. Their bioavailability was assessed using an *in silico* ADME assay from SwissADME. We found that Qx34 and Qx62 recovered ABR and DPAOE thresholds the fastest of all treatment groups. Qx34 and Qx62 also preserve ABR wave I amplitude and latency, suggesting they protect the synapses against excitotoxic insult. Morphological analysis revealed that Qx62 prevented inner hair cell synapse degeneration and outer hair cell loss. According to SwissADME, all five derivatives are highly orally bioavailable and predicted to passively cross the blood-brain barrier, suggesting they will likely cross the blood-labyrinth barrier into the cochlea. Qx34 and Qx62 protected the inner ear against NIHL at 94dB, and future studies are needed to assess their otoprotection following oral administration and at a higher noise level.

[DoD W81XWH2010633]

207 *Preparation of 2-Tellurophenecarboxylic Acid and 2-Tellurophenethiocarboxylic Acid*

Department of Chemistry and Biochemistry

Alec Brown and Dr. Martin Hulce

Metal-organic frameworks (MOFs) are porous structures of alternating organic and inorganic groups, commonly, crosslinking organic Lewis bases and metal ions or metal clusters. These materials have a wide range of chemical properties that make the useful in energy storage, drug delivery, environmental remediation, and as a variety of catalysts and sensors. Among the thousands of reported MOFs, almost none contain tellurophenecarboxylic acid linkers. To investigate the preparation of lanthanide-tellurophenecarboxylic acid MOFs by hydrothermal synthesis, 2-tellurophenecarboxylic acid was prepared in 31%-36% yields via two metalation strategies. Preparation of 2-tellurophenthiocarboxylic acid from 2-tellurophenecarboxylic acid also was achieved using an “active amide” acyl transfer strategy.

208 *Spinal Cord H-reflex Excitability is Linked with the Altered Mobility of Adults with Cerebral Palsy*

Department of Exercise Science and Pre-Health Professions

Shayla M. Edwards, Morgan T. Busboom, E. Sarah Baker, and Max J. Kurz

Background and Objective(s): The neurophysiology underlying the mobility declines in adults with cerebral palsy (CP) is a prominent knowledge gap in our understanding of the longitudinal changes associated with CP. The initial brain injuries seen in persons with CP have been shown to have cascading effects that disrupt the spinal cord microstructure, as well as the excitability of the Hoffmann reflex (H-reflex). This study evaluated if alterations in the spinal cord H-reflex relate to the mobility impairments seen in adults with CP.

Study Participants: A cohort of adults with CP (N=22; age=20.77Â±6.18yrs; GMFCS I-III) and neurotypical controls (NT; N=32; age 22.95Â±3.72yrs).

Materials/Methods: Initially, the standing H-reflex maximum (H-max) was measured via an electrical stimulation applied to

the tibial nerve and electromyography (EMG) of the soleus activity. Secondarily, we provided an electrical stimulation at the H-max value determined from the standing condition while the participant walked at 0.45 m/s on a treadmill. The H-reflex protocol was followed by a clinical assessment that evaluated how far the participant could walk in one-minute.
Results: The H-reflex of the adults with CP was less excitable while walking (CP=0.24± 0.03, NT=0.36± 0.04, p=.008). Furthermore, the distance walked for one-minute was positively related to the excitability of the walking H-reflex (rho=.29, p=.033).
Conclusions/Significance: The spinal cord of adults with CP while walking is less excitable and partially linked with the extent of their mobility impairments. Alterations in the spinal cord neurophysiology may play a role in the mobility declines in adults with CP.

209 *Effect of Active Glucose Absorption on Paracellular Absorption*

Department of Exercise Science and Pre-Health Professions
Caroline Jachino, Liam Murphy, Katherine Krueger, and G. Patrick Lambert
Previous studies have shown intestinal glucose absorption is associated with activation of the Na+-glucose cotransporter (SGLT1), which may further increase glucose absorption via opening of tight junctions between epithelial cells. However, limited studies have been performed in human subjects. Using eight healthy individuals, this study aimed to further determine whether active glucose absorption via SGLT1 transporters stimulates passive glucose absorption in humans. Based on a randomized, balanced design, two experiments were conducted to test the effects of glucose or fructose on passive intestinal absorption of mannitol. Mannitol served as the probe for paracellular glucose absorption (due to structural similarities to glucose and the fact that it is not metabolized but rather excreted in the urine). Each experiment consisted of ingestion of either 1 liter of a flavored solution containing 4% glucose and 0.5% mannitol or 1 liter of a flavored solution containing 4% fructose and 0.5% mannitol, with fructose serving as the control. Ingestion of glucose significantly (P <

0.05) increased urinary excretion of mannitol (0.52 +/- 0.27 g) compared to ingestion of fructose (0.39 +/- 0.13 g), indicating that active glucose absorption via SGLT1 increases the absorption of molecules similar in size to glucose (i.e. mannitol). These results suggest passive absorption of glucose through the paracellular pathway might be a mechanism for enhanced glucose absorption in humans.
Funded by the CURAS 2022 Magis! Investigatio Research Award (MIRA)

210 *"For Real Life?": A Critical Discourse Analysis of the Bluey Fandom*

Department of Communication Studies

Cassandra Kallhoff

Bluey, a preschool television show produced by Ludo Studio in Queensland Australia contains 151 episodes featuring Bluey, a six-year-old Blue Heeler puppy and Bingo, Bluey's 4-year-old younger sister. The show has amassed fans with a wide variety of demographic backgrounds, including child-free adults. In this study which consisted of 10 interviews and analysis of 25 reddit posts, Critical Discourse Analysis helped uncover themes of how the fandom may oppress certain groups on the inside or outside of the group. The results had three major themes. Fans of the show personally insult those who do not regard their show as the ultimate form of media. Fans also consider the show to be "theirs" and avoid speaking about their affinity for the show. Lastly, Australians are the second largest viewer demographic behind Americans, for a show about Australia, this leads to cultural misunderstanding. This research is a starting point for future research in online fan spaces with an eye toward critical analysis. Online spaces are the most common way for fans to interact and this analysis of reddit posts proves to be a framework for further online forum analysis in the future. Lastly this analysis proves to be interesting with globalization concerns in mind as it is Australian based with a US dominant audience.

211 *Unlocking Klotho: SVZ Adult Neurogenesis Insights*

Department of Biology

Ameera Naif, and Gwen King

The brain is an almost exclusively a post-mitotic environment, meaning that once neurons mature, they cease further replication. Thus, damage to the brain is permanent and unrepairable. The caveat to this is the two small regions where the process of generating new neurons to very specific brain regions persist through young adulthood. One is the hippocampal sub granular zone, a critical region for learning and memory, particularly spatial memory. Second, the subventricular zone, which sends developing immature neurons to the olfactory bulb, region responsible for all smell sensory input. While cells in both niches are neural stem cells, neither group can become neurons anywhere else in the brain. Our lab reported premature depletion of the sub granular neurogenic niche in a model of premature brain aging. In that model, genetic deletion of the klotho gene results in rapid onset of an array of age-related phenotypes including cognitive impairment. We recently observed a critical role for klotho protein expression choroid plexus epithelial cells. These cells serve the brain as part of blood brain barrier by producing cerebrospinal fluid. Cerebrospinal fluid is the brain's blood substitute, circulating around every cell to keep all brain cells healthy. Since the choroid plexus is closest to the subventricular stem cell niche and the stem cells are particularly sensitive to environmental change, we hypothesize the subventricular stem cells may be affected earlier and more severely than other brain cells. We are in the process of assessing stem cell proliferation, maturation, and integration in the subventricular neurogenic migration pathway.

212 *Cigarette Smoke Exposure and Glucocorticoid Insensitivity of Airway Smooth Muscle Cells*

Department of Pharmacology and Neuroscience

Tianzhou Xing, Thomas Casale, Yan Xie, Reynold A. Panettieri, Peter W. Abel, and Yaping Tu

Background/Objective: Cigarette smoking is recognized as the major risk factor in chronic obstructive pulmonary disease

(COPD) and asthma patients who smoke often have poorly controlled disease. Glucocorticoids (GC) are the most effective anti-inflammatory drugs available. However, COPD and refractory severe asthma are frequently resistant to glucocorticoid therapy, thus posing an unmet need for better therapies. Although immune cells have been used to investigate glucocorticoid insensitivity (GCI), airway smooth muscle (ASM) cells have emerged as key contributors not only to airway hyperresponsiveness (AHR) but also to airway inflammation in patients with COPD and severe asthma. The objective of this study was to investigate effects of cigarette smoke exposure on glucocorticoid sensitivity of ASM cells. **Hypothesis:** Cigarette smoking exposure renders ASM cells insensitive to glucocorticoid transactivation. **Methods:** Primary human ASM cells derived from healthy controls and asthma patients were treated with various concentrations of cigarette smoking extract (CSE) for 24 h or two weeks. GC transactivation was measured using a Glucocorticoid Response Element (GRE)-driven luciferase reporter assay and measuring GC-inducible gene expression by qRT-PCR. RNA sequencing was performed to identify differentially expressed genes (DEGs) in HASM cells and confirmed by qRT-PCR. Twenty normal nonsmoking subjects were enrolled as controls, with screening FEV1> 80% predicted. Forty current smokers were also enrolled, divided into subjects who demonstrated AHR, with a positive methacholine challenge (n=20) versus those without AHR (n=20). DEGs expression from peripheral blood mononuclear cells (PBMC) in chronic smokers, with and without AHR were determined by western blot assays. Data are presented as the mean± SEM. P <0.05 is considered to be statistically significant. **Results:** CSE treatment for 24 h impaired GRE activation and the GC induction of several anti-inflammatory genes in multiple HASM cell lines in a dose-dependent manner with 70% reduction in 5% CSE-treated HASM cells. Chronic treatment with 2.5% CSE caused transcriptomic changes in HASM cells including RGS2, a key regulator of ASM hypercontraction and AHR in asthma. Importantly, the GC dexamethasone enhanced β2-agonist albuterol-induced RGS2 expression in HASM cells, which was also impaired in CSE-treated HASM cells. In addition, RGS2 protein expression was significantly reduced in PBMC from chronic smokers without AHR, and to a greater degree in

smokers with AHR, versus non-smokers. **Conclusions:** Our results indicate that CSE exposure not only profoundly impairs GC transactivation but also abolished dexamethasone and β2-agonist-induced RGS2 protein expression in HASM cells. Since RGS2 upregulation is a genomic mechanism of β2-agonist-induced bronchoprotection that is enhanced by GC, our study suggests ASM as an important target for glucocorticoid therapy and may contribute to cigarette smoking-related GC insensitivity seen in patients with COPD and severe asthma.

213 *Synthesis and Characterization of Polymeric Ion-Releasing Fillers (PIRFs)*

Department of Chemistry and Biochemistry

Hannah Reynolds, and Dr. Stephen Gross

Secondary caries is one of the biggest problems dentists deal with on a day-to-day basis. It is a disease caused by the incursion of bacteria and other acidic causing conditions in the margin between the tooth and existing fillings. The goal of this research is to develop biodegradable polymeric ion-releasing fillers (PIRFs) that can prevent these cavities from forming. This is most pertinent for underprivileged or lower income patients who might not have easy access to oral health care. We synthesized the PIRFs with 5M $CaCl_2$ and before characterizing them via scanning electron microscope and viscosity measurements. Preliminary results show that the PIRFs are able to withstand the synthesis process and that the mixtures containing the PIRFs exhibit non-Newtonian fluid properties, regardless of the addition of the PIRFs.

214 *The Relationship Between Increased Gait Speed and Static Stance in Older Adults*

Department of Physical Therapy

Hannah Sealock, PT, DPT; Blake Murphy, BS; Kelley Hammond, PhD; Mitch Magrini, PhD; Rashelle Hoffman, PT, DPT, PhD, GCS

Purpose: Static balance and gait speed are critical metrics to quantify a patient's fall risk and risk for adverse events (e.g., hospitalization). The purpose of this study is to examine the relationship between static stance performance and gait speed in older adults.

Materials and Methods: This cross-sectional study included adults 65-95 years of age (77.3± 6.0 years) who performed baseline testing prior to completing a 12-week high-intensity interval training (HIIT) program. Outcome measures including comfortable and maximum gait speed were measured using the 10-meter walk test (10 MWT) and static balance using center of pressure (CoP) excursion metrics (mediolateral excursion, anteroposterior excursion, total excursion, and mean velocity) measured with a force plate. The static stance trials include eyes open with feet side by side, semi-tandem stance, tandem stance, and single leg stance. Spearman's rho analyses were used to determine the relationship between CoP excursion metrics and gait speed.
Results: Comfortable 10MWT speed (1.21± 0.12 m/s) was negatively correlated with CoP mediolateral excursion with feet side by side (21.0± 7.07 mm) (rho = -0.801, p = 0.002). No other static balance or gait measures were significantly correlated.
Conclusions: These results demonstrate a relationship between balance (i.e., static stance) and mobility (i.e., gait speed). Specifically, the correlation between faster gait speed and reduced excursion of CoP suggests that older adults who are able to walk faster may be less likely to fall. Clinicians should consider static stance performance measures when choosing outcomes as well as when developing balance intervention programs.

215 *The Effect of Load on Femur Symmetry: A Test Comparing Bipedal and Quadrupedal Rodents*

Department of Biology

Kaylen Lathrum, and Gabriel Rivera

In a recent study, it was found that the hind limbs of bipedal kangaroo rats (Dipodomys deserti) are more symmetric than the hind limbs of quadrupedal gophers (Geomys lutescens). These findings indicate that lower fluctuating asymmetry (FA) is selected for in more functionally important limbs. These findings were based on the distance between the proximal femur head and the distal end of the femur and indicate that the functional length of the bone is highly regulated. These results lead to a second question of whether this regulation would only be found in bone lengths that represent load-

bearing segments (LBS). To test this, we evaluated FA based on a non-load-bearing segment (NLBS), measured as the distance between the proximal greater trochanter and the distal end of the femur. We predicted that there would be no difference when compared to the previous FA calculations of the respective species. FA was calculated from the lengths of the NLBS. Our results found no statistical difference between LBS and NLBS FA for either species. However, within gophers the FA for NLBS was noticeably larger than for LBS and was nearly significant (P=0.077). No such pattern was found for kangaroo rat femurs (P=0.774). These data show that within gophers the LBS, which is more functionally important, trends toward being more symmetric, as would be predicted by the morphofunctional hypothesis of symmetry. Additionally, no such pattern is found in kangaroo rats potentially because, as a bipedal rodent, femur symmetry is more strongly regulated throughout the whole bone.

216

Defining Infant Mortality in the United States: A Social Science Literature Review with Recommendations for Future Research

GROUP Department of Anthropology
Sophia St Marie, Megan Ptak, Jordyn Johnson, and Cristina A. Pop, Ph.D

Infant mortality rate (IMR) represents the number of children per 1000 live births that die before reaching the age of one. In the United States, studies found race and socio-economic status to impact IMR. Since it quantifies the ability to keep babies alive, IMR also reflects public health systems' effectiveness. However, less attention has been given to how is infant mortality defined, controlled, and reported across US administrative and medical organizations.

To review the social science literature about IMR management in the US, we conducted an advanced search for peer-reviewed articles on Creighton University library database, using the keywords "infant mortality" AND "reporting," "control," "effectiveness," "management," "public health," and "disparities." We narrowed the search for English articles about the US and excluded those with a strict biomedical approach. The search yielded 57 social science peer-reviewed articles.

After further excluding irrelevant entries, outdated reports, and duplicates, we reviewed a total of 30 articles.
The literature reveals significant differences between states, counties, and hospitals in defining and reporting infant mortality. Also, there is a correlation between states' public health funding and local IMRs. We argue that additional research is needed to specifically address state and local policies and practices of IMR management, with a focus on differential reporting outcomes for racial/ethnic minority groups. Against the medical landscapes of evolving neo-natal intensive care technologies, the study of the bureaucratic management of IMR could contribute to a nuanced anthropological understanding of what it takes to survive past infancy in the contemporary US.

217 *Synthesis of Fused-ring 1,5-diaryl-1,2,3-triazoles Containing 4-quinoline and 4-isoquinoline Subunits*

Department of Chemistry and Biochemistry

Logan Buchanan, and James Fletcher

Quaternary ammonium compounds (QACs) contain a cationic quaternary nitrogen group and are known for their display of antiseptic properties. Our research has been focused on synthesizing QAC derivatives known as triazolium salts. Triazoles are aromatic heterocyclic rings composed of three nitrogen atoms and two carbon atoms. This overall project focuses on synthesizing triazolium salt derivatives with 4-quinoline and 4-isoquinoline subunits and studying the antiseptic properties of these compounds. Progress towards this goal involved incorporating 4-quinoline and 4-isoquinoline rings into 1,5-disubstituted-1,2,3-triazoles using click synthesis, iterating between the N1-triazole and C5-triazole positions through use of either azide- or alkyne-functionalized reactants. By incorporating 2-bromoaryl reaction partners, quinoline and benzene rings were fused using a palladium-catalyzed arene-arene coupling reaction to generate polyheterocyclic expanded arene rings. Analogs incorporating simple phenyl partners serve as the controls for this study. These neutral compounds will be used to prepare monovalent and divalent salts via reaction with tert-butylbenzyl bromide. This series of modifications will ultimately allow the reactivity, UV-vis properties and antiseptic

properties of fused vs. non-fused compound analogs to be compared, along with a comparison of varying triazole connectivity. Each compound will be tested for antiseptic properties using microdilution minimum inhibitory concentration (MIC) assays against Gram-positive and Gram-negative bacteria. Details regarding the synthesis and characterization of these compounds will be presented.

218 *Study of Therapeutic Potential of HDAC-6 Isoform Specific Inhibitor, Tubacin for Parkinson's Disease (PD) using 3-D Midbrain Neurospheres*

School of Pharmacy/ Pharmaceutical Sciences

Ameya Joshi, Erik Moore, and Surabhi Shukla

Introduction: Parkinson's Disease (PD) is a complex neurodegenerative disease that stems from multifaceted mechanisms including oxidative stress, mitochondrial dysfunction, α-synuclein misfolding, lewy body (LB) formation, neuroinflammation, ferroptosis & gut dysbiosis. Many of these aren't addressed by current therapies. Standard 2-D in-vitro cultures fall short of being able to recapitulate all the molecularity and histopathological findings of PD-affected Dopaminergic neurons. 3-D cell culture allows for complex characterization, higher degree of mechanistic elucidation, and closer modelling to actual disease conditions. Specific Histone Deacetylase (HDAC)-6 inhibition is associated with neuronal survival and regrowth after injury, thereby holding considerable potential for neurodegenerative disease therapy. Pan-HDAC inhibitors like Vorinostat, Sodium Butyrate, Phenyl Butyrate and K560 exhibit neuroprotection in chemical-induced 2-D cell culture models. Yet, research on HDAC-6 isoform specific inhibitors for PD treatment remains limited. **Purpose:** Our study aims to explore neuroprotective effect of Tubacin, an HDAC-6 specific inhibitor, on Dopaminergic neurons within 3-D midbrain Neurospheres. The study seeks to elucidate Tubacin's mechanism of action. **Methods:** Initially we will evaluate cytotoxic effects of a related hydroxamate HDAC inhibitor, Vorinostat, on cell lines of neuronal origin like T-98G and U87. IC 50 estimation will be done using MTT & Alamar Blue assays. The dose which is not cytotoxic will be further used to compare the effect of Vorinostat in 2-D culture (T98 G and U87) and a 3D

culture of Neural Progenitor cells (NPCs) and further studies will be conducted to study the pathological markers of Parkinson Diseases such as α-synuclein, lipofuscin & Lewy Bodies.

219 *Students' Perception of Occupational Therapy's Role in a Homeless Shelter: A Phenomenological Study*

Department of Occupational Therapy

Grace Stegeman

Introduction: This study seeks to unveil the impact of a fieldwork placement in a homeless shelter on the students' understanding of occupational therapy's (OT) role in the homeless shelter. **Methods:** OT students completing their level II fieldwork or capstone experience at the Stephen Center were asked to answer the question, "What is OT's role in a homeless shelter?" in an open-ended essay format. The participants were asked to answer this question before their fieldwork or capstone experience at the Stephen Center and after their experience concluded. Data from the reflections was analyzed using a qualitative, inductive, thematic analysis. **Results:** Four themes were identified through analysis of the pre-fieldwork reflections, which included (1) empowering clients through bridging resources, (2) holistic empowerment, (3) occupations as a means to an end, and (4) addressing injustice by reconnecting clients with meaningful occupations. Six themes were identified through analysis of post-fieldwork reflections, which included (1) versatile OTs going beyond expectations, (2) building and promoting social interaction skills, (3) OTs as a holistic care provider, (4) OTs as a coach to facilitate client empowerment, (5) modeling trauma-informed care through action, (6) walking alongside the client OT's role as a friend. **Discussion:** Results indicate that there were several areas of increased understanding of the role of OT in a homeless shelter. OT students not only expanded their perception of OT's role in homeless shelters but reported personal and professional growth through the experience.

220

Air Force Relevant Cold Injury Induces Release of Microvesicle Particles Which is Downregulated by Treatment with Tricyclic Antidepressant Imipramine

Department of Chemistry and Biochemistry
Philip Richardsen, Carson Rohan, Christine Rapp, Karen Henkels, Jeffrey Travers, and Saber Hussain, Saber

The Department of the Air Force has the greatest US Military presence in the Arctic region with assets in Alaska, Greenland, and around the world. The Air Force continues expansion of operational capabilities in the Arctic region in pursuit of defense from foreign threats. Warfighters in these Arctic subarctic regions are at high risk for cold injury including frostbite and hypothermia. One of the most significant pathologies associated with frostbite is inflammation and its consequences including ischemia, necrosis, and self-amputation. The Travers group has shown that the lipid mediator platelet-activating factor (PAF) was biosynthesized and released by cells undergoing cold injury. Moreover, many environmental stressors (heat, UVB radiation) which also produce PAF also generate subcellular microvesicle particles (MVP). These studies sought to define whether cold injury results in MVP generation and release and whether cold injury effects on MVP release were PAF-Receptor (PAFR)-dependent or -independent. Using the human keratinocyte-derived cell lines HaCaT, KBM (PAFR-), and KBP (PAFR+) we find that cells undergoing Air Force relevant cold injury released MVPs consistent with the release of PAF. We also tested if experimental cold injury to porcine skin explants resulted in MVP release, and if tricyclic antidepressant imipramine which blocks MVP releasing enzyme acid sphingomyelinase is a down-regulator of MVP release. These studies provide the first evidence that cold injury results in MVP release. Future studies will define roles of PAFR and acid sphingomyelinase in MVP release as well as the pathologic consequences of MVP release in the setting of cold injuries.

221

Integrating RNA Sequencing Analysis to Decode the Cardiac Impact of BubR1 in the Adult Heart

Department of Biomedical Sciences

Aliya L. Haas, Brian J. North, and Renju Pun

Heart disease is the leading cause of mortality in the adult population and its incidence increases with age. Recent studies have identified the mitotic checkpoint protein Budding uninhibited by benzimidazole Related-1 (BubR1) as a regulator of aging. Mice engineered to have lower levels of BubR1 (termed hypomorphic mice) exhibit early onset of aging phenotypes such as cataracts, curvature of the spine, shorter lifespan, and impaired wound healing (Baker, 2004). We have further identified that BubR1 hypomorphic have varied cardiac rhythms and die in a manner similar to sudden cardiac death in humans (North, 2014), suggesting that BubR1 plays a major role in the maintenance of cardiac structure and function. Because BubR1 declines with age, it can be inferred that this decline may mediate various age-related pathologies in humans. Therefore, it is important to further understand how BubR1 regulates cardiac structure and function, and how loss of BubR1 contributes to the increased incidence of heart disease in the aging population. Recent strides in machine learning and bioinformatics have led to tools that enhance the analytical capabilities and predictive models for biological data. Notably, RNA sequencing analysis can discern genes exhibiting significant upregulation or downregulation in hypomorphic mice compared to their wildtype counterparts. The versatility of RNA sequencing extends to exploratory data analysis to identify key genetic regulators and to visualize the data in a comprehensible and concise manner. RNA Sequencing analysis will provide insights into a role for BubR1 in cardiac function, offering potential diagnostic tools for age-related heart disease.

222 *Multiple Analyte Analysis of ECL Detection with Low-Cost Raspberry Pi System*

Department of Chemistry and Biochemistry

Nick Lovick, Natalie Liao, and Erin Gross

Electrogenerated chemiluminescence (ECL) occurs when an electric current induces an oxidation-reduction reaction that produces visible light as a byproduct. The visible light range can be captured via low-cost systems such as a camera attached to a Raspberry Pi computer. ECL detection has been investigated in prior studies using a CCD camera and a phone as the detection device. The goal of this study is to determine if a cost-effective device is sensitive for detection of ECL. Secondarily, limit of detection (LOD) and limit of quantitation (LOQ) will be compared to the two previous capture methods. Using tris(bipyridine) ruthenium (II) chloride (Ru(bpy)32+) and 2-(dibutylamino) ethanol (DBAE) co-reactant to evaluate red wavelengths, a LOD at 190 micromolar and a LOQ of 240 micromolar were calculated. The linear regression had high precision with a coefficient of determination at 0.999 over a range from 250 micromolar to 1 millimolar. The LOD and LOQ for the Raspberry Pi were at higher concentrations than the two previous capture methods. Luminol study conducted to access ability to capture shorter wavelengths of light. So far, this study has determined capture is possible at a higher concentration, but linearity studies are ongoing to determine LOD.

223 *Silencing the Ototoxic Symphony: JAK-STAT Inhibition Emerges as a Promising Therapeutic Avenue in Lipopolysaccharide-Exacerbated Aminoglycoside Ototoxicity*

Jonathan Fleegel, Alex Rahn, Nicole Rudd, Alyssa Burd, Sarath Vijayakumar, and Marisa Zallocchi

Aminoglycoside antibiotics are an essential group of medications deemed by the World Health Organization. Each year thousands of children and adults are prescribed aminoglycosides to treat severe gram-negative bacterial infections. Unfortunately, administration of aminoglycosides carries substantial risk for life altering side effects, namely

irreversible hearing loss. Hearing loss, whether from natural causes or necessary medications like aminoglycosides, can drastically impact communication and quality of life, leading to isolation and depression. Despite tireless research, we still lack FDA-approved treatments to prevent hearing loss caused by aminoglycoside antibiotics. Recent research demonstrates a concerning interaction between Lipopolysaccharide (LPS), an immunogenic component of gram-negative bacterial cell walls, and aminoglycoside antibiotics. LPS exacerbates the ototoxic effects of these antibiotics, a critical finding with significant clinical implications. Understanding this link between inflammation and hearing loss offers a potential avenue to improve patient outcomes. By targeting the inflammatory response triggered by LPS, we show that Fedratinib specific inhibition of JAK2 signaling represents a promising opportunity to expand the therapeutic window for aminoglycosides, thereby minimizing the risk of ototoxicity in patients requiring these life-saving antibiotics.

224 *Mechanisms of Al+ and Nitriles in Titan's Atmosphere*

Department of Chemistry and Biochemistry
Chance R. Persons, Camille Foscue, Hypatia Meraviglia, Makenzie Provorse Long, and William S. Taylor

The moon Titan's atmosphere is mostly composed of nitrogen-containing organic compounds. These molecules can be important predecessors of amino acids and nucleobases, so studying how they react with different species can inform us about the origins of these biological species leading to life. Meteors entering Titan's atmosphere release metal ions that react with atmospheric nitrile groups, but we are unsure of the mechanisms and outcomes of these metal ion-nitrile reactions. To study these mechanisms, we use a drift cell ion reactor to carry out reactions between the metal ions Al^+ and Mg^+ and the nitrile compounds CH_3CN (acetonitrile) and C_2H_5CN (propionitrile). Mass spectrometry is then used to characterize the observed products of these reactions. Here, we aim to fill in the gaps in the proposed mechanisms of the Al^+ and acetonitrile reaction to form the observed end products using computational modeling with density functional theory at the B3LYP/aug-cc-pvtz level. Using Gaussian16, we optimize the

molecular geometry of proposed transition state and intermediate structures and use the relative molecular energies and zero-point energies to verify that a structure is valid for a given step of the mechanism. This allows us to propose full mechanisms for the formation of the observed products of the Al^+ and acetonitrile reaction.

225 *Computational Modeling of Quantum Dots for NPRT Using MATLAB*

Department of Physics

Jackie Austin, and Dr. Andrew Ekpenyong

Purpose: Size-dependent quantum effects give quantum dots (QDs) their peculiar characteristics and myriad applications, leading to the 2023 Nobel Prize for the earliest discoverers and developers (Moungi G. Bawendi, Louis E. Brus and Aleksey Yekimov). Here, we use QDs for nanoparticle-mediated radiation therapy (NPRT), aimed at enhancing radiotherapy outcomes through two main strategies: local tumor dose enhancement and radiosensitization. The QDs themselves need to be thoroughly characterized, both theoretically and experimentally. **Methods:** In our Translational Biomedical Physics Laboratory, we earlier characterized CdSe/ZnS core-shell quantum dots via computational simulations using COMSOL Multiphysics™ and published our results. With the recent campus-wide availability of MATLAB, we now use MATLAB for the simulations, to further characterize carbon and graphene QDs which we currently use for our NPRT experiments. The characterization is done by using the Schrodinger Equation in 3D spherical coordinates to simulate the energy eigenvalues of the electrons and holes in our QDs. **Results:** The energy eigenvalues of previous work and the band gap obtained from simulations corresponded well with experimental spectroscopic results. Current simulations are ongoing. Results will be presented as they become available. **Conclusions:** It is expected that the simulation results will aid in the refinement of NPRT and the improvement of the therapeutic outcomes, especially for patients of brain cancers, the main cancer type involved in our NPRT.

226 *Tissue Engineering Using Simulated Microgravity*

GROUP Department of Physics

Natasha Ratnapradipa, Jacob Woolf, and Andrew Ekpenyong

Purpose: Microgravity is a condition of apparent weightlessness which can be simulated in a laboratory setting. Astronauts returning for space missions suffer bone, muscular and immune system dysfunctions partly due to microgravity. Interestingly, efforts to find solutions to these adverse effects of microgravity led to the discovery of beneficial effects such as the transformation of single cells in culture to 3D tissue. In this project we use simulated microgravity to develop 3D tissue models useful for biomedical science and engineering applications. **Methods:** We grow brain cancer cells lines (T98G and U87) in microgravity simulated using a NASA-developed Rotary Cell Culture System (RCCS), which transforms the cells into tissue-like spheroids. **Results:** We have successfully transformed U87 and T98G glioblastoma cells into 3D tissue-like spheroids comprising tens and hundreds of cells. These are then grown in 3D hydrogels to replicate the 3D microenvironment in vivo. **Conclusions:** The 3D tissues we have engineered using microgravity are used for further biomedical research including the physics of cancer, an attempt to use cell mechanical properties to develop anti-metastasis strategies against cancer.

227 *New Structural Insights into Heavy Metal Complexes with Thiosalicylate*

Department of Chemistry and Biochemistry

Dylan G. Nill, and Eric M. Villa

2-Mercaptobenzoic acid, commonly called thiosalicylic acid, ($C_7H_6O_2S$) is a useful organic compound that contains both a carboxylic acid and a mercaptan functional group. With its low cost and close proximity of functional groups it is a useful precursor in many organic reactions and can also be used as a stabilizing agent in the synthesis of metal nanoparticles. Additionally, when complexed with ethyl mercury it forms Thiomersal (which has antiseptic and antifungal properties). These latter two applications frame a continued interest in how this ligand can interact with metal cations. When

deprotonated, the thiosalicylate anion has both a soft donor in thiolate and a hard donor in carboxylate, which provides a compact ligand to react with a variety of hard and soft metal cations; however, care must be taken when performing reactions so as not to simply form the 2,2â€²-dithiodibenzoate species. The single crystal investigation explored provide unique insights into how this flexible ligand is able to interact with different heavy metals. Herein we will discuss the synthetic strategies and single-crystal structural characterizations of new metal thiosalicylate complexes.

228 *Quantum Dots for Advancing Nanoparticle-Mediated Radiotherapy Against Glioblastoma*

GROUP Department of Physics
Jayce Hughes, Kacey Nishida, Jackie Austin, and Dr. Andrew Ekpenyong

Purpose: Nanoparticle-mediated radiation therapy (NPRT) is an emerging clinical research frontier which seeks to enhance radiotherapy outcomes through two main strategies: local tumor dose enhancement and radiosensitization. In our Translational Biomedical Physics Laboratory at Creighton University, we have developed essays and published new findings on NPRT for brain cancers such as Glioblastomas. We filed a non-provisional patent application in October 2022, with the US Patent and Trademark Office, titled “Cancer Radiation Therapy with Biocompatible Quantum Dots for Simultaneous Dose Enhancement and Counter-Metastasis. **Methods:** We use biocompatible quantum dots (graphene, carbon, etc.) as NPRT to effect both the increased release of electrons that promote reactive oxygen species (ROS) generation and dose enhancement, while making the cells more susceptible to the killing effect of ionizing radiation. Our methods include state-of-the-art cell irradiator (Faxitron) for clinically relevant dosing, monitoring cell migration in real time using the electric cell impedance sensing device (ECIS), assessing ROS generation via fluorimetry, obtaining survival curves using a cloud-based clonogenic assay (CytoSmart Omni). **Results:** Our in vitro results suggest simultaneous enhancement of dose delivered to cancer cells and reduction in their migration prior to cell death. Migration is a key step in metastasis, the process that accounts

for over 90% of cancer-related deaths. **Conclusions:** We are now expanding the methods to other types of cancer, besides brain cancers, while going from our 2D assays to 3D tissue constructs.

229

Effects of a 12-Week High-Intensity Interval Training Program on Vastus Lateralis and Rectus Femoris Cross-Sectional Area and Echo Intensity in Older Adultsα

Department of Exercise Science
April Krywe, Blake Murphy, Devon Stoffel, Jacob Siedlik, Kelley Hammond, Rashelle Hoffman, and Mitchel Magrini

Purpose: The purpose of this study was to examine the effect of a 12-week high-intensity interval training (HIIT) program on m. vastus lateralis (VL) and m. rectus femoris (RF) cross-sectional area (CSA) and echo intensity (EI) in older adults (OA). Decreased EI measurements indicate increased muscle quality, meaning there is a reduced amount of intramuscular non-contractile tissue. **Methods:** Eight older adults (73.75±4.68 yrs) volunteered to complete a 12-week HIIT program (3x/wk). Panoramic ultrasound (US) images of the RF and VL of the right thigh were captured at baseline (PRE) and after training HIIT program (POST). The CSA (cm2) and EI of each muscle (RFCSA, VLCSA, RFEI, and VLEI, respectively) was determined from panoramic US images using grayscale ultrasonography on a scale of 0-255 (au). The EI value was then corrected for subcutaneous tissue thickness. Differences in dependent measures were analyzed using paired samples t-tests and Hedges' g was used to determine effect size. **Results:** There was a significant difference in VLCSA from PRE-to-POST training (PRE: 10.27±4.23 cm2 vs POST: 12.15±4.35 cm2, p=0.049, Hedges' g=-0.91), with an average increase of 1.89 cm2 (95% CI: 0.002, 3.77). No significant differences were observed in RFCSA (p=0.50), RFEI (p=0.43), or VLEI (p=0.30). **Conclusions:** This data suggests that 12-weeks of HIIT increased VLCSA in older adults. HIIT protocols can be used as a clinical rehabilitation protocol to induce VL hypertrophy in older adults but should be further studied to delineate muscular strength effects of the entire quadriceps muscle group.

230 *Lenalidomide-Based Radioimmunotherapy Against Glioblastoma*

Department of Physics
Charlotte Block, Jordyn Rockwell, Isaac Amoah, Sara Strom, and Dr. Andrew Ekpenyong

Background and Purpose: Glioblastoma is a highly aggressive primary brain tumor. Challenges such as resistance to chemotherapy and radiation, local invasion, and a pronounced risk of recurrence contribute to bleak prognosis for glioblastoma patients, with a median survival of approximately 15 months. The existing standard of care involves surgery, radiation therapy, and chemotherapy utilizing temozolomide (TMZ), all of which have shown little or no improvement in the median survival rate. A new modality, radioimmunotherapy, is currently under clinical trials. This approach combines radiotherapy with immunotherapeutic agents. Lenalidomide is one of such agents. Lenalidomide is undergoing phase I and II clinical trials in radioimmunotherapy for newly diagnosed glioblastoma and pediatric gliomas. However, agents with high therapeutic potential may also entail unforeseen effects that could impact treatment outcomes. This study aims to conduct in vitro tests on these radioimmunotherapy agents for cellular level characterization. **Methods:** The experimental setup includes a Faxitron CellRad cell irradiator and a commercially available Electric Cell Impedance Sensor (ECIS). This combination allows for the quantification of cell migration after the application of both radiotherapy via the Faxitron CellRad and chemotherapy with lenalidomide. **Results/Outlook:** Experiments are currently running, and results will be presented. The results will hopefully provide cellular-level evaluation of the impact of Lenalidomide-based radioimmunotherapy on glioblastoma cells, thereby helping with the interpretation of results from clinical trials.

231 *3D Tissue Morphometry for NPRT Against Brain Tumors*

Department of Biology
Joshua Taylor, Dylan Bui, Jordyn Rockwell, and Dr. Andrew Ekpenyong

Purpose: This work joins the decades-old search for appropriate nanoparticles that mediate the delivery of highly localized and enhanced doses of radiation to tumors that are radioresistant such as glioblastomas. Nanoparticle mediated radiotherapy (NPRT) is a multidisciplinary field, and our lab uses NPRT to target glioblastoma, one of the most aggressive forms of brain cancer with dismal survival rates. **Methods:** Here, we study the efficacy of NPRT against glioblastomas, using fluorescence-guided morphometry. We have also gone from 2D cell layers to 3D tissue spheroids. We have maintained the same dyes used in the 2D assays: Hoechst and Calcein. The *in vitro* radiotherapy is carried out using a standard cell irradiator (Faxitron). Following florescence imaging of the spheroids, we quantitatively and qualitatively analyze the images using ImageJ's fractal analysis plugin, FracLac, to extract parameters such as lacunarity. **Preliminary Results/Ongoing Work:** Our preliminary results for lacunarity at early time points (24 to 48 hours) will consolidate our later time clonogenic assays (14 to 21 days) as we decipher treatment conditions that promise better therapeutic outcomes.

232 *Fluorescence-based 3D Morphometry for Chemoradiotherapy*

Department of Chemistry and Biochemistry
Dylan Bui, Jordyn Rockwell, Joshua Taylor, and Dr. Andrew Ekpenyong

Purpose: Glioblastoma (GBM) is the most common form of brain cancer affecting over 12,000 people per year in the United States. It is commonly treated with a combination of chemotherapy and radiotherapy but has one of the worst treatment outcomes: a median survival of 12-15 months. Our goal is to develop in vitro assays to test promising chemoradiotherapeutics against GBM with a view to improving treatment outcomes. **Methods:** We use a standard clinical combination of Temozolomide and radiation on two

glioblastoma cell lines: T98G and U87. To improve therapeutic outcome, we are now testing a novel combination of Lenalidomide and radiation. Chemoradiotherapy targets and disrupts the structure of DNA in order to harm rapidly dividing cells of the tumor. Fluorescent imaging after exposure to these conditions enables us to detect, evaluate, and quantify morphometric changes in cancer cells. We use the dye Hoechst to stain the nucleic acids, highlighting the DNA material in the nucleus and the dye, Calcein, to stain the cytoplasm, which allows for a comparison between nucleus and cytoplasm. Using morphometric parameters such as lacunarity, circularity, mitotic cAs ell count, and nuclear-to-cytoplasm ratio, we have quantified the damage caused by cell exposure to chemotherapy and radiation. To improve the in vivo and clinical relevance of our experiments, a Rotary Cell Culture System (RCCS) is used to generate 3D clusters of T98G and U87 cells that more accurately models real tissue. **Results and Outlook.** Our results from 2D assays provide early morphometric indicators of cell death. These have been published. Results from 3D assays are still preliminary and will be presented.

233 *The Influence of Age and Gender on the Load Velocity Profile in Females*

Department of Exercise Science and Pre-Health Professions
Devon Stoffel, Blake Murphy, Jacob A. Siedlik, and Mitchel A. Magrini

With aging comes significant declines in muscle size, power, strength, and overall functional ability. Resistance training programs based on the load-velocity (LV) relationship help mitigate these declines in performance. However, there has been a paucity of research examining at the LV relationship across the age-span in females. Therefore, the purpose of this study was to examine the influence of age on the LVP in females. Female participants (19-78 y) completed a LV assessment on the belt squat where three trials at each load were completed, with each load increasing by 20% of the participant's body weight. A one-way ANOVA was run to examine group differences. Significant group differences were revealed in AUCabs ($F= 11.93$, $p= <0.001$), AUCrel ($F= 10.42$, $p=<0.001$), Maximal Strength ($F= 11.54$, $p=<0.001$), REL 1 RM

(F= 11.50, p=<0.001), Maximal Movement Velocity (F= 5.92, p= 0.008). Significant differences were observed through post-hoc analysis between YF and OF in Maximal Strength, REL 1 RM, and Maximal Velocity. These data suggest that there are significant differences in Maximal Strength, REL 1 RM, Maximal Movement Velocity, AUCabs, and AUCrel across the age span in females. These data suggest that, due to the small effect sizes and no significant differences in SLOPEabs and SLOPErel across the age span, AUCabs and AUCrel might be a better indicator for differences between age groups in the Load-Velocity relationship. These data provide clinicians, strength and conditioning coaches, and health care providers with additional information when prescribing evidence-based exercise programs to females of any age.

234 *Clinical Skills Interview Chatbot in Spanish*

Department of Computer Science, Design, & Journalism
Cole Krudwig, Carina Cook, Manuel Cevallos, and Steven Fernandes

The research project targets a vital need in medical education: boosting Spanish-speaking skills for clinical interviews to better serve the substantial Hispanic community in Phoenix, Arizona. Recognizing the disparity where only 9% of physicians in Phoenix speak Spanish, the Spanish Clinical Skill Club at the university has adopted a universal template to enhance comfort with Spanish-language interviews for medical students. In the heart of this initiative is the development of a universal digital application, augmented by Dante-AI's custom chatbot capabilities. This tool leverages the latest in Automatic Speech Recognition (ASR) and Natural Language Processing (NLP) technologies, enabling students to independently practice and improve their clinical interview skills in Spanish. Dante-AI's platform offers an interactive, adaptive learning experience, closely mirroring real-life patient interactions. Designed for self-practice, the application will be initially tested by second-year medical students to fine-tune its features. Feedback from this phase will inform further improvements, ensuring that the application meets educational needs effectively. Following this pilot phase, the chatbot will become available across multiple campuses, reflecting the institution's dedication to educational

excellence and cultural competence. Offering a seamless, user-friendly interface, the application promises to be a continuous, inclusive, and free tool. It aims to be a cornerstone in the students' journey to becoming proficient in medical Spanish, thereby improving the quality of healthcare communication with Spanish-speaking patients. Ultimately, this tool will ensure round-the-clock availability, equipping future medical professionals with the linguistic skills essential for empathetic and effective patient care.

235

The Use of Artificial Intelligence in LC-MS Method Development to Identify Unknown Natural Products in Wild Mushrooms found on the Creighton University Campus

Department of Pharmacy Sciences

Katie Cunningham, and Jeffrey E. North

Natural products contain an abundant source of highly unusual and molecularly complex compounds that many have laid the foundation for the development of novel drugs, materials, and cosmetics. These products are derived from living organisms that use these compounds for a variety of reasons such as chemical defense, camouflage capability, or by-products from their metabolism. Essentially, natural products are all hits, yet our understanding of their biological action is quite low. Utilizing natural product molecular scaffolds and performing synthetic modifications has yielded many therapeutically diverse drug classes ranging from pain relief (i.e., hydromorphone, opioid) to anticancer (docetaxel), making semisynthetic drug discovery one of the most powerful and translational medicinal chemistry approaches to drug discovery. Unfortunately, due to time, resources, and success rates it is challenging to prioritize the discovery of natural product compounds. However, artificial intelligence has untapped potential in the revitalization of natural product research by enhancing the efficiency of chemical method development. The program, ChatGPT, has the putative capability to streamline this process and could help expand the chemical space and subsequent library of novel compounds to enhance chemical structure diversity in synthetic design. We have performed a robust extraction and fractionation process on wild mushrooms

found on the Creighton University campus. We will test the abilities, capabilities, and limitations of ChatGPT for LC-MS method development to identify various components found in these fungi with a confident vision of compound isolate identification.

236 *Molecular and Synthetic Design of D-Alanyl-D-Alanine Analogs as Cell Wall Inhibitors in Mycobacterium Tuberculosis*

Department of Pharmacy Sciences

Jenny Grissom, and Jeffrey E. North, E.

Tuberculosis (TB), which is caused by the Mycobacterium tuberculosis (M.tb) pathogen, is one of the leading causes of death globally. These infections tend to target those with a weakened immune system like those who suffer from HIV. Additionally, M.tb has increasing drug-resistance rates worldwide, which limits the efficacy of first-line therapeutic agents. This demonstrates an increasing need for novel anti-tubercular agents. Previous research efforts show urea derivatives as potent TB agents but have poor aqueous solubility. These urea analogs have a similar structure to a major component of the peptidoglycan cell wall layer, D-alanyl-D-alanine. This led to the design of D-alanyl-D-alanine analogs with putative-improved aqueous solubility with enhanced hydrophilicity over the urea series. Developing analogs of this cell wall substrate could lead to various inhibitor potential in the cell wall. Likewise, these analogs fit the pharmacophore of Mycobacterial membrane protein large 3 (MmpL3) inhibitors. MmpL3 is an essential transporter involved in the M.tb cell wall biosynthetic pathway. The goal of this project is to design and synthesize D-alanyl-D-alanine-inspired anti-tubercular gents. The future of this project will include running various in vitro microbiological assays to determine cell growth inhibition activity against M.tb, other mycobacteria, gram (-), and gram (+) bacteria. Pharmacokinetic and cytotoxicity assays will also be performed to determine a lead compound for this series. If time permits, performing surface plasmon resonance (SPR) and computational modeling of potential binding sites will be completed to rationalize a putative biological target.

237

Evaluating Photodeprotection rates of 1,4- and 1,5-disubstituted-1,2,3-triazoles: A Structure Property Relationship Study

Department of Chemistry and Biochemistry

Quinn Carlson, and James Fletcher

Quaternary ammonium compounds (QACs) are cationic quaternary nitrogen containing molecules that can display antimicrobial properties against Gram-positive and Gram-negative bacteria. There is an increasing need for antiseptics that can be deactivated after use in order to combat environmental accumulation and potential evolution of antimicrobial resistance. The project focusses on the synthesis of 1,4- and 1,5-disubstituted-1,2,3-triazoles with varying substitution and their conversion into triazolium salts via reactions with photolabile protecting groups (PPGs). Click chemistry was used in the synthesis of all triazoles utilized in the study, and PPGs were various acetophenone groups (4-methoxy, 4-methyl, 4-chloro, 4-fluoro, 4-hydroxy, 4-cyano, 2-methyl). H-NMR was used to characterize chemical identity. Each synthesized analogue was exposed to 365 nm UV light for extended periods of time (0-7 days). Intermittent H-NMR analyses, utilizing d6-DMSO and d3-acetonitrile, were obtained to monitor the progression of decomposition as well as to determine the efficiency of triazole photorelease. Initial results show that diaryl-1,2,3-triazolium salts generally decompose quicker and more cleanly than alkylated triazolium salts, and PPG substituent identity also directly influences this rate. Antiseptic properties of these triazole compounds and triazolium salts were measured using minimum inhibitory concentration (MIC) assays against two Gram-positive (S. epidermidis and B. subtilis) and two Gram-negative (E. coli and K. aerogenes) bacterial strains to determine the influence of PPG identity on toxicity. Details regarding the synthesis, photodeprotection studies and antiseptic properties will be presented.

238 *The Effect of Hydration Status and Muscle Glycogen on Muscle Size and Echo Intensity*

Department of Exercise Science and Pre-Health Professions
Matthew LeMay, April Krywe, Jacob Siedlik, Mitchel Magrini, and Melani Kelly

Diagnostic ultrasonography is becoming more popular to examine skeletal muscle architecture. Previous research has suggested that hydration status and muscle glycogen content may influence the muscle's architecture leading to inaccurate outcomes. However, limited research has examined the impact that hydration and muscle glycogen content have on skeletal muscle size and brightness. **Purpose:** The purpose of this study was to determine the effects of hydration status and muscle glycogen content on ultrasonography derived muscle size and echo intensity. **Methods:** Twelve participants volunteered to complete a total of five visits over the course of seven days. Hydration and muscle glycogen content will be manipulated and assessed at each testing session. Urine samples and total body water will be collected at the beginning of each visit to determine hydration status. Panoramic ultrasound images of the right vastus lateralis will be captured and assessed during each visit. Changes in vastus lateralis cross-sectional area and echo intensity were measured using a 1 x 5 repeated measures ANOVA. **Results:** There were no significant differences in either CSA ($p = .961$) or echo intensity ($p = .986$). **Conclusions:** These data suggest that muscle glycogen content and/or general hydration levels do not significantly impact ultrasonographic derived muscle cross-sectional area or echo intensity. However, the impact of muscle glycogen on skeletal muscle size and echo intensity should be examined by a more direct measure of muscle glycogen (i.e., skeletal muscle biopsy) to confirm these results.

239

Validation of Open Systems Pharmacology Modeling and Simulation Software for the Development of Novel Antimycobacterial Chemical Entities

Department of Pharmacy Sciences, SPAHP

Daniel Kohl, and E. Jeffrey North

The U.S. Center for Disease Control and Prevention (CDC) considers *Mycobacterium tuberculosis* (*M. tb*) and non-tuberculous mycobacterium (NTM) infections to be of utmost concern. Deleterious risks can be associated with these infections in addition to current treatment involving complex multidrug regimens that are lengthy, inconvenient, demonstrate significant side effect profiles. In addition, extensive drug-drug interactions may occur putting those infected with a mycobacterial strain at greater risk for further morbidity and mortality. According to the American Thoracic Society, some mycobacterial infections have no proven efficacious treatment regimen. All things considered, the development of novel chemical entities effective against these deadly organisms is warranted. We have focused efforts towards further development of coumarin- and quinolone-based compounds targeting inhibition of FadD32, a fatty acyl-AMP ligase as well indole- and acetamide-based entities targeting MmpL3, a mycolic acid transporter, that are essential components in mycobacterial cell wall biosynthesis. Although these efforts have demonstrated promise, pre-clinical drug development processes are often extensive and prolonged to which the utilization of pharmacokinetic and pharmacodynamic simulations can allow for simpler decision making and greater efficiency regarding the development of lead chemical entities with possible therapeutic utilization. Herein, the utilization of Open Systems Pharmacology modeling and simulation software for novel antimycobacterial chemical entities for further mycobacterial drug development will be discussed.

240 *Expression and Purication of Bacterial Peptide Transporter SaOpp3A*

Department of Chemistry and Biochemistry

Andrew Sheppard, and Clifford Gee

The oligopeptide permease (Opp) system plays a key role within bacteria, acting as the pathway for the uptake of peptides which are used as carbon and nitrogen sources. Opp3 in particular is found in all staphylococcal species and imports peptides from 3-8 amino acids in length. Our goal is to express, isolate, and purify SaOpp3A, the substrate binding protein of the Opp3 system in Staphylococcus aureus, so that it can be characterized. Future biophysical assays will use fluorine labeled SaOpp3A for fluorine NMR in order to analyze the binding affinity of different peptides.

241 *Design and Synthesis of Peptides as Precursors for Targeting Antibiotic Resistance*

Department of Chemistry and Biochemistry

William Culp, and Clifford Gee

The rise of antibiotic-resistant pathogens presents a grave challenge to public health, calling for the exploration of various defensive approaches. In this study, we focus on two pivotal peptide transporters in the bacteria *Staphylococcus aureus*, crucial for peptide uptake as carbon and nitrogen sources. Our objective is to elucidate the chemical properties essential for peptide binding to increase our comprehension of these protein targets. Synthesizing 20 peptides derived from the MPIQA parent sequence, we used the purification techniques High-Performance Liquid Chromatography (HPLC) and Mass Spectrometry to successfully purify the first five of these peptides. This achievement will help lay the foundation for future investigation in the pursuit of antimicrobial strategies with the goal of better understanding peptide transport mechanisms in *S. aureus*.

242

Synthesis of Short Chain Analogues of Trehalose Monomycolates as Substrate for Mycobacterium Membrane Protein Large 3 (MmpL3)

Department of Pharmacy Sciences

Amit Pant, and E. Jeffrey North

Mycobacterium tuberculosis (M. tb) is the causative pathogen for tuberculosis, which remains a top killer globally. Mycolic acids are β-hydroxy fatty acids containing up to 90 carbons and are the primary lipid component of the mycobacterial cell wall. Mycolic acids are essential for M. tb cell integrity and virulence. Mycobacterium membrane protein large 3 (MmpL3) is an essential transporter involved in the mycolic acid biosynthetic pathway. MmpL3 functions by transporting mycolic acids, in the form of trehalose monomycolates (TMM) to the outer membrane. For insights on molecular mechanism of MmpL3 function and development of MmpL3 inhibition assays, we are synthesizing TMM analogs as physiologically relevant MmpL3 substrates. TMM analogs are synthesized through three schemes. The first scheme is multistep synthesis of mycolic acids. Initially, β-keto methyl ester intermediates obtained in good yields (71-82%) by coupling fatty acids to potassium malonate. After alkylation of the alpha carbon, reduction of the β-keto group to a β-hydroxy group was mediated by sodium borohydride (55%). Finally, soaponification of the methyl ester quantitatively yielded mycolic acids. The second scheme generated a hexasilyl protected trehalose. Firstly, trehalose was protected by trimethylsilyl chloride. Selective deprotection of the primary alcohols was achieved using potassium bicarbonate (55%). The final scheme generated TMM. Coupling mycolic acids to hexasilyl-protected trehalose is currently underway using various coupling conditions. The final reaction to deprotect trehalose will be carried out using the DOWEX H^+ resin. All compounds were purified by normal phase flash column chromatography and characterized by 1H nuclear magnetic resonance.

243 *Patterns in Reproductive Morphology Based on Size and Sex in Water Lilies (Nymphaeaceae)*

Department of Biology

Jennifer Omann, and Mackenzie L. Taylor

Flowers have two main functions: 1) entice pollinators, and 2) to provide an environment for a pollen grain to land and grow a pollen tube to reach the egg. There can be a trade-off for plants between flower size and facilitating fertilization, as larger flowers can mean longer distances for pollen tubes to grow. Flowers have evolved to have tremendous variation in size. In the Family Nymphaeaceae, flowers can reach a diameter of anywhere between 3 and 25 cm. This variation has affected the size of floral structures. However, despite this variety in size, the flowers in core Nymphaeaceae (Victoria, Euryale and Nymphaea) remain similar in overall flower form. Data on morphological traits, especially from this family with variation in size but similar floral structure, will aid our understanding of the trade-offs that lead to reproductive success. The goal of our study was to determine how overall flower size scales with the size of the female reproductive organs. We collected samples from species and cultivars of Nymphaea, Euryale and Victoria from six botanical gardens. We measured morphological traits such as stigma and flower diameter and ovary size for both functionally female and male flowers. We also tagged flowers and measured them throughout anthesis, gathering data on overall size and petal and sepal reflection angles. Our preliminary results show that flower size changes from day to day due to petal and sepal reflection and does not correlate with the pollen tube pathway length.

244 *Design, Synthesis, and Evaluation of Benzoxazolyl Urea Derivatives as Potential Vancomycin Enhancers Against Intermediate-resistant Staphylococcus Aureus*

Department of Pharmacy Sciences

Anupama Nair, Emerson P. Heckler, Liaqat Ali, Shrijan Bhattarai, Brittnee Cagle-White, May H. Abdel Aziz, and Aurijit Sarkar

Community-Associated Methicillin-Resistant *Staphylococcus aureus* (CA-MRSA) is currently the leading cause of bacterial

infections. Vancomycin is often the preferred treatment for these infections. However, prolonged exposure to vancomycin has led to an increase in Vancomycin Intermediate-Resistant *Staphylococcus aureus* (VISA) infections (MIC of ∼4 to 8 μg/mL). Therefore, there is a significant demand for identifying chemicals that can augment vancomycin's activity and overcome the resistance that has developed. A benzoxazolyl urea has been identified as capable of inhibiting VraS, a histidine kinase responsible for resistance in VISA. This chemical works by inhibiting the VraS gene, enabling vancomycin to effectively kill the bacteria and exhibit antibacterial activity. In the presence of this chemical, the Minimum Inhibitory Concentration (MIC) decreased significantly to 0.25 μg/mL i.e., by a 16-fold change. This MIC is below the clinical breakpoint for vancomycin. The aim of my research is to develop a protocol and synthesize the chemical, as there currently isn't an established method available to the wider scientific community. Additionally, I intend to investigate its structure-activity relationship (SAR) and identify the essential pharmacophore required for its inhibitory activity. Furthermore, we will optimize the potency of this series of chemicals. If successful, we can then study the mechanistic effects of this chemical, which lead to enhancement of vancomycin. The optimized enhancer of vancomycin will be a worthy addition to literature, as most groups usually focus on developing beta-lactam enhancers.

245 *Antiseptic Properties of Divalent Triazolium Salts with Photolabile Subunits*

Department of Chemistry and Biochemistry

Benjamin Brockmann, and James Fletcher

Quaternary Ammonium Compounds (QACs) are cationic compounds that contain antiseptic properties against Gram-positive and Gram-negative bacteria. This project focuses on the synthesis of divalent triazolium salts bridged together either by a single aryl group or two aryl groups, the toxicity variance of differing subunits attached to the salts and the ability for the compound to decompose back into reactant components and deactivate when exposed to UV light. The compounds were synthesized utilizing click chemistry and

verified using H-NMR. Minimum inhibitory concentration (MIC) assays were then run against two Gram-negative (E. coli and K. aerogenes) and two Gram-positive (S. epidermidis and B. subtilis) strains of bacteria. Results show that the compounds were more effective against the Gram-positive strains, with less effective results against the Gram-negative bacteria. To test the efficiency of the photolabile subunits, each compound was exposed to 365 nm UV light for an extended period (5-7 days). During which, H-NMR samples were taken to quantify the reversibility of the synthesis with d6-DMSO and d3-acetonitrile used as solvents. Results of the UV exposure show that all compounds decompose from their product with rates that vary with the identity of the triazole substituents. Some compounds reverted into their original reacts cleanly and others decomposed into an unidentified array of molecules. Details regarding the preparation, antiseptic assays and photo-decomposition studies will be presented.

246 *Evaluation of Single-leg Balance During Eyes Open and Closed Conditions in Individuals with Flat Feet*

GROUP Department of Exercise Science
Daylen Kallberg, Malvika Skukla, Andrew Schlundt, Andrew Pellerito, Abbis Jaffri, Anastasia Kyvelidou, Dimitrios Katsavelis

Pes planus, also known as flatfoot, is characterized by overpronation of the foot and misalignment of the ankle, knee, and hip joint that can increase the risk of lower extremity injuries. While the effect of flatfoot on dynamic stability during locomotion is well documented, there is limited literature on standing stability with rather inconclusive results. Most of the research on static stability is on double-leg standing and does not challenge the somatosensory system of the participants. Therefore, the purpose of the present study is to investigate the effect of flatfoot with eyes open and closed on single-leg balance. Individuals with a Foot Posture Index greater than +6 were placed in the flatfoot group. Nine college students with flatfoot (age = 20.3Â± 1yr) and six healthy controls (age = 20.8Â± 1yr) participated in the study. Computerized Dynamic Posturography measured the single-leg balance of both legs during eyes-open and eyes-closed conditions. All participants performed a total of 12 trials (3 for each condition).

Independent t-test showed that there were significant differences in the balance scores during the eyes-open ($p=0.002$), and the eyes-closed ($p=0.004$) conditions with the healthy group displaying better scores compared to the flatfoot group. Interestingly, the flatfoot group performed poorly in the eyes-open condition based on the normative scores from the manufacturer, while their scores in the eyes-closed conditions were within the norms. The findings indicate that individuals with flatfoot exhibit reduced static stability compared to healthy controls, however, these changes are more profound in the eyes-open condition.

247

Genomic Location of a Putative Male Determining Gene in Black Flies

Department of Biology

Maisie Laughlin, and Charles Brockhouse

This study investigates the chromosomal location and copy number of a candidate sequence of the primary male determining factor of two Simulium species: *Simulium tribulatum* and *S.vittatum*, which differ only in the chromosomal location of the male determiner. Known as the black fly, this family is of substantial interest to the scientific community, due to the ability of adult females to transmit an array of pathogens, including the causative agent of Onchocerciasis, commonly known as River Blindness. The World Health Organization identifies Onchocerciasis as a Neglected Tropical Disease (NTD) due to its significant effects on global health and economic affairs. Through preliminary work by the Brockhouse lab, a candidate for the primary male determiner has been determined to be similar to the sex-specific splicing protein Transformer-2 (TRA-2), and it is expected to occur on chromosome III in *Simulium tribulatum* and chromosome I in *S. vittatum*. We have evaluated this candidate sequence through bioinformatics work. In the future, we plan to use in situ hybridization and droplet digital PCR as well. Through these tests, we hope to map the site of this male determining factor and test its copy number in both sexes. We anticipate that the completion of this study will lay foundations for future research to investigate the ability to transform *Simulium tribulatum* and *S. vittatum* females into pseudo-males. This transformation has been completed in mosquito species Aedes albopictus, through utilizing its own male determiner (Zhao et al., 2022). We expect that the replication of this technique could prove effective to reduce female black fly pathogen spread.

248 *Synthesis of "Trojan Horse" Peptides as Mechanisms for Targeting Antibiotic Resistance in S. Aureus*

Department of Chemistry and Biochemistry

Jack Vandenbussche, and Clifford Gee

The increasing antibiotic resistance in bacterial populations presents an ever-changing problem for worldwide healthcare, necessitating a creative approach to finding solutions. Thus, we began by targeting the peptide transporter Opp3a, a membrane transporter responsible for the intake of peptides as nitrogen sources in *S. aureus*, in order to determine the necessary properties of those peptides that are compatible with Opp3a. A selection of peptide sequences derived from the parent sequence EQIVIR were synthesized using the proven technique of solid-phase peptide synthesis (SPPS) and then characterized and purified by High-Performance Liquid Chromatography (HPLC) and Mass Spectrometry. The synthesis and purification of these select peptides will provide the basis by which future investigations into the structure and chemistry of bacterial transporters may be leveraged to make more efficient and effective treatments for bacterial diseases.

249 *Modeling Optical Variability in Quasars by Simulating Mass Accretion Rates as a Continuous Autoregressive Process.*

Department of Physics

Hare, Thomas; Gabel, Jack,

Optical variability is a fundamental characteristic in quasar observations and can give insight into their physical characteristics. We have developed simulations of quasar accretion disks to generate variable light curves. Our goal is to characterize the physical parameters that affect the variability, which will allow us to predict observations of real quasar light curves. In these simulations, the variability is caused by thermal fluctuations in the disk that are driven by random perturbations in the mass accretion rate. Our model uses a continuous autoregressive (CAR) process to produce these perturbations. This model enables us to simulate the effects of different physical processes on the variability by comparing light curves and PSDs for different characteristic timescales. We intend to

compare our simulation results to synthetic data of the Vera Rubin Observatory, or LSST, to predict future observations of quasars. The Vera Rubin Observatory will survey a large number of targets and will conduct more consistent observations using instruments with better sensitivity than what has been capable with previous sky surveys, such as the SDSS.

250

The Relationship Between Crossover Offenders and Dynamic Risk Assessments

GROUP

Department of Psychology

Sanford LeGrand, Emma Hennessey, Matthew Huss

Scholars have long debated the specialization of sexual offenders. It has been assumed that most sexual offenders specialize in their victim choices but increasingly, the literature is examining the nature of crossover offenders (Kleban et al., 2012). Crossover offenders are sexual offenders who have multiple victims who cross over on one of three categories, age, gender, or relationship to the perpetrator (Kleban et al., 2012). The current study examined 261 incarcerated sexual offenders undergoing treatment, of which 84 were identified as crossover offenders. From this population, 69 crossed over based on age, 18 based on relationship, and 21 based on gender. It is hypothesized that crossover offenders will show greater improvement in risk over the course of treatment than specialist offenders. Examination of STABLE 2007 scores, a dynamic risk assessment instrument was insignificant, however. Results indicate that there were no differences during treatment among specialist and crossover offenders. While these results provide little support, the continued examination of these cross over offenders and how they interact with dynamic risk assessments will shed light on different ways in which a perpetrator past actions can impact their receptiveness to treatment and subsequent risk potential.

251 *Postural Control Assessment in Individuals With Flatfoot.*

GROUP Department of Biomedical Sciences

Schlundt, Andrew, Shukla, Malvika, Kalhberg, Daylen, Kramer, Kandace, Jeffries, Abbis, Kyvelidou, Anastasia, and Katsavelis, Dimitrios

Flatfoot is a chronic condition characterized by a collapse of the medial longitudinal arch and misalignment of the ankle, knee and hip joint that can increase the risk of lower extremity injuries. While the effect of flatfoot on dynamic stability during locomotion is well documented, there is limited literature on how individuals with flatfoot control their standing posture. Most studies in this domain focus on static conditions ignoring the effect of perturbations or rhythmic movements on the postural control of the participants. Therefore, the purpose of this study was to evaluate the postural control of individuals with flatfoot during two postural control tasks. Nine college students with a Foot Posture Index greater than +6 (age = 20.2Â± 1yr; weight = 71.1Â± 16kg; height = 171.9Â± 12cm) participated in the study. All participants performed a total of 24 trials: 3 for each of the 6 Motor Control (MC) conditions and 1 for each of the 6 Rhythmic Weight Shift (RWS) conditions. Latency (measure of reaction time) and Amplitude Scaling scores were within the norms provided by the manufacturer for both anterior and posterior translation conditions and for all speeds (slow, medium, fast) during the MC test. Movement velocity scores were within the norms for both mediolateral and anteroposterior conditions for all 3 speeds, while Directional Control was only within the norms for the fast-speed and barely below for the slow- and medium-speed conditions during the RWS test. The findings indicate that motor control of posture of individuals with flatfoot is intact.

252 *Enhancing Awareness of Sensory Experience: Promoting best outcomes for adolescents and young adults with cerebral palsy.*

Department of Exercise Science

(Nguyen, Aidan) (Corr, Bradley) (Scott, Kimberley) (Kurz, Max)

Introduction: Somatosensory processing for people with cerebral palsy (CP) is impaired, hindering the ability to learn

new movement patterns. Optimal dosing of physical therapy (PT) interventions may include promoting patient attention to the sensory experience of training tasks ("Experience"). Purposes were to quantify Experience for an 8-week PT intervention and investigate differences in Experience across levels of motor ability (GMFCS level) and between therapists. **Participants:** N=17 participants with CP, ages 20.7Â±5.9 years, GMFCS levels I-III, participating in a gait training intervention clinical trial. **Methods:** Experience was defined as the therapist explicitly emphasizing the participant's perception of motor tasks. Rate is Experience frequency/session duration (Exp/min). Non-parametric testing compared average Experience rates between GMFCS levels (I and III) and between therapists (n=2). **Results:** Mean session duration was 46.7Â±6.6 minutes. Median (IQR) Experience Rate (Exp/min) was 0.25(.11) for Therapist 1; 0.24(.22) for Therapist 2; 0.19(0.21) for GMFCS level I; 0.68 (N/A) for level II; and 0.28(0.10) for level III. No significant differences were found across GMFCS levels (p=.100) or therapists (p=.724). **Conclusion:** Results show that promoting sensorimotor experience can occur across multiple therapists and different GMFCS levels during PT intervention for adolescents and adults with CP. **Relevance:** Consistent intervention delivery across GMFCS levels and therapists promotes accurate analysis of intervention outcomes. Future studies can assess variables that may account for differences in Experience rate, such as novelty of training tasks.

253 *Revolutionary Rhetoric in the Mid-19th Century*

Department of History

Budesheim, Ben. Appleford, Simon

1848 marked the outbreak of labor revolutions all across Europe. In the lead up many politicians, philosophers, and political writers published their beliefs about the state of the working class in Europe. Among these writers were Karl Marx, Friedrich Engels, and many others who wrote in support of the working class as well as the revolutions. This research examines a link between the political publications and four novels written around the time in England. The novels and authors were selected based on their relation to working-class, revolutionary, and socialist rhetoric. The novels selected were Barnabry Rudge

and A Tale of Two Cities, by Charles Dickens, as well as North and South, and Mary Barton, by Elizabeth Gaskell. Dickens and Gaskell both wrote multiple novels with themes of working-class people as well as the relationship between the upper and lower classes in England. The political publications were works of Karl Marx, Friedrich Engels, Thomas Carlye, Auguste Blanqui, Pierre-Joseph Proudhon, and Felix Pyat. These works were chosen partly for their content and availability of translated versions. The analysis was done using the Python package BERTopic, which provided tools for textual analysis and visualization. This research shows the trends of revolutionary rhetoric throughout the period covered and through the links between the novelists' works and political writers.

254

Exploring Physiological Signal Extraction from Facial Videos: Neural Motion Transfer for Data Augmentation in Original and Deepfake Content Analysis

GROUP

Department of Computer Science, Design and Journalism
Graff, Hannah; Mondiri, Ariana; Van Handel, Kaylee; Phillips, Samantha; Fernandes, Steven

In the domain of digital content verification, the challenge of accurately distinguishing between original and deepfake videos, especially when analyzing subtle physiological signals such as cardiac pulses, is significant. Our novel research adopts a two-pronged approach, leveraging neural motion transfer as a data augmentation tool to enhance the detection and analysis of physiological markers in both authentic and manipulated video content. In Case 1, we utilize neural motion transfer to introduce a range of motion variations into original videos, carefully preserving essential physiological changes to bolster the model's resilience against motion-related artifacts, which is critical for the precise extraction of physiological signals and leads to more reliable analytical outcomes. Extending this method to deepfakes in Case 2, we evaluate the effectiveness of motion augmentation in preserving physiological signal integrity amidst the distortions of video manipulations, facing the challenge of discerning genuine physiological signals from those altered or obscured by deepfake technology. Our dual-case analysis sheds light on the nuanced impacts of motion variation on physiological change

detection, offering valuable insights into the intersection of motion artifacts and signal fidelity in digital videos. The findings underscore the importance of neural motion transfer as a pivotal data augmentation technique, contributing significantly to the fields of digital forensics and the development of sophisticated tools and methodologies aimed at safeguarding the authenticity and integrity of digital media.

255 *The Effect of Acute Ketone Supplementation on Time to Fatigue in NCAA Division I Cross-Country Athletes*

Department of Exercise Science
Marcos Gonzalez, Caroline Jachino, Blake Murphy, Kaitlyn Heinemann, Mitchel A. Magrini, Eric C. Bredahl, Joan M. Eckerson, Jacob A. Siedlik

This investigation aimed to determine the effect of a ketone supplement on heart rate (HR), perceived exertion (RPE), blood lactate concentration, blood glucose concentration, blood ketone concentration, and time to fatigue (TTF) during a running task to volitional exhaustion. Twelve NCAA Division I cross-country runners participated in this randomized, double-blind, placebo-controlled cross-over study. Bayesian statistical methods were utilized, and parameter estimates were interpreted as statistically significant if the 95% highest-density intervals (HDI) did not include zero. TTF was not significantly different between conditions with a posterior Mean diff = 48.7± 6.3 seconds (95% HDI: -335, 424) and a 0.39 posterior probability that the supplement would increase TTF relative to the placebo control. Blood lactate concentration immediately post-exercise was significantly lower in the supplement condition compared to placebo with an estimated posterior Mean diff = -4.6± 1.9 mmol; 95% HDI: -8.3, -0.9). There were no significant interaction effects observed for either blood glucose or ketone concentrations nor HR or RPE. These findings suggest that acute ingestion of ketones prior to running at lactate threshold pace has a low probability of increasing TTF in highly trained runners.

256

Sterically Directed N_π-Imidazole Side Chain Acylation Strategies for Preparation Of 4(5)-Benzyl-L-Histidine Peptide Synthesis Reagents

Department of Chemistry and Biochemistry

Young, Patrick; Hulce, Martin

Calcitonin gene-related peptide (CGRP) is a potent peptide vasodilator produced in the peripheral and central nervous systems. Binding of CGRP to its receptor causes dilation of cerebral and dural blood vessels, thought to be the source of migraine nociception. The derivatized CGRP fragment Nα-benzoyl-[4(5)-benzyl-L-His^{10}]-CGRP(8-37) is a CGRP antagonist with 100-fold greater binding affinity compared to a standard antagonist, CGRP(8-37). To develop a high yield route to [4(5)-benzyl-L-His10]-CGRP(8-37) by solid-phase peptide synthesis using appropriately protected 4(5)-benzyl-L-His, preparations from Pictet-Spengler cyclocondensation of L-His with benzaldehyde to yield 4-phenylspinacines, which were regioselectively N_π-acylated by novel T3P-mediated amidation and subsequently hydrogenolyzed, were investigated.

POSTER PRESENTATIONS: 8:45-10:45 AM
WEDNESDAY MARCH 27, 2024
STUDENT ABSTACTS

300 *The Impact of Self-Concept and Purchase Urgency on Consumer Decision-Making*

Department of Psychological Science

Hessman, Kate Fairchild, Joshua

In a society that emphasizes consumerism, we are inundated with decisions about what we should buy. Erasmus and colleagues (2001) state that individuals tend to follow the consumer decision-making model when evaluating their satisfaction of purchase. Johe and Bhullar (2016) emphasize that our own self-concept, in addition to the decision-making model, can have a subtle effect upon the buying behaviors we choose. I hypothesize that higher self-concept will decrease purchasing intention, especially when a decision is more urgent. Conversely, those with low self-concept, and under high conditions of urgency, will experience more pressure to purchase than those with a higher self-concept.

These hypotheses were tested through a 3 (Urgency) x 3 (Self-Concept) mixed factorial design where a significant interaction between urgency and self-concept was discovered (F (4, 153) = 2.88, P =.025). The nature of the interaction was different than expected as individuals with high self-concept were more likely to purchase than those with low self-concept, regardless of urgency. For those with moderate self-concept, urgency had a negative effect on likelihood to purchase. This suggests that those with moderate self-concepts, especially when in a condition of low urgency, seek control over their decisions due to the pressure to feel secure and increase self-concept. However, individuals with moderate self-concept, in conditions of high urgency, avoid purchasing to maintain autonomy as the choice to reject a purchase elicits personal control.

Prior research fails to address the flaw that moderate self-concept concludes in the consumer-decision making cycle. Urgency becomes highly variable toward self-concept as the ambiguity of one's self concept may affect the success of purchasing.

301 *Effects of Tallgrass Prairie Weather Patterns on Black Swallowtail Hill-Topping Behavior*

Department of Biology

Strom, Nicole, Dr. Burk, Theodore

Male Papilio polyxenes (Black Swallowtail) practice hill-topping behavior in Glacier Creek Preserve in Bennington, Nebraska. Hill-topping behavior is defined as territorial and mating behavior in which males perch in their own territorial areas. The territories are won by engaging in fights or chases with other males who attempt to enter. The goal of obtaining a territory is to be found by a female and successfully mate. In this research project, Elise Goodling-Lord, Hana Griffin, and I conducted observations at the topographic peak in the Glacier Creek Preserve to observe the number of altercations among Black Swallowtail butterflies and among other insects in their territories. In conjunction with our observations, I recorded the weather in order to study if there was a connection between the activity of fights (i.e., their number) and certain weather conditions. We noted the following weather conditions: temperature, wind speed, percent humidity, and cloud coverage to determine their connection. The Black Swallowtail population's use of hill-topping behavior has not been studied since 1982 by Dr. Lederhouse. In Dr. Lederhouses's previous research, Papilio polyxenes were studied in upstate New York. However, Nebraska's tallgrass prairies have not been studied until now. With the increase in extreme weather changes, due to climate change, the effect of weather conditions on Black Swallowtail butterflies' mating practices has yet to be studied. Therefore, this project is of importance to maintaining the species' health.

302 *Factors Affecting a State's Allocation of Disaster Preparedness Funds*

Department of Political Science and International Relations

Vigil, Camille

This study examines the factors affecting a U.S. state's allocation of disaster preparedness funds in Fiscal Years 2008, 2014, and 2019. Explanatory factors include a state's support for a particular political party in the previous presidential

election, a state's median age, Gini Index, GDP per capita, and whether the state is disaster-prone. This study concludes that the states that allocate more funds in disaster preparedness funds are those that have higher levels of economic inequality, have higher levels of GDP per capita, and are not disaster-prone states.

303 *Multi Theoretical Framework for Mob Modeling*

Department of Social and Cultural Science
Orr, Bridget; Murray, Rebecca; Al-khateeb, Samer; Burright, Jack

As social media made us more connected, it also increased our ability to gather large groups of people and coordinate large-scale events, such as mobs. Understanding the motivation of individuals to join such events and the ability to predict the outcome of these events (success or failure) is complex and requires a robust understanding of social science theories. In this research, we aim to apply five social science theories to mobs, namely: collective action theory, diffusion of innovation theory, lifestyle-routine activity (L-RAT) theory, low self-control theory, and environmental design theory. Through mapping the concepts/factors from these theories and operationalizing them accordingly, we hope to gain clarity surrounding the mob phenomenon. The five theories are comprised of shared and unique concepts/factors related to the individuals (i.e., potential mobbers) and the event itself (i.e., the mob), and we identify areas of theoretical overlap, creating a network of connected social science theories for this phenomenon. We discuss methods in which these concepts/factors can be measured using event-based social media (EBSM) platforms.

305 *Structural Analysis of OAZ RNA in Neurospora crassa*

Department of Chemistry & Biochemistry

Sousley, Caitlin. Curran, Emma. Strauss-Soukup, Juliane

Riboswitches are segments of non-coding RNA that bind cellular metabolites to alter expression of a downstream gene. This is accomplished by the riboswitch interacting with a ligand

which induces a structural change that can alter transcription, translation, or RNA processing of the downstream gene responsible for producing more of the metabolite. Riboswitch regulatory behavior in bacteria has been largely documented. However, eukaryotic riboswitch behavior on biosynthesis of polyamines remains uninvestigated. Polyamines are organic molecules that interact with DNA, RNA, and proteins to influence cell growth and proliferation. Therefore, understanding riboswitch structure and riboswitch-ligand specificity will greatly improve the targeting and reprogramming of polyamine biosynthesis using non-natural compounds and synthetic riboswitches for medicinal and biotechnological applications. The potential eukaryotic riboswitch (OAZ RNA) is highly conserved across various organisms. Previous work in the Soukup lab has found strong evidence for the presence of a riboswitch in the mouse OAZ RNA. The goal of this work is to investigate the OAZ RNA from Neurospora crassa. In-line probing (ILP) is being used to characterize conformational changes in the OAZ RNA from N. crassa. Specifically, ILP is used to identify changes in the secondary structure of the RNA in the presence of varying concentrations of polyamine ligands. By using varying concentrations and different types of polyamines, it is possible to determine whether the OAZ RNA demonstrates one of the key characteristics of a riboswitch, conformational changes upon ligand binding. Further experiments will aid in examining binding affinity and ligand specificity for this potential riboswitch.

306 *Restorative Justice in Youth Incarceration Rates*

Department of Political Science

Leilani Hung

This study highlights the percentage of youth that have been increased in 2021. The variables that play a factor into the rising of rates such as: number of restorative justice programs offered, population size served, political party, race and poverty rates. The research does support that their a significant amount of variances that play a role in youth interaction rates and Restorative Justice is a major one.

307 *Youth Incarceration in America: State Level Analysis*

Department of Political Science

Britto, Madeleine

During the early 2000s, the American penal system experienced a sudden and increasingly rapid growth in its youth prison populations. It is imperative we understand the factors that influence a children's success and the barriers that impact them since they are the future generations. This study examines macro-level state characteristic effects on youth incarceration in the United States between the years 1997 - 2013. Using a pooled time-series analysis, the results show that Republican strength and income inequality lead to higher youth incarceration rates. These results validate previous findings and add to the existing literature on youth incarceration.

308 *Determinants of CO Emission Rates: A Multivariate Analysis*

Department of Political Science

Reed, Emma

This study explores the political and economic factors that influence the success of climate finance mitigation efforts, with a focus on recipient countries. Analyzing data from 2003 to 2020, it investigates the impact of democracy levels (V-Dem Score), GDP per Capita, and Government Effectiveness using a fixed-effects regression model. The findings support a consistent negative relationship between democracy levels and CO2 emissions, in contrast with the positive associations found for GDP per Capita and Government Effectiveness. The study highlights the need for future research to examine regional and economic nuances in climate finance and the insights this provides for policy development.

309 *Solar Power Incentives in the United States*

Department of Political Science

Corwin, Shea

This study examines the factors that influence a state's passage of pro-solar power bills. Explanatory factors include

political party, corruption, carbon monoxide production, the number of power plants in the state, wealth, and the amount of sun in the state. The study found that political party was a significant factor in state solar power bill passage.

310 *Influential Factors: Granting Fifth Circuit Certiorari*

Department of Political Science

Monte, Ava

This research examines the factors that explain how the Supreme Court of the United States grants certiorari deriving from the Fifth Circuit Court of Appeals. Examining: The United States government as the petitioner, the United States government as the respondent, a state or U.S. attorney general or solicitor general as representing counsel of the petition, the time passed from the time the petition was docketed to the time the petition was granted or denied, and finally by the number of briefs submitted to the court in accompaniment of the petition. The analysis shows that the government representing either party is a significant factor in granting Fifth Circuit certiorari to the Supreme Court, as well as the number of Amicus briefs submitted, and either a state level or the U.S. solicitor general or attorney general.

311 *Homeland Insecurity: Analyzing Varying Cyberattack Threat Perceptions*

Department of International Relations

Atamov, Emily

As rapid technological innovation progresses, a new era of warfare is emerging. The political implications of cyberwarfare have been an area of great interest within academia. Specifically, past research has analyzed state cyber behavior and individual responses to hypothetical attack scenarios. However, the literature substantially neglects a comprehensive interpretation of an individual's threat perception of cyberwarfare. This research seeks to address this disparity by analyzing the variation in cyberattack threat perception in individuals within the United States. I test demographic variables and response measurement to indicate

when individuals are more likely to perceive a cyberattacks as a critical threat to the United States within the next ten years. My findings suggest that age, party identification, and feelings towards the Russian military matters, while gender and attitudes towards maintaining U.S economic superiority does not.

312 *The Influence of Social Media on Protest Activity Post-2020*

Department of Political Science

Said, Mary

This study seeks to understand the influence of social media on protest activity in the post-2020 election landscape. Using a panel survey, I examine protest activity prior to the 2020 presidential election and after the 2022 midterm elections. The factors that explain protest activity pre-election 2020 include political party identification and age. The factors that explain protest activity post-election 2022 are political party identification, current use of twitter, and frequency of use of Reddit, TikTok, YouTube, and Twitter. I found that predicted probability of participating in protest activity was more likely in the post-election 2022 period if the individual frequently used Reddit, TikTok, YouTube, and Twitter.

313 *Intentional Horrors: The Appeal of Horror Film as a Coping Mechanism to Fans with Anxiety*

Department of English

Wenzel, Amy

With an increase of interest in horror as a genre and the ever-growing conversations about mental health, researchers have started to look into correlations between the two. One such find is that people with anxiety disorders tend to lean more towards the horror genre, especially horror films. This has become a topic of quantitative research due to the fact that horror movies are by nature meant to increase feelings of anxiety and fear rather than ease them, and yet horror fans with anxiety are not a small population. My research project would look at this information qualitatively, interviewing fans of horror films who also identify as or have been diagnosed

with anxiety and trying to see the appeal of horror films for them. Using the lens of Reader Response Theory, I intend to look at how horror affects said individuals on a personal level in order to determine any similarities or correlations in how people with anxiety disorders interact with the horror genre.

314 *Stereoselectivity of Allenyl Alcohol Formation by Regioselective 1,4-Hydride Reductions*

Department of Chemistry and Biochemistry

Carpenter, Emily; Hulce, Martin

Allenes are useful building blocks in organic synthesis: They permit a variety of synthetic transformations, serve as ligands for organometallic catalysts and are essential structural motifs in drugs. Tandem 1,2 - 1,4 double hydride addition to 3-alkynyl-2-alkenones provides allenyl alcohols from alkenynones but may have variable diastereoselectivity in the second 1,4-hydride addition step. To determine if sterically bulky alkoxyhydride donors increase diastereoselectivity and enantioselectivity in the second addition step, proton NMR analysis and Mosher analysis protocols were designed and deployed to quantify enantio- and diastereoselectivity of the reaction.

315 *Inhibition Kinetics of Novel Anti-Tuberculosis Compounds*

Department of Chemistry and Biochemistry

Lauren Ross, Dr. Lynne Dieckman

Tuberculosis (TB) is a disease originating from the slow-growing bacteria Mycobacterium tuberculosis (M.tb). In recent years, there has been an increasing number of strains that are unresponsive to the most commonly used TB medications. This has created high demand for the development of a new TB treatment method. My project aims to synthesize new anti-TB compounds that target the less-studied enzyme FadD32. FadD32 is a unique enzyme to M.tb and is required for the synthesis of mycolic acids, which are large fatty acids that maintain the integrity of the M.tb cell wall. The inhibitors that I study are modified from coumarin-based compounds. Coumarin-based compounds possess inhibiting properties on

FadD32 but a short half-life in vivo. Dr. Jeffrey North, our collaborator from the School of Pharmacy and Health Professions at Creighton University, determined the ester functional group to be an area of instability on the original coumarin-based molecules. He therefore synthesized new inhibitors by modifying this region into an amide. I performed enzyme inhibition kinetics on these novel inhibitors to determine if FadD32 inhibitory activity is maintained. My results show that all three novel inhibitors retained inhibitory activity similar to their original coumarin molecule, suggesting that the modification of replacing the ester functional group with an amide successfully improves half-life while also maintaining the inhibitory activity of the target enzyme. One novel inhibitor, in particular, showed the highest inhibition and half-life and will therefore be used to design new compounds with even better stability and/or inhibition kinetics. With further research, these novel compounds may become a new resource for TB therapeutics.

316 *Phantom Limb Pain: Patient-Reported Utility and Outcomes of Various Management Strategies*

Department of Occupational Therapy

Jones, Sarah

Limb loss, both to the upper and lower extremities, is an increasingly common condition throughout the United States. Stemming from causes such as diabetes, vascular disease, and trauma, patients with limb loss require ongoing care from a large interdisciplinary team to manage a range of sequelae, one of the most well-known of which is phantom limb pain (PLP), a perceived pain or discomfort in the region of the lost limb. While there have been many theories as to the underlying mechanisms of PLP, there is still much left to learn. Without a clear understanding of the cause, a definitive best course of treatment is difficult to ascertain. As patients with limb loss are uniquely situated to provide personalized, introspective insight, seeking out these perspectives is essential to generating practical, applied research on PLP. Moreover, given the prevalence of limb loss and this population's need for specialized care, education, and support, the value of this patient-centered research cannot be

overstated. With this in mind, this research project investigates patient experiences with various PLP management strategies. Through the evaluation of limb loss demographics, PLP prevalence, and effectiveness of PLP treatments, this study provides necessary clarity for patients and practitioners on best practices for PLP management. By generating patient centered research, this study empowers practitioners, while also providing individuals with limb loss additional resources to address their PLP and, ultimately, improve their quality of life.

317 *Predicting interactions between proteins involved in genome stability using AlphaFold2*

Department of Chemistry and Biochemistry

Ward, Ryan; Dieckman, Lynne

DNA is packaged in the nucleus in the form of chromatin, which is composed of units called nucleosomes. Immediately following DNA replication, nucleosomes are formed by a protein called chromatin assembly factor 1 (CAF-1), and which is recruited to the DNA by another protein called proliferating cell nuclear antigen (PCNA). Both proteins play a key role in maintaining genome stability, as the direct interaction between PCNA and CAF-1 promotes this stable nucleosome assembly. To better understand these proteins and the interaction between them, we must carry out detailed structural analysis. However, determining the structures of PCNA and CAF-1 and the complexes they form is relatively difficult. CAF-1 is an intrinsically disordered protein, so its structure cannot be determined by traditional methods. The goal of my research is to understand the interaction between PCNA and CAF-1 using the machine learning software AlphaFold2. I have generated structural predictions of PCNA and CAF-1 individually and in complex with each other and results show multiple possibilities for ways these proteins can interact together. Predicting these structures and interactions will help shape the direction of many other experiments in our research lab and serve as a reference to validate all structural data obtained in the laboratory

318 *Delivering Rehabilitation Care Around the World: Voices from the Field*

GROUP Department of Occupational Therapy
Hagen, Shannon, Martin, Emily, Bracciano, Alfred, To Dutka, Julia, Gans, Bruce, Bharadwaj, Sneha, Akinwuntan, Abiodun, Mauk, Kristen, Akinci, Fevzi, and Oliver, Richard

The need for worldwide rehabilitation services has been expanding due to increases in an aging global population, and higher survival rates for individuals with severe illnesses or disabilities. The World Health Organization (WHO) determined that 2.41 billion people require rehabilitation care globally, with approximately 1.71 billion people having musculoskeletal conditions (WHO, 2015). Due to the increasing need of global rehabilitation workers, in 2019 CGFNS International Inc. (CGFNS) partnered with the Association for Schools Advancing Health Professions (ASAHP) to develop a global certification program to recognize and address the need for rehabilitation services. As of 2024, the global certification program is in its final stages of development and implementation led by a team of rehabilitation professionals.

An initial study completed (To Dutka, 2021) provided a rationale for the need of a global certification process to identify healthcare workers and which were concurrent with the WHO Rehab Competency Framework. This poster will describe the findings from a follow-up, qualitative study looking at resources for rehabilitation care, health disparities which may be inherent in low human resource and rural settings and identifying the challenges and opportunities facing the global rehabilitation health workforce.

320 *Structural Studies of a Eukaryotic OAZ1-PK RNA*

Department of Biochemistry/Chemistry
Andree Kakish, Lindsay Nedungadi, Zach Frevert, Lucas Struble, Gloria Borgstahl and Juliane Soukup.

Riboswitches are elements found within noncoding regions of messenger RNAs (mRNAs) that regulate gene expression via metabolite binding. Upon binding to the riboswitch, the metabolite/ligand induces a conformational change in the

RNA, resulting in modulation of the expression of a nearby gene. Most riboswitches are found in bacteria, although the Soukup lab has been investigating a highly conserved eukaryotic RNA sequence that exhibits the characteristics of a bacterial riboswitch that being high specificity and affinity for a single ligand, the induction of RNA conformational change upon ligand binding, and a resulting change in gene expression that is ligand dependent. The lab's previous results demonstrate riboswitch function of a mouse RNA element that is highly conserved among vertebrate genes required for polyamine biosynthesis. The vast majority of biological organisms are able to synthesize natural polyamines (putrescine, spermidine, and spermine), which are essential for normal cell growth. Halting the production of polyamines prevents cell growth. Because of its unique regulatory function, this putative riboswitch RNA has potential biomedical applications, including anticancer pharmaceuticals. The main goal of my research project is to examine the structure and function of the Ornithine Decarboxylase Antizyme Pseudoknot (OAZ1-PK) RNA, a putative riboswitch, using X-ray crystallography. In doing so, my progress on the project includes large scale in vitro transcription of RNA, gel electrophoresis and size-exclusion chromatography (SEC) to purify the RNA, dynamic light scattering (DLS) to analyze the RNA and manual setup up of crystallography trays to test a wide array of chemical conditions for crystal growth.

321 *Chemosensing properties of aminopyridine click chelators*

Department of Chemistry and Biochemistry

Price, Connor and Fletcher, James

Chemosensors operate by displaying physical property changes in the presence of their designated analyte, such as visible color changes or an increase in fluorescence intensity. Click-derived 1,4-diaryl-1,2,3-triazoles are known to display visible emission properties that are strongly influenced by their peripheral substituent identity. Chelating 4-(2-pyridyl)-substituted-1,2,3-triazoles are known to form stable coordination complexes with a variety of transition metal ions. The aim of this study was to utilize a high-throughput

approach to screen a family of 4-(2-pyridyl)-1-aryl-1,2,3-triazole chelators with varying peripheral substituents to identify analogs with selective chemosensing properties. Forty-nine analogs were prepared and screened against seventeen different monovalent, divalent, and trivalent metal cations in ethanol and water solutions. Twelve analogs were observed to display an increase in fluorescence signal intensity when exposed to micromolar concentration solutions of Fe (II) and Fe(III). It was determined that only analogs with a 5-aminopyridine subunit selectively generated intensified and red-shifted emission (from 375 nm to 420 nm) upon excitation at 275 nm in response to analyte binding, whereas aminopyridine groups at the 4- and 6-pyridyl positions resulted in emissive compounds that were unresponsive to metal cation identity. A variety of para functional groups were tolerated on the 1-phenyl-1,2,3-triazole subunit, enabling the optimization of emission intensity as well as water solubility of the chelator. Competitive binding assays showed analyte binding to be reversible, and Job plot assays showed iron binding in a 2:1 ratio relative to the chemosensor. The preparation of triazole analogs, high-throughput analyte screening, and chemosensing structure-property relationships will be discussed more in-depth.

322 *TAKAI: Teaching Human Anatomy with Artificial Intelligence*

Department of Computer Science, Design, and Journalism
Cook, Carina; Krudwig, Cole; Cevallos, Manuel; Fernandes, Steven

Aiming to transform the learning experience for medical students in their Anatomy course, a Machine Learning (ML) platform is being developed as part of a multifaceted initiative. Unfolding in two critical phases, the effort concentrates on creating, evaluating, and continuously enhancing an educational tool designed to complement traditional teaching methods. The foundational phase focuses on the construction of the ML platform, integrating Natural Language Processing to facilitate smooth voice and text interactions, and utilizing cloud storage for efficient data management and user interaction. Initial testing with anatomy faculty and student volunteers assesses the platform's primary effectiveness and

collects user satisfaction feedback, which informs further enhancements. The refined platform is subsequently distributed to first-year medical students, inviting more feedback for additional improvements. The second phase shifts attention to deploying the platform for student evaluations, encouraging an active exchange of questions and answers. It introduces "Neural integration," a feature that allows the platform to tailor its functionalities based on the interactions with students, thus markedly enriching the educational content. The effectiveness of this phase is verified through experimental pilots and satisfaction surveys, with the analysis of data guiding decisions on its wider distribution to students. By undertaking this innovative project, the goal is to set a new benchmark for interactive and adaptive learning in medical education, catering to the dynamic needs of modern medical students.

323 *Effectiveness of Traditional Sex-Offender Treatments for Child Pornography Offenders*

GROUP Department of Psychology

Calvin, Lily; Kirkpatrick, Marren Van Laanen, Olivia Pershing, Tagg Rogge, Emily

Sexual violence is widespread, affecting a variety of people in many places. With the rapid evolution of technology over the last few decades, the possession and distribution of child pornography have increased exponentially (United States Sentencing Commission, 2020). Differences in psychopathologies, behaviors, and uncertainty concerning recidivism rates have caused questions to arise about the effectiveness of traditional Sex Offender Treatment Programs for child pornography offenders (Elbert, Drury, & Delisi, 2021). The current study intends to examine the relationship between child pornography offenders and treatment completion. Participants were either charged with purchase/possession of child pornography (n = 13; 2.8%) or dissemination/distribution (n = 24; 4.3%) and were evaluated based on a variety of factors including whether they completed treatment and if they accrued charges post-treatment. A Chi-Square test was completed to compare treatment completion of child pornography offenders to other

types of offenders including adult contact, adult non-contact, and child contact. Results indicate that child pornography offenders' complete treatment at the same rate as other types of offenders. However, results also indicate that child pornography offenders completed more treatment sessions than other types of offenders. This study provides research in a neglected area of forensic psychology and starts a dialogue surrounding treatment effectiveness for child pornography offenders.

324 *Exploring Individual Variability in Motor Planning at the Shoulder Following Stroke*

Department of Physical Therapy
Johnson, Brianna; Thomas, Christina; Kannan, Shreya; Heckman, Rosalind L.

StartReact, the involuntary initiation of a planned movement triggered using a loud acoustic stimulus (LAS), has been used to demonstrate intact motor planning for wrist and elbow movements but not for multijoint reaching movements following stroke. Intact motor planning has been demonstrated with consistent kinematics and shorter onset latencies with startReact than movements initiated voluntarily. Though deficits in planning a reaching movement have been shown, impairment contribution in motor planning for isolated shoulder movement has not been investigated.
Further, variability in stroke presentation has not been considered in prior startReact studies. **PURPOSE** Investigate individual differences in motor planning at the shoulder post stroke. **METHODS** Data were collected from seven, right-hand dominant participants (45–68 years, 4 male) with chronic upper extremity impairments following stroke, evaluated using the Fugl-Meyer Assessment (FM, 0: complete paralysis–66: normal function). Participants performed shoulder abduction movements in response to auditory cues. Training was completed with tactile feedback until participants consistently moved 30º. A LAS was delivered on <25% of testing trials to probe motor plan presence. Shoulder movement was measured with an electrogoniometer to determine onset latency. Electromyography recorded both sternocleidomastoids (SCM) as an indicator of startReact and

shoulder musculature. **RESULTS** Shoulder abduction was initiated with shorter onset latencies in response to the LAS than when initiated voluntarily, consistent with startReact studies of distal upper extremities. Early SCM activation as an independent indicator of startReact varied across participants. Differences in kinematics and muscle activation contribute to variability in motor planning at the shoulder and can inform future studies investigating startReact post stroke.

325 *Role of BubR1 in regulating postnatal intestinal development*

Department of Biomedical Sciences

Hazem Monieb, Rodaina and North, Brian

One million Americans are estimated to suffer from intestinal bowel diseases, with approximately 30,000 newly diagnosed cases every year. The intestinal epithelium is a constantly renewing tissue, turning over every 3-5 days largely due to rapidly dividing intestinal stem cells (ISCs) in the crypt base that differentiate as they migrate up the crypt-villus axis until eventually sloughing off into the lumen. This intricate balance of cellular proliferation, differentiation, and death is a major contributor to intestinal homeostasis. The villi harbor specialized differentiated cells necessary for absorption of nutrients and secretion of antimicrobials and mucins to protect the tissue from infections. Intestinal stem cells have a rapid cycling nature that confers their susceptibility to molecular damage that contributes to intestinal bowel diseases such as Ulcerative Colitis and Crohn's Disease. Paneth cells within the crypts secrete Wnt signals to regulate proliferation of intestinal stem cells by activating the transcription factor-catenin. We recently identified that BubR1 plays a critical role in the intestine, where intestinal-specific deletion of BubR1 in mice causes defective intestinal development and homeostasis leading to postnatal failure to thrive and decreased survival. We found that loss of BubR1 leads to hyperactivation of the Wnt/b-catenin pathway, a decrease in intestinal stem cell populations, and aberrant differentiation of Paneth cells perturbing the crypt-villus axis. Our data suggest that enhancing BubR1 function may promote the regenerative potential of intestinal stem cells, offering a

novel therapeutic avenue for treating intestinal bowel diseases such as Ulcerative Colitis and Crohn's Disease, and promoting mucosal health.

326 *Changes In Tanycytes in Preclinical Epilepsy: Implications for Metabolic Homesotasis*

Department of Pharmacology and Neuroscience
Rafiei, Parisa*; Mian, Huda*; Iyer, Shruthi; Draves, Samantha; Matthews, Stephanie; Simeone, Tim; Simeone, Kristina

Epilepsy is a neurological disorder that causes spontaneous recurrent seizures (SRS) due to sudden surges of abnormal and excessive electrical activity in the brain. Seizures can induce injury, ectopic neurogenesis, and metabolic dysfunction. The hypothalamus has regulatory influence over important functions including sleeping, cardiorespiration, emotion and eating. One of the therapeutic treatments which is effective in reducing seizure frequency is the Ketogenic Diet (KD). KD is a high fat, low carbohydrate/protein diet. It reduces seizure frequency by >50% in approximately two thirds of patients with refractory epilepsy.

Tanycytes are cells in the hypothalamus that surround the third ventricle and facilitate communication between the CSF and local hypothalamic regions to ensure metabolic homeostasis. It is unknown whether tanycytes are dysregulated by seizures or not. Considering that severe seizures can propagate down to the hypothalamus; it is important to understand how spontaneous recurrent seizures influence tanycytes due to their vital role in metabolic homeostasis. We tested the hypothesis that seizures dysregulate tanycytes in preclinical epilepsy and performed immunohistochemistry using the *Kcna1*-null preclinical mouse model. We found elevated levels of GFAP, a marker for all tanycytes, (p <0.05) along the third ventricle, and reduction of GLUT1, a functional marker of glucose transport, (p <0.01) in the medial-posterior aspects of the third ventricle. Furthermore, we found that the ketogenic diet had no effect in the expression of GFAP, and it did not restore GLUT1 levels. Considering our results, we will be conducting experiments to study the disease-modification aspect of KD in epilepsy by using the *Kcna1*-null preclinical mouse model.

327 *Formulation and Optimization of Lipid-Polymer Hybrid Nanoparticles of HDAC Inhibitors for the Treatment of Retinitis Pigmentosa*

GROUP Department of Pharmacy Sciences

Monson, Ty; Md Jobair Hossen, Jony; Dash, Alekha; Shukla, Surabhi.

Retinitis Pigmentosa (RP) is an inherited retinal disease, causing color and peripheral vision loss, leading to blindness. Current treatments aim to slow disease progression, but with no cure. Histone deacetylase inhibitors (HDACi), show promise for neuroprotection and neuronal regeneration in RP. Clinical trials have demonstrated the neuroprotective effects of HDAC inhibitors in RP. Injecting HDACi like Trichostatin A (TSA) and Vorinostat into the eye have shown slow photoreceptor cell degeneration in advanced RP mouse models. However, the rapid metabolic degradation of these HDACi limits their efficacy, necessitating frequent injections. To overcome this limitation, lipid-polymer hybrid nanoparticles (NPs) for sustained delivery of HDACi have been investigated in this study. These NPs will prevent rapid degradation and eliminate the need for repeated intravitreal injections of HDACi. The NPs are prepared using a single-step nanoprecipitation method. The NPs consist of three functional components, including a hydrophobic polymeric core for drug encapsulation, a hydrophilic polymer shell for stability and systemic circulation, and a lipid monolayer at the interface to promote drug retention and control drug release. The particle size for blank and drug-loaded nanoparticles ranges from 80.00 nm to 86.00 nm. PDI and zeta potential varied from 0.13 to 0.19 and -125.00 mV to -70.00 mV, and SEM images also confirmed the formation of nanoparticles and their spherical shape. Both blank and drug-loaded particles were physically stable for 7 days when stored at both room temperature and $4^{o}C$ and they had similar diameters and surface charges as compared to day 0 formulations.

328 *Critical role of BubR1 in cardiac development*

Department of Biomedical Sciences
Pun,Renju. Thapa,Aradhana. Takafuji,Sylar. Suzuki,Rexton. Kim,Michael. North,Brian.

Congenital heart defects (CHD) are the most common type of congenital defects and are found in 8/1000 births each year in the US. Aneuploidy, defined as an abnormal number of chromosomes in a cell, is the largest contributor to CHD. Defects in mitotic regulators can promote aneuploidy. For instance, mutations in the mitotic checkpoint protein BubR1 can lead to mosaic variegated aneuploidy (MVA). MVA patients display growth deficiency, a shortened lifespan, and some patients develop CHDs including atrioventricular septal defects. Therefore, we hypothesized that BubR1 is a critical regulator of cardiogenesis. To assess this, we harvested heart tissue at various embryonic stages and found that BubR1 expression dramatically increases in the heart through in utero development. We engineered a conditional BubR1 knockout mouse model and generated cardiac-specific BubR1 knockout animals by crossing these mice to NKX-2.5-cre mice. Homozygous cardiac-specific BubR1 knockout pups were not observed in newborn litters, suggesting that loss of BubR1 during cardiogenesis is embryonic lethal, with further analysis indicating that these embryos die between E10.5-E12.5. Morphological analysis showed that deletion of BubR1 in the embryonic heart leads to cardiac malformations. Immunofluorescence studies reveal that cardiac-specific BubR1 knockout embryos have increased cell death. Single cell RNA sequencing of E10.5 embryonic hearts further revealed significant changes in the transcriptomic landscape of myocardial subclusters in BubR1 knockout hearts. Overall, our results demonstrate that BubR1 is an essential regulator of proper cardiogenesis, the absence of which leads to severe cardiac malformations which mimic those observed in human CHDs, and embryonic lethality.

329 *Ligand Specificity of the glmS Ribozyme Investigated Through FRET Assay*

Department of Chemistry and Biochemistry

DeBoer, Olivia; Nedungadi, Lindsay; Strauss-Soukup, Juliane

Riboswitches are non-coding RNA elements that regulate gene expression by binding to specific ligands that induce structural changes. Riboswitches are of interest as antibacterial drug targets since the genes they regulate are essential to bacterial cell growth and metabolism. The glmS riboswitch is also a ribozyme that undergoes self-cleavage in the presence of its specific riboswitch ligand glucosamine-6-phosphate (GlcN6P). This ribozyme is an excellent candidate for a drug target as GlcN6P is an essential component of bacterial cell walls. Thus, high throughput assays to determine ligand specificity will help identify other GlcN6P analogs quickly. We are employing a Forster Resonance Energy Transfer (FRET) assay to determine the ligand specificity of the glmS ribozyme found in Staphylococcus aureus. This FRET assay utilized a pair of fluorophores, one attached to the 5' end and the other to the 3' end of the ribozyme. Upon ligand binding and subsequent cleavage, the fluorophores spatially separate, which leads to a measurable change of fluorescence intensity. This change is indicative of ribozyme activity. I will focus on a library of GlcN6P analogs to determine their ability to induce self-cleavage of the S. aureus glmS ribozyme. This assay can be modified and applied to glmS ribozymes found in other bacteria to shed light on the regulatory mechanisms used which can then be applied to future pharmaceutical work.

330 *Respiratory chemoresponses in Kv1.1 KO mice, a preclinical model of Sudden Unexpected Death in Epilepsy (SUDEP).*

Department of Pharmacology and Neuroscience

Iyer, Shruthi; Draves, Samantha; Matthews, Stephanie; Herr, Shelby; Booth, Cameron; Yeh, Mary; Simeone, Timothy; Simeone, Kristina

Sudden unexpected death in epilepsy (SUDEP) is one of the leading causes of death in epilepsy. Right before death, patients experience generalized-convulsive seizure and apnea. Failure to autoresuscitate from apnea-induced hypoxic-

hypercapnic(H-H) blood gas fluctuations, results in death. Hypothalamic chemosensing orexin neurons respond to H-H fluctuations and activate brainstem respiratory nuclei to restore breathing. Thus, chemoreception dysfunction may drive autoresuscitation failure in SUDEP. We have previously reported that the Kcna1-/- mouse model of SUDEP, have increased seizures, apnea, chronic hypoxia, blood gas instability and higher orexin neurons as they approach SUDEP. Blocking orexin receptors reduced their apneas and increased longevity, suggesting an augmented orexinergic influence on their chemoresponses. We hypothesize that, as Kcna1-/- mice approach SUDEP, they have impaired chemoresponses to H-H challenges. Orexinergic blockade will improve the chemoresponses.
Wildtype (WT) and Kcna1-/- mice were subjected to intermittent hypoxia (6% O2), or hypoxia-hypercapnia (9% CO2, 6% O2), or anoxia-autoresuscitation (97% N2, 3% CO2). In response to intermittent hypoxia, and hypoxia-hypercapnia, chemoresponse in older, high-SUDEP risk Kcna1-/- mice included higher tidal volume, peak expiratory flow and minute ventilation, compared to controls. When tested for anoxia, 85% older WT mice were able to autoresuscitate and survive. However, 75% of older, high-SUDEP risk Kcna1-/- mice failed to autoresuscitate and died. In a younger cohort, both WT and Kcna1-/- mice were able to autoresuscitate. Orexinergic blockade with TCS1102 (100mg/kg) improved autoresuscitation and survival in ~85% of Kcna1-/- mice. Thus, an exaggerated orexin response maybe contributing to chemoreception dysfunction and autoresuscitation failure in this SUDEP model.

331 *Cre-ER recombination rate in murine Intermediate cells: A comparison between three different models*

Department of Biomedical Sciences

Nayak, Mahesh K; Renauld Justine

The cochlea, the organ of hearing in the inner ear, is a highly organized structure. The lateral wall of the inner ear entails a specialized epithelium called the stria vascularis that consists primarily of three layers of cells, namely, marginal cells, intermediate cells and basal cells, each derived from distinct

embryonic origins. The stria vascularis pumps potassium ion into the scala media, generating positive endocochlear potential, crucial for the mechanosensory cells for auditory signal transduction. Any defect in these cells leads to the dysregulation of ionic composition of the endolymph, ultimately resulting in deafness.
To date, there is an absence of Cre driver mouse lines that effectively facilitates the study of individual cell functions within the stria vascularis, limiting our ability to understand strial deafness. Furthermore, the use of CreER transgenic mice brings the risk of poor recombination or non-specific expression. Therefore, it is imperative to establish a mouse line targeting each cell of the stria vascularis.
The present study aims to determine the most appropriate CreER transgenic line targeting the intermediate cells by comparing 3 CreER mouse lines: Pax3, DCT, TYR. The CreER mice were crossed with Ai9 reporter mice and induced with tamoxifen to study the spatiotemporal recombination in the inner ear. We quantify the recombination efficiency in the intermediate cells at P0 and P28 on cryosections labelled for CD44 and DAPI. This study will allow us to select the most appropriate Cre-line to study genes function in the intermediate cells.

332 *Preliminary Evidence that Upper Extremity Use Influences Sit to Stand in the Absence of Clinical Impairments*

GROUP Department of PT
Welsh, Colin; Holder, C'Airra; Tavares, Hunter; Knight, Heather; Heckman, Rosalind

Sit to stand (STS) has been recognized as a core movement by the physical therapy profession, but clinical measures have focused on performance in independent adults. In those with clinical impairments, such as decreased strength and balance, upper extremity (UE) use may be necessary to complete STS. Initial research has shown UE use decreases force through the lower extremities and increases time to complete STS. Prior studies, including ours, included participants needing their UE to stand, and it remains unknown how UE use influences STS in the absence of clinical impairments. Our purpose was to determine the influence of UE use on STS timing and

biomechanics. Healthy young adults performed STS at a self-selected speed in response to verbal cues. Participants were instructed in two movement initiation strategies: trunk flexion with arms crossed on the chest (TFX) and UE use on armrests (UEU). Preliminary data was collected from five male participants (19-22 years). Eight movements were recorded for each initiation strategy with order blocked and randomized. Electrogoniometers and force sensors were used to measure STS kinematics and kinetics. Range of preliminary results reported. The time to complete STS was longer for the UEU strategy (>0.19s for four participants). For the UEU strategy, UE force was applied 0.32-0.60s after initial trunk flexion to start STS and reached a peak 16.8-68.1% body weight. UE use decreased peak force through the lower extremities 5.9-25.6% body weight. Preliminary results suggest UE use influences STS timing and biomechanics in young adults able to stand independently. Additional data will provide a basis to describe UE use in STS.

334 *Structural Analysis of OAZ RNA in Agaricus bisporus*

Department of Chemistry and Biochemistry
Pendola, Zachary, Venkatraman, Siddharth, Giandinoto, Tessa, Strauss-Soukup, Juliane

Riboswitches are non-coding segments in mRNA that downregulate gene activity in cells when a polyamine binds to an aptamer. In order to be classified as a riboswitch, it must meet three criteria: binding specificity, structural change, and altered gene expression. Riboswitches, such as the glmS riboswitch, have been studied in bacteria. However, riboswitches in eukaryotic organisms have not been explored as much. The research project uses an in-line probing technique to study the interactions between various polyamines and the highly conserved proposed riboswitch in OAZ RNA from the mushroom Agaricus bisporus. The genes from the OAZ RNA are required for spermine biosynthesis, and a riboswitch discovery could lead to new drug treatments. Previous work has shown that mouse OAZ RNA binds with spermine more readily than other natural and non-natural polyamines. Preliminary data suggests that the Agaricus bisporus OAZ RNA is a polyamine sensitive riboswitch due to

the structural changes that occur when spermine is present. As fungal infections build resistance to the already limited treatments, it becomes increasingly important to learn about gene expression control within eukaryotes so medicinal and biotechnological applications can target polyamine synthesis.

335 *An Updated Functional Diversification of Human and Gibbon Ribonuclease A Superfamily and Influence of this on Related Multigene Families*

Department of Biology

Bertagnolli, Jack; Cho, Soochin

The RNase A superfamily represents a cluster of genes prevalent across various vertebrate species, with exclusive absence elsewhere. These genes exhibit dynamic evolutionary patterns, perpetually undergoing modifications. Among their key functions, they serve in bolstering vertebrate defense mechanisms against pathogens and facilitating digestive processes. I focus on their defense mechanisms in the latter part of this study. Recent findings indicate a proliferation and expansion of these genes in modern vertebrates, thereby highlighting their beneficial roles. Consequently, modern mammals possess a significantly greater number of RNase genes compared to non-mammalian vertebrates. This study delves into an examination of the genetic distinctions within these genes, utilizing online genetic techniques that have provided the visualizations present in this research to compare humans and gibbons and how these specific genes differ between the two and what these differences could potentially indicate. A prior investigation by Soochin Cho and Stephen M. Goo undertook a similar comparison between the RNase gene compositions in humans and gibbons in 2013, warranting an update. This updated assessment also reveals notable duplications and expansions of RNase 1, RNase 4, and RNase 5 genes in both human and gibbon populations. These genetic alterations contribute to the complexity and efficacy of their respective host defense systems. This comprehensive analysis sheds light on the intricate mechanisms steering the volutionary trajectories of RNase genes across diverse vertebrate species!

336 *Effects of heat treatment on chemical composition and network evolution of glass materials derived from hybrid sol-gel particles*

Department of Chemistry and Biochemistry

Vires, Rebekah; Destino, Joel

The development of hybrid sol-gel nanoparticles (NPs) has played a central role in advancing the additive manufacture, or 3D printing, of glass materials in geometries and compositions unimaginable by conventional melt quench techniques. In this presentation, we investigate how glass materials made from different weight percent GeO2-SiO2 NPs change over the heat treatment process. Our study explores the complete range of weight ratios possible for two different architectures of NP materials having undergone eight different heat treatment schemas. By varying the maximum and dwell temperatures and times experienced by the NPs, the opacity and structure of the finished glass can be optimized for each NP composition. NP shape, size, and morphology were analyzed using electron microscopy. The chemical composition of the NPs was probed by energy-dispersive X-ray spectroscopy. Raman was used to study chemical structures and bonding in the resulting NPs and glass networks. Comparisons of crystallinity, particle shape and structure, and optical properties of the glass were compared between heat treatment schema at differing heat treatment stages for all weight ratios and particle architectures in an attempt to develop a universal heat treatment plan to optimize manufacturing.

337 *Polychromy and Non-destructive Analysis: Methodology and Implication of X-ray Fluorescence Analysis in Archeological Studies in Cyprus*

Department of Art History

Vires, Rebekah; Averett, Erin

The ancient Mediterranean world boasted bright colors throughout its design that are not always reflected in the modern perception of that era. This inaccuracy leads to skewed perspectives of the past which becomes complicated by the reliance of modern structures of power economic, governmental, and cultural on the aesthetics of this period.

Archaeologists, art historians, conservators, and restorationists across the world have been and continue to work on adapting the modern view of the ancient world to reflect its polychromatic truth. This requires specialized equipment and training as well as reflection on ethics, aesthetics, and historical peoples and places. Non-destructive analysis and recoloration efforts provide physical data and demonstrations that strive to make this depiction of the past more widely understood and accepted. The example of archeological and chemical research done in Athienou, Cyprus in the 2023 study season will be used to demonstrate this process and both the findings and limitations of non-destructive analysis, specifically portable x-ray fluorescence (p-XRF) in providing context and content to the colored artifacts of the ancient Mediterranean world. The Athienou Archeological Project (AAP) is directed by Dr. Michael Toumazou and sponsored by Davidson College in North Carolina and has been excavating since 1991. This project seeks to identify pigments on terracotta and limestone figurines excavated by AAP and housed at the Larnaka Archeological District Museum.

338 *Computational Models for Impedance-Based Cell Migration using MATLAB and R codes*

GROUP Department of Physics

Homecgoy, Ashley. Westerhaus, Colleen. Lemke, Katherine. Ibironke, Bayode. Schwengler, Melanie. Dr Andrew Ekpenyong.

Cell migration is a key process in the development and maintenance of multicellular organisms. Among methods for in vitro measurement of cell migration is the use of an electric impedance sensing device (ECIS). The modeling of electric cell-substrate impedance sensing (ECIS) data has been growing in popularity in order to better understand cancer metastasis and other diseases in which aberrant cell migration is implicated. Typically, the impedance is graphed in relationship to time, and there are many models used to fit these data. The best fitting models seem to be the power law and growth models, but other tested models include the Standard Linear Liquid model, the Kelvin Voight model, and the Burger model. Furthermore, there are many software programs that can be used to model these data, to create graphs of fittings and

other visual representations to help better understand the experimental data. In this study, we use codes in R and MATLAB to determine which model provided visuals that were easier to interpret so that the obtained ECIS data could be used most effectively. We compare the results of R and MATLAB models for ECIS data of cells in the context of cancer metastasis following chemotherapy and radiotherapy. This will hopefully offer biophysical insights and rationale for anti-metastasis strategies and better treatment outcomes.

339 *Special Education Graduation in the United States*

Department of Political Science

Gearity, Jeanne

The focus of this research is on Special Education Graduation Rates and what are the contributing factors to a high or low success rate. The research looks for connections between special education graduation rates and Democratic votes in the presidential election, legislative compensation, expenditure per pupil, Gini index, GDP per capita, and teacher certification. The control variables are Black graduation rates, Hispanic graduation rates, and Caucasian graduation rates. Findings found three statistically significant variables: legislative compensation, Gini index, and GDP per capita.

ORAL PLATFORM PRESENTATIONS: 8:45-10:45 AM
TUESDAY MARCH 26, 2024
STUDENT ABSTACTS

108 *On the Generalized Distance Matrix*

8:45-9:00 AM Department of Mathematics

HARPER 2045 **Hannah Graff**

Given a graph G and a function f, the generalized distance matrix D(G, f) has rows and columns
indexed by the vertices of G with the (u, v) entry being the distance between vertices u and v. Two graphs G and H are said to be strongly distance cospectral if D(G, f) and D(H, f) have the same characteristic polynomial for all f. We give a sufficient condition for two graphs to be strongly distance cospectral in terms of simultaneous similarity of related 0-1 matrices. Moreover, we give a sufficient condition in terms of a block similarity matrix for two strongly distance cospectral graphs to remain strongly distance cospectral after gluing arbitrary graphs on to subsets of the vertices (i.e., coalescing).

109 *In vitro data suggest a role for PMS2 Kozak sequence mutations in Lynch Syndrome risk*

9:05-9:20 AM Department of Neuroscience and Pharmacy

HARPER 2045 **Evanjalina Matoy**

Lynch Syndrome (LS) is the most common hereditary cancer syndrome. Heterozygous loss-of-function variants in PMS2 are linked to LS. While not directly cancer causing, reduced PMS2 function results in the accumulation of somatic variants, increasing cancer risk over time. The Kozak sequence is a highly conserved eukaryotic translation initiation motif and is defined as the nine base pairs upstream of the translation start codon through the first four bases of the translated sequence (5'-GTTGCATCCATGG-3'; human PMS2 (hPMS2); NM_000535.7). While Kozak sequence variants in PMS2 have been reported in ClinVar in suspected hereditary cancer-predisposing syndrome patients, all variants are currently classified as variants of undetermined significance (VOUSs). We hypothesized that variants significantly

disrupting the Kozak sequence of PMS2 would decrease PMS2 protein expression, contributing to increased cancer risk over time. Using a dual luciferase reporter plasmid and site-directed mutagenesis, we changed the plasmid Renilla Kozak sequence (but not the Firefly sequence) to the hPMS2 Kozak sequence. A second round of mutagenesis was used to generate all the ClinVar VOUSs within the PMS2 Kozak sequence. Plasmids (wild-type hPMS2 or PMS2 Kozak variants) were individually transfected into HEK 293T cells, grown for 48 hours, and translation efficiency was determined as the ratio of Renilla/Firefly expression using the Dual-Glo™Luciferase Assay. Besides the c.1A>C control variant, we implicate six additional variants as likely pathogenic and nine as likely benign. In summary, we present a novel method for the classification of hPMS2 Kozak sequence variants that can contribute to the re-classification of VOUSs identified in patients.

110

Weaving the Narrative: An Exploration of Personal Identity Through Fiber Arts

9:25-9:40 AM

Department of Fine & Performing Arts

HARPER 2045

Abby Jordan

Throughout history, artists have used their creative practice to process personal events, share their stories of vulnerability and build community. The bonds formed through “arts and crafts” are vital for communities to thrive, wherein knowledge sharing is often cross-generational. Weaving the Narrative: An Exploration of Personal Identity Through Fiber Arts explores how relationships are fostered in craft communities through the examination of familial heirlooms, their connection to developing a sense of self and the “practice” of “craft”. Craft discourse is full of implications about gender, sexuality, and self-expression. In the 1970’s, with the rise of second wave feminism, popularized crafts emerged as fiber arts, symbolizing a resistance to constricting binaries like art vs craft and male vs female. Artists of this period used sewing, knitting, quilting, and beading in attempts to elevate what was seen as domestic craft, or women’s work, to the status of fine art. Along these lines, Weaving the

Narrative creates an investigative framework by integrating methods of crochet, beading, embroidery, cross stitching and scrapbooking with painting and drawing. Through the lens of a queer artist, I have materialized personal history, self-expression, the meaning of "craft" and its cultural implications.

111

9:45-10:00 AM

HARPER 2045

Oscillatory Dynamics Serving Verbal Working Memory Differ in People with HIV

Department of Pharmacology & Neuroscience

Kellen McDonald

Background: Medical advances have greatly improved the quality of life of people with HIV (PWH). However, many PWH develop neurocognitive deficits even with effective viral suppression, which can greatly impact their ability to perform daily activities. While previous neuroimaging studies have demonstrated altered neural responses during verbal working memory (VWM), the underlying temporal dynamics remain poorly understood. **Hypothesis:** PWH will have differential alpha/beta oscillatory dynamics in language regions during VWM compared to controls, and this difference in neural oscillatory activity will scale with task performance. **Methods:** Our sample consisted of 75 PWH and 84 controls. Participants completed a six-load VWM task during magnetoencephalography (MEG). The encoding phase of the task was parsed out into four equal time bins. A whole-brain repeated measures analysis was performed to assess the HIV status-by-oscillatory time window interaction across the encoding period. **Results:** PWH had significantly lower accuracy on the task compared to controls. We found a significant interaction effect of group-by-encoding window. Posthoc testing showed that controls exhibited significantly stronger alpha/beta oscillations than PWH across the encoding period in the left inferior temporal gyrus and prefrontal cortex. Weaker inferior temporal gyrus activity was significantly associated with declining accuracy across both groups. **Conclusions:** PWH had weaker alpha/beta activity

during the encoding period in regions supporting the language component of VWM. Brain-behavior relationships revealed that weaker alpha/beta oscillations in the inferior temporal gyrus scaled with poorer task performance across all participants. These findings support the notion that HIV status modulates the neural oscillatory dynamics underlying VWM.

112

Targeted sequencing for hereditary breast and ovarian cancer in BRCA1/2-negative families from the Lynch Memorial Biobank identifies potential Lynch Syndrome families.

8:45-9:00 AM

HARPER 2046

Department of Pharmacology & Neuroscience

Jocelyn Plowman

Approximately 20% of breast cancer cases are attributed to increased family risk; yet variation in BRCA1/2 can only explain 20-25% of cases. Until recently, only single gene or single variant testing were common in at-risk family members, and further sequencing studies were rarely offered after negative results. In this study, we applied an efficient and inexpensive targeted sequencing approach to provide molecular diagnoses in 245 human samples representing 134 BRCA mutation negative (BRCAX) hereditary breast and ovarian (HBOC) families recruited from 1973-2019 by Dr. Henry Lynch. Sequencing identified 291 variants, which were functionally annotated and ranked based on their predicted clinical impact. Some BRCAX families could be explained by hereditary cancer syndromes that increase HBOC risk: Li-Fraumeni Syndrome and Lynch Syndrome (LS). LS is the most common hereditary cancer affecting an estimated 1 in 279 people and is caused by germline heterozygous mutations in mismatch repair genes: MLH1, MSH2, MSH6, and PMS2. While not directly cancer-causing, mutations in LS genes increase the number of somatic mutations over time, increasing cancer risk. Of the families sequenced, two potential LS families were identified. Family 084 was affected by several mutations, one being a MSH6 nonsense pathogenic variant. We observed this variant in all individuals who had samples available for testing.

Additionally, a CHEK2 frameshifting pathogenic and a CDH1 missense VOUS variant were also identified in this family. The CHEK2 and MSH6 variants are moderately penetrant, which likely synergized in an anticipatory pattern, leading to the early onset breast cancer in this family.

113

9:05-9:20 AM

HARPER 2046

A transcriptome-based approach to drug repurposing for aggressive group 3 medulloblastomas

Department of Biomedical Sciences

David Doss

Medulloblastoma is the most prevalent malignant brain tumor in childhood, constituting 20% of pediatric brain tumors. Four molecular subgroups have been identified: WNT, SHH, group 3, and group 4. Current treatment strategies, based on histologic tumor grade and stage, do not consider these subgroups, resulting in variable prognoses. Group 3 medulloblastoma (G3MB) poses specific challenges with rapid recurrence and aggressive disease progression, underscoring the need for tailored interventions.

We conducted differential expression analysis on two medulloblastoma patient-derived cohorts (GSE148389, GSE164677) against the LINCS database to identify candidate antineoplastic compounds. Candidates were filtered for blood-brain barrier permeability and FDA approval. Functional assays assessed drug effects on cytotoxicity, clonogenicity, wound healing, cell cycle, and apoptosis in vitro using G3MB cell lines (HDMB03, D425). RNA sequencing elucidated pathways impacted by the top compounds.

Eighty-one compounds passed filtering criteria, with ten selected for in vitro testing based on pediatric safety profiles. Nortriptyline, a tricyclic antidepressant, emerged as the lead compound, demonstrating IC50 values of ~7uM (HDMB03) and ~11uM (D425). Nortriptyline impaired clonogenicity and wound healing and induce apoptosis at the IC50 value. RNA-sequencing revealed nortriptyline induced mitochondrial stress, confirmed by increased superoxide production, and decreased mitochondrial membrane potential. CHRM3, a canonical target of

nortriptyline, was upregulated in G3MB patient samples, and downregulated by NT treatment. Western blotting confirmed inhibition of CHRM3 downstream effectors. Our approach identified cytotoxic compounds, including nortriptyline, against G3MB. Nortriptyline induced mitochondrial stress, offering potential for repurposing FDA-approved drugs to mitigate toxicity of traditional chemotherapy and improve outcomes in high-risk G3MB.

114

The Ideal American: A Pentadic Analysis of United States World War II Propaganda

9:25-9:40 AM

Department of Communication Studies

HARPER 2046

Jobalia, Nathan

I apply Burkean pentadic criticism to analyze the organizational rhetoric of the United States' Office of War Information via its propaganda produced during World War II. Specifically, I examine six representative propaganda posters that recruit people to fight as soldiers or to help make machinery, as well as ask everyday Americans to remain vigilant and act in favor of the U.S. war effort through service, support, and loyalty. In traditional pentadic analysis, the constituent elements of agent, act, agency, scene, and purpose are identified and quantified in terms of their ratios to other constituent elements. However, this application of pentadic criticism emphasizes the agency, as it is unique to each propaganda poster while other elements are shared between the six. This unique application of the pentad helps elucidate the physical, mental, and spiritual characteristics of the perceived ideal American who could contribute to the war effort in the eyes of the United States government, with traits such as Whiteness and (predominantly) maleness being emphasized. This implied, idealized, individual simultaneously included and excluded various different groups of people and its legacy can still be seen today.

115

A Shift toward Precision Rehabilitation: Investigating how repeated practice drives improvements in performance of functional transfers for adolescents and young adults with cerebral palsy

9:45-10:00 AM

HARPER 2046

Department of Physical Therapy

Kaden Luellman

One million Americans have cerebral palsy (CP) and experience lifelong motor impairment, with negative implications for participation and community integration in adulthood. Optimal dose of PT interventions that that increase performance for adolescents transitioning to adulthood with cerebral palsy (CP) is a research priority. Adolescents and young adults with CP experience impaired motor and postural control, which negatively impacts independence with daily activities, including functional transfers (e.g., sit to/from stand). Inefficient functional transfers are associated with decreased independence with self-care and mobility. Physical therapy interventions aimed at improving balance and transfers result in improved scores on standardized measures of capacity, such as the Pediatric Balance Scale. In other words, these task-specific interventions result in increased motor capacity (i.e., best performance in a clinical setting). Motor performance corresponds to typical movement used in day-to-day life. Performance is how patients choose to complete tasks, without outside instruction from a provider. Improvements in capacity mostly do not result in improved performance. The longitudinal impact of physical therapy (PT) interventions on self-selected transfer speed (performance) is not known. Our long-term goal is to define optimal dosing parameters of PT interventions that result in improved real-world function for adolescents and adults with CP. The aims of this proposal are to quantify self-selected transfer speed; analyze the proportion of training session time spent performing functional transfers; and compare self-selected transfer speed for individuals with different levels of independent motor function across time. The impact will be stronger evidence of intervention dosing that leads to improved function.

ORAL PLATFORM PRESENTATIONS: 1:45-3:45 PM
TUESDAY MARCH 26, 2024
STUDENT ABSTACTS

257

1:45-2:00PM HARPER 2045

The interplay between preclinical indices of obesity and neural signatures of fluid intelligence in youth

Department of Pharmacology and Neuroscience

Thomas Ward

Pediatric obesity rates have quadrupled in the United States, and deficits in higher-order cognition have been linked to obesity, though it remains poorly understood how obesity impacts neural populations serving cognition in youth. Herein, we sought to determine how measures of obesity scale with neural activity in brain regions underlying fluid intelligence. Seventy-two youth aged 10-16 years underwent high-density magnetoencephalography (MEG) during performance of an abstract reasoning task. The resulting data were transformed into the time-frequency domain and significant neural oscillations were imaged using a beamformer. Whole-brain, voxel-wise correlations with age-and-sex-adjusted measures of BMI (zBMI) were then performed to quantify relationships between obesity, performance, and neural activity serving fluid intelligence. The results revealed that participants with elevated zBMIs exhibited attenuated theta (4-8 Hz) responses in both the left dorsolateral prefrontal cortex (DLPFC) and left temporoparietal junction (TPJ; ps < 0.001, corrected), and that weaker TPJ responses predicted slower reaction times ($p = 0.016$). These findings suggest that elevated zBMI among youth is associated with poorer performance and weaker theta oscillations in key brains regions during abstract reasoning. These findings suggest that even subclinical levels of pediatric obesity are associated with altered behavior and neural function, and future work examining the long-term implications is warranted.

258

2:00-2:15PM HARPER 2045

Kinetic Studies of Proteins Involved in Gene Silencing Using Surface Plasmon Resonance

Department of Chemistry and Biochemistry

Williams, Ivy; Dieckman, Lynne

Genomic DNA in eukaryotes must be tightly packed to fit inside the cell nucleus. To properly organize DNA, it is coiled around eight histone proteins to form nucleosomes, which are further condensed to form chromatin. Depending how tightly the nucleosomes are packed dictates whether a gene will be expressed or silenced. The regulation of nucleosome assembly and gene silencing requires the coordinated action of two key proteins: proliferating cell nuclear antigen (PCNA) and chromatin assembly factor-1 (CAF-1). PCNA is a homotrimeric sliding clamp protein that encircles the DNA double helix and recruits CAF-1 to the replication fork to deposit histone proteins on newly synthesized DNA. If PCNA and CAF-1 are unable to interact, gene silencing cannot occur, resulting in genome instability and disease. The precise mechanism governing the PCNA-CAF-1 interaction still remains unclear. The goal of my research is to determine the kinetics of binding between PCNA and CAF-1 using surface plasmon resonance (SPR). I have determined that the PCNA-CAF-1 interaction occurs with a 2-step mechanism of binding and an affinity comparable to other PCNA binding partner interactions. Additionally, our lab has identified two different binding motifs within CAF-1, and the kinetics of binding of these CAF-1 motifs will be quantitated using SPR in the future. Coupling my kinetic data with other structural and thermodynamics studies of the PCNA-CAF-1 interaction obtained in the lab will provide a comprehensive understanding of how CAF-1 and PCNA interact, and thereby how these proteins regulate nucleosome assembly to maintain genomic stability.

259 GROUP 2:15-2:30PM HARPER 2045

Age-Related Changes in Grip Strength and Balance: Exploring the Correlation

Department of Physical Therapy

Worthington, Lindsey, PT, DPT; Gonzalez, Natalie, PT, DPT

Objective: Weak grip strength is associated with increased fall risk, morbidity, and mortality. Impaired static and dynamic balance are associated with increased fall risk, which can lead to mortality. We investigated the correlation between grip strength, fall risk, and age in community-dwelling older adults.
Methods: Older adults (65-95 years of age) were recruited for this baseline cross-sectional analysis. Peak grip strength was measured using an electronic handheld dynamometer. The Functional Gait Assessment (FGA) and Berg Balance Scale (BBS) were used to evaluate balance and fall risk. Nonparametric statistical analyses were conducted to compare grip strength, FGA, BBS, and age. Spearman rho was used to assess relationships between balance metrics and grip strength with significance defined as 0.05.
Results: Eighteen individuals (73.7 + 4.7 years) volunteered for the study. There were no significant correlations between peak grip strength (301.10± 91.40 N) and FGA (54.44± 1.70 points, rho = 0.40, p=0.11p) or BBS (25.44± 2.31 points, rho= 0.22, p=0.38). However, FGA was significantly negatively correlated with age (rho=-0.703, p=0.001), while no relationship was significant between BBS and age (rho=-0.443, p=0.066) or grip strength and age (rho: -0.10, p=0.68).
Conclusion: These findings support the increased risk of falls with aging, specifically, in dynamic balance. As balance worsens, most older adults begin using an assistive device increasing the reliance on their hands, suggesting that grip strength may decline slower than balance. This could be a potential cause for the lack of correlation between grip strength and fall risk.

260

2:45-3:00 PM HARPER 2045

Structure and Function of Potential Mammalian Riboswitch using SHAPE

Department of Chemistry and Biochemistry

Brianna Blake

Understanding the secondary structure of RNA can provide insight into the roles that RNA participates in, specifically that of riboswitches. Riboswitches are located in non-coding segments of messenger RNAs with the prime purpose of regulating gene expression through ligand induced conformational changes. Due to its primary function, understanding and achieving accurate structures of riboswitches can lead to unanswered questions behind the role of RNA in cellular processes. Further research into the secondary structure can assist in future development of new anti-biologics agents. One technique used to analyze the secondary structure of RNA is Selective 2'-Hydroxyl Acylation by Primer Extension, SHAPE. SHAPE detects RNA structure changes by modifying the RNA in a structure-dependent manner and then performing primer extension. I am investigating a potential mammalian riboswitch using SHAPE in hope of elucidating information of ligand binding structural changes.

261

1:45-2:00PM HARPER 2046

Sniffing out the role of novel long non-coding RNA Nostril in microglial phenotypic polarization and antiviral responses

Department of Biology/Neuroscience

Sophie Ciechanowski

Neurodegenerative pathologies of various diseases are frequently associated with systematic immune responses triggered by viral and bacterial infections. When activated by pathogens, microglia participate in pathogenic clearance and can promote both neurorecovery and neurotoxicity. Due to the role of microglia in CNS immune responses, an increased understanding of factors regulating microglial antiviral mechanisms is important in identifying targets for limiting neurodegeneration following dysregulated proinflammatory

feedback. Our previous work shows that long noncoding RNAs (lncRNAs) can regulate microglial antibacterial responses. We hypothesized that lncRNAs also play an essential role in regulating microglial antiviral immunity. LncRNAs are transcripts that lack coding potential and perform regulatory activities through interacting with RNA binding proteins, such as transcription factors. Our model systems show that infection with Theiler's murine encephalomyelitis virus (TMEV) causes neurodegeneration and upregulated expression of the lncRNA Nostrill in chronically demyelinated brain and infected microglial cell lines. siRNA constructs were used to block upregulation of Nostrill with TMEV infection, and qRT-PCR analysis showed increased viral burden with silencing. Overexpression of Nostrill resulted in increased expression of genes known to modulate antiviral response mechanisms, such as interferon Î²1 (IfnÎ²). LncRNA Nostrill may also influence microglial antiviral immunity by directing their polarization. Silencing of Nostrill influences the expression of neuroprotective and proinflammatory mRNAs following TMEV infection. These data suggest that Nostrill mediates the microglial antiviral proinflammatory response through modulating the expression of interferon regulating factors and microglial phenotypes. Studies investigating these mechanisms are essential in identifying targets for limiting cell death in CNS proinflammatory pathologies.

262

2:00-2:15PM HARPER 2046

Neuroinflammation and TREM1 signaling contribute to global ishcemia pathology

Department of Pharmacology & Neuroscience

Rachael Urquhart

Global ischemia occurs when blood flow to the entire brain is impeded and is associated with cardiac arrest. Global ischemia induces selective, delayed degeneration of hippocampal CA1 pyramidal neurons, leading to learning and memory impairments. Current cardiac arrest therapies focus on rapidly restoring blood flow, but do not address secondary injuries driving long-term global ischemia effects. Therefore,

identifying molecular mechanisms contributing to global ischemia is crucial for developing novel treatments to prevent global ischemia pathology.

To determine how dysregulation of genes promotes global ischemia pathology, RNA-seq was performed on hippocampal CA1 from rats subjected to global ischemia via 4-vessel occlusion (4VO). Ingenuity Pathway Analysis (IPA) then revealed neuroinflammation and TREM1 signaling as top canonical pathways. TREM1 is a myeloid derived cell surface receptor involved in immunity and inflammation with known roles in myocardial ischemia and sepsis, but its role in neuroinflammation and global ischemia remain unclear. Based on RNA-seq and IPA, we hypothesized TREM1-mediated neuroinflammation contributes to global ischemia-induced neuronal death and cognitive deficit, and TREM1 inhibition attenuates this pathology. To address this, we performed RT-qPCR, Western blot analyses, and cytokine profiling on hippocampal CA1. This revealed that following global ischemia, TREM1 expression is increased within 48HR, proinflammatory cytokines are upregulated (IL-6, IL-18, ICAM-1, CXCL7, VEGF), while anti-inflammatory and synaptic plasticity-associated cytokines are decreased (IL-10, CX3CL1). Taken together, these data establish that TREM1-mediated neuroinflammation takes place in the hippocampal CA1 following global ischemia.

IHC was performed on hippocampal CA1, and it was observed that 24HR following global ischemia, TREM1 is localized not with neurons, astrocytes, or microglia, but with CD11b+ myeloid cells. These results suggest that TREM1 may have its action in the brain due to peripherally infiltrating immune cells. Additional IHC reveals increased IgG fluorescence within and dispersing from the CA1 following global ischemia, indicating BBB deterioration. To further address BBB damage, we performed Western blot analyses which revealed a decrease in expression of tight junction proteins (ZO-1, Occludin) which are necessary for the physical structure and integrity of the BBB. Taken together, these findings suggest that following global ischemia, loss of BBB integrity allows peripherally derived immune cells expressing TREM1 to enter the hippocampal CA1 and induce neuroinflammation, which ultimately contributes to global ischemia pathology.

To establish a causal relationship between TREM1 and global ischemia, the effect of TREM1 inhibition via the LR12 peptide was measured. LR12 administration once daily over a 3-day period following 4VO significantly reduced neurodegeneration in the hippocampal CA1, attenuated increases in proinflammatory cytokines while preserving anti-inflammatory markers, and rescued loss of tight junction proteins necessary for BBB integrity. These data demonstrate that TREM1 inhibition can attenuate neuroinflammation and global ischemia pathology.

263

2:15-2:30PM
HARPER 2046

Polyvalent pyridinium- and quinolinium-substituted triazoles as antiseptics

Department of Chemistry and Biochemistry

Adam Burr

Quaternary ammonium compounds (QACs) comprised of N-heterocycles such as cetylpyridinium chloride are common commercial disinfectants. Recently, click-derived 1,2,3-triazolium salts have been shown to display antiseptic properties in a substituent dependent manner. The aim of this study was to prepare both pyridinium-substituted 1,2,3-triazole QACs and quinolinium-substituted 1,2,3-triazole QACs, as well as polyvalent hybrid salts possessing both pyridinium or quinolinium and triazolium subunits, and to evaluate their respective antiseptic properties. Under mild conditions, N-benzylation at either single nitrogen-containing heterocycle subunit could be achieved selectively over N-benzylation at the 1,2,3-triazole subunit. Under forcing conditions, N-benzylation at both single nitrogen-containing heterocycle subunits and 1,2,3-triazole subunits to form a hybrid polyvalent QAC was achievable. When comparing the ability of bis-triazole, para-phenyl bridged bis-triazole and para-biphenyl bridged bis-triazole analogs, the efficiency of preparing polyvalent hybrid triazolium products was distance-dependent with respect to the other heterocycle. Monovalent and polyvalent QACs were evaluated for antiseptic properties against exemplary Gram-positive bacteria (S. epidermidis and B. subtilis), Gram-negative

bacteria (E. coli and K. aerogenes), and yeast (C. albicans and S. cerevisiae) using minimum inhibitory concentration assays. Micromolar MIC values were observed for select analogs, with overall charge as well as peripheral substituent identity influencing antiseptic potency. Details regarding the synthesis of target compounds, examination of relative N-benzylation rates and evaluation of antiseptic potency will be presented.

264

2:45-3:00 PM HARPER 2046

Innovation Toward Adaptive Neuromuscular Motor Response: A longitudinal investigation of a motor learning intervention for adolescents with cerebral palsy

Department of Physical Therapy

Lukas Kocher

Determining optimal dosing for physical therapy (PT) interventions that maximize lifelong function for adolescents and young adults with cerebral palsy (CP) is a national research priority. Optimal intervention dosing requires a shift toward precision rehabilitation right intervention, at the right dose, for the right person. This approach is most likely to improve neuromuscular motor function across the lifespan for people with CP. Interventions with scientific underpinnings rooted in neurophysiological mechanisms of motor learning hold strong promise for improving motor function. Motor errors lead to adaptive changes in the neuromuscular system which allow new motor strategies to emerge. PT interventions leverage adaptation-based learning by incorporating error exposure, specifically balance perturbations, within motor training. In other words, opportunities for loss of balance (LOB) and balance recovery during task execution are incorporated into PT interventions with the goal of promoting adaptative motor strategies to meet diverse everyday environmental demands. There is known variability in intervention outcomes among individuals, from large clinically significant improvements to no change. The optimal rate of LOB during gait training which would result in positive functional outcomes is not yet known. Our long-term goal is to define optimal dosing

parameters of PT interventions for adolescents with CP transitioning to adulthood. The overall objective is to determine the rate of balance perturbations required to drive neuromuscular adaptations for individuals with CP who primarily walk for mobility (GMFCS I-III). Through behavioral coding methodology, we aim to quantify rates of LOB across GMFCS levels longitudinally over an 8-week motor learning-based PT intervention.

ORAL PLATFORM PRESENTATIONS: 8:45-10:45 AM
WEDNESDAY MARCH 27, 2024
STUDENT ABSTACTS

342

9:00-9:15 AM
HARPER 2045

Beyond the Color Lines: An Autoethnographic and Literary Analysis of South Asian American Femininity in Popular Culture

Department of English

Angelia D'Souza

Although portrayals of South Asian American femininity in popular culture have gained more visibility in the last decade, these narratives often perpetuate harmful model minority stereotypes, which refer to Asian Americans as obedient, productive, hardworking minorities who never need assistance, in comparison to other marginalized racial and ethnic groups. These representations of affluent, cisheterosexual Hindu women demonstrate how the model minority myth distorts our perceptions of identity, community, and nation, such that the stories of the South Asian women who do not fit these molds never get told. This project analyzes several prominent popular culture portrayals of South Asian American women such as Never Have I Ever, Velma, The Sex Lives of College Girls, and Ms. Marvel, and integrates it with an autoethnographic account and self-reflexive framework. Weaving cultural analysis with autoethnography highlights how the texts speak to my life and how my life speaks back to these stories. This project highlights my life as a queer Catholic South Asian writer on the fringes of the model minority. My personal history explores broader political themes: the means by which women are implicated in upholding and resisting model minority stereotypes, a recuperation of the history of feminism indebted to India, and the repercussions of the burden of representation. By deconstructing the model minority stereotypes enacted against South Asian American women, the project underscores the importance of respectful and empowering storytelling, and prompts critical reflections

on identity, community, and the broader societal impact of media depictions for women of color.

343

9:15-9:30 AM HARPER 2045

Mechanism of Aminoglycoside Transport into the Vestibular System

Department of Biomedical Science

Vignesh RA

Aminoglycoside antibiotics are widely used to treat life-threatening bacterial infections, yet they are toxic to the kidney and inner ear, resulting in hearing loss and vestibular deficits. Although preclinical studies have described the distribution and toxic side-effects of gentamicin in the inner ear, little is known about the molecular mechanisms that enable aminoglycosides to cross the blood-labyrinth barrier (BLB) and enter the inner ear, particularly into the vestibular end-organs. Furthermore, the molecular mechanism and cellular pathways by which gentamicin crosses the vestibular perilymph-endolymph barrier to reach the endolymphatic compartment (and enter hair cells) remain unknown. There are three primary candidate vestibular pathways into endolymph, via the elongated transitional cells, the cuboidal dark cells, or the epithelial canalar cells. We propose to establish a reliable, validated in vitro method to study the vestibular uptake of gentamicin. These in vitro models will allow us to mechanistically test hypotheses to identify which molecular mechanisms are involved in gentamicin trafficking into the endolymphatic compartment using confocal microscopy, enzyme-ligand immunosorbent assays (ELISAs), and mass spectrometry (UHPLC-MSMS) to determine endolymph-like fluid levels of gentamicin.
Impact: Understanding the mechanisms by which aminoglycosides are transported into endolymph will allow to identification of druggable targets using small molecules or RNAi to ameliorate ototoxicity to prevent or ameliorate hearing loss in most vulnerable populations such as neonates and children learning to listen and speak, as well as those over 65 years of age that are more susceptible to drug-induced hearing loss.

344

9:30-9:45 AM HARPER 2045

ERK1/2 Inhibition Alleviates Noise-Induced Hearing Loss While Tempering Down the Immune Response

Department of Pharmacology & Neuroscience

Richard Lutze

Noise-induced hearing loss (NIHL) is a major cause of hearing impairment, yet no FDA-approved drugs exist to prevent it. Targeting the mitogen activated protein kinase (MAPK) cellular pathway has emerged as a promising approach to attenuate NIHL. Tizaterkib is an orally bioavailable, highly specific ERK1/2 inhibitor, currently in Phase-1 anticancer clinical trials. Here, we tested tizaterkib's efficacy against permanent NIHL in mice at doses equivalent to what humans are currently prescribed in clinical trials. The drug given orally 24 hours after noise exposure, protected an average of 20-25 dB SPL in three frequencies, in female and male mice, had a therapeutic window >50, and did not confer additional protection to KSR1 genetic knockout mice, showing the drug works through the MAPK pathway. Tizaterkib shielded from noise-induced cochlear synaptopathy, and a 3-day, twice daily, treatment with the drug was the optimal determined regimen. Importantly, tizaterkib was shown to decrease the number of CD45 and CD68 positive immune cells in the cochlea following noise exposure, which could be part of the protective mechanism of MAPK inhibition. This study further demonstrates the importance that the MAPK pathway has in hearing loss and explores the mechanism of how MAPK activation leads to hearing loss.

345

9:45-10:00 AM HARPER 2045

Ha-Gao-Ta / Storyteller: Johnny Cash, a Voice for Native Rights

Department of History

Cameron Brookhouser

In the collective memory, Johnny Cash is the Man in Black: a drug-addled, rebellious, country singer. Critics and friends alike described the 1960s as Cash's "lost decade," because he spent those years wrestling with the depths of his addiction.

Though his commercial success dwindled during this time, the collective memory omits the strides that Cash made in promoting Christian and socially progressive ideals and expressly tying them to his public persona through song. A path from empathy to advocacy led him to champion the subaltern in his Concept Albums of the 1960s. This project will investigate the theological and political tenets that fueled Cash's crusade for social justice, and place said tenets in historical context. It will then highlight Cash's specific dedication to the plight of Native Americans through an examination of Cash's folk-based Concept Album, *Bitter Tears*.

346

10:00-10:15 AM
HARPER 2045

Persons with Cerebral Palsy that Respond to Gait Training have Improved Somatosensory Cortical Activity

Department of Biology, Pharmacology and Neuroscience

Liana Chinen

Purpose: Considerable effort has been dedicated to identifying optimal treatment strategies for enhancing the mobility of individuals with cerebral palsy (CP). There is still substantial response variability, with some showing clinically significant gait improvements and others having little or no response. The purpose of this investigation was to evaluate differences in the somatosensory cortical activity of those who respond to gait training compared to those who are found to be non-responders.
Methods: 24 persons with CP completed 24 gait training sessions (3 days/week for 8 weeks). Participants who exceeded the minimally clinically important difference (>0.7 seconds) on the Timed Up and Go (TUG) were classified as intervention responders. Standardized low-resolution brain electromagnetic tomography was used to image the pre/post gait training changes in the evoked somatosensory cortical responses.
Results: Group results showed an 18% improvement in the TUG scores (Pre=10.32-1.77s, Post=8.72-1.39s; $p<.001$), with 67% of participants classified as responders and 33% as non- responders. Notably, the change in the strength of

evoked somatosensory cortical activity was significantly greater in those who were classified as responders when compared to the non- responders (responders=62.99-60.77AU, non- responders: -122.17-52.75AU; *p*=.032). **Significance:** Our results suggest that non-responders do not exhibit as large of a change in their somatosensory cortical activity. We suspect that responders were able to interpret and/or attend to the sensory feedback returned during gait training, impacting their ability to beneficially update their internal model of body mechanics. Non-responders may benefit from alternative treatment strategies that stress sensory awareness.

347

10:15-10:30 AM
HARPER 2045

Western Sanctions as a Determinant of Central Bank Renminbi Diversification

Department of Political Science & International Relations

Timothy Pfannestiel

This study considers factors that influence a state's decision to diversify their foreign exchange reserve portfolio to include the Chinese Renminbi (RMB) at a stage in which there isn't a clear economic benefit to doing so. Sanction data is collected for all state members of the United Nations General Assembly, 37 of which were identified as having diversified into RMB denominated reserve assets. Factors under consideration are levied sanctions, sanction type, duration, regime type, and bilateral distance with China. The study concludes that trade sanctions imposed by Western institutions increases the likelihood that a state will diversify their foreign exchange reserve portfolio to include assets denominated in the Chinese RMB. Further, this study encourages approaching the analysis of state behavior on the international stage through an international political economic lens.

348

8:45-9:00 AM HARPER 2046

TARGETING P38MAPK SIGNALING PATHWAY TO REGULATE TUMOR-ASSOCIATED MACROPHAGE POLARIZATION

Department of Pharmacology and Neuroscience

Daniel Afolabi

Macrophages are an important component of the immune system widely known to be polarized into either pro-inflammatory and anti-tumor M1 macrophages or anti-inflammatory and pro-tumor M2 macrophages. In a tumor microenvironment, macrophages are recruited and converted to tumor-associated macrophages (TAM), also referred to as M2d macrophages. While both M1 and M2 macrophages are present in the tumor microenvironment, M2-like polarized TAMs increase tumor progression to malignancy and metastasis via angiogenesis, and tissue remodeling and suppress antitumor immune responses. The high influx of TAMs into the tumor correlates with poor clinical outcomes in breast, prostate, ovarian, hepatocellular, and cervical cancers. Thus, TAMs are considered a promising target for novel cancer immunotherapies. However, the molecular mechanisms underlying TAM polarization and the complicated association between TAMs and cancer cells have not yet been elucidated, which hinders the development of TAM-targeted therapy for cancer. Understanding the mechanisms and developing strategies to target TAM polarization pose a significant unmet need.
The p38 mitogen-activated protein kinase (MAPK) signaling pathway mediates several important inflammatory reactions in response to a variety of stimuli. Recent studies have identified a role for p38 MAPK in IL-4-induced M2 peritoneal macrophage polarization. We hypothesize that targeting the p38MAPK signaling pathway will regulate tumor-associated macrophage polarization. We have successfully established two TAM in vitro models using both primary BMDM and RAW 264.7 cell lines. Importantly, our results showed the important role of p38MAKP in M2-like TAM polarization. Since inhibition of p38MAKP reduces the M2d macrophages with little effect on M1 macrophage polarization.

349

Apples and Oranges: Comparing Saint Augustine of Hippo to Saint Thomas Aquinas on the Classification and Gradation of Sin

9:00-9:15 AM HARPER 2046

Department of Chemistry and Biochemistry

Philip Richardsen

As the addage tells us, “Don’t compare apples and oranges.” Hence, when we classify items, we divide them into species that share a common genus. Not just metaphysicians like Aristotle or biologists like Linnaeus, but also theologians apply rational principles of classification. This study focuses on Aquinas’s and Augustine’s efforts to classify sins and determine their various levels of severity. Synthesis of these taxonomies established by Aquinas and Augustine allows for a systematic rational approach to self-reflection on one’s sin and carrying out penance.

350

Detection and Quantification of Gentamicin in the Inner Ear Using Different Liquid Chromatography Methods

9:15-9:30 AM HARPER 2046

Department of Biomedical Sciences

Shreshtha Dash

Background: Quantifying drugs in the inner ear is challenging due to its relative inaccessibility. The ototoxic drug gentamicin, used to treat Meniere’s disease, consists of 4 major C-subtypes - C1, C1a, C2, and C2a. Detection of these subtypes is difficult because gentamicin lacks UV-absorbing chromophores. Liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS) can quantify gentamicin due to its high sensitivity. High-performance liquid chromatography with fluorescence (HPLC-Fl) can also quantify derivatized gentamicin. We present new LC-MS/MS and HPLC-Fl protocols to detect multiple gentamicin subtypes simultaneously in microliter sample volumes to estimate its pharmacokinetics in the perilymph after intratympanic administration. **Methods:** Gentamicin was separated on an Acquity UPLC BEH C18 column (Waters, 2.1 x 50 mm) using a gradient of 30-90% acetonitrile in water containing

nonafluoropentanoic acid (100 mM) at 0.2 mL/min. Gentamicin standards (1-50,000 ng/mL) were prepared in artificial perilymph, with amikacin (1000 ng/mL) as an internal standard. Alternatively, gentamicin was derivatized with ortho-phthaldehyde (OPA) and ethanethiol before being eluted from a Poroshell 120, EC C-18 column (50 x 4.6 mm), using an isocratic mobile phase of 0.02 M sodium heptanesulfonate monohydrate in methanol: water: acetic acid (80:18:2 v:v:v) at 1 mL/min. A kanamycin solution in water (50 ng/mL) served as an internal standard. OPA-derivatives of gentamicin were detected at 337 nm-454 nm (excitation-emission wavelengths, respectively). To determine the pharmacokinetics of gentamicin in the perilymph, 5µL gentamicin solution (30 mg/mL) was injected intratympanically near the round window membrane in a murine model. After 0.5, 1, 2, and 6 hours, perilymph was collected from the posterior semicircular canal. Gentamicin concentration in murine perilymph was analyzed using the developed HPLC-Fl method. **Results:** Using LC-MS/MS, the LOD and LOQ for gentamicin are 10 pg/ÂµL and 25 pg/ÂµL, respectively. The standard curve obtained was linear with R2 > 0.99. Using HPLC-Fl, the LOD and LOQ for gentamicin are 0.1 pg/ÂµL and 10 pg/ÂµL, respectively. This method was validated as per USP specifications and was linear (R2>0.99) over a concentration range of 10-1000 ng/mL. The %RSD of intra-and interday precision are 5.35± 2.96 and 6.52± 3.6, respectively, and the %accuracy is 97.49± 6.60. The concentration of gentamicin peaks 1 hour after it is intratympanically administered. The Cmax of gentamicin is 19.32 ng/uL; the Tmax is 1 hour; the half-life of gentamicin in the perilymph is 2.54 hours, and the mean residence time is 4 hours in the perilymph. **Conclusions:** A new sensitive LC-MS/MS and a novel HPLC-Fl method were developed to detect and quantify low levels of gentamicin C-subtypes in small sample volumes in vivo. Other pharmacokinetic properties, such as clearance and volume of distribution, will be determined next, and the concentration of gentamicin in serum after intratympanic administration will also be determined.

351

9:30-9:45 AM HARPER 2046

Effects of pH on Autoresuscitation Efficacy and Sudden Unexpected Death in Epilepsy risk in a mouse model of SUDEP

Department of Pharmacology and Neuroscience

Jillian Hinman

During a generalized-convulsive seizure, patients stop breathing due to tonic muscle paralysis. The autoresuscitation reflex is engaged by resulting hypoxia and hypercapnia (HH) decreasing pH and triggering a chemoresponse to expel excess CO2. If too much CO2 is expelled, hypocapnia triggers apnea to increase CO2. The hypercapnia/hypocapnia continues, lessening until CO2 stabilizes and eupnea ensues. In sudden unexpected death in epilepsy (SUDEP), individuals fail to autoresuscitate. We hypothesize the starting pH has a critical role in determining autoresuscitation efficacy. We tested the effects of decreasing or increasing in vivo pH on ventilatory chemoresponses and autoresuscitation of wild-type and Kcna1-null mice, a well-studied model of SUDEP. For 48 hours, mice were supplemented with ammonium chloride (280 mM) to decrease, or sodium bicarbonate (150 mM) to increase pH. Mice were subjected to either a combination of hypoxia-hypercapnia (6% O2, 3-9% CO2) to test for ventilatory chemoresponses, or an anoxia challenge (97% N2, 3% CO2) to test for autoresuscitation. Kcna1-null ventilation response to the HH challenge was variable indicating chemoresponse dysfunction. We found 25% of Kcna1-null mice mounted a successful autoresuscitation response, whereas 75% of wild-type mice succeeded. In Kcna1-null mice, increasing pH improved autoresuscitation and survival to 72%. In contrast, decreasing pH reduced autoresuscitation success to 0%. Next, we tested whether daily treatment influenced lifespan. Ammonium chloride decreased lifespan, whereas treatment with sodium bicarbonate increased lifespan. These data suggest that baseline pH affects the ability to commence a proper chemoresponse and autoresuscitation, which may be detrimental in individuals at high-risk for SUDEP.

352

10:00-10:15 AM HARPER 2046

Exploring the Immunological Regulatory Function of Long Non-coding RNA Expression in Aminoglycoside Induced Ototoxicity

Department of Biology

Collin Jackson

Aminoglycoside antibiotics are a subset of antibiotics frequently prescribed in clinical practice because of their effectiveness and relative low cost. Ototoxicity and permanent hearing loss are recorded in 20-50% of patients with bacterial ear infections following treatment with aminoglycosides. Treatment-related Toxicity and cell death is exacerbated by infection and is seemingly enhanced by inflammatory responses in the cochlea. To develop novel treatments for the alleviation or inhibition of these inflammatory responses associated with ototoxicity, we must understand the molecular mechanisms behind pro-inflammatory pathways in the inner ear. Preliminary data shows that inflammatory responses in both animal models and in auditory cell lines involve regulation of gene expression by long noncoding RNA (lncRNAs). Our in vitro data demonstrate that differential expression of lncRNAs in House Ear Institute of Corti 1 (HEI-OC1) as well as Mouse Distal Convoluted Tubule (MDCT) cells auditory cells occurs following exposure to bacterial lipopolysaccharide (LPS). RT-qPCR indicate that differential expression of lncRNAs underlies the regulated cytokine expression after stimulation with the aminoglycoside Kanamycin. Data suggests that at least lincRNA-Cox2 and lincRNA-Tnfaip3 are significantly upregulated when auditory cells respond to bacterial antigen LPS as compared to controls and both lncRNAs are significantly downregulated when exposed to aminoglycoside treatment alone. We hypothesize that differentially expressed lncRNAs, like lincRNA-Tnfaip3 and lincRNA-Cox2, may play a role in proinflammatory responses and that blocking these responses will reduce inflammation and ototoxicity seen with aminoglycoside treatment or bacterial ear infections. To further test this hypothesis, additional in vitro and in vivo methods are being used. A more robust understanding of the mechanisms of inflammation in the

cochlea and the mechanisms of ototoxicity could provide therapeutic targets for the treatment or prevention of hair cell death and hearing loss following antibiotic delivery for ear infections. Given the number of children treated globally with aminoglycosides each year, there is a clear and present need to understand the mechanisms of aminoglycoside-induced ototoxicity.

353

10:15-10:30 AM HARPER 2046

Identifying methylation on the CERE of Naegleria species

Department of Medical Microbiology and Immunology

Nik Johnson

The ribosomal DNA (rDNA) of Naegleria is encoded on a closed circular extrachromosomal element (CERE) in the nucleolus of the trophozoite. It is estimated that one trophozoite contains ~4,000 copies of the CERE. Most of the CERE sequence is comprised of non-ribosomal sequences (NRS) which is believed to contain a single origin of replication (ori). Regulation of gene transcription by the CERE of Naegleria is largely unexplored, but understanding how ribosome expression is regulated may provide a target for treatments against Naegleria fowleri infections, which are 97% fatal. One general mechanism of gene regulation in eukaryotes is via DNA methylation. DNA methyltransferase enzymes have been described in Naegleria. I hypothesized that CERE from Naegleria gruberi, Naegleria jadini, Naegleria australiensis, and Naegleria pringsheimi are methylated. Trophozoites were harvested from four species of Naegleria and CERE isolated. CERE were sequenced using Oxford Nanopore Technologies and analyzed to determine methylation status. Methylation was found at points across the different elements of the CERE, with little to no analogous locations of methylation across the four species investigated. The percentage of cytosines methylated on each species of CERE ranged from 0.48% - 2.8%, with Naegleria jadini having the lowest level of methylation at 0.48%, Naegleria gruberi and Naegleria australiensis having similar levels of methylation at 1.4% and 1.6% respectively, and Naegleria pringsheimi having the highest level of methylation at 2.8%.

Methylation of the CERE of trophozoites could point towards it being a form of regulation of the rDNA.

354

10:30-10:45 AM

HARPER 2046

Maximizing the Swing Speed of a 3D, Non-Planar Golf Swing

Department of Physics

Tucker Knaak

Swing speed is one of the best indicators of a golfer's skill-level. We studied the effects of varying parameters of the golf swing on the swing speed of a three-dimensional, non-planar double pendulum golf swing model. We derived the equations of motion for this new model from Lagrangian mechanics and included constraints found in the golf swings of professional golfers. We then developed the 4th-Order Yoshida Predictor-Corrector algorithm to conserve the energy of the system and to numerically solve the velocity-dependent equations of motion with Python. Next, we varied six parameters and initial conditions of the model to determine how to maximize the swing speed. We found that a model with a lag parameter of 1.0, an arm plane angle of 30.0 degrees, a shaft angular velocity of 90.0 degrees per second, a wrist cock angle of 270.0 degrees, a club mass of 0.310 kilograms, and a body torque of 325 Joules not only maximized the swing speed of the models but also matched the characteristics of the golf swings of professional golfers. These results and matching characteristics show validity of the model and provide insight into how golfers can begin to maximize their swing speeds.

DISTANCE PRESENTATIONS
STUDENT ABSTACTS

356

1:45PM

Zoom

I Need Clarification: A Quality Improvement Projection to Increase Communication in an Ambulatory Outpatient Oncology Clinic

School of Nursing

Megan Anderson

Background: Communication failure is costly, causing 1,744 patient deaths and 7,149 malpractice cases over a 5-year period and incurring 1.7 billion in total losses in the U.S. An ambulatory outpatient oncology unit at an academic health system identified communication issues between providers and clinic staff leading to delayed treatments and risk of patient harm. National organizations suggest addressing communication failures through use of communication tools, such as the I-PASS.

Sample/Setting: Use of an I-PASS dot phrase was initiated in the clinic's electronic health record (EHR) for communication between the 17 medical providers and the nursing staff within the infusion department.

Methods: The I-PASS dot phrase was used in communicating patient treatment plans over a 10-week period. Data was collected before and throughout the project period with an audit tool to identify I-PASS utilization rates and impact on communication failures and adverse communication-related events. A total of 6119 charts were audited with 2025 eligible I-PASS encounters. In the last two weeks, 15 staff and 5 providers gave qualitative survey feedback on acceptability and usability of the I-PASS tool.

Results: Total I-PASS utilization was 35.5% among providers. I-PASS was not used in 83% of communication incidences. Outcomes included a 97.7% decrease in total time clarifying orders, 77% decrease in total daily order clarifications, 63.8% decrease in patient wait time, and 75% decrease in total communication-related adverse events during I-PASS implementation.

Conclusion: I-PASS dot phrase use improved communication among clinic and infusion staff. Staff expressed satisfaction and medical providers reported quick, easy use.

358

GROUP

2:00PM

Zoom

Exploring Leadership Experiences from the Perspective of Editorial Board Members of Pharmacy Journals

School of Pharmacy and Health Professions

Jessica Scherer, Sierra Conner

Objective To examine experiences and representation of women in leadership positions in pharmacy, through editorial boards and editorial leadership teams of high impact pharmacy journals.

Methods A cross-sectional online survey study design was used. Participants were individuals listed as members of the editorial leadership team (e.g., editor-in-chief, associate editor, editorial board member) from one of 19 English-language, high-impact, pharmacy practice-focused journals (n=683). Survey was researcher-developed and explored various aspects of participants' editorial leadership experiences. Study was conducted from November 2023 – February 2024. Data was analyzed descriptively with future analyses planned to examine demographic differences in experiences.

Results We collected 180 complete survey responses (26.4% response rate). Of these, 32 agreed to a follow-up interview. Respondents reported spending average 10.0±15.2 hours monthly fulfilling editorial leadership responsibilities, while 10.1% (n=18) reported receiving release time from primary job responsibilities to perform these duties. Less than half (n=69, 38.3%) of respondents indicated that current editorial leadership position is their first. Nearly half of respondents (n=86, 47.8%) indicated they were unrecognized for editorial leadership. Only 30.0% (n=54) respondents reported not experiencing barriers in seeking editorial leadership position(s).

Conclusions Results are based on preliminary analyses

of only quantitative data, limiting our current understanding. We will follow with qualitative analysis and develop interview protocol for respondents in agreement. Linking release time with primary position may allow us to investigate avenues of improving equity and work-life balance moving forward in our analysis. Other limitations include failing to account completely for international audience and ensure clear operational definition of "editorial board leadership."

359

2:15PM

Zoom

Investigating the impact of COVID-19 on burnout among pharmacists in Nebraska

School of Pharmacy and Health Professions

Jess Frantz

Objective: To gain a deeper understanding of how pharmacists practicing in the state of Nebraska experience burnout, and how it was influenced by the COVID-19 pandemic.

Methods: A qualitative multiple case study design was used in which semi-structured interviews were conducted via Zoom with Nebraska-licensed pharmacists who responded to a prior survey about burnout during the COVID-19 pandemic. Questions focused on feelings of burnout and how they changed during the pandemic, primary contributors to burnout, how burnout should be addressed, and how perspectives of the pharmacy profession have changed. Interviews were transcribed and then analyzed using a thematic analysis by at least two researchers.

Results: A total of 17 interviews were conducted with pharmacists across multiple practice settings. Five themes emerged: 1) Burnout was experienced differently across practice settings; 2) Increased workload was a major contributor to burnout; 3) Covid exacerbated pre-existing sources of burnout; 4) Addressing burnout is a shared responsibility; and 5) One step forward, one step back.

Conclusions: Pharmacists had complex experiences with burnout resulting from the COVID-19 pandemic. While there were some positive aspects to the

increased responsibilities they were asked to take on, there is a clear need to re-evaluate how burnout is identified and addressed within the profession. The insights gained from this study have application towards preventing or mitigating burnout during future public health emergencies. In addition, there is potential for application to corporate/health system policies and government regulations that could protect pharmacists from the conditions that most often contribute to burnout.

360

2:30PM

Zoom

The Role of Occupational Therapy Services in Maternal Health

Department of Occupational Therapy

Carrie Miller- Conley

Purpose Pregnancy and the transition to motherhood can have a profound impact of the daily activities, roles, and health of mothers. Research suggests women may experience occupational disruption and role conflict along the spectrum of pregnancy to postpartum. There is limited research within the United States on how occupational therapists (OTs) could support women in these disruptions and role conflicts. This study aimed to explore opportunities for occupational therapy interventions throughout the transition to motherhood.

Design A descriptive qualitative design was used to sample postpartum women across the U.S. Recruitment took place through social media and flyers posted in public places in multiple states.

Methods Data was collected through an online anonymous Qualtrics survey. The survey consisted of demographic questions and questions drawing from multiple measures and the Occupational Therapy Practice Framework. Domains of maternal functioning and postpartum recovery came from the Maternal Concerns Questionnaire and the Barkin Index of Maternal Functioning. Survey is currently undergoing thematic analysis.

Results Data collection ended in December 2023 with a total of 45 participants. Initial results on quantitative reports support expected outcomes in terms of occupational disruption and difficulty with postpartum recovery.

Conclusions Preliminary findings suggest various areas of occupational therapy interventions to promote quality of life, occupational balance, and role integration with mothers across pregnancy and postpartum. Findings suggest OTs have a role to support mothers as part of an interdisciplinary healthcare team.

361

2:45PM

Zoom

How Trauma-Informed Care is Perceived and Delivered by Pelvic Health Physical Therapists

Department of Physical Therapy

Michelle Bridgeman

Background: Traumatic experiences can lead to emotional distress and can affect pelvic floor muscle function. Trauma-informed care (TIC) is a topic of uncertainty amongst healthcare workers and with the high prevalence of women reporting traumatic events, it is imperative that pelvic health providers confidently deliver TIC. The purpose of this study was to qualitatively investigate how trauma-informed practices are currently being implemented by pelvic health physical therapists and whether formal guidelines for TIC would be beneficial.
Methods: Subject recruitment included licensed pelvic health physical therapists (n=13). Semi-structured interviews were completed to assess perceptions of the TIC principles developed by the Substance Abuse and Mental Health Services Administration. Interview findings were analyzed using qualitative analysis software and a direct content analysis was performed.
Results: Themes for safety included ensuring a private space, setting session expectations, and providing the right to refuse care. Themes for trustworthiness and transparency included patient-provider connection, and verbal and nonverbal communication. Themes for

collaboration and mutuality included shared decision making and providing options that best fit patient needs. Themes for empowerment, voice, and choice included patient autonomy, patient makes the final treatment option decision, and ensuring the patient feels in control of the session. Finally, themes for cultural, historical, and gender issues included use of gender-neutral terminology/pronouns and self-continuing education. Providers reported they would like more information on TIC approaches and felt guidelines would be helpful.
Discussion: Several trauma-informed practices are currently in place by pelvic health physical therapists; however, participants desired further education to enhance their TIC practices.