



Student Scholars Symposium Journal
Volume 1, Supplement 1
July 2020

Published in honor, acknowledgement and celebration of Lipscomb University students and faculty who submitted abstracts for presentation at the Ninth Students Scholars Symposium. The symposium was cancelled due to the SARS-CoV-2 Pandemic

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Student Scholars Symposium Journal

Vol. 1, Supplement 1. 2020

Welcome to the inaugural issue of the Student Scholars Symposium Journal Supplement. The Student Scholars Symposium is an annual academic conference that is open to all Lipscomb students and is designed to give students an opportunity to showcase their creative works and research results in a professional setting. During the conference, students showcase their scholarly works in the form of oral or poster presentations, live musical and theater performances, readings of poetry or other creative writings and art exhibitions. Students from all academic disciplines offered at Lipscomb University are eligible to present at the symposium. The Student Scholars Symposium Journal Supplement is therefore academic and multidisciplinary. It is a faculty-reviewed student journal supplement devoted to the rapid dissemination of our students' creative works and research results. In this issue, you will find a compilation of outstanding abstracts submitted by undergraduate and graduate students who have been involved in faculty-mentored research and creative projects. This issue provides a snapshot of the types of research and creative activities at Lipscomb University that involve undergraduate and graduate students.

Dr. Florah N. Mhlanga
Associate Dean, College of Liberal Arts and Sciences
Director, Student Scholars Symposium

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A university can be defined in many ways. Certainly, research is a vital component in any measure of a university's standing. For that reason, Lipscomb is proud to be designated by the Carnegie Foundation as a doctoral/professional university. This classification places Lipscomb among some of the premier colleges and universities in America and is based upon the amount of research done by students at the various institutions. The Student Scholars Symposium reflects the quality, creativity, and range of research produced by students at Lipscomb. I am most proud of the fact that the Student Scholars Symposium is now not only a tradition at Lipscomb, but a growing one. This new journal is further evidence that the Student Scholars Symposium is a vital contributor to the vibrant culture of research now at Lipscomb. I am also delighted to see the diversity of talent and voices reflected in the growing number of presentations in the creative arts. This speaks to the vitality of our academic programming. I appreciate the work of our student researchers, their faculty sponsors, and Dr. Florah Mhlanga, Director of the Student Scholars Symposium and Associate Dean of the College of Arts and Sciences, in putting together this exciting new journal that announces Lipscomb's commitment to the promotion of research at the undergraduate and graduate levels.

W. Craig Bledsoe
Provost

Undergraduate Paper Presentations

- 1. A Call to Faith, Prayer, and Forgiveness: A Sermon on Mark 11:12-26**
Emmeline Stuart and David Fleer, College of Bible and Ministry
- 2. Sabbath: Recognizing Our Futility in Light of a Good God**
Corey Shannon and Lauren White, College of Bible and Ministry
- 3. The Effect of Nest Placement and Temperature on Reproductive Success in the Barn Swallow**
Perri Haga and John Lewis, Biology
- 4. Preparation and Clinical Testing of Psoriasis Gels as a Potential and More Efficient Treatment Option for Psoriasis**
Manvitha Indukuri and Florah Mhlanga, Biology
- 5. The Impact of Equine Therapy on Children with Disabilities**
Tommi Lynn and Florah Mhlanga, Biology
- 6. Analysis of Smooth Muscle Contraction Pathway Proteins as Potential Biomarkers for IBD**
Haley Kling and Amanda Williams, Biology
- 7. Comparing the Effects of CBD and Hu-331 on the Neurological Development of Embryonic *Danio rerio***
Avery Roland and Bonny Millimaki, Biology
- 8. Determining Developmental Pathways That Might Differentiate IBD from Potential Biomarkers**
Elizabeth Fisher and Amanda Williams, Biology
- 9. TRAF4-Induced Expression of Proinflammatory Cytokines in Colon Adenocarcinoma**
Theodore Reed and Jon Lowrance, Biology
- 10. Ultrafine Carbon Black Promotes Lysosomal Membrane Permeabilization and NLRP3 Inflammasome Activation**
Jennie Hibma, Jay Brewster and Jon Lowrance, Pepperdine Natural Science Division and Biology
- 11. Analysis of Neprilysin Knockdown in Triple Negative Breast Cancer**
Reed Haga and Beth Conway, Biology
- 12. The Effect of CBD on Neurological Development in *Danio rerio***
Kyra Drobny and Bonny Millimaki, Biology
- 13. The Effect of HD5 on Cell Death in Normal Human Colonocytes**
MiKayla Scillion and Amanda Williams, Biology

- 14. TLR4 Isotype Abundance in Human Colonocytes with Acetic Acid Treatment**
Kelly Roy and Jon Lowrance, Biology
- 15. A Case for Diversity in the Healthcare System**
Deranique Jones, Shaniya Pleasant and Florah Mhlanga, Biology
- 16. Teaching Students About Chirality**
Robert King, Rylee Davie, Rebecca Duke, Owen Glogovsky, Melica Nikahd, Lakelyn Reed, Kaitlyn Wiley and Matt Vergne, Chemistry and Biochemistry
- 17. The Mechanism of the Catalysis of the Claisen Rearrangement of Chorismate to Prephenate by Chorismate Mutase**
Niyati Pathak and Kent Clinger, Chemistry and Biochemistry
- 18. Crystallization of Vanadium dependent haloperoxidases from *Asparagopsis taxiformis***
Owen Glogovsky and Kent Clinger, Chemistry & Biochemistry
- 19. Structural Properties of Halogenated Fused-Ring Cyclopropanes**
Robert King and Kent Clinger, Chemistry and Biochemistry
- 20. Data-Guided Permeability Estimations for Polymeric Membranes**
Rebekah Duke, Konstantinos Vogiatzis, Jacob Townsend and Kent Clinger, Chemistry and Biochemistry
- 21. Cyber Security Education: A Game Inspired Solution**
Aaron Thompson and Chris Simmons, Computing and Technology
- 22. A Parallelizable Algorithm for the Generation and Analysis of Mutation Matrices**
Isaac Saffold and Tim Wallace, Computing and Technology
- 23. Launching the Nashville International Airport (BNA) Online Merchandise Store**
Abby Miller, Kayla Wood, Katie Christ, Mason Thomas, Katrina Hughes, Aleksa Loch and Aerial Ellis, Communication and Journalism
- 24. Brick by Brick: Building an On-Campus Public Relations Firm**
Josh Odum and Aerial Ellis, Communication & Journalism
- 25. Continued Observations of Clinical Presentations of Waterborne Illness Symptoms with and without Access to Clean Water in Guatemalan Villages**
Avery Roland and Kirsten Dodson, Engineering
- 26. On Beginning and Ending; Analysis of T.S. Eliot's 'East Coker'**
Ryan Gabriel Wilson and Jan Harris, English and Modern Languages
- 27. An Artist's Moments of Being in Virginia Woolf's *To the Lighthouse***
Tori Thurmond and Jan Harris, English and Modern Languages
- 28. Virginia Woolf's "The Waves" and Louis' Development of Otherness**
Emerson Loudenback and Jan Harris, English and Modern Languages

29. **"Very Near Heaven:" Charles and Sebastian's Relationship as Divine Grace in Evelyn Waugh's Brideshead Revisited**
Matthew Smith and Jan Harris, English and Modern Languages
30. **Spoken Sacrament: Coinherence Through Speech-Acts in Charles Williams' Descent Into Hell**
Jack Webber and Jan Harris, English and Modern Languages
31. **The Necessity of Doubt in The End of the Affair**
Abigail Falk and Jan Harris, English and Modern Languages
32. **Etymological Changes in Social Media**
Hannah Peeler and Jan Harris, English and Modern Languages
33. **Influence of British Slang on American Culture**
Alexa Tully and Jan Harris, English and Modern Languages
34. **The History of English in the Effect of French**
Ryan Gabriel Wilson and Jan Harris, English and Modern Languages
35. **From English to Espanol: The Rise of Language Brokering**
Ruby Aguilar and Jan Harris, English and Modern Languages
36. **The Influence of Code Switching in Classrooms**
Emily Blankenship and Cecelia Ramsey, English and Modern Languages
37. **"The Gold Axe" --A Study in Translating Suspense**
Brianna Burch and Cecelia Ramsey, English and Modern Languages
38. **Even Before the Little Brown Speck: Analyzing Rot Within Toni Morrison's The Bluest Eye**
Emily Wieman and Sonya Green, English and Modern Languages
39. **Community and Suffering in the Works of Alice Walker**
Alex Fleming and Sonya Green, English and Modern Languages
40. **Who Owns History: Diasporic Identity Construction in Nathan Englander's Everything I Know About My Family on My Mother's Side**
Madeline Stevens and Brandi Kellett, English and Modern Languages
41. **Street Slang and the Trials of the Translator**
Brianna Burch and Cecelia Ramsey, English and Modern Languages
42. **Zora the Philosopher: Moses, Man of the Mountain as a Commentary on Racial Consciousness**
Hutton Cate and Jan Harris, English and Modern Languages
43. **The Impact of Emotional and Creative Writing on "The Yellow Wallpaper"**
Sara Eaton and Matt Hearn, English and Modern Languages

44. **Ecksersees Doo Steel: Lay Pasteesh Doon Amereecanuh**
Codie Miller and Cecelia Ramsey, English and Modern Languages
45. **Gender and Character Types in Bram Stoker's Dracula**
Emerson Loudenback and Jan Harris, English and Modern Languages
46. **A Room of One's Own: Observations on the Walls and Interior that Created Limited Space for Female Authors**
Marlena Jenkins and Jan Harris, English and Modern Languages
47. **Death and Defiance: Examining Shakespeare's Tragic Female Characters**
Caroline Stair and Greg Carpenter, English and Modern Languages
48. **Wifey**
Bana, Araz, Faraj and Jan Harris, English and Modern Languages
49. **Sotto Voce: Life and Labyrinths**
Kimberley Klein and Jan Harris, English and Modern Languages
50. **Superheroine**
Kimberley S Klein and Kimberly Reed, English and Modern Languages
51. **India Wasn't Liberated in a Day**
Andrew Lundborg and Jan Harris, English and Modern Languages
52. **Bent & Twisted: Advocating for the Cause of Adolescent Idiopathic Scoliosis**
Lindsey Newland and Sonya Green, English and Modern Languages
53. **A Dot on the Line: Contextualizing Oneself within Modern Art History**
Caleb Clemente, Rocky Horton and College of Entertainment and the Arts
54. **Contextualizing Murakami Saburo and "Passing Through"**
Caleb Clemente and Mandy Rogers-Horton, College of Entertainment and the Arts
55. **Animation Not Discrimination**
Grace Kwock and Tom Bancroft, College of Entertainment and the Arts
56. **Executive Function Complaints Predict Neurodegenerative Changes in Older Adults**
Kacie Pennington, John Suey, Kaitlynn Logsdon, Camdyn Gilbert, Shelby Leoni, Luke Schueller, and Katie Osborn Spirko, Family Sciences
57. **Older Adults' Subjective Memory and Language Complaints Predict Regional Brain Atrophy Prior to Objective Cognitive Deficits**
Kaitlynn Logsdon, Shelby Leoni, John Cole Suey, Camdyn Gilbert, Kacie Pennington, Luke Schueller and Katie Osborn Spirko, Psychology, Counseling, and Family Science
58. **The Effect of Cognitive Training on Reaction Time**
Mira Hana, Natalie Miller, Jocelyn Hamilton and Ruth Henry, Kinesiology
59. **Intrinsic Motivation and Exercise Adherence in Group Exercise vs. Individual Exercise**
Caroline Leverett, Jacob Locke, Lynley Childress and Ruth Henry, Kinesiology

- 60. Hunger as Child Adversity: How Nonprofits Should Address Longer Term Solutions**
Jacob Neill and Christin Shatzer, Law, Justice and Society
- 61. A Statistical Demographic Analysis for a Local Homelessness Organization**
Rebekah Duke, Jerod Crockett and Katie Link, Mathematics
- 62. Design and Initial Characterization of Topoisomerase II Expression Constructs**
Mariam Hawaz, Ashley Dougherty, Judy Trac and Joe Deweese, Pharmaceutical Sciences
- 63. A Confucian Divine Command Theory of Morality in the Context of Medical Non-Disclosure to Terminally Ill Patients**
Jerod Crockett and Lee Mayo, History, Politics and Philosophy
- 64. Inculturation: What's A Christian to Do?**
Elizabeth Kwock and Richard Goode, History, Politics and Philosophy
- 65. Combating Negative Effects of Parental Conflict in Children**
Hannah Jones and Christin Shatzer, SALT
- 66. Improvements to a Student-Run Free Clinic Food Pantry**
Kaitlyn Wiley and Christin Shatzer, SALT
- 67. Creation of an Aquatic Facilities Guide for The Public**
Kendra Lozano, Christin Shatzer and Kent Clinger, SALT
- 68. Increasing Access to Community Courts for Non-Violent Offenders**
Meredith Crockett and Christin Shatzer, SALT
- 69. Raising Awareness: Educating Professionals in LGBTQ+ Competency**
Mackenzie Bayes and Amy Crossland, Social Work and Sociology
- 70. Trauma-The Gateway to Addictions. Lowering Stigmas with Paraprofessionals**
Chad Curtis and Amy Crossland, Social Work and Sociology
- 71. Mental Health and Crisis Assessment Training in Child Advocacy Centers**
Alexis Olsson and Amy Crossland, Social Work and Sociology
- 72. Bridging the Gap within the 37207 Community**
Anna Grace Hinkle and Amy Crossland, Social Work and Sociology

Undergraduate Performances

- 73. An Approachable Octopus**
Marah Grant and Jan Harris, English and Modern Languages
- 74. Challenging Mud**
Caleb Clemente and Jan Harris, English and Modern Languages
- 75. East Carolina**
Ryan Gabriel Wilson and Jan Harris, English and Modern Languages
- 76. We're Inside Out**
Tori Thurmond and Jan Harris, English and Modern Languages
- 77. The Tendency of an Isolated System,**
Emily Wieman and Jan Harris, English and Modern Languages
- 78. More Content When Moving**
Kamryn Wong and Jan Harris, English and Modern Languages
- 79. It's Going to Be Okay**
Veronika Lynn Jones and Jan Harris, English and Modern Languages
- 80. Can I at least have a map?**
Sierra Gonzalez and Jan Harris, English and Modern Languages
- 81. Beyond Our Bones**
Allison Whiting and Jan Harris, English and Modern Languages
- 82. Enacting My Revenge**
Matthew Smith and Jan Harris, English and Modern Languages
- 83. Intimate Anthropology**
Madeline Stevens and Jan Harris, English and Modern Languages
- 84. Push Farther to the Hidden Corners**
Emma Dryden and Jan Harris, English and Modern Languages
- 85. Degrees of Impiety**
Makala Marsee and Jan Harris, English and Modern Languages
- 86. Things That Make Me Queasy**
Makala Marsee and Jan Harris, English and Modern Languages

Undergraduate Poster Presentations

- 87. The Impact of Corporate Social Responsibility on Firm Performance: A Study of Certified B Corporations**
Kaitlin Stanfield and Marcy Binkley, Accounting
- 88. The Art of "Good Boy Richard"**
Daniel Haycox and Eric Stars, Animation
- 89. Saturday Morning Cartoons feat. the Tennessee Titans**
Hayley Mullins and Tom Bancroft, Animation
- 90. Godzilla in Mexico**
Conner B Delgado and Rocky Horton, Art
- 91. The Effect of Albendazole on Different Model Systems**
Erin Lisk, Caitlyn Scherr, Perri Haga and Brian Ellis, Biology
- 92. The Effects of Albendazole on *C. elegans*, HepG2 Cells, and Zebrafish**
Morgan Meador, Michael Cannone, Erin Stanley and Brian Ellis, Biology
- 93. Testing the Effectiveness of Albendazole Drug on Varying Model Systems**
Will Huff, Tommi Lynn, Tommi Lynn and Brian Ellis, Biology
- 94. Using A Health-Rating System to Evaluate the Effectiveness of Albendazole On *Caenorhabditis elegans* as A Model for Anthelmintic Study**
Will Huff, Grace Proffitt, Madeline Surdacki and Brian Ellis, Biology
- 95. A New Perspective on Clean Beauty Products: Sulfates and Parabens**
Shaniya Shontay Pleasant, Kiandra Hawkins and Florah Mhlanga, Biology
- 96. Relationship Between Longevity and Breed Size in *Canis familiaris***
Fatima Guzman and Florah Mhlanga, Biology
- 97. Effect of Therapy Dogs on Self-Reported Stress in College Students**
Kathleen Baggett and Florah Mhlanga, Biology
- 98. The Medical Importance of Himalayan Yew Plant Species**
Danielle Ladines, Ashley Rose Lynn and Florah Mhlanga, Biology
- 99. The Effect of Nigella Sativa Extract Oil On the Growth Of *Escherichia coli***
Kalkidan Dejene and Florah Mhlanga, Biology
- 100. Effect of Human Defensin 5 on the activation of Apoptosis in Human Colon Cell Lines**
Sarwar Kokoy, Avery Roland, Ali Mohammad, Theodore Reed and Amanda Williams, Biology

101. **Resulting Canonical Apoptosis of Colorectal Epithelial Cells Upon Treatment with Human Alpha Defensin 5**
Jennie Hibma, Sydney Clark, Christopher Roach, Reagan Bain and Amanda Williams, Biology
102. **Apoptotic Responses to Human alpha Defensin 5 in Normal Human Colonocytes**
Kyra Drobny, Kelly Roy, Macy Glassco, Haley Kling, Breckin Horton, Ameer Moussaed and Amanda Williams, Biology
103. **The Role of HD5 in Activation of Cell Death in Colorectal Epithelial Cells**
Caleb Berta, Stephen Wigger, Mina Gerges, David LeCates and Amanda Williams, Biology
104. **Role of Beclin-1(coiled-coil myosin-like BCL2-interacting protein) in Apoptosis**
Abbey Olson, Sydni Caldwell, Noah Walker, Toria Smith and Regine Lane, Biology
105. **Quantification and Detection of Secondary Metabolites in *Aliivibrio fischeri* using Liquid Chromatography Tandem Mass Spectrometry**
Christopher F Ross and Kent Clinger, Chemistry and Biochemistry
106. **Enhanced Optical Clarity of Polyimide Aerogels via Fluorinated Monomer Incorporation**
Melica Nikahd and Stephanie Vivod, Chemistry & Biochemistry
107. **Structural Investigation into Chemistry of Vitamin B6**
Tony Nguyen and Kent Clinger, Chemistry and Biochemistry
108. **The Microwave Synthesis of Phenylalanine: A two-step Synthesis in the Organic Teaching Laboratory Using Acetone and Butanone as Solvent**
Elizabeth Behrens and Kent Clinger, Chemistry and Biochemistry
109. **High Performance Liquid Chromatography Assay of Amino Acid Decarboxylase**
Manvitha Indukuri and Kent Clinger, Chemistry and Biochemistry
110. **Computational Study of the Eclipsed Arrangement of 1,1-Dihalo-2,2,3,3-Tetramethylcyclopropanes and How They Contribute to Angle Strain in Complex Molecules**
Owen Glogovsky, Breckin Horton and Kent Clinger, Chemistry and Biochemistry
111. **Purification of Green Fluorescent Protein to Obtain Neutron Diffraction Data**
Caleb Berta and Kent Clinger, Chemistry and Biochemistry
112. **Conspiracy or Cure: Cannabidiol and Inflammation**
Kaitlyn Wiley and Brian Cavitt, Chemistry and Biochemistry
113. **What Ingredients Are in Psychic Vampire Repellent Spray?**
Robert King, Rebecca Duke, Owen Glogovsky, Melica Nikahd, Lakelyn Reed, Rylee Davie, Katelyn Wiley and Matt Vergne, Department of Chemistry and Biochemistry
114. **Do Balloons Restrict Modern Advances?**
Lakelyn Reed and John Smith, Chemistry and Biochemistry
115. **Analyzing gene expression data using Tableau**
Yuan Sui and Qingguo Wang, College of Computing and Technology

116. **Lower Body Exoskeleton**
Nate Foote, Leah Hampton, Carson Littlefield, Jeremiah Niehls, Seth Mann, Lauren Heinrich and John Hutson, Electrical Engineering
117. **A Student-Led Exploration of Manufacturing Through the Development of a Four Cylinder Bourke Air Motor**
Lauren Heinrich and Mark Chandler, Engineering
118. **OmniCOMM**
Christopher Miller, Ben Davis, Jacob Eshleman, Hannah Mason, Joseph Morris and Greg Nordstrom, Electrical and Computer Engineering
119. **Lipscomb Motorsports**
Trey Hickey, Scott Johnston, Hunter Haynes, Issac Vaught, Jase George, Kevin Tobin and Samuel Wright, Engineering
120. **Dewatering Drilling Mud**
Katelynn McMaster, Lauren Heinrich, Ben Vogel, Jacob Gunter, Brian Cavitt and Todd Lynn, Chemistry and Civil & Environmental Engineering
121. **Medical Waste Incinerator at Polyclinic Health Center in Honduras**
Payton Otto, Nathan Klemz, Austin Eager, Daniel Etson, Sam Shaylor, Matthew Moore, Abdus Samad and Kirsten Dodson, Engineering
122. **Lipscomb University Aeronautics NASA Student Launch Project**
Nial Redha, Bryce Minton, Jack Wood, Haley Cable, Molly Watts, Ben Musoni and Joseph Tipton, Mechanical Engineering
123. **Thorium: An Overlooked Solution**
Robby Renfrow and Richard Gregory, Mechanical Engineering
124. **Coffee County Earth Dam Remediation Project**
Tiana Y. Lynn, Ben Vogel, William Raihala, Thomas Clawson and Chris Gwaltney, Civil Engineering
125. **A Balanced Mixture Design Approach for Asphalt Paving Mixtures**
Tiana Y. Lynn and Todd Lynn, Civil & Environmental Engineering
126. **Bridging the Gap**
Noah Kimbrough, Trent Beacham, Chris Schneider, Emily Morgan and Chris Gwaltney, Civil Engineering
127. **The Role of a Wardrobe Stylist**
Bethanie Jones and Sissy Simmons, Fashion & Design
128. **The Effects of Caffeine on Anaerobic Metabolism**
Katlyn Council, Lindsay Bradshaw, Taylor Morrow and Ruth Henry, Kinesiology

129. **Anthropometric, Body Composition, and Muscular Performance Comparisons Between Collegiate Division I Baseball Pitchers and Position Players**
Marko A. Aziz, William C. Vantrease, Bailey Pihera, James T. Haynes, Megan Jones, Grace Zimmerman and Jeremy Townsend, Kinesiology
130. **The effect of social media and internet use on adolescents aged 13-18 on mental health and well-being.**
Isabella Park, Areen Mohamad-Ali, Sydney Wilson, Rachel Lalky and Mary Koziura, Nursing
131. **Does screen time in children under 18 affect behavior, sleep, or overall development?**
Heather Corbin, Katie Braumiller, McKenzie Allen, Kayla Rudie and Mary Koziura, Nursing
132. **Does the use of AI-enabled electrocardiograms improve the screenings for potentially fatal arrhythmias compared to traditional electrocardiograms?**
Lauren Mosley, Molly Joseph, Brian Nguyen, Jinal Patel and Gail Humes, Nursing
133. **Are Middle to High School-Aged Adolescents (Aged 12-18) Who Have Used E-Cigarettes Such as JUUL, at an Increased Risk for Developing Respiratory Problems?**
Ryan Lyle, Grace Mason, Stephanie Hite, Elizabeth Queen and Mary Koziura, Nursing
134. **The Effect of HIV/AIDS on the Development of Children in Third World Countries**
Alyssa Hollingsworth, Grace Lahey, Leah Major, Sydney Carnock, Mary and Mary Koziura, Nursing
135. **Virtual Reality as treatment for Phantom Limb Pain**
Lauren Guthrie, Alena Vermillion, Christina Mixayphone, Cailey Burman and Gail Humes, Nursing
136. **The Effect of Probiotics on the Symptomatic Treatment of Inflammatory Bowel Disease in Adults**
Rojeda Merani, Elizabeth Melby, Sun Kim, Rachel Blackwell and Gail Humes, Nursing
137. **Antibiotic Resistant Bacteria in Cystic Fibrosis**
Gine Ahmed, Lucas Bennie, Brette Allison, Jonida Dervishi and Mary Koziura, Nursing
138. **Is there a correlation between preterm infants and language/speech delays when compared to full term infants?**
Ally Hockaday, Hannah Jamerson, Courtney Majors, Nicolle Weber and Gail Humes, Nursing
139. **How does the use of alcohol in adolescents ages 12-20 affect brain development extending into adulthood?**
Katie Duke, Hannah Jamerson, Courtney Majors, Nicolle Weber and Gail Humes, Nursing
140. **What Are the Changes in Personality and Decision Making in Professional Football Players After Being Diagnosed with Chronic Traumatic Encephalopathy Developed from Recurring Concussions?**
Taylor Romine, Maggie Stewart, Yeabsira Taddese, Sarah Fehland and Mary Koziura, Nursing
141. **In Mothers That Use Opioids During Pregnancy, What Are The Long-Term Effects Of Neurodevelopment In Children?**
Marisol Bishop, Olivia Richardson, Sage Olson, Khiya Booker and Gail Humes, Nursing

142. **Cooking Education in Individuals with Intellectual and Developmental Disabilities**
Madison Shea, Halle King, OTD, OTR/L, Bailey Pihera and Nancy Hunt, Nutrition and Dietetics
143. **Development of a Micro-Plasma Collection Card Method for Intestinal Permeability Assays**
Rylee Davy and Matt Vergne, Pharmaceutical Science
144. **Demonstration of the Polarization and the Intensity Profile of Electric Dipole Radiation**
Beshoi Grees, Kyra Hendrickson and Randy Bybee, Physics
145. **Adaptive Center of Mass Adjusting Device**
Beshoi Grees, Shelbi Sullivan, Mariam Almadan, Nathan Foote and Alan Bradshaw, Physics
146. **Electrical Signatures of Swallowing in Patients with Swallowing Difficulties**
Fiona O'Neal and Alan Bradshaw, Physics
147. **Evaluation of the Definite Integral of $\int_0^1 x^x dx$**
Dawson Black and Randy Bybee, Physics
148. **Cerebral Blood Flow and Cerebrovascular Reactivity Changes in Prodromal Alzheimer's Disease**
John Cole Suey, Shelby Leoni, Luke Schueler, Kait Logsdon, Kacie Pennington, Camdyn Gilbert and Katie Osborn Spirko, Family Science
149. **Grey Matter Atrophy Rates in Older Adults with Normal Cognition and Mild Cognitive Impairment**
Katie Osborn Spirko, Luke Schueler, Kaitlynn Logsdon, Kacie Pennington, John Cole Suey and Shelby Leoni, Psychology, Counseling, and Family Science
150. **Mental Health and the Church: Are We Leaving a Beneficial Impact?**
Abby Myers and Dave Morgan, Psychology, Counseling, and Family Science
151. **White Matter Hyperintensities in Nondemented Older Adults**
Luke Schueler, Kaitlynn Logsdon, Kacie, John Cole Suey, Camdyn, Shelby Leoni and Katie Osborn Spirko, Psychology, Counseling, and Family Science
152. **Cruel and Unusual Punishment: Banning the Death Penalty in the United States**
Calah Gipson and Amy Crossland, Social Work and Sociology
153. **The Intersection of Social Work and Social Enterprise: Innovations for Justice**
Grace Boucher and Cayce Watson, Social Work and Sociology

Graduate Oral Presentations

154. **Efficacy of Mebendazole and Albendazole on Soil Transmitted Helminth Infections Using Synchronized L1 Stage of N2a *Caenorhabditis elegans* Strain as a Model**
Opeyemi Duyile, Jasmine Milligan, and Brian Ellis, Biology
155. **Macular Degeneration and the Effects of Complement and DICER1**
Daniel Jordan and Brian Ellis, Biology
156. **Examining Differential Apoptotic Biomarkers in Inflammatory Bowel Disease for Increased Diagnostic Accuracy**
Olivia Marvel and Amanda Williams, Biology
157. **The Downstream Effects of Mutations in the von Willebrand Factor Protein and How It Leads to von Willebrand Disease Type 1**
Stephanie Green and Amanda Williams, Biology
158. **U.S. Health Care: Market Justice and Social Justice**
Drew Dameron, Tim Tant, and Donita Brown, Business
159. **The "Green" Plan for Healthcare Facilities**
Hanyi Yin and Donita Brown, Business
160. **Measles Rash Image Detection Using a Convolutional Neural Network Approach**
Kimberly Glock, Andre Louie, Charlie Napier, and Todd Gary, Computing and Technology
161. **Designing a Data Science Exploration of 125,000 US Wildfires to Lower Cost, Save Lives, and Increase Efficiency.**
Janaar Harbour, Olivia Samples, Kun Zhao and Todd Gary, Computing and Technology
162. **A Multigraph-Based Approach for Improved Music Recommendation Systems by Connecting the Artistic Relationships of Musical Groups**
R Waggoner, Randi Dunkleman, Laura Gau, and Todd Gary, Computing and Technology
163. **Reverse Transfer: A Mixed-Methods Study Examining the Graduation Rates of Reverse Transfer Students and Their Motivations and Perceptions of the Process**
Alex Atkinson, Prentice Ashford, and Emily Mofield, Education
164. **The Impact of ACT Preparation Courses on Student ACT Performance**
Alesha Harmon, Sheryl Rae Reid, Yvette Mallory and Emily Mofield, Education
165. **Effects of Writer's Workshop on Students' Writing Skills**
Kristin Sessler and Lonnie Cochran, Education
166. **How Students' Self-Reported Test Anxiety Correlates to Student Test Grades**
Emma Woody and Lonnie Cochran, Education

167. **K Modes algorithm software for submolecular protein structure prediction**
Thomas Townsley, Kirk Durston, James T. Wilson, Harrison Akers, Salvador Cordova, T.L. Wallace and Joe Deweese, Pharmaceutical Sciences
168. **Analysis of a Multimodal Technology-Based Solution for American Public Transit**
Emily Rutter, Ahmed Alhaddad, and Dodd Galbreath, Sustainability
169. **Comparing Bariatric Surgical Outcomes in Patients with Diabetes**
Josh Davenport, and Matthew Steidl, Physician Assistant Studies
170. **Modified Geriatric Depression Scale (GDS) Scores Among Individuals with Mild Cognitive Impairment**
Shelby Leoni, Kaitlynn Logsdon, Camdyn Gilbert, John Cole Suey, Kacie Pennington, Luke Schueller, and Katie Osborn Spirko, Psychology, Counseling, and Family Science
171. **Moderators of cerebrospinal fluid and plasma biomarkers of neurodegeneration in relation to cognitive decline**
Katie Bowder and Katie Osborn Spirko, Psychology, Counseling, and Family Science
172. **Redemption Begins with Women**
Hunter Maerz and John Mark Hicks, Theology and Ministry

Graduate Poster Presentations

173. **Clinical Impact of a Free Diabetes Management Program at A Clinic for Uninsured Patients**
Kristine Hoang and Sarah Uroza, Pharmacy Practice
174. **Can A Voice Call Improve Adherence Rates in Patients Using Oral Antidiabetic Medications?**
Christopher Deshawn Bowens, Richard Randolph, and Benjamin Gross, Pharmacy Practice
175. **Evaluating The Effects of the Diabetes Prevention Program Teaching Style, Group Versus One-On-One Education Sessions, On Weight Loss and A1C Reduction.**
Jasmin Valentin and Benjamin Gross, Pharmacy Practice
176. **Implementation of a Pharmacist-Led Smoking Cessation Service for Chronic Obstructive Pulmonary Disease (COPD) Patients in a Primary Care Clinic**
Hannah Boren and Benjamin Gross, Pharmacy Practice
177. **Impact of independent community pharmacies creating and implementing e-clinical care plans, based on Flip the Pharmacy (Ftp) transformation models, on patient health and economic outcomes**
Meron Tegete and Benjamin Gross, Pharmacy Practice
178. **Intraleural Alteplase Prescribing on an Academic Trauma Service**
Samuel J. Schiltz and Susan Hamblin, Pharmacy Practice
179. **The Efficacy of Topical Silicone Products in the Prevention of Hypertrophic Scarring**
Maia Matyas, PA-S and Susan Hamblin, Pharmacy Practice
180. **Pediatric Physical and Emotional Effects from Smart Device Use**
Jana Reichenberger and Susan Hamblin, Pharmacy Practice
181. **Risk and Benefits of Fecal Microbiota Transplant in Immunocompromised**
Athena Reese and Susan Hamblin, Pharmacy Practice
182. **Evaluation of Mechanical Circulatory Support Device use in Cardiogenic Shock Following Acute Myocardial Infarction**
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214. **Comparing First and Second Line Treatments for Severe Pediatric Immune Thrombocytopenia Purpura**
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215. **Melatonin and its Efficacy in the Treatment of Insomnia**
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216. **A Comparison of Robotic-assisted versus Conventional Manual Total Knee Arthroplasty**
Cade C. England and Kelly Smart, Physician Assistant Studies
217. **Teplizumab Drug Therapy in Type 1 Diabetes Mellitus**
Shannon Postle and Lauren Webb, Physician Assistant Studies
218. **Treating Adolescent Polycystic Ovarian Syndrome**
Ashton Perez and Matthew Steidl, Physician Assistant Studies
219. **Managing Acute Appendicitis with Antibiotics Compared to Appendectomy**
Elizabeth Mathers and Kelly Smart, Physician Assistant Studies
220. **The Efficacy and Safety of Ketamine Use on Depression and Suicidal Ideation**
Kaitlin Dinh and Kelly Smart, Physician Assistant Studies
221. **The Role of Hyperbaric Oxygen Therapy in the Management of Diabetic Foot Ulcers**
Terra Lomber and Lauren Webb, Physician Assistant Studies
222. **Protocols to Use in Consideration of the Optimal Timing of Palliative Care Implementation for the Oncology Patient**
Payton Tidwell and Patrecia Eaton, Physician Assistant Studies
223. **Animal-Assisted Therapy Treating Mental Health Disorders**
Ashley Beyke and Linda Elrod, Physician Assistant Studies
224. **The Influence of Diet and Antibiotic Use on the Pathogenesis of Inflammatory Bowel Disease**
Fariha Ghazi and Linda Elrod, Physician Assistant Studies
225. **Chimeric Antigen Receptor T-Cell Therapy**
Timothy Schorkopf and Laruen Webb, Physician Assistant Studies
226. **The Long-Term Effects of Concussions Sustained during Childhood, Adolescence or Young Adulthood**
Matthew Thomas Beauregard and Linda Elrod, Physician Assistant Studies
227. **Factor Xa Inhibitors versus Vitamin K Antagonists for Stroke Prevention in Patients with Atrial Fibrillation**
Morgan Long and Lauren Webb, Physician Assistant Studies
228. **Factors Decreasing Secondary ACL Injuries**
Megan Knoernschild and Lauren Webb, Physician Assistant Studies

229. **Comparing the Efficacy of Vyvanse and Ritalin in ADHD Diagnosed Adolescent Patients**
Evan Forhertz and Matthew Steidl, Physician Assistant Studies
230. **Considerations for BMI Restriction in Lower Limb Arthroplasty**
Destinee Fowler and Mathew Steidl, Physician Assistant Studies
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Will Bradshaw and Lauren Webb, Physician Assistant Studies
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Jessica Baker and Linda Elrod, Physician Assistant Studies
233. **The Role of Vancomycin Powder in the Prevention of Surgical Site Infections**
Jenny Muesing and Kelly Smart, Physician Assistant Studies
234. **Outcomes of Radial Vs Femoral Artery Access for Cardiac Catheterization**
Haili Byington and Marie Patterson, Physician Assistant Studies
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Jon Rapacz and Marie Patterson, Physician Assistant Studies
236. **Vaping: A Rising Health Concern**
Johnny Le and Lauren Webb, Physician Assistant Studies
237. **The Efficacy and Safety of Ketamine Use on Depression and Suicidal Ideation**
Kaitlin Dinh and Kelly Smart, Physician Assistant Studies
238. **Benefit in Treatment and Prevention of Cardiovascular Consequences in Rheumatoid Arthritis**
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239. **Trauma-Informed Compassion-Focused Therapy and Adult Victims of Sex Trafficking**
Ana Paula Ar'valo Laveaga, Chris Gonzalez, Psychology

Undergraduate Students Oral Presentation Abstracts

A Call to Faith, Prayer, and Forgiveness: A Sermon on Mark 11:12-26

Emmeline Stuart and David Fleer, Bible and Ministry

In my “Communicating the Gospel” class last semester, I spent the course of the term developing and cultivating a sermon over an assigned passage. Throughout our class meetings and outside work, we learned how to be effective communicators and advocates of the gospel in a way as true to the text as possible. We engaged with performance styles similar to that of the original presentation of these texts. The passage that my sermon would come to be over is Mark 11:12-26. In this passage of scripture, Jesus richly and radically depicts what he desires of his followers: faith, prayer, and forgiveness. While some of this can be inferred upon multiple readings of this text, with further study one finds that deeper implications emerge. I consulted and engaged with biblical commentaries, articles, and personal experience to help shape my understanding of this text and its meaning. My sermon is a call to what I found this text to mean. It is an invitation for the church to wrestle truthfully with whether or not we have lived out the radical claims of faith, prayer, and forgiveness that Jesus calls us to every day.

Sabbath: Recognizing Our Futility in Light of a Good God

Corey Shannon and Lauren Smelser White, Bible and Ministry

In a culture obsessed with productivity and suffering from workaholism, it is vital that modern western Christians assess how these values have impacted our perspectives and seek alternative ways of being God's people. As the New Israel (see 1 Peter 2:9), the church has much to learn from the faith community with whom God walked throughout Old Testament Scripture. This paper argues that Israel--a people surrounded by violent and oppressive cultures--provides a glimpse of an important way we can live as a contrast community in a world caught up in doing things better and faster: through the practice of Sabbath. A defining commandment given to Israel at Mount Sinai, *shabbat* called for a threefold practice of reorientation, remembrance, and rest. It was built on the expectation that when we recognize the futility of human striving we can truly know the goodness of God, remember His mighty works, and rest in His power and love. This paper argues that incorporating Sabbath into our own weekly rhythm is long overdue, not as a few hours dedicated to Sunday worship services, but as a full day set apart for renewal and deepened intimacy with God. The implementation of such a rhythm could be a catalyst for the western church to experience and model what Christ promised: a peaceful, joy-filled, and generous life in relationship with God, one another, and the creation.

Preparation and Clinical Testing of Psoriasis Gels as a Potential and More Efficient Treatment Option for Psoriasis

Manvitha Indukuri and Florah Mhlanga, Biology

Psoriasis is a medical condition that results in a faster life cycle for skin cells. As a result, there is a buildup of skin cells on the epidermis. Many drugs aim to treat the disease by slowing the growth of the cells. The current drugs available in the Indian Market for this chronic condition have been associated with many side effects and organ damage. We attempted to formulate a drug that minimizes this damage. A more efficient delivery of the drug along with minimal traces of the drug in the systemic circulation was observed. The amount of drug delivered is also greatly increased because of direct topical usage. Approved human clinical trials have shown that there was minimal to no damage or side effects that were attributable to the drug. Parameters like blood pressure, heart rate, insulin levels, liver function, iron levels, oxygen levels, and organ functions were assessed. Further studies assessing the parameters of drug stability are in progress.

Determining developmental pathways that might differentiate IBD from potential biomarkers.

Elizabeth G Fisher and Amanda D. Williams, Biology

Ulcerative Colitis (UC) and Crohn's Colitis (CC) have been heavily misdiagnosed or ruled indeterminate colitis (IC) due to lack of ability to distinguish between the two. This inconclusive diagnosis can lead to procedures (such as ileal post-anal anastomosis) that can increase an IC patient's ability to get Crohns post-operation. In light of this pressing medical need, the following particular IBD project serves to find potential biomarkers that can aid in the diagnosis of IBD, ultimately eliminating the risk of undergoing misdiagnosis and improper treatments. To begin finding a candidate marker for differentiating UC and CC, a transcriptome analysis was done to compare tissue from both UC and CC patients in order to identify and consolidate candidate genes, ultimately highlighting potential pathways to study. This research is in the developmental biology pathway, which is upregulated in Crohn's Colitis. My ongoing research has been done in the pursuit to attempt to find developmental genes responsible for causing the crypt stem cells to differentiate into paneth cells instead of progenitor cells. The three developmental proteins I have worked with so far are DAB1, PTP-H1, and HOOK1.

The Effect of Nest Placement and Temperature on Reproductive Success in the Barn Swallow

Perri Haga and John Lewis, Biology

Barn Swallows are obligate insectivores, and with the predicted collapse of insect populations, the implications for Barn Swallow populations necessitates a close look at their behavior and survivorship. For Barn Swallows, coloniality has evolved largely out of necessity due to limited nesting sites. This study was designed to study the effects of coloniality, specifically nest placement, on Barn Swallows' reproductive success. Data was collected during the breeding season of one colony at Warner Park Nature Center in Nashville, Tennessee. Nests were monitored at least one time per week to determine survivorship, and data was collected on nest temperature, height, and placement on the building within the colony. We hypothesized 1) high nest temperature would be detrimental due to nestlings unable to regulate temperature, 2) increased height would increase survivorship by lowering predation risk, and 3) greater nest density would have a negative effect on reproductive success as risks for predation and disease increased. Results indicated a slight negative relationship between temperature and total nestlings, fledglings, and percent fledged, with correlation coefficients ranging from 0.03 to 0.22. A slight negative correlation was also found concerning nest height with coefficient values ranging 0.03 to 0.53. Nest distance, visibility, and density did not seem to have an effect. Collectively, this study begins to give insights into the effects that limited nest-site selection may have on survivorship of the Barn Swallow, a significant inquiry for understanding the future of the species.

Comparing the Effects of CBD and Hu-331 on the Neurological Development of Embryonic *Danio rerio*

Avery Roland and Bonny Millimaki, Biology

Cannabidiol (CBD) is a major non-psychoactive component of marijuana, which has become a popular health and wellness drug readily available to the public. In addition, CBD has recently been approved by the FDA as a therapeutic drug to combat seizure disorders in patients two years and older. However, there is limited research on potential negative effects of CBD exposure, especially on the developing nervous system. Using *Danio rerio*, Zebrafish, as a model organism, we are currently investigating the impact of CBD exposure on early neurologic development. CBD has been shown to oxidize into Hu-331, a known catalytic inhibitor of Topoisomerase-II beta (TOP2B), which is involved in DNA replication. Our lab's previous research with Hu-331 suggests that exposure during early neurological development results in dose dependent axon guidance defects correlating with behavior and reflex deficits. Observations of tail

neuron length, survival of embryos, and hatching rates suggest CBD has similar effects on neural development when compared to Hu-331.

The Impact of Equine Therapy on Children with Disabilities

Tommi Lynn and Florah Mhlanga, Biology

Equine therapy or hippotherapy is widely used by trained physical, occupational and speech therapists. It is defined as a physical, occupational, and speech therapy that utilizes the natural gait and movement of a horse to provide motor, and sensory input. Horses have the ability to induce anatomical movements in children with disabilities and to positively impact the patient's locomotion, cognitive ability, and psychological wellbeing. The horse offers a multifaceted system of stimuli to the patient including movement in all three planes for muscle stimulation, tactile stimuli and cognitive stimulation. The main objectives of this study were i) to review the literature on impacts of hippotherapy and ii) to evaluate the effect of equine therapy on children with disabilities. For the second objective, observational data on locomotion before and after hippotherapy was provided by a physical therapy clinic that uses horses as a part of the physical therapy program with their patients. The data came from clinical records of 19 patients. The identity of the children was not revealed. The physical disabilities included cerebral palsy (47%), and Joubert Syndrome (15.8%). Time in hippotherapy ranged from three months to six years. The hippotherapy was conducted at Saddle Up! in Nashville, TN. The clinical records showed significant improvement in locomotion and muscle strength after hippotherapy. From both the literature review and the observational study, it seems hippotherapy is a unique and highly beneficial form of therapy that has a significant impact on children with disabilities physically, mentally, and emotionally.

Analysis of Smooth Muscle Contraction Pathway Proteins as Potential Biomarkers for IBD

Haley Kling and Amanda D. Williams, Biology

Although inflammatory bowel diseases (IBD) were once thought of as a western disease, Crohn's and ulcerative colitis are a growing world-wide problem. Morphological similarities between the two diseases makes it very difficult for clinicians to effectively differentiate the two. Both illnesses are found in the mucosal lining of the colon; however, Crohn's colitis (CC) can leave the mucosal lining in some instances. When CC remains localized to the mucosal layer, diagnosing patients with either UC or CC becomes very difficult. It is important to note the difference in Crohn's colitis from Crohn's disease (CD). Crohn's disease is found in the GI tract and can be anywhere from mouth to anus, whereas CC is strictly localized to the large intestine. Because of the similarities between UC and CC, about thirty percent of patients are not able to be accurately diagnosed according to previous research. The treatments for the two diseases vary greatly, so being able to accurately diagnose one from the other is vital. A patient diagnosed with ulcerative colitis (UC) can receive IPAA surgery. Therefore, a misdiagnosis of UC causes many complications if the patient finds out they have CC after receiving IPAA surgery. To determine which genes are upregulated in UC or CC, a microarray was conducted using RNA extracted from human colon samples. The resulting microarray data was put into Reactome pathway analysis software which showed upregulation of the smooth muscle contraction pathway in UC and no evidence of upregulation in CC. From this pathway, various proteins are under investigation in an effort to prove their hypothesized upregulation in UC samples. Bradford assays were run on all colon samples to ensure viable protein concentrations before running western blots for these proteins of interest. Because very little is known about ulcerative colitis biologically, recognizing that there is, in fact, upregulation in a specific protein is important for finding a pathway to help gain an understanding of this IBD and to potentially utilize the protein as a diagnostic biomarker.

TRAF4-Induced Expression of Proinflammatory Cytokines in Colon Adenocarcinoma

Theodore Reed, and Jon Lowrance, Biology

Toll Like Receptor 4 (TLR4) is an innate immunity receptor expressed on all nucleated cells in the human body. The stimulation of TLR4 induces the release of proinflammatory signaling molecules called cytokines as a response to the lipopolysaccharide (LPS) pathogen-associated molecular pattern (PAMP) associated with gram negative bacteria. Excess inflammation is a known influencing factor of cancer development and this can be caused by a lack of regulation of cytokine-producing cellular pathways. Preliminary research conducted by this lab showed that the stimulation of TLR4 with short-chain fatty acids (SCFA) triggers an upregulated response in colon adenocarcinoma cell lines (Caco-2). TRAF4 is a cytosolic protein and is known to negatively regulate the TLR4 MyD88-dependent signaling cascade. This signaling cascade activates the NF- κ B transcription factor which activates genes that code for proinflammatory cytokines such as TNF- α , IL-6, IL-8, and IL-1 β . This lab is interested in knocking down TRAF4 using silencing RNAs (siRNAs) in a primary cell line (NCM-460D). This data will be used to compare the release of TNF- α , IL-6, IL-8, and IL-1 β between cell lines. We hypothesize that when healthy cells undergo siRNA knock down of the TRAF4 mRNA, they will release a similar proinflammatory cytokine assay as the stimulated cancerous cells. These data are relevant to cancer immunotherapy research as a potential pathway to target with combinational therapy if the hypothesis is correct.

Ultrafine Carbon Black Promotes Lysosomal Membrane Permeabilization and NLRP3 Inflammasome Activation

Jennie Hibma and Jay Brewster, Biology and Pepperdine Natural Science Division

Ultrafine carbon black (CB) particulates, a central component of diesel exhaust, can contribute to adverse health effects on the lungs, heart, and nervous system when high exposure induces chronic inflammation. To examine the capacity for ultrafine CB (~30-130 nm in diameter) to accumulate in RAW267.4 mouse macrophages, endocytosed particulates were quantified via absorbance readings (A595) following varied CB treatments at time points from 0-48 hours. Results show a gradual accumulation over time, with significant accumulation detected after 2 hours of exposure with doses of 25, 50 and 100 ug/ml. Additional studies used THP-1 monocytes differentiated with phorbol-12-13-acetate (PMA) into macrophages to evaluate inflammasome signaling. To examine the hypothesis that CB accumulation impacts membrane integrity in lysosomes and phagolysosomes following endocytosis of the particles, we assessed cathepsin B release into the cytosol and Galectin-3 localization to lysosomal vesicles. Results indicated a model of CB-induced lysosomal membrane permeabilization (LMP). Finally, we hypothesized that CB could stimulate inflammasome assembly and a subsequent production and release of IL-1 β . Prior to CB treatment, THP-1 macrophages were stimulated with lipopolysaccharide (100ng/ml) to upregulate expression of inflammasome components such as NLRP3 and pro-IL-1 β . To assess inflammasome assembly and activity we measured ASC oligomerization, formation of cytosolic ASC “specks”, and IL-1 β accumulation in the extracellular environment. Analysis of ASC oligomerization as well as fluorescent tagging of ASC oligomer complexes (specks) provided some evidence for CB activation of the inflammasome, though a clear potential for LPS to similarly stimulate the inflammasome was observed.

Analysis of Nephilysin Knockdown in Triple Negative Breast Cancer

Reed Haga and Beth Conway, Biology

Triple-negative breast cancer (TNBC) makes up 10-15 percent of all breast cancers and is characterized by a lack of surface estrogen, progesterone, and HER2 receptors. TNBC is denoted by its resistance to treatment methods such as hormone therapy, HER2 targeted therapy, and reduced effectiveness of chemotherapy options. The PI3K pathway receives extracellular signals which in turn activates an intracellular signaling cascade with a variety of impacts on cellular functions such as metabolism, proliferation, invasion, and metastasis. PI3K mutations present as one common mutation amongst TNBC tumors suggesting PI3K modulation shows great importance in TNBC. Nephilysin (NEP), a zinc metallopeptidase, or surface protease capable of cleaving small peptides such as ET1, insulin, and angiotensin, may have effects on PI3K activation through small peptide cleavage. To determine whether

NEP mediated cleavage influences PI3K activation, NEP was knocked down using shRNA plasmid in TNBC cells. Stably transfected cells were then selected and subjected to western blotting for NEP. Although we were able to confirm knock-down at the mRNA level, protein expression in control cells was too low to observe efficient knock-down. Therefore, we will change to a cell line expressing higher NEP protein for future experimentation.

The Effect of CBD on Neurological Development in Danio rerio

Kyra Drobny and Bonny Millimaki, Biology

Cannabidiol (CBD) is a major non-psychoactive component of marijuana, which has become a popular health and wellness drug readily available to the public. In addition, CBD has recently been approved by the FDA as a therapeutic drug to combat seizure disorders in patients two years and older. However, there is limited research on CBD's effects, especially on the developing nervous system. Using Danio rerio, Zebrafish, as a model organism, we investigated the impact of CBD exposure on early neurologic development. CBD has been shown to oxidize into Hu-331, a known catalytic inhibitor of Topoisomerase-II beta (TOP2B), which is involved in DNA replication. Our lab's previous research with Hu-331 suggests that exposure to Hu-331 during early neurological development results in axon guidance defects and related behavior and reflex deficits. We have begun investigating if exposure to CBD through the stages of early neural development will result in similar neurological deficits. Hindbrain neuron development, as well as behavioral and phenotypic data, will be observed in a dose-dependent manner. Preliminary data has led us to hypothesize CBD exposure will result in neurological development deficits similar to those seen with Hu-331.

The Effect of HD5 on Cell Death in Normal Human Colonocytes

MiKayla Scillion, and Amanda D. Williams, Biology

Inflammatory bowel disease (IBD) affects three million people in the United States every year. The two forms of IBD are Ulcerative and Crohn's colitis, and they are often misdiagnosed as each other. It was previously discovered that the innate immune peptide, alpha defensin-5 (HD5), is upregulated and secreted in the large intestine of patients with Crohn's colitis. Our lab is seeking to determine the effects of overexpression of HD5 in the human colon. Previous trypan blue assays performed in our lab showed that an increase in the concentration of HD5 leads to an increase in cell death. This leads us to ask what kind of cell death is taking place in this instance. Flow cytometry was performed to analyze whether apoptosis or necrosis was more prevalent in these cell samples. We predict that we will see apoptotic activity due to the abnormal inflammatory characteristics of Crohn's colitis.

TLR4 Isotype Abundance in Human Colonocytes with Acetic Acid Treatment

Kelly Roy and Jon Lowrance, Biology

Toll-like Receptor 4 (TLR4) is a membrane protein that plays a role in pathogen recognition and stimulation of the innate immune system. Specifically, TLR4 is a receptor for lipopolysaccharides (LPS) and induces an LPS-mediated inflammation. Current literature and our preliminary data have indicated that there is an upregulation of TLR4 in cancerous colonic epithelial tissue likely due to activation by short chain fatty acids (SCFAs), a byproduct of microbial fermentation. There are three known isoforms of the TLR4, which differ in the expression of certain sequences or domains within the protein. TLR4 is roughly an 850 bp sequence that consists primarily of beta sheets and a smaller proportion of alpha helices that form LRR domains along with the TIR domain. Isotype 1 consists of the entire 839 bps, isotype 2 lacks the first 40 bps, and isotype 3 lacks the first 200 bps. The predominant isotype expressed when treated with SCFAs like acetic acid, was determined using qPCR analysis with specific primers that are designated to the appropriate sequences that are associated with each isotype. NCM460, a normal cell line, and Caco2, a

cancerous cell line, were treated with acetic acid for either 12 or 24 hour periods. This data may help delineate which TLR4 isotype is most abundant after treatment with acetic acid.

A Case for Diversity in the Healthcare System

Deranique Jones, Shaniya Pleasant, and Florah Mhlanga, Biology

The United States is known for its racial and ethnic diversity, and it is increasing. Despite the diversity of the country, it is not reflected in our healthcare system. Diversity goes far beyond a language barrier; it encompasses culture, gender, sexual orientation, religion, and socioeconomic level. Our current healthcare system exhibits a white, male majority, with approximately 60% of physicians being male and approximately 70% of physicians being white. When a highly homogeneous healthcare system is caring for extremely diverse populations, the quality of care often times can suffer. Our paper will discuss the history of our homogeneous healthcare system, the unintended problems that have arisen due to the increasing diversity of our country, and why diversity in healthcare is necessary. While our research may seem like an indictment on our healthcare system, we recognize the growth it has experienced and we are hopeful for the future of the workforce we aspire to enter.

Teaching Students about Chirality

Robert King, Rylee Davie, Rebecca Duke, Owen Glogovsky, Melica Nikahd, Lakelyn Reed, and Matt Vergne, Department of Chemistry and Biochemistry

About half of drugs marketed are chiral molecules, and of these 90% are marketed as racemic mixtures of equal amounts of enantiomers. However, enantiomers can differ in the pharmacological activity due to the interactions with stereoselective receptors in biological systems. About 10% of chiral drugs are marketed as single enantiomers. Despite the importance of chirality in pharmaceuticals, there are few published chemistry lab procedures for teaching upper-level chemistry students about chirality. The Advanced Integrated Lab created a lab procedure to separate enantiomers of a chiral drug, cetirizine (brand name: Zyrtec) with high performance liquid chromatography (HPLC). Students compared chromatograms of cetirizine and levocetirizine, which is the single enantiomer version of cetirizine (brand name: Xyzal). Students processed cetirizine and levocetirizine tablets by crushing the tablets and dissolving tablets in methanol. The extracted drugs in methanol were injected into the HPLC. The students also created a calibration curve with racemic cetirizine. The learning objective, to understand drug chirality and chromatography, was met in this lab. The lab will be appropriate for analytical chemistry, instrumental chemistry, and other third and fourth year chemistry course labs.

The Mechanism of the Catalysis of the Claisen Rearrangement of Chorismate to Prephenate by Chorismate Mutase

Niyati Pathak and Kent Clinger, Chemistry and Biochemistry

Chorismate mutase is an important enzyme in the shikimate pathway catalyzing the Claisen rearrangement of chorismate to prephenate, a key step in the biosynthesis of the aromatic amino acids: phenylalanine and tyrosine in bacteria, fungi and higher plants. This aromatic amino acid synthesis pathway is absent in animals. Catalysis through the Claisen rearrangement is a rare example of a biochemically catalyzed pericyclic reaction. The enzyme exists as trimeric subunits with active sites shared between two neighboring subunits. The enzymatic mechanism does not involve any covalent interaction between the enzyme and the substrate with the transition state being electrostatically stabilized. Electrostatic interactions of the critically located Arg 6/7 and Arg 90 residues with two carboxylates of chorismate place it in a reactive conformation to spontaneously undergo the Claisen rearrangement.

Crystallization of Vanadium Dependent Haloperoxidases from *Asparagopsis taxiformis*

Owen Glogovsky and Kent Clinger, Chemistry & Biochemistry

Bromoform is a halogenated methane compound that is responsible for depleting stratospheric ozone. It is abundantly produced by a number of marine organisms including the red macroalgae, *Asparagopsis taxiformis*. This macroalgae uses vanadium dependent haloperoxidases (VHPOs) to produce bromoform. In order to understand the characteristics of the VHPO enzyme/substrate complex, transcripts of the protein were prepared for crystallography. Using fast protein liquid chromatography, one of the two bromoform producing VHPOs were purified and subsequently crystallized for later crystallographic analysis.

Structural Properties of Halogenated Fused-Ring Cyclopropanes

Robert King and Kent Clinger, Chemistry and Biochemistry

This research presentation will present both the synthesis and structures of various halogenated cyclopropanes, some of which are newly discovered. In terms of synthesis, this research examines carbene reactions to add halogenated cyclopropane rings to larger unsaturated rings. In addition, the reaction can be adjusted to control whether one or two cyclopropane rings are added to cyclohexa-1,4-diene and cycloocta-1,5-diene. Many crystals of these compounds have also been studied by x-ray diffraction. The most significant insight which we hope to attain from these data is the preference for cis or trans isomerism. Since only one of the compounds examined in this research has been observed as having a cis configuration, the information collected from this x-ray diffraction will provide insight into the preferred isomers in terms of different halogens being added to the outer cyclopropane rings and the varying sizes of the central ring. In addition, this x-ray crystallographic data will be compared to the computational results.

Data-Guided Permeability Estimations for Polymeric Membranes

Rebekah Duke, Konstantinos Vogiatzis, Jacob Townsend, and Kent Clinger, Chemistry and Biochemistry

Gas separation is a promising method for carbon emissions reduction, oxygen purification, and natural gas sweating. Using polymer membranes for this process shows great potential to improve its energetic and economic efficiency. However, there are countless polymers and few ways to determine each one's potential gas separation utility. We present machine learning techniques to develop a model for predicting polymer permeability coefficients. To train the model, we introduced monomer structures and permeability coefficients from a database of approximately seventy polyimide polymers with experimentally determined permeability coefficients for O₂, N₂, CO₂, and CH₄ gases. The machine learning model uses as input the monomeric structures in one of three molecular fingerprinting formats: a persistence image derived with persistence homology, a bag-of-bonds array, and a Coulomb matrix. In addition, we tested a plethora of machine learning algorithms to optimize the prediction performance. Ultimately, persistence images coupled with a neural network produced the most accurate model predicting permeability coefficients. If applied to a larger training data set, the model is the suggested method to predict polymer permeability and direct future polymeric research.

A Parallelizable Algorithm for the Generation and Analysis of Mutation Matrices

Isaac Saffold and T. L. Wallace, Computing and Technology

A more complete understanding of genetic mutation may be feasible via numerical ensemble simulations based upon binary tree models. Conveniently, mutations and their propagation over time can be modeled via matrices, and thus the tools of linear algebra can be applied to their study. The current approach uses mutation matrices and explores statistics about their eigenvalues which may be used to make predictions based upon various hypotheses and use cases. An algorithm, implemented in parallel, has been developed to generate these matrices and perform statistical operations on them. Certain aspects of the model and the methods used have improved over time, as new information and insights have led to the evolution of their theoretical basis. The algorithm has been revised accordingly. A review of the algorithm, C++ code, and measurement of the time required to perform two types of matrix decomposition is to be presented.

Cyber Security Education: A Game Inspired Solution

Aaron Thompson and Chris Simmons, Computing and Technology

Cyber Security Education: A Game Inspired Solution Today, we are more connected than ever through the internet. However, this in and of itself poses a problem that the internet is not prepared for. When the internet was created, security was pushed to the wayside in favor of function. And this was fine for when they were creating it, but now it poses a greater issue. Any normal person with the time, patience, and a laptop, can find out anything about anyone; this can be extremely dangerous in today's world. It's easier today to figure out where someone lives, things that a person may have done, and even where someone went to high school, all due to us being more connected to the internet. The issue, how are we supposed to secure ourselves? And most importantly, are we doing enough to pass the issue of securing our personal information to the younger generations. The purpose of the research that we are conducting is to assess the cyber security knowledge of high schoolers in 3 different level income high schools. We will test this knowledge by using a five-part survey. The five parts being: technology access, mobile usage, cyber security efficacy, cyber security training in school, and internet browsing traits. These five parts of our survey will allow us to draw a conclusion as to how income level affects cyber security training in schools, what students in high school actually know about cyber security and will overall allow us to be able to create a better curriculum in order to better educate the students of the Nashville area. The game that we have planned to implement as a "hook" to the program is called "Potato Pirates 2: Enter the Spudnet". This game is currently in development by the group called Codomo, and can be found on kickstarter. This game is meant to help people understand 2 things. First, how does the internet actually work? It uses warehouses and shipments as routers and packets to help people try to understand the concept. The second part is how certain attacks work like a man-in-the-middle attacks. We believe that, while utilizing this game as our "hook", it will give kids a good baseline understanding of cybersecurity, so that if this is their cup of tea, they will have enough information to be able to build up their knowledge through research now that they understand the basics.

Launching the Nashville International Airport (BNA) Online Merchandise Store

Abby Miller, Kayla Wood, Katie Christ, Mason Thomas, Katrina Hughes, Aleksa Loch, and Aerial Ellis, Communication and Journalism

Our student-run PR firm Herd House will help launch an online merchandise shop for the Nashville International Airport (BNA) slated for an April kickoff. Our goal is to produce a social media campaign to support the launch of this online store in conjunction with the enhanced branding strategy in place for the present expansion of the Nashville airport. We will present our research including the findings, strategies and tactics developed for this plan. Herd House is an entity sponsored by Lipscomb University's Public Relations Student Society of America (PRSSA) chapter.

Brick by Brick: Building an On-Campus Public Relations Firm

Josh Odum and Aerial Ellis, Communication & Journalism

In Fall 2018, a group of public relations students at Lipscomb founded Herd House, an on-campus public relations firm open to students. The goal was to give young professionals in the field of strategic communications valuable experience with firm life and responsibilities. Though Herd House encountered many pitfalls and roadblocks along the way, the yearlong project laid the foundations for a profitable in-house PR firm that will serve students and Nashville-area clients for years to come.

Continued Observations of Clinical Presentations of Waterborne Illness Symptoms with and without Access to Clean Water in Guatemalan Villages

Avery Roland and Kirsten Dodson, Engineering

Illness due to lack of clean water is one of the top causes of death worldwide. It is estimated that 2.2 million deaths per year are due to symptoms associated with waterborne pathogens (eg. weakness, nausea, diarrhea, and vomiting). An annual medical mission team noticed that the local villages in Guatemala seen by their clinic had no access to clean water. Many villagers presented with symptoms and signs of illness similar to those that correlate with waterborne disease. Due to the lack of diagnostic equipment, confirmation of any diagnosis is difficult, but it was hypothesized that contaminated water was likely a factor of many of the illnesses. In mid-2018, a water system was installed in the village where the clinic is located, Setzimaaj. The water system provides clean water for 127 families, and within the first year, the clinic saw a significant decrease in patients presenting with waterborne illness symptoms. Another water system was installed mid-2019 in La Reforma, a village also seen by the clinic. Decreased clinical presentations of waterborne illness symptoms are expected.

On Beginning and Ending; Analysis of T.S. Eliot's "East Coker"

Ryan Gabriel Wilson and Jan Harris, English and Modern Languages

"East Coker" begins with an attempt to impose meaning on life by rooting oneself in shared histories; the speaker finds community in being within East Coker. The poem then moves into moments of spiritual importance and the effect of writing and language. In Wilson's paper, he argues the transition toward spiritual understanding is deeply set in the exploration of the speaker's thought and desire to share their divine experience. If the speaker's experience is as demanding linguistically as they claim it to be, "East Coker" threatens to be the most austere of Eliot's Four Quartets. Wilson's paper explores the work of the speaker to unlock their rigidity through the address of the "via negativa", a theology of negation.

An Artist's Moments of Being in Virginia Woolf's To the Lighthouse

Tori Thurmond and Jan Harris, English and Modern Languages

Virginia Woolf is known for her progressive views surrounding women's roles in society. Her novel *To the Lighthouse* explores feminist ideas through her characterization of the female artist. Thurmond's research explores the role of the artist figure in Virginia Woolf's novel *To the Lighthouse* by examining Lily Briscoe's relationships with others and herself. This research discusses Woolf's ideas on moments of being and authentic self. Thurmond's paper compares Woolf's views on being and chatter with those of philosopher Martin Heidegger to give the reader context for the novel specific content. This paper illuminates the value Woolf places in the female artist by following Lily's journey of empowerment throughout the novel.

Virginia Woolf's "The Waves" and Louis' Development of Otherness

Emerson Loudonback and Jan Harris, English and Modern Languages

Virginia Woolf's book *The Waves* explores marginalization and otherness through the character of Louis. Louis' development as a child, adolescent, and adult is shaped by his interaction with the other characters: Bernard, Neville, Jinny, Susan and Rhoda. Louis' separation from his peers presents itself through his foreign Australian nationality and in his struggle to learn alongside the other kids, when they reach higher education where Louis becomes a scholar. He is separated from other boys as they take on athletic pursuits and as he keeps to his books. Louis' relationships to the women in the book speak to his like of order (in Susan) and the disruption that being pulled into reality can cause him (with Jinny). Louis' homosexual attraction to Percival, and the effects that Percival has on his writing and on his thoughts throughout the book express Woolf's intent to further Louis' otherness and to speak to the marginalization of non-heterosexual identities.

"Very Near Heaven:" Charles and Sebastian's Relationship as Divine Grace in Evelyn Waugh's Brideshead Revisited

Matthew Smith and Jan Harris, English and Modern Languages

Since Stonewall in the late 1960s, queer people have gained more political access and acceptance. However, a large rift still exists between the queer community and the Church. As the church struggles to situate sexuality in a contemporary context, one may look back to 1944 when Evelyn Waugh published *Brideshead Revisited* and see how spirituality and sexuality can intersect. The novel follows Charles Ryder and tracks his relationships with the Flyte family and more importantly, Sebastian Flyte. The novel explores large encompassing themes of love, loss, and youth. However, my paper focuses on the homoerotic relationship that develops between the two protagonists. Through Charles and Sebastian's relationship, Waugh suggests homosexual relationships can be seen as equal and acceptable to heteronormative culture and asserts that relationships, like Charles and Sebastian's, can be a pathway which leads to divine love and union with God.

Spoken Sacrament: Coinherence Through Speech-Acts in Charles Williams' Descent Into Hell

Jack Webber and Jan Harris, English and Modern Languages

Charles Williams was a mid-twentieth century English poet, critic, and novelist whose fiction married theological-religious ideas with settings which blurred the line between the sacred and the profane. In his novel *Descent Into Hell* Williams conceptualizes the teleological end of human life as coinherence—a divine unification and ideal interdependence of God's creation through His universal love. In the novel, coinherence is enacted through sacramental rituals such as Peter Stanhope's play and Pauline Anstruther's Doctrine of Substituted Love. Through these sacraments, characters move either towards or away from unity with each other. However, the mechanism by which they enact sacrament is unusual. Sacramental moments in *Descent into Hell* occur through characters' speech. The characters employ a combination of performative and constative speech-acts to enact Williams' sacramental notion of coinherence. Williams makes spoken sacrament possible through his sophisticated combination of performative and constative speech-acts with an ideological framework. Using speech-acts, Williams creates sacramental rituals for his characters to choose unification or isolation, equivalent to salvation or damnation in the novel.

The Necessity of Doubt in *The End of the Affair*

Abigail Falk and Jan Harris, English and Modern Languages

My paper wrestles with themes of apophatic theology within Graham Greene's *The End of the Affair*. In Greene's novel the antagonist, Sarah Miles recounts not only her affair with Maurice Bendrix, but also the evolution of her theology. *The End of the Affair* completes Greene's series of "Catholic novels," and its narrative reflects Greene's unorthodox perspective about the twentieth century. The novel embodies Greene's apophatic theology, explicitly as it recounts Sarah's conversion to Catholicism in Book Three. In *The End of the Affair*, Graham Greene transfigures Sarah's doubt into a sacramental state which she must pass through to accept the possibility of God's existence. *The End of the Affair*'s narrative hinges on one conversion moment which I analyze through theologians such as St. Augustine and St. John of the Cross. Greene transcribes the sacramental idea of God working throughout Sarah's life in both positive and negative experiences. Humans live in the tension of being fully human, but also being able to access a sense of spiritual nature. My paper explores how the greatness of Greene's novel lies in its intersection of vulnerability and the pain of human existence. Greene's apophatic theology uses doubt to propel Sarah deeper into a sacramental life and to what is not understood. Sarah's doubt gives her the framework to accept her reality to be transformed into the sacred.

Etymological Changes in Social Media

Hannah Peeler and Jan Harris, English and Modern Languages

Many extralinguistic factors influence the amount of borrowing in a language. The evolution of words can describe the culture's values. Depending on the values of culture the etymological changes can be rapid or slow. Since the rise of social media, one key factor of language change is the internet. The etymologies have evolved faster due to the rise of social media, and platforms, like Twitter, have initiated changes in syntax and word usage due to limited character counts. Other limited character counts items, like memes, abbreviations, and emojis have proliferated throughout the language. Social media is in constant flux, and apps are always trying to make their communication more fluid. Since global communication has never been more accessible, and internet users don't need to interact physically to adopt language changes. In the age of digital media, the conversation around language growth involves the linguistic and nonlinguistic markers that have entered language systems, dialects and registers through social media.

Influence of British Slang on American Culture

Alexa Tully and Jan Harris, English and Modern Languages

Robert McCrum writes *Globish: How the English Language became the World's Language* to educate readers on the expansion of the English language from a global perspective. McCrum analyzes shifts in the development and interpretation of the English language, as he emphasizes English's increasing popularity throughout various parts of the world. English's transformation into a global language includes the development of different types of slang. Although slang can carry a negative connotation, the significance of slang strengthens everyday vernacular. Slang continues to elicit comments like "informal" and "unprofessional," yet much of a speaker's used dialect consists of slang. In recent years, popular culture has enhanced slang's negative connotation. Through books, television, or movies, popular culture slang has become more respected for its contributions to dialectical differentiation. British phenomenon Harry Potter and American classic, *Clueless*, impacted how scholars assess the influence of popular culture in the development and interpretation of slang. British English and American English vary, but their merging of popular culture allows for expanded perspectives about slang as an area of linguistic inquiry.

The History of English in the Effect of French

Ryan Gabriel Wilson and Jan Harris, English and Modern Languages

In Ryan Gabriel Wilson's paper, Wilson works to explore the far-reaching effects of French in Old English. In 1066, the Normans conquer the English relatively quickly under the lead of William the Conqueror. Through the shift in power, the language normalcies shift to include the new language: French. Wilson aims to study the effect of French through the appointment of Norman nobles, the submersion of English culture and language, the extent of word borrowing, and the cultural borrowing in higher society.

From English to Espanol: The Rise of Language Brokering

Ruby Aguilar and Jan Harris, English and Modern Languages

Professional translators are paid to facilitate access to other languages; however, children of immigrants perform this job daily without pay or formal acknowledgment. Educational and psychological researchers first coined the term Language Brokering in the 1990s when immigration into the United States increased. A need for understanding the implications for children emerged. Language Brokering involves children translating for their immigrant or non-English-speaking parents, or family members and is an emerging area of study. Children of immigrants endure the social/ emotional, psychological, academic and cultural stressors resulting from translating for their families in high stakes circumstances. Language Brokering is prominent amongst Latino immigrant communities and is a commonly practiced form of translation in settings such as parent-teacher conferences, grocery shopping, doctor's appointments, medical emergencies, and legal situations. Children of immigrants not only broker English for their families, but they also serve as advocates and representatives, making their work unique and valuable.

The Influence of Code Switching in Classrooms

Emily Blankenship and Cecelia Ramsey, English and Modern Languages

In 1996, a school district in Oakland, California voted to acknowledge the validity of Ebonics [commonly termed by linguists African American Vernacular English (AAVE), more recently known as Black English] as its own dialect. The controversial verdict provoked a widespread debate around questions like: is there a place for Black English in the classroom, what is the place of dialects, what is the role of Standard American English (SAE), how are language and identity intertwined, etc. As it pertains to the classroom, one key consideration in this debate has been the potential of teaching children code-switching. From a sociolinguistic standpoint, code-switching is the decision to use one language or dialect, as opposed to another, based on the social or cultural circumstances. This paper seeks to review recent arguments both in favor and against the use (or legitimacy) of code-switching in American classrooms.

"The Gold Axe"—A Study in Translating Suspense

Brianna Burch and Cecelia Ramsey, English and Modern Languages

French journalist and author Gaston Leroux is best known in the English-speaking world for writing *The Phantom of the Opera*, but he is also celebrated for his substantial contributions to French horror and detective fiction, comparable to English authors such as Sir Arthur Conan Doyle and Edgar Allan Poe. Originally published in a French magazine, Leroux's lesser-known 1912 short story "La Hâche d'Or" recounts the grim tale of a traveler who encounters a mysterious woman with a gruesome secret. Reflecting on my own original translation of the text, using an approach similar to dynamic equivalence, this presentation will address the challenges of translating for the genre of suspense, considering audience, effect, and syntax.

Even Before the Little Brown Speck: Analyzing Rot Within Toni Morrison's The Bluest Eye

Emily Wieman and Sonya Green, English and Modern Languages

The *Bluest Eye* by Toni Morrison tells the story of a young African American girl named Pecola Breedlove who wishes for blue eyes because of a racist world that refuses to accept her. Through this story, Morrison addresses the toxic white gaze by demonstrating its negative effects on *The Bluest Eye*'s characters, specifically the Breedloves, through the idea of rot. Much like Pauline's tooth that falls out because of a cavity that remained unnoticed, "there must have been the conditions, the setting that would allow it to exist in the first place" (Morrison 116). Within "Even Before the Little Brown Speck: Analyzing Rot Within Toni Morrison's *The Bluest Eye*," *The Bluest Eye* is examined through this lens of rot, focusing specifically on the setting and condition that allowed for the brown speck of internalized racism to stick and the Breedloves' varying reactions to this rot which demonstrate the methods of escape used by those living in a white focused society.

Community and Suffering in the Works of Alice Walker

Alex Fleming and Sonya Green, English and Modern Languages

The release of *The Color Purple*'s Academy-award-winning film adaptation in 1985 established Alice Walker's novel as a household name. Ten years after the novel's publication, Walker returned to the world of *The Color Purple* in *Possessing the Secret of Joy*. The latter novel focuses on the struggles of the Olinka, a fictional African people featured in a subplot of the original story. Walker's narratives concern themselves with characters suffering in an oppressive society, but Walker gives the protagonist of *The Color Purple* a much different outcome than the Olinka. The original novel's protagonist Celie decides to escape her situation, while the Olinka become even more deeply rooted in their oppression. Walker asks her readers to consider the differing implications of suffering as an individual and suffering as a group.

Who Owns History: Diasporic Identity Construction in Nathan Englander's Everything I Know About My Family on My Mother's Side

Madeline Stevens and Brandi Kellett, English and Modern Languages

In *Everything I Know About My Family on My Mother's Side*, Nathan Englander explores the ways in which history shapes the identity of communities as well as the individual. The main character, Nathan asks himself if he, an American-born Jew, has a story to tell, ““But what do you do...if you're American and have no family history and all your most vivid childhood memories are only the plots of sitcoms?”” His Bosnian girlfriend responds, ““Those are the stories you tell.”” I will examine how Englander views who "owns" history and memory and who has the authority to talk about Jewish issues and identity. I plan to spend time deconstructing memory's power and examine how history is always present for those in the diaspora. Trauma theory and diaspora construction will be crucial to my research in order to illuminate the concept of positionality and what it means to position oneself as a subject rather than an object when telling a story. Englander's short stories provide insight into the conflict between Jewish groups and how these groups all have claim to the true Jewish identity.

Street Slang and the Trials of the Translator

Brianna Burch and Cecelia Ramsey, English and Modern Languages

Faïza Guène's 2004 debut novel, *Kiffe kiffe demain*, has been celebrated in France for its authentic depiction of young people in the working class and has subsequently been translated into twenty-two languages. Presented as a series of diary entries, the narrative follows Doria, a Muslim girl who lives with her immigrant mother in a housing project on the outskirts of Paris, as she navigates biculturalism, patriarchy, and puberty. Her narrative voice is sometimes poetic, sometimes dry, and is above all peppered with colloquial language, which can be enormously demanding to translate. Published in 2006 as *Kiffe Kiffe Tomorrow*, Sarah Adams's English edition demonstrates the challenges of faithfully rendering slang in translation and different strategies translators can use to resolve them. A side-by-side comparison of both texts illustrates how these strategies are put into practice, but also the semantic consequences the act of translation inevitably leaves on a text.

Zora the Philosopher: Moses, Man of the Mountain as a Commentary on Racial Consciousness

Hutton Cate and Jan Harris, English and Modern Languages

In the wake of the Harlem Renaissance, Zora Neale Hurston published her 1939 novel, *Moses, Man of the Mountain*. In *Moses*, Hurston showcases her experience as a writer and as an African American woman in the first half of the 20th century. Hurston had a unique perspective on race relations in the U.S. because she grew up in Eatonville, Florida, an all-black community. Throughout *Moses, Man of the Mountain*, Hurston employs allegory to shape her commentary about race, class, and identity. Hurston critiques the actions of both whites and blacks from slavery, to abolition, and into the early 20th century. Hurston's novel emphasizes her view that the lack of resolution in American race relations is due to an absence of strong African American identity. *Moses, Man of the Mountain* finishes with Hurston's prescription for how African American society can grasp the racial identity she believes it's missing, at last becoming the truly free people dreamed of since abolition.

The Impact of Emotional and Creative Writing on "The Yellow Wallpaper"

Sara Eaton and Matt Hearn, English and Modern Languages

When Charlotte Perkins Gilman wrote “The Yellow Wallpaper,” she was existing one of the darkest times in her life. This author suffered from severe depression after marriage and the birth of her daughter and had recently endured Silas Weir Mitchell's rest cure. This treatment confined her to bed, where she was forbidden from completing basic tasks, such as feeding or bathing herself, and prohibited intellectual

stimulation. Gilman's health plummeted during this treatment, but once she reentered the literary world with "The Yellow Wallpaper," her health began to improve. While Gilman believed writing aided her mental health, medical professionals at the time rejected this novel idea. Modern day mental health professionals often use two types of writing as therapy: expressive and creative writing. My paper suggests that Gilman's self-prescribed treatment "writing a story using the tenants of expressive and creative writing" was more beneficial than Mitchell's remedy. I support this claim by using psychological studies that examine which patients are most likely to improve from creative therapies in conjunction with Gilman's own diary entries. While the field of psychology has now evolved to study which patients best benefit from literary therapies, I argue that Gilman's utilization of therapeutic writing was ahead of her time and explore this early example of the intersections among medicine, the humanities, and cultural understandings of mental health.

Ecksersees doo steel: lay pasteesh doon amereecanuh

Codie Miller and Cecelia Ramsey, English and Modern Languages

"Ecksersees doo steel" is an ode to the French language and an attempt at imitating some of the most thought-provoking writings to emerge from French literature through a collection of pastiches. In 1947, French novelist and poet Raymond Queneau published *Exercices de style*, or "Exercises in Style," in which he retells the same story in 99 alternate styles. Inspired by Queneau's work, this collection is a series of "exercises in style" in which the author mimics well-known French texts while inserting a contemporary American perspective. This collection explores the power and freedom given to us through literature to fight against the status quo, to inspire our contemporaries, and to contextualize the present for those in the future.

Gender and Character Types in Bram Stoker's Dracula

Emerson Loudenback and Jan Harris, English and Modern Languages

Bram Stoker's novel, *Dracula*, exhibits Victorian views of women and gender. Stoker's female characters act out the binary of either dignified, "angelic," women, or of monstrous, demon-like and doomed creatures. Male narrators display female types and the "male gaze" confirmed through the narrations of the female characters. Bram Stoker uses the character types to contrast the male and female roles within the Victorian culture. When male characters become or are vampires, they maintain a stereotypical vampire nature, as opposed to the impure and villainous sexuality of the female vampires. Again and again, female character's identities are endangered, and they risk being compromised, becoming too liberated, or sexually active. Anytime a woman is turned into (or already is) a vampire, the response of male narrators isn't simple opposition, it is one of fear. The contrast between the descriptions of male and female vampires throughout the novel exaggerates the differentiation of gender roles. Each depiction points to the parallels between the vampiric characters in *Dracula* and the "angel in the house" culture of the Victorian era.

A Room of One's Own: Observations on the Walls and Interior that Created Limited Space for Female Authors

Marlena Jenkins and Jan Harris, English and Modern Languages

In *A Room of One's Own*, Virginia Woolf tackles the subject of female inequality within fictional writing by reflecting on this topic in both the sixteenth century and into the twentieth century. She brings consciousness of female inequalities to the reader by conveying many of the realities that women faced in each of these centuries. While addressing these inequalities, she also expands on the responsibility that is left to female authors and artists based on resources and new abilities to gain education amongst male counterparts in the creative world. What is shown in Woolf's work are issues arising from the need of both access and power for female authors and artists in the face of ever-present societal discouragement. Through

a combination of current literary theories, observations of Woolf's writing, and historical events, further evidence can be brought to light of the state of being for female voices within the literary industry.

Death and Defiance: Examining Shakespeare's Tragic Female Characters

Caroline Stair and Greg Carpenter, English and Modern Languages

Although Shakespeare wrote many impactful works, most scholars view four of his plays - Hamlet, Othello, King Lear, and Macbeth - as his major tragedies. In these four works, Shakespeare kills all of his main female characters regardless of their response to their society, illustrating their imprisonment within patriarchal gender roles. These women's deaths tend to grow more violent as they become less willing to conform to these roles. In this paper, I examine the correlation that emerges in Shakespeare's treatment of leading female characters in these tragedies. Women in these plays tend to exhibit one of three reactions to patriarchal expectations and gender roles: conformity, reversal, or defiance. In Hamlet, Shakespeare gives female characters who conform to traditional roles the least complexity but also the least violent deaths. He also shows in Macbeth and King Lear that attempting to reverse the gender roles established by their society causes women to meet a grislier end. Finally, women such as those in Othello who openly resist the patriarchy receive the cruelest and most shocking deaths. However, Shakespeare also portrays the women who choose defiance over compliance or reversal as some of the most sympathetic and admirable characters in all of his works. Shakespeare may have recognized that societal expectations of his time confined and limited women and tried to illustrate that injustice through the fates of his female characters in these plays.

Sotto Voce: Life and Labyrinths

Kimberley S Klein and Jan Harris, English and Modern Languages

The first collection of poetry by Kimberley S. Klein, "Sotto Voce: Life and Labyrinths," has the speaker explore their confusion of the difficulty of understanding humanity by tripping across the thin line between whimsy, reality, and back again. Pop culture references, mythical beasts, and the rough terrain that is today's interpretation of love and romance are just some of the symbolism that weave through the narrator's liberal use of free verse. With influences of contemporary poets such as Zachary Schomburg and Brenda Hillman, Klein's use of feminine lyric voice progressively analyzes her spiritual place in the world. Dosages of self-deprecating and observational humor alleviate some of the more morose aspects and Klein hopes will add just a little bit of relatability; especially for those who can only view society from afar, whether mentally, physically, or even both. And for the child buried deep inside every single one of us, some deeper than others, a sprinkle of magic that can only come from a durable imagination.

Wifey

Bana, Araz, Faraj, and Jan Harris, English and Modern Languages

I created a piece where I explore the discourse of being a wife and what that looks like in modern society, how it has evolved, and what issues we still seem to face as a society when referring to women in the context of marriage.

Superheroine

Kimberley S Klein and Kimberly Capps Reed, English and Modern Languages

"Superheroine" is a first person POV story told in the view of a third person, about a high school girl whose name is never mentioned that gains superpowers. The story opens as the girl hears of a robbery on the news and by this time, she has her powers. She decides catching the robbers is her chance to test them out and she makes her own costume, deciding to go with a fox theme for her secret identity. As she takes the time to do this, we get flashbacks of her attending a party and being pressured to insert a random needle into her arm; she has destructive tendencies in response to being a child of adoption and being angry that her birth

parents gave her up. The moment the needle entered her skin, she felt weird and here a male voice within her head annoyed that it is now stuck in a young girl. This is how she got her powers. The rest of the story involves the girl chasing the robbers on foot through her city, jumping off buildings and using car roofs as ways to get closer and the voice in her head instructing her the whole time. She catches the robbers with the help of the police. Later, she speaks to her head voice and finds out it is a liquid AI that was stolen and meant as a possible military weapon against terrorists. She names it Darwin. The mayor of her city thanks her for her services.

India Wasn't Liberated in a Day

Andrew Lundborg and Jan Harris, English and Modern Languages

Jesus saves, but some Christians cherry-pick Bible verses to fit their agenda. Lundborg's short story *India Wasn't Liberated in a Day* allegorizes a conversion experience and exhibits the danger of pulling quotes out of context in order to support one's argument. In Louisiana, an unnamed, alcoholic first-person narrator works as an undercover detective infiltrating the Bandidos Motorcycle Club. The narrator enjoys his time with the club too much. Late nights filled with infidelity and debauchery wear on his marriage. His wife eventually leaves him and takes their dog. When a bugged telephone reveals that the narrator's life is in jeopardy, his police chief finds him a spot with the Homicide Department in Lubbock County. On his first assignment, the narrator encounters Gandhi, or at least one of Gandhi's quotes. The quote sparks an epiphany, which dramatically changes his life. As the narrator begins life with a new perspective, he must learn how to follow Gandhi without wounding others with Gandhi's words.

Bent & Twisted: Advocating for the Cause of Adolescent Idiopathic Scoliosis

Lindsey Newland and Sonya Green, English and Modern Languages

Adolescent Idiopathic Scoliosis (AIS) has no known cause. Several myths persist about AIS patients' progression and treatment. Options for treatments, such as bracing and extended chiropractic therapies, are offered to families whose children are suffering from AIS, but there is little evidence for the effectiveness of these treatments. Even many legitimate treatment options only attempt to slow the progression of the existing condition, and offer palliative care, rather than a cure. Researchers studying AIS have struggled to secure funding to investigate the causes of this condition. This presentation seeks to raise awareness about AIS, and to advocate for research funding about the causes and potential cures of AIS.

A Dot on the Line: Contextualizing Oneself within Modern Art History

Caleb Clemente and Rocky Horton, College of Entertainment and the Arts

My presentation will primarily be a paper dissecting my place within the lineage of historical and contemporary art. I will engage myself and my mentors to contemplate what artistic legacies I am participating in within my artistic career. It will be a mark of transitioning to see myself as a competent artist, who is inter-textualized within the cultural zeitgeist of art, rather than an isolated force in the college atmosphere. Because of the nature of this presentation, I find it necessary to contribute around 2-3 of my own artworks to show and perform during the symposium.

Contextualizing Murakami Saburo and "Passing Through"

Caleb Clemente and Mandy Rogers-Horton, College of Entertainment and the Arts

Through this research paper, I will be summarizing and analyzing the performance piece called, "Passing Through" and relating it to a broader social/historical context. This will provide a greater understanding of the artwork, as by a casual glance it seems sneakily abstract and superficial. But such a description is false. Using this presentation as a platform, I will inform the readers of the subtleties of contemporary art that are

not always obvious, hoping it can inspire the audience to take more precautions when deconstructing an artwork.

Animation Not Discrimination

Grace Kwock and Tom Bancroft, School of Art

The animated short film has been a classic element of modern Americana ever since its mainstream adoption in the early 1900s. Although cartoons are an intrinsic aspect of American childhood, most audiences are unaware of animation's racially troubled origins, one example being the Censored Eleven. Herein lies the question, "What was the Censored Eleven, and what significance do they hold in American Animation?" Demonstrated within is how the early American entertainment practices of blackface minstrelsy "derogatory performative exaggeration of Blacks" and vaudeville led to the birth of cartoon minstrelsy, the animated version of blackface minstrelsy, influencing the creation of the Censored Eleven, eleven animated shorts produced by Warner Brothers during 1931-1951, the cartoons' subsequent ban in 1968, and ultimately, the fallout still subconsciously perceived in the twenty-first-century animation industry. The primary sources of this work are from animation historian Karl Cohen, St. Cloud State University Professor Christopher P. Lehman Ph.D., and the University of Toronto Associate Professor of Cinema Studies Nicholas Sammond. The Censored Eleven were a product of their time and are now antiquated; however, the influences of blackface minstrelsy and vaudeville remain in present-day animation. In conclusion, the importance of remembering the Censored Eleven lies in the significant ongoing improvement of the animation industry and in not falling victim to the same offensive stereotyping patterns.

Executive Function Complaints Predict Neurodegenerative Changes in Older Adults

Kacie Pennington, John Cole Suey, Kaitlynn Logsdon, Camdyn Gilbert, Shelby Leoni, Luke Schueller, and Katie Osborn Spirko, Psychology, Counseling, and Family Science

The frontal lobe primarily manages executive functions, whereas the hippocampus and temporal lobe regulate memory function. Cognitive aging studies tend to focus heavily on memory problems, whereas executive dysfunction in older adults is less understood. This study assessed whether self-reported symptoms in executive functioning could predict early regional neurodegenerative changes. Older adults ranging from cognitively normal to mild cognitive impairment ($n=299,72\pm 7$ years, 58% male) completed self-report questionnaires about their executive functioning and underwent brain MRI as part of a larger community-based study on cognitive aging and dementia (i.e., Vanderbilt Memory & Aging Project). Executive functioning questionnaires were completed at baseline, and MRI data were obtained at baseline and 18-month follow-ups over 5 years. Linear regression models related baseline questionnaire scores of executive function to longitudinal changes in MRI-measures of grey matter volume and cerebral blood flow with comprehensive covariate adjustment for demographic and health characteristics. More severe reports of executive dysfunction predicted subsequent grey matter atrophy in the hippocampus ($p=0.04$) and medial temporal lobe ($p<0.001$), as well as global CBF reductions ($p<0.001$). Interestingly, executive function complaints were not predictive of frontal lobe atrophy. These findings suggest that executive function complaints in older adults may be more reflective of atrophy in the temporal lobe than in the frontal lobe. Perhaps, temporal-mediated memory problems are underlying perceived executive function symptoms. In contrast, individuals with true frontal-mediated executive dysfunction would be less likely to endorse symptoms due to the accompanying deficits in insight.

Older Adults' Subjective Memory and Language Complaints Predict Regional Brain Atrophy Prior to Objective Cognitive Deficits

Kaitlynn Logsdon, Shelby Leoni, John Cole Suey, Camdyn Gilbert, Kacie Pennington, Luke Schueller, and Katie Osborn Spirko, Psychology, Counseling, and Family Science

Memory and language declines are clinical features of Alzheimer's Disease (AD). As there is no cure or effective treatment for AD, early identification of these symptoms is crucial for the timely implementation of strategies to prevent further cognitive decline. It is unknown how accurate self and informant reports are in identifying objective cognitive decline in early prodromal stages of AD. The present study assessed whether subjective cognitive decline (SCD) in memory and language could predict regional cerebral atrophy. Participants included older adults from the Vanderbilt Memory and Aging Project ranging from normal cognition to mild cognitive impairments. As part of a larger protocol, participants completed self-report measures of memory and language SCD at baseline, as well as 3T brain MRI at baseline and in multiple follow-ups across five years. Linear regressions analyzed whether memory and language SCD predicted regional brain atrophy across the five-year period covarying for age, sex, race/ethnicity, education, diagnosis, mood, and apolipoprotein E (APOE)- 4 status. Memory SCD predicted hippocampal and medial temporal lobe atrophy (p -values <0.04), but not lateral temporal atrophy, whereas language SCD predicted atrophy in all three aforementioned regions (p -values <0.04). These results support the notion that older adults can accurately self-report symptoms associated with AD-related neurodegeneration. In addition, it highlights the importance of assessing language problems among older adults in addition to the more prototypical memory complaints.

The Effect of Cognitive Training on Reaction Time

Mira Hana, Natalie Miller, Jocelyn Hamilton, and Ruth Henry, Kinesiology

Reaction time is important for safety and some sport skills and finding a way to improve it is beneficial. The purpose of this study is to examine the effects of cognitive training on reaction time on college students. Twelve male and female college students completed reaction time tests before and after a cognitive training intervention using the FITLIGHT trainer system. The duration of the reaction time pre/posttests was 90 seconds, using 5 of the 8 available FITLIGHTS, and the lights appeared in random patterns requiring bilateral motion. The subjects then completed 4 weeks of cognitive training using the Lumosity app once a day. Training included completing the daily workout of about 10 minutes which consisted of a variety of cognitive games that improve memory, attention, problem solving, flexibility, speed, language, and math skills. There was a significant difference in reaction time with the posttest compared to the pretest. The results suggest that a 4-week program of cognitive training improves reaction time significantly.

Intrinsic Motivation and Exercise Adherence in Group Exercise vs. Individual Exercise

Caroline Leverett, Lynley Childress, Jacob Locke, and Ruth Henry, Kinesiology

The purpose of this study is to compare levels of intrinsic motivation and exercise adherence between those who exercise in a group setting and those who exercise individually. 21 college-aged students enrolled in a yoga-based exercise class participated in this study, as well as 19 college-aged students who completed an at-home exercise protocol on their own. Each subject completed a survey prior that measures attitudes and perceptions about exercise. The intervention lasted 7 weeks. The first group attended one exercise class per week, and the second group completed one provided exercise video per week that was similar in length and style to the class. After 7 weeks the subjects repeated the survey, and factorial ANOVA compared scores between the pre- and post-tests, between the two groups, and the interaction. There was a significant main effect for group ($p<0.05$), as the home group had higher scores in both tests than the class group. There was a significant main effect for time ($p<0.05$); the average score for both groups increased after the intervention. There was not a significant difference between the two groups over time ($p>0.05$). We noted that the home group were volunteers whereas the class group were required to take the class. However, our class group had higher exercise adherence than our home group. Our results suggested that exercising in a

class setting does not have a significant effect on intrinsic motivation when compared to exercising individually at home.

Hunger as Child Adversity: How Nonprofits Should Address Longer Term Solutions

Jacob Neill and Christin Shatzer, Law, Justice and Society

The relationship between food insecurity and Adverse Childhood Experiences poses a burden for low-income families. Food insecurity contributes to a host of mental and physical difficulties for both the parent and the child (Crowe, et al., 2018; Sun, Jing et al., 2016; Chilton, et al., 2015; Hecht, Amelie A et al, 2018; Weinreb, Linda et al., 2002; Wu, Zheng et al, 2005). The mental consequences of food insecurity for the parent and child have the potential to create experiences qualified as Adverse Childhood Experiences (ACEs) (Jackson, Dylan B et al., 2019; Boullier, Mary et al., 2018; Cox, Robynn et al., 2016; Weinreb, Linda et al., 2002). ACEs contribute to a wide variety of negative physical and mental outcomes for the child later in life (Shonkoff, Jack et al., 2014; Boullier, Mary et al., 2018). Among these issues include food insecurity for their own children, emphasizing the cyclical nature of ACEs (Chilton, Mariana et al., 2015; Sun, Jing et al., 2016). In Davidson County, an estimated 14.6% of residents face food insecurity (Healthy Nashville, 2019). Nashville's nonprofits largely address important short term effects of hunger but neglect longer term impacts. This research aims to explore ways nonprofits can best minimize adverse physical and mental effects on children.

A Statistical Demographic Analysis for a Local Homelessness Organization

Rebekah Duke, Jerod Crockett, and Katie Link, Mathematics

While Nashville's growth has exploded in the past decade, homelessness remains a significant problem. Shower the People is a new Nashville organization that seeks "to show love by providing mobile shower facilities to homeless individuals in the community." Since April 2019, they have provided over 500 showers to more than 200 homeless individuals. Each guest provided basic demographic data that were compiled in a database. We sought to assist Shower the People by providing statistical analysis of this demographic data. We evaluated and compared data on age, gender, race, and veteran status between different Shower the People locations as well as with demographic data from the homeless populations of Nashville, Tennessee, and the United States gathered from the Department of Housing and Urban Development. We also examined the demographics of those who returned for multiple visits versus using the services only once. Ultimately, we found that the Shower the People's population well reflects the homeless population of Nashville and that there are significant variations in demographics by location. This analysis will be useful in improving service quality and equity to the Nashville homeless population and in acquiring funding for this organization through grants.

Design and Initial Characterization of Topoisomerase II Expression Constructs

Ashley Dougherty, Mariam Hawaz, Judy Trac, and Joe Deweese, Pharmaceutical Sciences

Topoisomerase II is an anticancer drug target due to its involvement in replication, transcription, and cell division. Topoisomerase II is a crucial nuclear enzyme that creates temporary double-stranded DNA breaks in order to detangle chromosomes. Humans have two isoforms of Topoisomerase II (TOP2): TOP2A and TOP2B. Current anticancer therapies that target TOP2 cannot differentiate between the two isoforms. Further, TOP2A is primarily used in DNA replication and mitosis, whereas TOP2B is mainly used in transcription. Due to their distinct roles and the involvement of TOP2B in some adverse events, this work focuses on selective targeting of TOP2A for the treatment of cancer. In order to carry out this work, we designed and tested expression constructs for making purified TOP2A and TOP2B. The synthetic plasmid constructs were produced and transformed into the yeast strain for expression of the proteins. The yeast cultures were scaled up, induced to express TOP2A or TOP2B, and harvested. The enzymes were purified via affinity chromatography. The purified TOP2A or TOP2B were tested for basic activity including DNA

cleavage and relaxation. Additional characterization of TOP2A included the use of a fluorescence-based DNA binding assay. This work demonstrates and confirms the baseline activity levels for these purified enzymes. Future directions include the design, purification, and testing of targeted point mutations in TOP2A in order to probe the function of domains within the enzyme that have not been fully characterized. These studies will aid in developing strategies for selectively inhibiting TOP2A, while avoiding TOP2B.

A Confucian Divine Command Theory of Morality in the Context of Medical Non-Disclosure to Terminally Ill Patients

Jerod Crockett and Lee Mayo, Philosophy

In Chinese medicine, families and physicians often conceal terminal illness diagnoses from patients. This practice of medical non-disclosure has been made prominent with the 2019 release of an award-winning film based on a true story, *The Farewell*. In the film, the matriarch of a family receives a stage 4 lung cancer diagnosis but is never informed of her terminal condition. The family arranges a sham wedding as an excuse for everyone to see her a final time before her passing while maintaining the lie about her health. Medical non-disclosure is often justified in these circumstances as a fulfillment of the moral imperatives of Confucianism. However, it is unclear from what source the obligation to fulfill such commands comes. Confucianism has no central divine figure like monotheistic religions. Religious moral philosophies often fall into the category of Divine Command Theories (DCT), which claim that moral obligations arise from the direct or implicit dictates of God (or gods). This paper examines the possibility of a Confucian DCT in the context of medical non-disclosure to terminally ill patients.

Inculturation: What's A Christian To Do?

Elizabeth Kwock and Richard Goode, History, Politics and Philosophy

One question that has plagued Christian evangelists and apologists almost since the religion's inception is, "What happens if Christians justify faith according to pagan philosophies?" Devout adherents of Christianity have spent millennia attempting to justify their fundamental values to cultures with polytheistic, atheistic, or secular worldviews. This essay will demonstrate the efforts of early Christian teachers and apologists to justify their faith, the positive effects of the Second Vatican Council (1962-1965) on contextual theology, and the potential drawbacks of justifying Christianity through concepts people already understand--a method termed inculturation. The research presented in this work comes primarily from the president of Chicago's Catholic Theological Union Fr. Mark R. Francis, CSV, and Fr. Peter Schineller, SJ. This paper concludes that in the twenty-first century, the inculturation of Christianity can improve people's understanding of the Christian faith, given the explanation remains true to the religion's central message.

Combating Negative Effects of Parental Conflict in Children

Hannah Jones and Christin Shatzer, SALT

Research suggests that parental divorce or conflict have considerable negative effects on children. For my SALT scholar final project, I will be creating a therapy-based program designed to help children develop coping mechanisms and teach them effective and healthy ways to express their emotions. The target audience is children aged three to twelve years old. Children participating in the program will also be provided with mentor support and care. A variety of techniques including play therapy will be implemented into the program. To accomplish this goal, a thorough review of current programs will be conducted as well as consulting with faculty and professionals in the child development field to develop a new program that

will help children affected by parental divorce. The goal of the proposed program is to create a positive impact in children's lives and to help prepare them for a healthy future of communication in relationships.

Improvements to a Student-Run Free Clinic Food Pantry

Kaitlyn Wiley and Christin Shatzer, SALT

Food insecurity is a considerable social determinant on health outcomes, particularly in populations utilizing student-run free clinics. With over half of its patients battling food insecurity, the Shade Tree Clinic has sought possible methodical solutions to food insecurity by establishing an in-clinic food pantry with the assistance of community partners. Through patient survey data and a meta-analysis, this paper will investigate possible improvements to the food pantry that can be made by the clinic to increase patient satisfaction and health outcomes. It is hoped that the conducted literature review and analysis of patient survey data will provide insightful and affordable suggestions to the Shade Tree Clinic concerning enhancing their in-clinic food pantry.

Creation of an Aquatic Facilities Guide for the Public

Kendra Lozano, Kent Clinger, and Christin Shatzer, SALT

Every single year, the aquatic facilities in the United States provide 3.1 million participants the joy of enjoying the 4th most popular sport in the United States, swimming (CDC, 2020). As of 2020, according to the PHTA (Pool and Hot Tub Alliance* formerly The Association of Pool and Spa Professionals/National Swimming Pool Foundation), there are 10.4 million residential pools and 309,000 public pools in the U.S. In Tennessee, the Tennessee Department of Health regulates the amount of bacteria, levels of pH, alkalinity, cyanuric acid and disinfectants (Chlorine or Bromine) in swimming and similar public pools. According to the Centers for Disease Control and Prevention, from 2009 to 2017 there were 239 recreational water-associated disease outbreaks, resulting in 5443 illnesses reported, 230 of whom had to be hospitalized, resulting in one death. In a typical year, 77% of the outbreaks were associated with recreational treated water and just over half of those cases were caused by *Cryptosporidium* (chlorine-resistant bacteria). This project is intended to produce a step by step guide for pool personnel to maintain the water quality in public swimming pools within safe limits and state regulations.* Each public pool should follow strict guidelines from the Environmental Protection Agency (EPA) on how to handle swimming pool chemicals or "pool chemicals" (Hazard control and protective Measures). Although lifeguards are CPR trained and monitored in public aquatic pools, there is a substantial lack of training for the maintenance of water quality in public pool facilities guides with clear instructions of upkeep cleanliness. As a public health issue, the cleanliness of community pools is a significant concern. Further, avoiding saturation of chemicals in community pools is a health issue as well. This presentation will discuss the chemical background to pool disinfection and the procedural guide to meet pool safety standards.

Increasing Access to Community Courts for Non-Violent Offenders

Meredith Crockett and Christin Shatzer, SALT

There are 2.3 million people currently incarcerated in the United States. Each incarcerated individual represents one mother, father, sister, friend, and community member. Our system of mass incarceration continues to create deep social, economic, and political divides between former offenders and their community. Over the past four decades, the United States has responded to criminality with increasingly long sentences and incarceration for offenders. This tactic, known widely as mass incarceration, has ravaged communities and left large swaths of the population without access to economic prosperity, employment, and community engagement. The Department Of Justice defines community courts as "neighborhood-focused court programs that combine the power of the community and the justice system to address local

problems. They connect offenders who commit less serious crimes, often misdemeanors “to judicially supervised drug treatment, alternative sanctions, and other community-based services.” Increasing access to community-based diversion programs is a proven method for decreasing crime and enhancing quality of life for offenders. The goal of community courts is to expand well-being and decrease crime rates among the poor, racial minority, and marginalized communities of the United States. This research serves as a reminder for the necessity of available diversion programs and to argue that our current system of mass incarceration is not an effective tool for crime prevention or rehabilitation.

Raising Awareness: Educating Professionals in LGBTQ+ Competency

Mackenzie Bayes and Amy Crossland, Social Work and Sociology

The Victim Witness Division is a division of the Office of the District Attorney in Nashville. A gap in services was identified as there is no competency training surrounding the LGBTQ+ population. Knowledge and awareness of the LGBTQ+ community is vital to the work of Victim Witness Coordinators because of the rates of LGBTQ+ domestic violence. A proposed program of an LGBTQ+ competency training arose and is discussed in detail. This paper explores the technicalities of the program as well as research and evidence for its effectiveness.

Trauma-The Gateway to Addictions. Lowering Stigmas with Paraprofessionals

Chad Curtis and Amy Crossland, Social Work and Sociology

As of 2015, 21.7 million Americans have substance use disorder. Many of these Americans get involved in our legal systems. The Tennessee Association for Recovery Court Professionals (TARCP) is committed to reducing substance abuse, crime, and recidivism by promoting, advocating, and supporting recovery courts with training and in many other ways. The following is a training offered to TARCP to help by lowering stigmas held against persons in recovery (from substance abuse). It is vital to ensure higher levels of quality of service and better restorative justice given to those struggling to stay clean in treatment courts across Tennessee. This training seeks to do that while increasing compassion, hope, and equanimity all while validating this program statistically with data. This program uses the most current research in the field of addiction to show the correlation of trauma as it relates to the initial use of substances as coping mechanisms to a reality too painful to manage alone. Trauma as the gateway to addictions is the basis for the foundation of this program. A post-test survey will be conducted on participants of training to validate the efficacy of the program. Qualitative responses will be placed in a program and configured back into quantitative numerical values.

Mental Health and Crisis Assessment Training in Child Advocacy Centers

Alexis Olsson and Amy Crossland, Social Work and Sociology

Davis House Child Advocacy Center provides services to children in Williamson County, Tennessee, who have been sexually or physically abused. Families are supported through forensic interviews, family advocacy, and counseling. Davis House staff recognized a need for training that would equip the Victim Advocate to address mental health issues that could arise during the forensic interview process. A program is being proposed to train staff at Davis House on how to administer an assessment that would determine the needs of a child who might face a crisis while participating in a forensic interview. This training will allow others to intervene to ensure safety and to provide the best support to children and families being served by Davis House who have experienced abuse. The proposed program was designed based on a review of current literature and an investigation into similar programs that already exist. | keywords: Davis House, advocacy, interviews, mental health, crisis intervention

Bridging the Gap within the 37207 Community

Anna Grace Hinkle and Amy Crossland, Social Work and Sociology

Residents of the 37207 community in Nashville, Tennessee are facing disproportionately high rates of domestic violence compared to the rest of the city. After reviewing the literature related to crime and social deviance, a resource fair may be a beneficial way to combat these rates. This fair may increase awareness about domestic violence, and connect residents with services they may likely need in the future. The fair may also increase the number of clients being served by various agencies, and potentially decrease the rates of domestic violence and other crimes.

Undergraduate Students Performance Presentation Abstracts

An Approachable Octopus

Marah Grant and Jan Harris, English and Modern Languages

Marah Grant's collection, *An Approachable Octopus*, muses on childhood, family dynamics, memory, and music. Influenced by poets like Mary Oliver, Grant's poetic style enacts both lyrical and rhythmic concision. Grant's poetry captures the natural flow of recalling "a somewhat blank and / melancholy hopefulness." Her collection explores the trials of growing up and describes the shifting stages of human development. Some transitions are greeted with nostalgia: "bare feet on the hardwood / your pink face / and all the winter shining." Others are embraced. Grant's speaker learns how to integrate her past and present through contemplating minute yet vivid details, while developing an acute awareness of her childhood home and familial relationships.

Challenging Mud

Caleb Clemente and Jan Harris, English and Modern Languages

In Caleb Clemente's collection, *Challenging Mud*, the speaker wrestles with issues of distance and physical space. Clemente's speaker reminisces about childhood memories and objects in order to reclaim a sense of meaning from their recollections. Clemente anchors his audience through the memories of the past as a way to recontextualize their ephemera of memory into a tangible work of art. As the speaker salvages their disjointed moments of childhood, they seek to bundle them and create a new community from the fragments they discover. Moments of expanse generate pockets of space for readers to compare and contrast peculiar memories of their own. On the surface, Clemente's poems seem hyper-individualized, but his poetry aims pockets of reflection back at the reader. *Challenging Mud* asks its audience to consider how their past casts light into the neglected corners of their present.

East Carolina

Ryan Gabriel Wilson and Jan Harris, English and Modern Languages

In Ryan Wilson's poetry collection *East Carolina*, the speaker explores the worlds which shape their identity. In the tradition of poets, such as Wendell Berry and Richard Siken, Wilson works through an accessible lyric voice to welcome the audience into the space of the poem; to reevaluate themselves apart from expectation and ordered emotions. By using dissociative movement, Wilson captures undertones of thought and memory, inviting the reader into the honest parts of themselves. In seeking the lost parts of oneself, Wilson's poetry brings the reader to moments of confrontation: how has the world shaped them and their understanding of others? As Wilson's poems develop, so does the apparent effects of one's environment, extending into the joys of the tulips, the beauty and malice of family, the mindfulness of physics, and inquiry of Charles Darwin. In the space of Wilson's images, the audience is left to reflect on the power they give themselves and the world around them.

We're Inside Out

Tori Thurmond and Jan Harris, English and Modern Languages

In Tori Thurmond's collection, *We're Inside Out*, Thurmond's speaker revisits moments of her existence, real and imagined. Locations like Charleston and Appalachia stretch out in the speaker's memory. Each incident and place begin to shift from moments of chronological time to moments of awareness and being. Who the speaker once was, an Amazonian queen, and who the speaker is now, someone trying to thread together her past and her present, remember each other and exist together in these poems. Thurmond's speaker looks backward at her lived experiences with a new perspective that leaves her feeling inside out. As the poems progress, the reader is invited to reflect and assess how they, too, have been shaped by their own memories.

The Tendency of an Isolated System

Emily Wieman and Jan Harris, English and Modern Languages

In Emily Wieman's collection, *The Tendency of an Isolated System*, her speaker investigates how relationships can push human beings away from each other, or pull them together. Imagining their lives through the Second Law of Thermodynamics, Wieman's speakers observe the gaps that emerge and remain unfilled when relational structures, like friendships, or families, drift apart. Wieman challenges her audience to consider that relationship dynamics "won't stop changing" even if they yearn for stasis. Young women metamorphose into trees, spacewalks go wrong, and the world heads towards disorder, and as all this transpires Wieman reminds her listeners that in the midst of entropy, we are "shouting words into the gaps/hoping to be heard." *The Tendency of an Isolated System* emboldens readers to search for peace amidst inevitable systems of chaos where they may currently find themselves.

More Content When Moving

Kamryn Wong and Jan Harris, English and Modern Languages

Kamryn Wong's poetry collection, *More Content When Moving*, reconnoiters about contemporary unrest in the state of human existence. In tones touched with hints of existentialism, and nostalgia, Wong's poems vibrate with a kinetic energy that offsets moments of the speaker's despair. Wong's collection entices her audience to grapple draws the reader with the feeling of being coupled to the underlying idea of anxiety. The poem, "sharkgirl" (sic), captures a romanticized past and impresses upon the reader a dissatisfaction with complacency and stillness. Wong balances her speaker's intellectual introspection with the speaker's requisite need for movement. In *More Content When Moving*, Wong deploys the wheels of introspection and turbulence to challenge her readers' understanding of their own past and the trajectories of their growth.

It's going to be okay

Veronika Lynn Jones and Jan Harris, English and Modern Languages

In Veronika Jones' collection *It's going to be okay* describes how people respond to the unplanned crisis. Jones' speaker reached for the strength within herself to survive the chaos that flows around her. Jones' poetry demonstrates the beauty of human resilience in the face of unexpected tragedy, even coaxing her speaker to grow gills so she can survive in the Atlantic Ocean. The physical contours of memory, the absence of touch, all filter through the details of Jones' collection to remind her reader that loss has no timeline. "It's going to be okay" reminds its audience that humans will endure unexpected trauma, but they have the strength within themselves to persist.

Can I at least have a map?

Sierra Gonzalez and Jan Harris, English and Modern Languages

In Sierra Gonzalez's collection, *Can I at least have a map?* her speaker explores their identity in the context of evolving relationships in a world where clear delineation and answers are not readily apparent. Gonzalez's poems grapple with what it means to recontextualize the past in the present for the present. Her

speaker explores the complexities of human relationships and attempts to reconcile them with unattainable ideas of simplicity, as exemplified in the contrast between the speaker's experience with relationships and those of an unsympathetic and poisonous frog. As Gonzalez's speaker questions the inherent fluctuations between human beings, they search for ways to articulate living a material life in the sight of an invisible god. Gonzalez's *Can I at least have a map?* asks the reader to contemplate the planes of human existence, both horizontal and vertical. Through her inquisitive and imaginative speaker, Gonzalez invites the reader to decide how much of the weight and the work of being alive they are willing to bear.

Beyond Our Bones

Allison Whiting and Jan Harris, English and Modern Languages

In Allison Whiting's collection, *Beyond Our Bones*, her speaker's reflections grow through the power of their dissociation. Whiting's poems explore the boundaries of reality and perception, finding a way to communicate moments of self-awareness to the external world. *Beyond Our Bones* challenges the expectations of esoteric verse and delivers existential predicaments in concise, humorous, and approachable language. Whether the speaker thinks about herself becoming a bird or ponders whether her true nature is that of a bunny or a shark, Whiting's speaker beckons her audience to accept those moments when humans find themselves lost in their own circular thinking, and encourages them towards embodiment.

Enacting My Revenge

Matthew Smith and Jan Harris, English and Modern Languages

Matthew Smith's collection of poems, *Orthopaedics*, guides the reader through an exploration of the body. The speaker in Smith's poetry presents the audience with a disembodied experience from physical reality. Throughout the collection, Smith employs dark humor like "From Bon Appetit's 2012 November Issue" when the speaker describes how to "disjoint the bones or tendons of your enemy" or in the casual tone of the poem "My Bag of Bones." The speaker's confident and seductive tone hopes to lure the reader into a false sense of security. Yet with shocking statements and abrasive turns, Smith's collection pushes the audience to rest uncomfortably in the revelation of their own dystopia.

Intimate Anthropology

Madeline Stevens and Jan Harris, English and Modern Languages

In Madeline Stevens' collection, *Intimate Anthropology*, her speaker reflects on the "inexact creases" left behind by a series of experiences. Stevens explores the tensions between love and loss, and how to begin piecing together a "sense of self fractured." The speaker ebbs and flows between mirroring her existence and the existence of friends, family, and relationships in order to reveal the universal highs and lows of each human life. Working in the tradition of seminal American poets, like Walt Whitman, Stevens tells the stories of everyday exchanges, at ballparks, on field trips, and during breakups, through her thoughtful and observant speaker. In *Intimate Anthropology*, Stevens uncovers what connects her audience together through her vulnerable study of the human experience.

Push Farther to the Hidden Corners

Emma Dryden and Jan Harris, English and Modern Languages

In Emma Dryden's collection, *Push Farther to the Hidden Corners*, Dryden's speaker seeks to find a connection between the past she has lived and the hope that calls her. Through the strength of those around her, the speaker explores the hidden corners of her mind and pushes to step deeper into the outside world. As the collection progresses, the reader is encouraged to consider the gentle voice that calls them out of the safety of their self-created fortress.

Degrees Of Impiety

Makala Marsee and Jan Harris, English and Modern Languages

Makala Marsee's collection, *Degrees of Impiety*, holds a magnifying glass to the cracks in humanity that hide our unattractive realities. The speaker precariously holds an exploration of sexism in one hand and a celebration of womanhood in the other as she struggles to assert her own place in society. Reminiscent of Frank O'Hara and Zachary Schomburg, Marsee pauses in each poem to focus on moments frozen in time in disconcerting detail. Marsee's themes of religious doctrinism and teenage hedonism place the reader in a state of disquietude as the speaker searches for beauty amidst "the things that make [the speaker] queasy."

Undergraduate Students Exhibits and Poster Presentation Abstracts

The Impact of Corporate Social Responsibility on Firm Performance: A Study of Certified B Corporations

Kaitlin Stanfield and Marcy Binkley, Accounting

A reconceptualization of firm performance is on the rise, one which includes both profit and purpose. Specifically, corporate social responsibility and related societal expectations have experienced a significant shift in recent years. In the past, traditional corporations had one primary concern, that of increasing shareholder value. However, this societal shift has led to the development of the B Certification, a voluntary certification available to all businesses through the not-for-profit organization B Lab. The B Certification creates a legal obligation for the organization to consider the impact of their decisions on their governance, workers, community, environment, and customers. Many believe this pursuit will result in rendering the organization unable to meet shareholder demands, as traditionally prioritized. By utilizing publically available data from the B Lab organization and Compustat, we review a sample of public corporations who voluntarily hold a B Certification to evaluate the impact of B Certification on financial performance. We also evaluate which impact metric yields the strongest predictive ability on changes in shareholder value. Implications for successful corporate social responsibility endeavors are discussed along with suggestions for future research.

The Art of "Good Boy Richard"

Daniel Haycox and Eric Stars, Animation

This exhibit will showcase original art created for "Good Boy Richard," one of the first animated short films produced at Lipscomb. Visitors will be able to see early concept art as well as beautifully rendered production artwork. They will also be able to view the finished film (approx. 1.5 minutes). This exhibit will inform interested persons about the process of creating an animated film from start to finish and show how a team of artists contributes unique skills to every shot.

Saturday Morning Cartoons feat. the Tennessee Titans

Hayley Mullins and Tom Bancroft, Animation

The Tennessee Titans "Saturday Morning Cartoons" are a combined effort between animation department head and former Disney animator Tom Bancroft, animation student Hayley Mullins and the Tennessee Titans. These illustrations are the very first project to come out of the newly developed CEA Studios. There are a total of 18 illustrations, from the beginning of the season until the most recent AFC Championship.

Godzilla In Mexico

Conner B Delgado and Rocky Horton, Art

A series of works for family and legacy, ranging from a 1/1 recreation of my childhood bedroom ceiling on three wall mounted panels, a photography book made from a hollowed out and recycled copy of a go dog go little gold book and documentary photos of the artists family and scans of cherished objects and handwritten letters.

The Effect of Albendazole on Different Model Systems

Erin Lisk, Caitlyn Scherr, Perri Haga, and Brian Ellis, Biology

Albendazole is a medication that can be given in mass to those affected with intestinal parasites. It acts by targeting beta-tubulin, which in turn inhibits formation of microtubules, uptake of glucose, and egg

production and formation. For those in third world countries, this drug is vital for ending the cycle of poverty that intestinal parasites indirectly cause. This study was designed to look at the effects of albendazole on different model systems. *C. elegans*, Hep-G2 cells, and zebrafish were all treated with different concentrations of albendazole. A concentration of 0.1 ug/ml of Albendazole was used to treat the Hep-G2 cells. Hep-G2 cells were also treated with IFN-alpha, and zebrafish were also treated with lavender oil. We hypothesized that albendazole would have a negative effect on *C. elegans*, as would the IFN-alpha on Hep-G2 and the lavender oil on zebrafish. The results show the *C. elegans* health decreasing with days of albendazole exposure with the higher concentrations of albendazole, and the Hep-G2 cells and zebrafish remain to be evaluated. Collectively, this study begins to investigate a known antiparasitic and its effects on different model systems.

The Effects of Albendazole on *C. elegans*, HepG2 Cells, and Zebrafish

Morgan Meador, Michael Cannone, Erin Stanley, and Brian Ellis, Biology

Albendazole is an antiparasitic drug that is commonly used to treat helminth-related diseases. The drug acts to inhibit parasitic worm activity and ultimately inhibits their reproduction in a host, while not significantly affecting the host. While commonly used on microbial diseases involving parasitic worms, its effect on other organisms is less known. Learning the molecular impact of albendazole on human tissue *in vitro* and animal tissue *in vivo* (zebrafish) will assist in better understanding the drug and potentially developing a new drug that will not lead to antimicrobial resistance in parasitic worms. To better learn about the effects of albendazole, the drug was tested on three scientific models: *C. elegans*, HepG2 cell culture, and zebrafish. So far, our results have shown that albendazole impairs *C. elegans* movement and overall well-being. Though we do not have conclusions for the HepG2 cells or zebrafish, we predict similar results.

Testing the Effectiveness of Albendazole Drug on Varying Model Systems

Will Huff, Tommi Lynn, Elizabeth Fisher, and Brian Ellis, Biology

Albendazole is a common anthelmintic drug that decreases the mobility of common helminths and is approved for mass drug administration (MDA) by the WHO. The drug inhibits the growth and reproduction of parasitic worms by interfering with microtubule formation and their intake of glucose, leading to worm mortality (NIH). Experiments were designed in three stages in which albendazole was introduced to different model systems in order to analyze its effect on the health of nematodes, DNA expression in human cells, and embryonic development of Zebrafish. *Caenorhabditis elegans* (*C. elegans*) is a preferred model organism for testing parasite-drug interactions. *C. elegans* were treated with differing concentrations of Albendazole in order to propose a standard medicinal protocol that can both stimulate nematode immobilization and promote a cost-effective system for drug distribution. HepG2 cells were grown in tissue culture and treated with Albendazole to observe the effect of the drug on human cells and the DNA expression of the LMP7 gene of interest. Zebrafish were used as a model organism for testing the effect of Albendazole on developing embryos. Increased concentrations of the drug led to an increase in *C. elegans*' immobilization and mortality. These model systems provide a framework for understanding the impact of this anthelmintic in both the parasitic target and the patients for whom it is prescribed.

Using a Health-rating System to Evaluate the Effectiveness of Albendazole on *Caenorhabditis elegans* as a model for anthelmintic study

Will Huff, Grace Proffitt, Madeline Surdacki, and Brian Ellis, Biology

Soil-transmitted helminths (STH) are intestinal worms transmitted to humans through contaminated soil. The three main STH that infect humans are *Ascaris lumbricoides*, *Trichuris trichiura* (whipworm), and *Necator americanus* and *Ancylostoma duodenale* (hookworm). Nearly 1.5 billion people are infected with at least one of these parasites, most of which are impoverished children. The effects of parasitic infection, while often nonlethal, are devastating; they deplete the host of nutrients while dampening the host immune

response, perpetuating the cycle of poverty and parasitic infections. The pharmaceutical options available to treat parasites are limited, due to the high cost of production and low profitability margins. Albendazole is the primary anthelmintic drug approved for mass drug administration (MDA) by the WHO. *Caenorhabditis elegans* (*C. elegans*) is a preferred model organism for testing parasite-drug interactions. Using a health-rating scale, we tested the effects of differing doses of Albendazole on *C. elegans* to develop an efficient dosage of medication that ensures both the immobilization of parasites and the cost-effectiveness of Albendazole for MDA.

A New Perspective on Clean Beauty Products: Sulfates and Parabens

Shaniya Shontay Pleasant, Kiandra Hawkins, and Florah Mhlanga, Biology

In recent years, the idea of living a “clean” lifestyle has become a prominent topic in Western culture. This research review seeks to provide an understanding of some of the chemicals that are now being removed from many cosmetic products throughout the beauty industry because they have not been deemed “clean.” Articles were examined that breakdown the purpose of sulfates, parabens, and other chemicals found in cosmetics and potential side effects. Through experimentation, the effects of these chemicals on DNA, skin, and the level of carcinogenicity were observed in order to determine if any substantial effects arise through the regular use of the consumer products that contain these substances. In high concentration and/or usage, there is evidence of negative effects being positively correlated with some of the reviewed chemicals, while with others, no adverse effects were found when incorporated into cosmetic products. This study will assist in raising awareness, and will also aid in more critical thinking when deciding if a product can be considered “clean” beauty.

Relationship Between Longevity and Breed Size in *Canis familiaris*

Fatima Guzman and Florah Mhlanga, Biology

Dogs are companion animals that share a very strong bond with the human beings. Fossil evidence indicates an association between human beings and animals dating back to almost more than 15,000 years ago when dogs were first domesticated. Today, this relationship remains strong as evidenced by high rates of pet ownership, and the economic prosperity of the pet industry. Dogs, as companion animals, also play a vital role in the psychological well-being and physical health of human beings. It is well documented that animal-assisted interventions have been successful at improving the mental health and quality of life for persons with developmental, neurological, social, and psychological impairments. An improved understanding of longevity in dogs represents a significant welfare opportunity for the domestic dog, given its unparalleled morphological diversity. Various research results seem to indicate that, due to developmental diseases that seriously diminish longevity, large dog breeds have a relatively shorter lifespan compared to small dog breeds. Developmental conditions such as canine hip dysplasia, dilated cardiomyopathy, and bloat occur at a higher rate in large dog breeds such as the French Mastiff and the Great Dane. On the other hand, small dog breeds such as Chihuahuas and Shih Tzu’s tend to have longer lifespans. The objective of this presentation is to articulate the factors that contribute to longevity in different breeds of dogs. The presentation will also recommend interventions that pet owners can adopt to potentially increase longevity of their companion animals.

Effect of Therapy Dogs on Self-Reported Stress in College Students

Kathleen Baggett and Florah Mhlanga, Biology

Meaningful relationships between humans and animals have been observed throughout history. Various studies have shown the value of pet therapy in different settings such as hospitals, assisted living facilities and hospice settings. The value of pet therapy in assisting college freshmen with the transition to campus and in reducing stress during exam times has also been documented. The objective of this project was to determine the effect of therapy dogs on self-reported stress in college students. Students were offered the

opportunity to interact with a trained therapy dog registered with Pet Partners. Prior to interacting with the dog, twenty-seven students volunteered to fill out the short-form Spielberger State-Trait Anxiety Inventory (STAI-6). The instrument was used to determine the baseline presence or absence of anxiety in the participating student populations. The STAI-6 results showed that the participating students were experiencing both anxiety-present and anxiety-absent feelings around the time of the trial. After interacting with the dog, twenty-eight students filled out a questionnaire on a five point Likert scale to determine their feelings before and after interacting with the therapy dog. A paired t-test was used for data analysis. The results showed that there was a significant drop in self-reported stress levels in students after interacting with the therapy dog ($p < 0.0001$). Twenty-five percent of the students reported that the interaction with the therapy dog was a “positive experience” while 75% reported that it was a “very positive” experience for them.

The Medical Importance of Himalayan Yew Plant Species

Danielle Ladines, Ashley Rose Lynn, and Florah Mhlanga, Biology

Various species of coniferous or gymnosperm plants are found in the *Taxaceae* family and genus *Taxus*. The species include *Taxus brevifolia* commonly called Pacific Yew. The Pacific yew trees are abundant in the western coasts of the USA and Canada. Himalayan yew (*Taxus wallichiana*) is found in India as an evergreen tree in the temperate Himalayas. There are many other *Taxus* plant species. Interest in the *Taxus* plant species is due to their medical importance. The Himalayan yew has been used traditionally for the treatment of high fever and painful inflammatory conditions. It is used as a herbal tea and juice for treating cold, cough, respiratory infections, indigestion, and epilepsy. The anticancer drug taxol (Paclitaxel) was originally discovered from the bark of *T. brevifolia*. Subsequent studies have shown various anticancer toxins in other *Taxus* plant species including *T. wallichiana*. Taxol inhibits cell proliferation by promoting the stabilization of microtubules at the G2-M phase of the cell cycle. Consequently, the depolymerization of microtubules to soluble tubulin is blocked. As a drug, taxol has been used in the treatment of breast, ovarian, and many other forms of cancer. This presentation will give an in-depth review in the uses of *Taxus* plant species in treating various ailments.

The Effect of Nigella Sativa Extract Oil on the Growth of *Escherichia coli*

Kalkidan Dejene and Florah Mhlanga, Biology

Nigella sativa is an herb that, for centuries, has been utilized for its therapeutic effectiveness in treating a wide range of ailments. Commonly known as 'Blackseed oil, historical records from eastern nations seem to indicate its versatility in treating various diseases, especially bacterial infections. Lately, extensive use of antibiotics has raised a serious public health issue due to antibiotic resistant bacterial pathogens that inevitably develop resistance to every new drug that is launched. Consequently, there is a pressing need to develop new antibiotics or alternative medications to keep pace with bacterial resistance. The objective of this study was to evaluate the effect of *Nigella sativa* oil on the growth of *E. coli*. Five concentrations of the oils were defined as 0% (control), 0.75%, 1.50%, 2.25% and 3.00%. The oil was saturated into Kirby-Bauer discs and placed into petri dishes inoculated with *E. coli*. A replication of ten petri dishes per concentration was used. The petri dishes were incubated for forty- eight hours after which clear zones of bacterial growth inhibition were measured. Although zones of inhibition were significantly different from the control ($p < 0.05$), there were no significant differences in the zone of inhibition by concentration ($p > 0.05$). The zones of inhibition ranged from 1.14mm-1.92 mm. Control plates had no noticeable zones of inhibition. The results of this study showed that *Nigella sativa* is capable of inhibiting the growth of *E. coli*.

Effect of Human Defensin 5 on the activation of apoptosis in human colon cell lines

Sarwar Kokoy, Avery Roland, Ali Mohammad, Theodore Reed, and Amanda D. Williams, Biology

Human Defensin 5 (HD-5) is an antimicrobial excreted by human cells in response to bacterial infection, specifically in the small intestines. The human colon contains commensal bacteria and thus should not have the antimicrobial present as it should only be present in a sterile environment. However, previous research showed HD-5 excretion in the colons of patients with Crohn's Colitis: a disease categorized by excess inflammation of the colon associated with cell death. HD-5 was identified as an apoptosis initiator in patients with Crohn's Colitis among the epithelial cells in the colon, but the apoptotic mechanism has yet to be identified as canonical or inflammasome mediated. In this lab, we hypothesized that the HD-5 associated cell death is inflammasome mediated. In order to test this, we examined the cleavage of caspase 1 which is typically activated in inflammasome mediated apoptosis and the cleavage of caspase 8 which is typically activated in canonical apoptosis. Human colorectal epithelial cells (NCM-460D) were cultured and treated with HD-5 and sterilized water was used as a control. We analyzed cell treatments at 8 and 12 hours at a concentrated treatment of 2 μ g of HD-5. Proteins analyzed in a western blot have shown us that caspase-8 is activated and thus canonical apoptosis activation seems to be the primary cell death pathway. Quantitative PCR will be used in order to confirm the results from the western blots.

Resulting Canonical Apoptosis of Colorectal Epithelial Cells Upon Treatment with Human Alpha Defensin 5

Jennie Hibma, Sydney Clark, Christopher Roach, Reagan Bain, and Amanda D. Williams, Biology

Ulcerative Colitis (UC) and Crohn's colitis (CC) are diseases of the colon characterized by increased inflammation and ulcers on the colon with depth ranging from just the mucosa to through all four layers, respectively. Human alpha-defensin 5 (HD5), a short peptide, is naturally produced by Paneth cells in the small intestine to protect sterility by degrading the plasma membrane of bacteria. However, previous studies have found that Paneth cells and production of HD5 also occurs in the colons of patients with CC with increasing levels in more severe cases. Previous studies have also shown that colorectal epithelial cell death occurs upon treatment with HD5 which may participate in the progression of the inflammation and ulcer formation in colitis patients. However, the mechanism of epithelial cell death by HD5 has previously not been described. Upon literature review of cell death mechanisms in inflammatory bowel disease and Crohn's disease, the cell death observed in these studies is hypothesized to be either the canonical apoptosis pathway characterized by activation of caspase-8 and downstream Bak and Bax, pro-apoptotic proteins or inflammasome mediated apoptosis characterized by activation of caspase-1 and downstream release of IL-1 β and IL-18 pro-inflammatory cytokines. In this study, NCM-460D colorectal epithelial cells were treated with 1 μ g HD5 for 8 or 12 hours. Following cell lysates were taken for further analysis by western blot and qPCR. Preliminary western blot analysis for caspases indicates no cleavage of caspase 1 but does indicate cleavage of caspase 8 with increasing cleavage upon longer treatment of HD5. These results suggest the death mechanism initiated by HD5 is canonical apoptosis. Therefore, we hypothesize that qPCR analysis will show gene amplification of pro-apoptotic proteins to further demonstrate cell death by canonical apoptosis resulting from HD5 treatment. These results will further our understanding of the disease mechanisms that participate in the progression of UC and CC.

Apoptotic Responses to Human alpha Defensin 5 in Normal Human Colonocytes

Kyra Drobny, Kelly Roy, Macy Glassco, Haley Kling, Breckin Horton, Ameer Moussaed, and Amanda D, Williams, Biology

HD-5 is an antimicrobial peptide secreted by Paneth cells found in the small intestinal colonic crypts whose normal function is to kill bacteria. However, previous research has shown upregulation of HD5 secretion by Paneth cells in the large intestine of patients with Crohn's colitis (CC). Paneth cells are not normally seen in the large intestine, so their presence in patients with CC is of interest. Little is known about the specific mechanism of cell death by HD5 in the colon. In order to understand whether canonical apoptosis,

via caspase-8, or inflammasome-mediated apoptosis, via caspase-1, is occurring, normal human colonocytes (NCM-460) were treated with 2 $\mu\text{g}/\text{mL}$ of HD5 after 8 and 12 hours. We conducted preliminary western blots of the protein extracted from NCM460 cells treated with HD5 and compared them to cells treated with water at both 8 and 12 hours. We used antibodies selective for caspase 1 and caspase 8. There was no evidence of caspase 1 cleavage or activation in cells treated with HD5. Caspase 8 showed evidence of cleavage and activation. The ratio of caspase 8 to procaspase 8 was not significantly different when comparing the 8 and 12-hour treatment times. We will further explore the pathway of apoptosis through qPCR analysis of genes related to canonical apoptosis.

The role of HD5 in Activation of Cell Death in Colorectal Epithelial Cells

Caleb Berta, Stephen Wigger, Mina Gerges, David LeCates, and Amanda D. Williams, Biology

Anti-microbial peptides (AMP) are innate immune components that are some of the earliest parts of our immune system. Human Alpha Defensins (HD) are a class of AMP that are produced by Paneth cells. Specifically, HD5 plays a role in membrane destruction which leads to cell death. It has been previously shown that HD5 is up-regulated in Crohn's Colitis and that it can potentially be used to delineate between Crohn's Colitis and Ulcerative Colitis. In this study we looked at the role of HD-5 in cell death in colorectal epithelial cells. Activation of Caspase 1 signals inflammasome mediated apoptosis while activation of Caspase 8 signals activation of canonical apoptosis. We treated normal colonocyte cell line, NCM460, with 1 μg of HD5 for either 8 or 12 hours and observed cell death after those incubation periods. We hypothesize that treatment of the cells with HD5 will result in activation of Caspase 1 and inflammasome mediated apoptosis.

Role of Beclin-1 (coiled-coil myosin-like BCL2-interacting protein) in Apoptosis

Abbey Olson, Sydni Caldwell, Noah Walker, Toria Smith, and Regine Lane, Biology

Beclin-1, a key protein found in mammals that acts as a tumor suppressor, has a central role in the regulation of both autophagy and apoptosis. Autophagy is a process of programmed cell survival, which allows the cell to survive stress. In contrast, apoptosis is a form of programmed cell death, or "cellular suicide," and does not allow the cell to survive external or internal stress. The apoptotic process is performed on cells that the body has declared to be unsalvageable. Beclin 1 interacts with Bcl-2, an anti-apoptotic gene, which induces apoptosis when caspase 8 cleaves the Beclin 1 protein. The caspase mediated cleavage of Beclin 1 acts as a toggle switch between apoptosis and autophagy. When tumor suppressors, such as Beclin 1, are mutated or become inactive, cancer cells proliferate at a higher volume and can lead to tumor formation and further growth. External trauma is signaled to a death receptor on the outside of the cell, which then signals to caspase to cleave Beclin 1 beginning the apoptotic pathway. Internal stressors, such as mutations in DNA, will be detected and cause the cell to undergo a suicidal pathway similar to extrinsic stress. We will be discussing the intrinsic and extrinsic pathways of Beclin 1, as well as its relation to maintaining cancerous cells.

Quantification and Detection of Secondary Metabolites in *Aliivibrio fischeri* using Liquid Chromatography Tandem Mass Spectrometry

Christopher F Ross and Kent Clinger, Chemistry and Biochemistry

Quorum Sensing (QS) is a type of density dependent cell-cell signaling between bacteria. The concentrations of QS molecules secreted increase with bacterial concentrations. QS molecules regulate gene expression through small molecule signaling pathways. These pathways allow bacteria to display group behavior, although only when enough members of the group are present. Previous studies have linked QS pathways to regulating biofilm formation and virulence factors, so these pathways are important in understanding bacteria pathogenesis. The *Aliivibrio fischeri*, a marine bacterium which resides in the light organ of the Hawaiian Bobtail Squid, exemplifies symbiosis between microbes and marine life. With

sufficient numbers, *A. fischeri* displays bioluminescence through the luciferase process. The redox reaction responsible for this bioluminescence requires several enzymes to catalyze the process and regenerate the reactants. The genes encoding these enzymes are located on the Lux operon which is regulated by LuxR, a transcription factor that requires the binding of QS molecules such as acyl-homoserine lactones (AHLs) to enhance transcription. The full extent of *A. fischeri*'s signaling networks have not yet been discovered. Detection and quantification of multiple QS molecules such as DPD (AI-2 precursor), C6-, C7-, and C8-HSL as well as concentrations of relevant secondary messengers such as cAMP in cultures of *A. fischeri* was attempted using liquid chromatography tandem mass spectrometry (LC-MS/MS) and ultra high performance liquid chromatography coupled to high resolution MS (UPLC-HRMS).

Enhanced Optical Clarity of Polyimide Aerogels via Fluorinated Monomer Incorporation

Melica Nikahd and Stephanie Vivod, Chemistry & Biochemistry

Aerogels are lightweight, nanoporous materials derived from a gel in which the liquid is replaced by gas. Because of their high porosity (>90%), small pore size (10-40 nm), low density (0.1-0.2 g/cm³), and large surface area (400-850 m²/g), aerogels are excellent thermal insulators, with a thermal conductivity of 20 mW/m*K. These properties, along with their low dielectric constants and good acoustic dampening, have allowed aerogels to become a prolific part of aerospace technology, as they can be used in applications such as inflatable aerodynamic decelerators, propellant tanks, heat shielding, insulation for EVA suits and habitats, and antenna substrates. In addition, aerogels incorporated with fluorinated monomers have shown to achieve lower dielectric constants, a greater resistance to higher temperatures, increased hydrophobicity, and enhanced optical clarity that would be ideal for replacing windows and windshields at a fraction of the weight and without the use of harmful or toxic chemical coatings. This study further explores the effects of fluorinated diamine incorporation in the polyimide structure to not only improve the thermal and mechanical properties of polyimide aerogels but also to observe the ability of a fluorinated polymer to enhance the optical clarity.

Structural Investigation into Chemistry of Vitamin B6

Tony Nguyen and Kent Clinger, Chemistry and Biochemistry

Advanced Glycation End (AGEs) products are harmful compounds that are responsible for several diabetes-related complications including atherosclerosis, renal dysfunction, Alzheimer's disease, and eye disease. One of the most promising therapeutic interventions to AGEs formation is pyridoxamine, a member of the B6 vitamins. It can act as a powerful inhibitor of AGEs formation for both in vivo and in vitro. Mechanistically, pyridoxamine forms a Schiff base analogous to glycation via the condensation of the pyridoxamine with carbohydrates. The Schiff base (or imine) forms a stable, tricyclic compound via the cyclization of the carbon on the 5-position reacting with the hydroxyl group on the second carbon of the sugar molecule. Using a hydrogenator, the imine will be reduced in order to improve the stability for analysis. Using sugars such as glucose or galactose, we aim to synthesize pyridoxamino-sugar structure in a pure and stable form so they can be analyzed by x-ray crystallography and other physical-chemical methods. Amino acids react with the aldehyde form of Vitamin B6, pyridoxal, which yields Schiff bases (or imines) as well. Apparently, these imines are unstable and decarboxylase the amino acid carboxyl group when exposed to visible light. The kinetics of this process will be investigated using ultra-violet/visible spectroscopy and fluorescence spectroscopy.

The Microwave Synthesis of Phenylalanine: A two-step Synthesis in the Organic Teaching Laboratory Using Acetone and Butanone as Solvent

Elizabeth Behrens and Kent Clinger, Chemistry and Biochemistry

A modified malonic ester synthesis may be used to synthesize phenylalanine from diethylacetamidmalonate (AAM). Malonic ester syntheses are organic chemical reactions in which an ester of malonic acid is

alkylated at the alpha carbon, adjacent to both carbonyl groups, and then is converted into a substituted acetic acid. The synthesis of phenylalanine illustrates the advantages of modified malonic esters in organic synthesis. However, the synthesis of amino acids has often been conducted in absolute ethanol and sodium ethoxide. Sodium ethoxide is commonly generated in situ by the addition of sodium metal to absolute ethanol. This presents a couple of difficulties: 1) metallic sodium reacts rapidly with water to produce hydrogen which can create an explosive condition; and 2) absolute ethanol is expensive and difficult to maintain in the absolute state. Therefore, our laboratory has sought to find safer alternatives for the base and the solvent. Following the work of Deiters and co-workers, we have performed malonic ester condensations using cesium carbonate as the base in various solvents. PEG 400, acetone, and butanone (MEK) have all been found to yield product suitable for hydrolysis into phenylalanine in the undergraduate organic chemistry laboratory. A microwave assisted acid hydrolysis using dilute acid is currently being developed to remove all the malonate protecting groups and decarboxylate one of the carboxyl groups.

High Performance Liquid Chromatography Assay of Amino Acid Decarboxylase

Manvitha Indukuri and Kent Clinger, Chemistry and Biochemistry

Amino Acids are converted to their corresponding amines in reactions catalyzed by amino acid decarboxylases. In previous experiments, we attempted to develop an assay for several of these decarboxylases using a high performance liquid chromatography equipped with a weak cation exchange column. The differences in charge of these amino acids would lead to variation in retention time and a peak would be observed. The activity of the enzyme can be understood by observing the peak areas which are indications of disappearance of the substrates and the appearance of the products. Recently, we have begun using a strong cation exchange column along with a sodium acetate buffer of pH 5.7 to analyze phenylalanine and methamphetamine, tryptophan and tryptamine, histamine and histidine. We hope that these results will allow us to determine the enzymatic activities of various amino acid decarboxylases.

Computational Study of the Eclipsed Arrangement of 1,1-dihalo-2,2,3,3-tetramethylcyclopropanes and How They Contribute to Angle Strain in Complex Molecules

Owen Glogovsky, Breckin Horton, and Kent Clinger, Chemistry and Biochemistry

Cyclopropane is a planar molecule with three carbon atoms and is characterized by its extreme ring strain and high heat of formation. In our molecule of interest, 4 eclipsed methyl groups and two halogens are each contributing to the torsional strain of the molecule. Wet labs have synthesized a number of these halogenated cyclopropanes, but 1-bromo-1-chloro-2,2,3,3-tetramethylcyclopropane, 1,1-dichloro-2,2,3,3-tetramethylcyclopropane, and 1,1-dibromo-2,2,3,3-tetramethylcyclopropane have been, as of yet, difficult to synthesize. Using computational methods, we are attempting to understand how different halogens impact the thermodynamic and torsional stability of the molecule. We will also explore the steric behavior of the molecule. We will build a series of 1,1-dihalo-2,2,3,3-tetramethylcyclopropanes halogens including fluorine, iodide, bromine, and chlorine on computational software. Using the density functional theory method and basis sets optimized for halogenated cycloalkanes, we will generate theoretical molecular models.

Purification of Green Fluorescent Protein to Obtain Neutron Diffraction Data

Caleb Berta and Kent Clinger, Chemistry and Biochemistry

One of the most widely used proteins in biological and medical research is a protein that comes from jellyfish *Aequorea victoria* called Green Fluorescent Protein. The protein has been used in many experimental applications such as markers for gene expression, protein localization and folding, as biosensors, and as probes for protein-protein interactions. It is a naturally fluorescent protein whose chromophore comes from the cyclization of a serine-tyrosine-glycine tripeptide of the protein itself. Due to this intramolecular processing it does not need an outside chromophore for its fluorescence making it a

useful marker for in vivo studies. The protein contains 238 amino acids folded into 6 alpha helices and 11 beta strands, with the strands forming a beta barrel with antiparallel strands that house the para-hydroxybenzylidene-imidazole chromophore which accounts for the stability of the fluorescence of the protein. Within the chromophore there is a complex hydrogen bonding pattern that permits the transfers of protons between the chromophore and residue sidechains and stabilizes the chromophore. This transfer of protons is made possible through a network of proton wires that are made up of amino acid residues. In this project we attempted to purify and concentrate Green Fluorescent Protein in order to use Neutron Diffraction to analyze its extensive hydrogen bonding network.

Conspiracy or Cure? Cannabidiol and Inflammation

Kaitlyn Wiley and Brian Cavitt, Chemistry and Biochemistry

Cannabidiol, better known as CBD, has become a significant interest to society in recent years. Raved anecdotally by consumers, CBD has been said to alleviate a broad range of medical ailments - from psychiatric illnesses to cardiovascular diseases. Despite its potential medicinal benefits, CBD is still in legal flux due to its psychoactive relative, tetrahydrocannabinol (THC), which is also derived from precursors in *Cannabis sativa*. Via a critical analysis of current literature, this poster will investigate the effects of CBD inhibition on the inflammation enzyme cyclooxygenase-2 (COX-2), providing biochemical evidence of CBD's potential for resolving inflammation. The critical analysis will correlate CBD's inhibitory effects on COX-2 and provide a well-developed background for future biochemical investigations.

What ingredients are in psychic vampire repellent spray?

Robert King, Rylee Davie, Rebecca Duke, Owen Glogovsky, Melica Nikahd, Lakelyn Reed, and Matt Vergne, Chemistry and Biochemistry

Recently alternative health products have become increasingly popular for consumers. These products are not regulated as drugs, and their labeled ingredients seem questionable. We plan to test one such alternative wellness product, psychic vampire repellent spray, and other health products of questionable health benefit. The vampire repellent spray label claims that the spray contains sonically tuned water, moonlight, and love. A volume of the vampire spray or other health products will be injected into a gas chromatograph mass spectrometer for analysis of organic compounds present. We plan to test for the presence of phenylethylamine (PEA) which is the chemical of love. The vampire spray also claims to increase positivity; therefore, we plan to identify if serotonin is present. We also plan to determine if there are any illicit drugs present by comparing the vampire repellent chromatograms with THC, CBD, amphetamine, and cocaine.

Do Balloons Restrict Modern Advances?

Lakelyn Reed and John Smith, Chemistry and Biochemistry

Helium is the second most abundant element in the universe; however, its existence is extremely rare on Earth. Helium is essential for the functioning of MRIs, the manufacturing of cell phones, computers, high-speed internet, and cable television. Helium is also important for scientific research, space missions, and welding. Most civilians are familiar with helium because of its use in balloons and blimps, but the price of helium skyrocketed in 2019 causing problems for balloon lovers everywhere. Several stores, including the famous Party City, had to make cutbacks in balloon offerings to cope with the spike. Helium is a vitally important element playing a large role in medical diagnostics and fiber optic technology, and many people are essentially misusing the element in balloons. The United States government must start regulating helium sales in hopes of preserving helium for truly important purposes. Everyday life will drastically change for many if we run out of helium, and there will be greatly reduced capacity for expansion of medical imagery services, high-speed internet installation, and other vital life improvements for the developed and developing worlds.

Analyzing Gene Expression Data Using Tableau

Yuan Sui and Qingguo Wang, College of Computing and Technology

Tableau is one of the most popular business intelligence tools for visualizing and analyzing business data. However, it is rarely used for processing biomedical data. In this study, we evaluate the feasibility of applying Tableau to analyze gene expression data. The test data we used is from two of the largest studies in sciences: Genotype Tissue Expression project (GTEx) and The Cancer Genome Atlas (TCGA). Our work indicates Tableau is capable of processing gene expression data.

Lower Body Exoskeleton

Nate Foote, Leah Hampton, Carson Littlefield, Jeremiah Niehls, Seth Mann, Lauren Heinrich, and John Hutson, Electrical Engineering

This team of mechanical and electrical engineering students have designed a lower body exoskeleton for the Applied Collegiate Exoskeleton (ACE) competition held by Michigan State. This is the first year that a team from Lipscomb University has entered this competition. The ACE competition is designed to evaluate exoskeletons in their ability to assist first responders. The main goal for the competition is to reduce the amount of energy required from the user to perform physical tasks that reflect situations that first responders experience every day.

A Student-Led Exploration of Manufacturing Through the Development of a Four Cylinder Bourke Air Motor

Lauren Heinrich and Mark Chandler, Engineering

The design, development, and manufacture of the Four Cylinder Bourke Air Motor along with the opposing piston compressor and electrical power system is an exploration of how fluids, mechanics, and controls work together to create a functioning system. Throughout the mechanical engineering program, Fluid Dynamics, Machine Design, and Thermodynamics present the governing equations which are used during the design of complex systems. The purpose of the interdisciplinary project was to investigate the process of designing, prototyping, and manufacturing of a complex system while also learning how to manual and CNC machine components. After the successful development of the first prototype of the Four Cylinder Bourke Air Motor, the development of an air compressor and accompanying power system began. Each component of the system had to be designed, dimensioned, machined, and assembled to work together. At the completion of the project, fundamental manufacturing concepts regarding material selection, proper tolerancing, and machining practices were well-honed and has led the student to pursue advanced manufacturing techniques in graduate school.

OmniCOMM

Christopher Miller, Ben Davis, Jacob Eshleman, Hannah Mason, Joseph Morris, and Greg Nordstrom, Electrical and Computer Engineering

OmniCOMM is a secure, interactive communication device allowing instructors to remotely send formatted public messages for display to visitors while away from the office (e.g. "I'll be out of the office until 1:30 p.m. this afternoon"), and to receive messages from visitors. Visitors may enter textual messages via an interactive touchscreen or record and send a voice message. All messages from visitors to the instructor are time stamped, and include a photograph of the sender. The device allows an instructor to upload routine information, such as their schedule or time-sensitive alerts, to the home screen of OmniCOMM for viewing.

OmniCOMM will be embedded in the wall and become a permanent fixture in the Fields Engineering Building. Ultimately, the intent is to install OmniCOMM devices throughout Lipscomb so all faculty may enjoy the benefits of immediate and secure messaging.

Lipscomb Motorsports

Trey Hickey, Scott Johnston, Hunter Haynes, Issac Vaught, Jase George, Kevin Tobin, and Samuel Wright, Engineering

Lipscomb Motorsports has designed and constructed a single-seat, all-terrain sporting vehicle to compete in the 2020 SAE International Collegiate Design Series (CDS) competition. Our final design selections utilize a “wishbone” style independent front suspension, paired with a “trailing arm” style rear suspension. Our designs were developed to provide additional strength, simplicity and ease of maintenance for the vehicle. We have confidence in our vehicle and expect it to be competitive in competition and serve as the basis of design for future Baja teams.

Dewatering Drilling Mud

Katelynn McMaster, Lauren Heinrich, Ben Vogel, Jacob Gunter, Brian Cavitt, and Todd Lynn, Chemistry and Civil & Environmental Engineering

In the process for drilling pipelines for natural gas or petroleum, water is mixed with various lubricants (e.g., clay) and suspension agents (e.g., polymer) to enhance the drilling process. After drilling through soil and/or rock, the resulting drilling mud must be disposed of. If traditional on-site disposal is not available, the drilling mud must be transported to a disposal site (e.g., landfill). Therefore, our investigation included a method to dewater the drilling mud in a cost-effective and sustainable fashion. Flocculation using a multivalent flocculant should collapse the polymer suspension agent and promote clay aggregation. After optimizing the polymer and calcium bentonite clay concentrations, we examined the flocculation potential of CKD (a waste material obtained from the production of cement), alum $[Al_2(SO_4)_3]$, iron(III) sulfate $[Fe_2(SO_4)_3]$, and iron(II) sulfate ($FeSO_4$) tabulating sedimentation time. The flocculant settled the solids in the separation vessel while centrifugal pumps removed the water due to their availability, ability to handle small solids, and widespread use in transfer applications. A rake system removes the solids and limits disturbance of the settled material which is then transferred to an extraction auger and aids in dewatering. The dewatered mud can then be reused, re-purposed, or collected for disposal. The goal of the dewatering cycle was to allow for continuous operation. The sustainability and disposal methods were analyzed with regard to the environmental impact and economic effectiveness of each method.

Medical Waste Incinerator at Polyclinic Health Center in Honduras

Payton Otto, Nathan Klemz, Austin Eager, Daniel Etson, Sam Shaylor, Matthew Moore, Abdus Samad, and Kirsten Dodson, Engineering

The Peugeot Center for Engineering Service to Developing Communities partners engineering students, professionals, and faculty to provide engineering solutions to those in need around the world. Since 2004, the Peugeot Center has established a relationship with Predisan Health Ministries, a Christian organization that provides health services in Honduras. In early 2019, a request was made by Predisan for the design and installation of an affordable and environmentally-friendly bio-incinerator at the Polyclinic Health Center in Honduras. The scope of the project is to design a bio-incinerator that can be scaled down and used at over 35 rural health centers to eliminate medical waste properly. Research on the incineration process including combustion and flue gas was done to determine air quality control, along with current incinerator designs. A detailed design was created using a 3D CAD modeling software known as SOLIDWORKS. The design was created to fix some of the issues that the current incinerator at the health center has, such as a short lifespan and unsafe emissions. The design consists of three chambers; an initial burn chamber, a settlement chamber, and a flue gas chamber to ensure the burn emissions are neutralized. A prototype will be built and

tested with representative materials before the final build at the Polyclinic Health Center in Honduras in May 2020 by an engineering missions team. This project has the potential to serve and impact rural medical clinics around the world. Results of the design, prototype, and testing will be described in the poster presentation.

Lipscomb University Aeronautics NASA Student Launch Project

Nial Redha, Bryce Minton, Jack Wood, Haley Cable, Molly Watts, Ben Musoni, and Joseph Tipton, Mechanical Engineering

NASA is holding a student launch competition for colleges around the country, and this is the third year that Lipscomb has entered a team of engineering students into the competition. The team's goal is to design and build a rocket that reaches an altitude of 5000 feet, and then deploys two parachutes to ensure the rocket lands safely so that it can be reused and so that nobody is injured upon contact with the ground. The smaller parachute is deployed at apogee, and the larger parachute is deployed 600 feet above the ground. The rocket must contain a payload that will collect a sample of a course, granular material. The payload contains a drone that must exit the rocket body upon contact with the ground and collect the sample before bringing it safely back to the rocket. The competition involves multiple scored reports that must be submitted to NASA throughout the design and construction process along with the actual flight and sample collection on competition launch day in Huntsville.

Thorium: An Overlooked Solution

Robby Renfrow and Richard Gregory, Mechanical Engineering

The world currently faces numerous challenges when it comes to producing adequate clean energy. There is much focus on the development of new technologies, but an old one may be the cornerstone of clean energy production in the future. Liquid Fluoride Thorium Reactors (LFTRs) are heavily based in technology that dates to the Molten Salt Reactor Experiment at Oak Ridge in the 1960s. This technology was abandoned when Admiral Hyman Rickover decided to standardize nuclear technology based on a uranium reactor design. These thorium reactors operate at high temperatures and atmospheric pressure while using a molten salt mixture as both a coolant and fuel. This is different compared to solid fuels cooled by pressurized water in uranium powered nuclear reactors today. This allows fuel to be used longer and makes the reactor safer. Since they are run at atmospheric temperature, LFTRs lack the need for high pressure water vessels and large cooling towers, which reduces the overall size and cost of the reactor. Regarding climate change, nuclear in general is a carbon free energy production option that could provide adequate carbon-free energy. However, there is much public concern about waste and fuel proliferation. Thorium solves these issues with less waste that can be released exponentially sooner. Regarding weaponization, its byproducts are immensely difficult to proliferate. Fuel is also readily abundant because thorium has a crustal abundance four times that of uranium with reserves all over the world. LFTRs are expected to receive funding in the next 10 years.

Coffee County Earth Dam Remediation Project

Tiana Y. Lynn, Ben Vogel, William Raihala, Thomas Clawson, and Chris Gwaltney, Civil Engineering

The Lynnguini & Sons, LLC senior design team was tasked with studying an earth dam and farm pond that was consistently losing water below the designed amount. The scope of the project was to provide seepage control for the existing structure, while also determining the best way to increase the pond's surface area and volume. Geotechnical investigation was conducted through obtaining soil samples and performing laboratory tests to determine the soil parameters, specifically the hydraulic conductivity, unit weight, and soil classification. Historical soil surveys were also referenced and included in the proposal. Test values

determined were used in the seepage and slope stability analysis to determine the existing conditions of the earth dam. A full hydrology analysis was conducted to determine the inflow and outflow rate of the pond and to determine the storm events for the site based on topography and current weather data. Topographic information was obtained through on-site surveying generating a contour map which was used to delineate the watershed. Hydrologic analysis was conducted to determine the inflow rate of the pond from the watershed. Using rainfall data and hydrologic modeling, the maximum storm event that the dam could withstand before overtopping was determined. Recommendations were then given to the client by the design team to correct the culvert, a likely cause to the seepage, and to potentially raise the dam to the appropriate height to withstand flooding and increase the water's surface area and volume.

A Balanced Mixture Design Approach for Asphalt Paving Mixtures

Tiana Y. Lynn and Todd Lynn, Civil & Environmental Engineering

Asphalt mixture design evolved in the latter part of the last century to focus on excessive rutting that had become prevalent with the nation's asphalt pavements due to increased traffic loads and inattention to the selection and design of materials appropriate for the pavement structure and traffic loadings. While implementation of technological advancements by many states resulted in the virtual elimination of rutting, these also brought about a general reduction of asphalt cement in mixtures which coupled with the incorporation of materials to promote sustainability such as Reclaimed Asphalt Pavement (RAP) and Reclaimed Asphalt Shingles (RAS), resulted in increased cracking susceptibility. Recently, an alternative mixture design process has emerged that addresses both rutting and cracking resistance in the laboratory via performance testing to produce a Balanced Mix Design. Currently, there are numerous performance tests available to determine the integrity of asphalt pavements; however, many of them are expensive and/or time consuming and tedious. In an effort to make performance testing economically available to those designing and testing asphalt mixtures, the Ideal-CT and Ideal-RT were developed as comparable alternatives that are more economic and efficient. Research was completed on both tests to compare them to other more accepted performance tests such as the Hamburg Wheel Tracker (a rutting test) and Semi-Circular Bend test (a cracking test). Both tests were statistically comparable and viable options to economically test for rutting and cracking in asphalt pavements. Moreover, the repeatability of these tests was evaluated and found acceptable.

Bridging the Gap

Noah Kimbrough, Trent Beacham, Chris Schneider, Emily Morgan, and Chris Gwaltney, Civil Engineering

A clinic in Bacadilla, Honduras serves a community of around 3,000 people, but yearly floods wash away the wooden bridge that connects the community to the clinic. Currently, a nurse at the clinic has an agreement with a local landowner to allow the use of his land for the wooden bridge to be rebuilt each year. Due to this, Predisan, the non-profit that runs the clinic, has requested that the Peugeot Center design and construct a permanent bridge to reach the clinic. A team of student engineers, with the insight and direction of professional engineers, have been tasked with making this happen.

The Role of a Wardrobe Stylist

Bethanie Jones and Sissy Simmons, Fashion

Miuccia Prada once said, "What you wear is how you present yourself to the world, especially today, when human contacts are so quick. Fashion is an instant language." Wardrobe styling has become a prominent and needed position taking on the role of mediator in a flourishing fashion industry. In a city such as Nashville that is filled with a prominent music industry of performers and artists alike, audiences are constantly given a story to interpret. A wardrobe stylist's role in all of this is to come along with artists to create a visual series of outfittings that reflect the story through the elements of design and colour. For Lipscomb University's acapella group, Sanctuary, my goal as a stylist was no different. The creative process

was a combination of forming relationships, collaborating, and vision casting. In the end, cohesive looks are pieced together to represent the performers and their musical set.

The Effects of Caffeine on Anaerobic Metabolism

Katlyn Council, Lindsay Bradshaw, Taylor Morrow, and Ruth Henry, Kinesiology

Caffeine has been studied as an aid to performance in aerobic exercise and muscular power. Fewer studies, however, have studied the relationship between caffeine and anaerobic metabolism. The aim of this study is to measure the effect of caffeine on anaerobic power in college students as measured by a Wingate bike test. Nine college students completed a Wingate bike test without caffeine intake for 12 hours prior to the test. Anaerobic power and peak power output were measured by a Wingate bike test, a 30-second bike sprint with resistance based on the subject's weight. Approximately one week later, the subjects repeated the test after having been given 200 mg of caffeine one hour prior to the test. Anaerobic power and peak power output measurements were compared to the baseline data to determine significant changes as a result of the caffeine. Both anaerobic power and peak power output were significantly increased with caffeine supplements ($p < 0.05$). The mean increase in peak power output was 113.0 watts and the increase in average power output was 15.899 watts. 200 mg of caffeine taken one hour prior to anaerobic exercise improves overall anaerobic power and peak power output in college students.

Anthropometric, Body Composition, and Muscular Performance Comparisons Between Collegiate Division I Baseball Pitchers and Position Players

Marko A. Aziz, William C. Vantrease, Bailey Pihera, James T. Haynes, Megan Jones, Grace Zimmerman, and Jeremy Townsend, Kinesiology

Purpose: To compare anthropometric values, body composition, and muscular performance between baseball pitchers and position players. Methods: Thirty-two Division I collegiate male baseball players (20.0 ± 1.5 yr., 184.6 ± 7.2 cm, 88.4 ± 9.2 kg) completed anthropometric, body composition, muscle ultrasound, and a lower-body muscular performance testing at the beginning of the off-season. Body composition was completed using a Dual X-Ray Absorptiometry (DXA) device which reported body mass, body fat percentage, and bone mineral density. Muscle thickness (MT) of the rectus femoris (RF) and the vastus lateralis (VL) was measured via ultrasonography. To assess muscular performance, all athletes completed a 30-second maximal effort Wingate Anaerobic Test (WnT) on a cycle ergometer. The WnT assessed average power (APwr), peak power (PPwr), and fatigue index (FI) during the test. Athletes were divided into two groups (pitchers: $n=15$; position players: $n=17$) and independent t-tests were used to analyze each variable between the two groups. Results indicated that position players possessed larger leg circumference ($p=0.039$) and a trend for pitchers being taller ($p=0.078$) with no other significant differences in anthropometric data. For muscle thickness, position players have larger VLMT ($p=0.002$) with no difference in RFMT. DXA analysis yielded no differences in body composition. For the WnT, there were no differences in APwr or PPwr, however, trend ($p=0.082$) was found for a higher FI in position players. Conclusion: Based on our data, it appears that position players may possess a larger amount of leg muscle mass than pitchers indicated by circumference and muscle thickness values.

The Effect of Social Media and Internet Use on Adolescents Aged 13-18 on Mental Health and Well-being

Isabella Park, Areen Mohamad-Ali, Sydney Wilson, Rachel Lallky, and Mary Koziura, Nursing

Adolescents today live in a "plugged in" society. Nearly everyone uses the internet as a way to stay connected with one another, remain up-to-date with the latest trends and more. This literature review seeks to uncover the toll that increased social media and internet use can have on the mental health of adolescents ages 13 to 18. The research databases PUBMED and CINAHL Complete were used to find relevant, current research articles for this literature review. Keywords such as "adolescents and social media" and "internet

use and mental health” were used and results were limited to full text sources that were published within the last 5 years. After synthesizing the information, it has been determined that adolescents who use social media on a regular basis are up to 9% more likely to develop symptoms of depression and anxiety than those who do not social media very often (Shensa et. al, 2017). A recent research study used a scale to quantify social media addiction and found that 4.5% of their population belonged to an “at-risk group” and reported increased feelings of depression and low self-esteem associated with their increased social media use (Bányai et. al, 2017). A separate study used structural equation modeling to prove that compulsive internet use predicted the development of poor mental health (Gloster et. al, 2016). However, the social media market is constantly changing, leading to a need for more research to further understand how increased social media and internet use impact adolescent mental health.

Does Screen Time in Children Under 18 Affect Behavior, Sleep, or Overall Development?

Heather Corbin, Katie Braumiller, McKenzie Allen, Kayla Rudie, and Mary Koziura, Nursing

The use of electronics for children under 18 has grown exponentially in the past decade. “Recent data suggests that children are spending more and more time using computers, video games, tablets, and smartphones” (Banda, Calvert, Fleming, Hale, Robinson, Shirong Lu & Wartella, 2017). Technology is becoming more accessible as devices can now be found in schools, homes, libraries. Research studies have attempted to examine how the use of electronics in youth affects their overall well-being and development. The authors used databases such as CINAHL, ScienceDirect, and PubMed to investigate the effects of increasing usage of screen time in children. The following key terms were used: “screen time,” “development,” “behavior,” and “children”. Analysts have discovered links between obesity, decreased sleep, and cognitive and emotional development through increased quantities of screen time (Domingues-Montanari, 2017). Devices such as tablets, virtual reality, video games, and cell phones are becoming more prevalent in the everyday life of youth. A research study analyzed the usage of media in children ages 8-18; it was found that the amount children owning cell phones had increased from 39% to 66% over the course of two years (Foehr, Rideout & Roberts, 2010). As prospective nurses, we are interested in investigating the holistic health in pediatrics and how the use of technology affects their overall well-being. Future research studies should focus on the management of screen time usage in youth and how healthcare providers can address the negative health effects that accompany this phenomenon.

Does the Use of AI-enabled Electrocardiograms Improve the Screenings for Potentially Fatal Arrhythmias Compared to Traditional Electrocardiograms?

Lauren Mosley, Molly Joseph, Brian Nguyen, Jinal Patel, and Gail Humes, Nursing

Failure to detect cardiac arrhythmias can lead to cardiac arrest and potentially death. Artificial intelligence (AI) is a new tool that researchers have applied to multiple fields including the medical field. The term artificial intelligence is defined as a “field of computer science that aims to mimic human thought processes, learning capacity, and knowledge storage” (Krittanawong, Zhang, Wang, Aydar, & Katai, 2017, para. 1). This literature review focuses on the use of AI in electrocardiograms (ECG) to screen and predict arrhythmias. Researchers have tested the integration of AI into traditional electrocardiograms and its ability to predict and identify potentially fatal heart complications. According to Attia et al. (2019), their AI model showed an 85.7% accuracy identifying ventricular dysfunction when tested on 52,870 patients. The same group of researchers developed a screening AI-enabled ECG model for atrial fibrillation. This AI-enabled ECG is able to detect atrial fibrillation with extreme accuracy allowing those at risk to be monitored more closely (Attia et al., 2019). Research shows that identifying adverse patterns in an AI-enabled ECG would save money that could be put towards further testing, allow physicians to treat patients proactively, improve patient outcomes, and decrease mortality rates.

Are Middle to High School-Aged Adolescents (aged 12-18) Who Have Used E-cigarettes Such as JUUL, at an Increased Risk for Developing Respiratory Problems?

Ryan Lyle, Grace Mason, Stephanie Hite, Elizabeth Queen, and Mary Koziura, Nursing

The prevalence of e-cigarette smoking in today's population has drastically increased in the past couple of years. Among high school seniors, the use of e-cigarettes has gone from 11% in 2017 to 21% in 2018 making this the largest increase in substance use in adolescents in over four decades (Singh et al., 2020). Research has shown that one of the main agents of an e-cigarette is diacetyl, and it has been found to cause irreversible obstructive airway damage in previously healthy adolescents (Clapp & Jaspers, 2017). This literature review is focused on finding research to examine the risk of developing respiratory problems and adolescents who use e-cigarettes, such as JUUL, regularly. The strongest strength JUUL pod is five percent nicotine which is equivalent to a pack of 20 cigarettes and can quickly result in nicotine toxicity leading to breathing difficulties, cardiac arrest, and respiratory failure (Singh et al., 2020). ScienceDirect and PubMed were utilized to find scholarly articles published since 2015 that researched the effects of e-cigarette usage and the respiratory problems associated with smoking from these devices. Asthma patients who use e-cigarettes can experience adverse lung effects, such as, wheezing, coughing, and asthma exacerbations (Singh et al., 2020). This literature review will focus on adolescents from the ages of twelve to eighteen. Since e-cigarettes are new to research, the long-term effects of vaping are not yet identified. However, as more cases present themselves, researchers will better understand long-term respiratory effects.

The Effect of HIV/AIDS on the Development of Children in Third World Countries

Alyssa Hollingsworth, Grace Lahey, Leah Major, Sydney Carnock, Mary, and Mary Koziura, Nursing

In many third world countries, HIV/AIDS is an epidemic, affecting a large percentage of the population. The literature review sought to understand the impact perinatally transmitted HIV/AIDS has on a developing child in third world countries. Through Pubmed, ScienceDirect, and CINAHL Complete, multiple searches were performed using the keywords "HIV/AIDS and child development and third world countries." Limitations of the search included only full text articles that were published after 2015. After synthesizing these articles, it was found that children who test positive for the virus were stunted in multiple areas; which include cognitive functioning, behavioral, growth, and overall developmental delay (Mpango et al., 2019). One of the findings that displays a delay in growth includes a z-score of the average "weight for age" of infected children at -0.53, in comparison to uninfected, unexposed children at 0.49 (Debeaudrap et al., 2018). Additionally, suppressed immune systems can be seen in affected children; this results in an increased risk of secondary infections, especially of the skin, which can lead to further complications. In Ethiopia alone 4 out of 5 children with HIV/AIDS develop at least one type of skin infection (Duko et al., 2018). Affected children consistently performed lower on tests that indicated neurocognitive abilities, they also had a higher risk of being underweight and developing a neurocognitive disorder such as depression (Yengopal et al., 2016). Additional research needs to be done in order to gain more insight and details about objective findings demonstrating health deficits.

Virtual Reality as treatment for Phantom Limb Pain

Lauren Guthrie, Alena Vermillion, Christina Mixayphone, Cailey Burman, and Gail Humes, Nursing

Phantom limb pain (PLP) is a condition where people who have had limbs or other body parts amputated perceive a sense of itching, spasms, and/or pain in the limb that has been amputated (Rutledge et al., 2019). Approximately 50-80% of amputee patients experience phantom limb pain (Diers et al., 2015). PLP can affect the amputees' life by limiting their ability to complete daily activities due to altered sensation

perception and intensity of pain (L. Guthrie, personal communication, 2019). Although the exact cause of PLP is unknown, research suggests the source of the pain originates from either the central nervous system or the peripheral nervous system (Stockburger et al., 2016). Options for treatment include both pharmacological and non-pharmacologic interventions. Virtual reality (VR) is one of the newest and fastest-growing non-pharmacologic approaches to treat PLP. The focus of this paper is to investigate the effectiveness and benefits of VR in adult patients experiencing PLP. A search of CINAHL Complete, PubMed, and ScienceDirect databases located 174 total results using the keywords, “phantom limb pain”, “treatments”, and “virtual reality.” After critical appraisal of the literature, it was determined VR is a viable form of therapy, reducing PLP intensity and sensations in amputees when compared to other treatment options. Virtual reality is a relatively new form of treatment for PLP, and studies reveal more research needs to be done to understand its benefits.

The Effect of Probiotics on the Symptomatic Treatment of Inflammatory Bowel Disease in Adults Rojeda Merani, Elizabeth Melby, Sun Kim, Rachel Blackwell, and Gail Humes, Nursing

Ulcerative colitis and Crohn’s disease are both inflammatory bowel diseases (IBD) that affect roughly 400 in 100,000 people (Ng & Shi et al., 2017). With no known etiology, both diseases have similar manifestations of abdominal pain and cramping, diarrhea, bloody stools, fatigue, weight loss, and ulceration or tissue damage. Because there is no standard therapy, the everyday burden of IBD warrants a need to find safe, alternative, therapeutic treatments to improve the daily lives of this population. To better understand treatment options including the use of probiotics, a literature review was done using search terms “probiotics” and “inflammatory bowel disease”. The search resulted in 97 peer-reviewed sources within the last five years from the CINAHL database. Research from the studies revealed that the use of probiotics, live microorganisms that could inhibit the overgrowth of potentially pathogenic bacteria, reduce the overall symptoms associated with IBD and offer a manageable way to live with these disease processes. In fact, populations that took probiotics experienced less inflammatory reactions compared to those who did not take probiotics (Jia & Tong et al., 2018). While many studies have shown only therapeutic effects and no adverse reactions to the use of probiotics in IBD, more research is needed to determine what strains and at what dose probiotics become more beneficial as part of a clinical intervention.

Antibiotic Resistant Bacteria in Cystic Fibrosis

Gine Ahmed, Lucas Bennie, Brette Allison, Jonida Dervishi, and Mary Koziura, Nursing

Cystic fibrosis (CF) is a single-gene autosomal recessive disorder characterized by chronic airway infections. These airway infections are a result of a defect in the conductance regulator (CFTR) protein, which causes a thickening of secretions and impaired ability to clear those secretions (Lim & Fitzgerald, 2017). As a result, bacteria are able to inhabit and infect the respiratory tract. These frequent infections lead to a consistent pattern of antibiotic prescriptions from providers. This use of antibiotics gives way to certain bacteria that are now unaffected by those same antibiotics, which creates a challenge for those seeking treatment. Therefore, this literature review focuses on antibiotic resistant bacteria in CF patients. The literature review was conducted using keywords, “cystic fibrosis” and “pseudomonas aeruginosa” and “antibiotic resistance.” Inclusion criteria included full text and publication year of 2015-present. Through the review of the literature, sources identified *Pseudomonas aeruginosa* to be a common resistant bacteria. The World Health Organization (WHO) has recently listed *P. aeruginosa* as one of three bacterial species in which there is a priority 1 critical need for the development of new treatments to treat infections (Tacconelli et al., 2017). It also identified that current methods to treat these emerging antibiotic resistant bacteria are failing to produce effective results in treatment. Current research looks at the evolution of this bacteria adapting to antibiotic treatment, and future innovative treatment options being explored. The

literature concludes that more treatment options need to be explored and evaluated for their effectiveness in treating these resistant bacteria.

Is There a Correlation Between Preterm Infants and Language/Speech Delays When Compared to Full Term Infants?

Ally Hockaday, Hannah Jamerson, Courtney Majors, Nicolle Weber, and Gail Humes, Nursing

Neurodevelopment is imperative to facilitate proper cognitive functioning. The central nervous system development begins at conception and continues, peaking at two years of age (Barera et al., 2016). According to Jacobsson et al. (2019), infants delivered earlier than 37 weeks face increased risks of developing language delays. In order to understand more about the correlation between preterm infants and language delays a critical review of literature was performed. A search of the ScienceDirect database using the search terms “preterm infants” and “language delay” located 882 results between 2015 and 2020. One study completed by Borradori et al. (2019) found that preterm delivery prevents the proper development of the brain due to a lack of maternal factors that enhance neuronal maturation that are involved in language processing and execution. Additionally, speech and auditory delays in children born before week 34 showed increased risk of language delays at 3-5 years old, while children born between 29-33 or before 29 weeks developed delays at 1.5 years age (Jacobsson et al., 2019). Review of literature of neurocognitive development in preterm infants compared to full term infants reveals concerns for language delays in preterm infants but more research needs to be done to fully understand the intricacies of these delays

How Does the Use of Alcohol in Adolescents Ages 12-20 Affect Brain Development Extending into Adulthood?

Katie Duke, Lauren Flynt, Kiera Holt, Rosy Vergara Ramirez, and Gail Humes, Nursing

In the United States underage alcohol consumption and binge drinking is a concern. According to the National Institute of Alcohol Abuse and Alcoholism (NIAAA, 2020), 11% of all alcohol consumption is by youths ages 12-20. Brain structures continue to develop up to and even after age 20 (Arain et al., 2013). The hippocampus, frontal lobes, temporal lobes, and hypothalamic-pituitary-adrenal axis all undergo substantial growth during adolescence (Arain et al., 2013). These areas of the brain control memory, decision making, reasoning, and stress response. Review of multiple studies (Ruan et al., 2019; Fernandes et al., 2018; Squeglia et al., 2015; Allen et al., 2016; Schnitko et al., 2019; Broadwater et al., 2014) included in this literature review on both humans and animals have shown that chemical substance use, in particular alcohol, can have a developmental impact on the still developing brain. Because these alterations affect development, their impact extends into adulthood. A database search of CINAHL and Pubmed using the words “adolescence”, “alcohol”, “development”, “binge drinking” and “effects in adulthood” resulted in 288 articles on CINAHL and 10 from Pubmed. Studies show that the impacts of adolescent alcohol consumption on the brain include delayed overall growth and memory deterioration (Fernandes, 2018), an increased threshold of acute stress responses in adulthood (Allen, 2016) and a decreased improvement of impulsivity (Ruan, 2019). Although research indicates a correlation between adolescent binge drinking and altered brain development, more longitudinal studies on humans would result in more complete data. This literature review focuses on the effects of underage binge drinking and altered brain development that extends into adulthood

What Are the Changes in Personality and Decision Making in Professional Football Players After Being Diagnosed with Chronic Traumatic Encephalopathy Developed from Recurring Concussions?

Taylor Romine, Maggie Stewart, Yeabsira Taddese, Sarah Fehland, and Mary Koziura, Nursing

Studies show that out of 111 National Football League players, 110 will have chronic traumatic encephalopathy (CTE), ranging in severity (Alosco, 2018). This means that 99% of the professional football population have a degenerative brain disease directly linked to consistent blows to the cranium. People who

have been diagnosed with chronic traumatic encephalopathy may experience many different symptoms. Less severe cases include symptoms of depression and anxiety, where more severe symptoms include complete personality change, parkinsonism, memory loss and eventual dementia (Alosco, 2018). In a study conducted with 202 former football players, 85% showed signs of dementia (Mez, 2017). The online research databases, CINAHL and PubMed, were used to explore credible and original research on the effects of personality changes and altered decision making in those who have been diagnosed with chronic traumatic encephalopathy. The terms “Chronic traumatic encephalopathy,” “professional football players,” “CTE football,” “impulsivity,” and “personality changes” were used to search for these findings. The results were narrowed by full text and peer reviewed articles that were published in the years of 2015 to 2020. Examination of the current data reveals that there is a significant relationship between declining decision making and major personality changes in those who play professional football. Additionally, there is further research that needs to be performed on a larger sample of the professional football population in order to find direct correlations between professional football players diagnosed with chronic traumatic encephalopathy and altered personality and diminished decision making.

In Mothers That Use Opioids During Pregnancy, What Are the Long-Term Effects of Neurodevelopment in Children?

Marisol Bishop, Olivia Richardson, Sage Olson, Khiya Booker, and Gail Humes, Nursing

The opioid epidemic in the United States has resulted in a dramatic increase in opioid use in the past decade. According to Cooper et al. (2015), the complications that are associated with this increase in opioid use affect a wide range of the American population which includes pregnant women and their infants. Children can be born with Neonatal Abstinence Syndrome (NAS), which is a postnatal withdrawal syndrome from certain drugs, characterized by symptoms such as poor feeding, seizures, tremors, and respiratory complications (Cooper et al., 2015). Azuine et al. (2019), states that exposure to opioids in utero was significantly associated with higher rates of neurodevelopmental disorders in affected children. The authors performed a literature review to evaluate the relationship of in utero exposure of opioids and the effects on neurodevelopment in children. For the review, a search of CINAHL and PubMed databases was done using the search terms “neurodevelopmental” and “opioid exposure and children”, “neurodevelopmental consequences of opioid exposure”, and “effects of opioids on children”. The database search was limited to articles published between 2015 - 2020. After a critical review of multiple research studies, it was determined that there is an association between neurodevelopmental delays, including attention-deficit/hyperactivity disorder (ADHD), learning disabilities, autism, intellectual disability, language delays, and conduct disorders within utero exposure to opioids. In conclusion, research shows children born from exposure to opioids are at higher risks for adverse neurodevelopmental outcomes. Further research is needed to better understand the long-term effects on neurodevelopment from opioid exposure.

Cooking Education in Individuals with Intellectual and Developmental Disabilities

Madison Shea, Halle King, OTD, OTR/L, Bailey Pihera, and Nancy Hunt, Nutrition and Dietetics

Individuals with intellectual and developmental disabilities (ID/DD) experience barriers to living independently due to their physical and/or emotional impairments. As a result, most rely on the support of caregivers for emotional, mental, physical, and financial support. Lipscomb University’s Igniting the Dream of Education and Access at Lipscomb (IDEAL) program provides access to higher education and supports students in career exploration, academics, and independent living skills. Individuals with ID/DD often experience comorbid conditions such as obesity. Other barriers to nutrition for individuals with ID/DD include: sensory sensitivities to certain foods that results in a limited diet, as well as, limited knowledge of nutritional information and cooking skills needed to prepare nutritious meals independently. In the IDEAL curriculum, students participate in a two-semester long cooking class. In the first semester, professors and peer mentors teach common kitchen skills such as food safety, measuring, and recipe accuracy. Throughout the class, students are evaluated on their skill progressions and their confidence in preparing a variety of

simple recipes. The objective of the cooking class is for students to be able to successfully prepare a variety of nutritious meals independently. This program evaluation will determine the effectiveness of the IDEAL cooking class for students with ID/DD in teaching cooking skills and gaining confidence in preparing recipes during the transition to independent living. Using this feedback, we aim to create an evaluation tool to further enhance students' learning experiences and provide a standard for further program development.

Development of a Micro-Plasma Collection Card Method for Intestinal Permeability Assays

Rylee Davy and Matt Vergne, Pharmaceutical Science

The small intestine is tasked with protecting extracellular fluid against unwanted substances; it is the primary site of nutrient digestion and absorption. The key component of this process is a single cell mucosal layer that forms the intestinal barrier. The effectiveness of the intestinal barrier can be measured by a permeability assay. A popular permeability assay is the dual sugar absorption test, which measures permeability by comparing the circulation uptake of a synthetic disaccharide, lactulose, and a monosaccharide, rhamnose. When the sugars are administered by mouth, the monosaccharide traverses the intestinal barrier and represents the total intestinal absorptive capacity. The larger disaccharide, lactulose, does not circulate in the intestinal system aside from cases where intestinal inflammation is present. Because of this, the ratio of disaccharide and monosaccharide concentrations post ingestion is a measure of intestinal permeability. Intestinal permeability is assessed by analyzing concentrations of sugars in circulation. This is usually measured in urine, but the acquisition, handling, and processing of urine can be inconvenient. The analyte concentrations can also be measured in blood by vein puncture, but this an invasive technique that requires a centrifuge and cold storage. Instead, a micro-plasma collection cards can be used to reduce the required amount of blood to a few droplets. The cards separate blood cells from plasma instantly, leaving a dried plasma spot, which can be stored at room temperature and analyzed later. This experiment will determine intestinal permeability and develop an LC-MS/MS method to measure lactulose and rhamnose in dried plasma spots.

Demonstration of the Polarization and the Intensity Profile of Electric Dipole Radiation

Beshoi Grees, Kyra Hendrickson, and Randy Bybee, Physics

The mathematical description of electromagnetic radiation has proven to be a tremendous triumph for physics and certain areas in engineering. The details of this description stem from the Maxwell equations and provide significant insight into the three-dimensional structure of the radiation generated by a particular source. Two quantities that can be useful in the description of electromagnetic radiation are polarization and intensity. Included among the large number of applications of radiation are the construction of antennas for the generation of as well as the reception of electromagnetic radiation. In order to maximize the efficiency and the use of an antenna, it is of practical interest to understand both the polarization and the intensity profile of electromagnetic radiation of given character. This project investigates both of these quantities for electric dipole radiation using a highly-visual, user-friendly arrangement. We use an rf-oscillator to power a center-fed electric dipole antenna and use a hand-held receiving antenna with a light-bulb appropriately connected to sample the polarization and the intensity profile of the generated radiation.

Adaptive Center of Mass Adjusting Device

Beshoi Grees, Shelbi Sullivan, Mariam Almadan, Nathan Foote, and Alan Bradshaw, Physics

In normal walking, the body's center of mass (COM) oscillates vertically which results in the body performing work each time the center of mass is lifted. Several studies have been conducted on the energy effects of walking on the body's COM, but no study has explored isolation of the vertical motion of the body's center of mass to determine the potential efficiency improvement. The goal of this work is a device that will actively adjust the vertical position of a person's center of mass in order to achieve straight line motion and increase metabolic efficiency. | The ACOM is attached to a subject and tracks the vertical center of mass after calibration. The device shifts a mounted weight up or down according to the motion of a

person's walk cycle. We will explore the effects this device has on metabolic efficiency by measuring oxygen consumption (VO2) while a person is walking under two different loading conditions: with the device unpowered, and with the device powered. | Preliminary data suggest that subjects expend 38.8 joules per step. We expect to show that the ACOM device will increase metabolic efficiency as measured by VO2 by reducing the amount of energy expended by adaptively changing the subjects' COM. | This research could be applied to any application that requires supporting weight while moving for extended periods of time as well as assisting individuals with balance and coordination issues.

Electrical Signatures of Swallowing in Patients with Swallowing Difficulties

Fiona O'Neal and Alan Bradshaw, Physics

Dysphagia is difficulty swallowing, pain while swallowing or even the inability to swallow. It is associated with compromised quality of life and significant morbidity and mortality. Achalasia is a specific dysphagic disorder in which the lower esophageal sphincter will not relax properly, so food is not allowed to enter the stomach. This causes the food to back up in the esophagus, deferring adequate absorption of nutrients and pain in the chest and throat. Other diagnoses have similar symptom presentation. This study aims to characterize electrical signatures of esophageal dysphagia. We examined electroesophograms in patients (N = 11) for evidence of pathology in dysphagia. A cutaneous electrode array was placed on the throat, chest, and stomach to record the electrical activity associated with swallowing. Recordings (units = voltage) were taken during nine sets of swallows. Data was filtered and analyzed for temporal frequency and to identify the timing and amplitude of voltage peaks. The patterns can tell us about the electrical conductance of the beginning of the digestive system, and we can distinguish which area is causing the abnormal wave patterns. In the data we have acquired thus far, we have observed significant differences in the voltage values between the healthy controls and the affected patients. We are hoping that the outcome of this research will allow us to better understand pathologies relating to dysphagia. Furthermore, we are hoping that this research will contribute to finding treatments and management for conditions that are contributing to swallowing difficulties.

$$\int_0^1 x^x dx$$

Evaluation of the Definite Integral

Dawson Black and Randy Bybee, Physics

$$\int_0^1 x^x dx$$

The definite integral $\int_0^1 x^x dx$ is celebrated for having no elementary anti derivative and for being particularly challenging, despite its humble appearance. This definite integral offers consideration of results involving

$$\int_0^1 \sqrt{x}^{\sqrt{x}} dx$$

various roots such as $\int_0^1 \sqrt{x}^{\sqrt{x}} dx$ as well. This original definite integral, though intimidating at first sight,

$$\int_0^1 x^x dx$$

can be evaluated through the use of an infinite sum. This work will present the evaluation of $\int_0^1 x^x dx$ as an infinite sum and will also show a generalized form for various roots. In addition, attention will be given to providing a closed form for the infinite sum.

Cerebral Blood flow and Cerebrovascular Reactivity Changes in Prodromal Alzheimer's disease

John Cole Suey, Shelby Leoni, Luke Schueler, Kait Logsdon, Kacie Pennington, Camdyn Gilbert, and Katie Osborn Spirko, Psychology, Counseling, and Family Science

Cerebral blood flow (CBF) and cerebrovascular reactivity (CVR) are reduced in Alzheimer's disease (AD), and to a lesser extent in normal aging. However, a small but accumulating body of literature suggests CBF and CVR may temporarily increase in prodromal stages of AD as a compensatory response to early pathological changes, while other studies find no declines during prodromal AD. This study assessed CBF and CVR among older adults with normal cognition (NC) and mild cognitive impairment (MCI), the latter being considered a prodromal stage of clinical AD. Vanderbilt Memory & Aging Project participants ($n=299,72 \pm 7$ years, 58% male) free of stroke history or prevalent cardiovascular disease completed a baseline multimodal 3T brain MRI, including pseudo-continuous arterial spin labeling to measure CBF and CVR at baseline and across multiple follow-ups (18-months, 3-years, 5-years). ANOVAs assessed whether NC and MCI groups differed on baseline regional CBF and CVR values, as well as on change in CBF and CVR values across study time points. At baseline, no differences were observed between NC and MCI groups on either CBF or CVR (all p -values > 0.06). Across the 5-year follow-up period, CBF declined more severely in the frontal lobe for the MCI group compared to NC ($F(1, 175)=9.4, p=0.002$), with no other differences emerging between groups (all p -values > 0.22). Our findings suggest the frontal lobe may be especially prone to CBF declines in prodromal AD. Future research should investigate how early perfusion changes in the frontal lobe might relate to hippocampal degeneration in prodromal AD.

Grey Matter Atrophy Rates in Older Adults with Normal Cognition and Mild Cognitive Impairment

Camdyn Gilbert, Luke Schueler, Kaitlynn Logsdon, Kacie Pennington, John Cole Suey, Shelby Leoni, and Katie Osborn Spirko, Psychology, Counseling, and Family Science

Alzheimer's disease (AD) currently has no cure or effective treatment. The main issue surrounding the failure of AD clinical trials is that by the time the disease is diagnosed, irreversible neurodegeneration (i.e., brain atrophy) has already occurred. Mild cognitive impairment (MCI) is considered a diagnostic halfway point between normal cognition and clinical AD, when brain atrophy and cognitive symptoms are occurring, but not as severely as in AD. This study compared the rate of grey matter atrophy in regions of the brain between older adults with normal cognition (NC) and MCI. Vanderbilt Memory & Aging Project participants ($n=299,72 \pm 7$ years, 58% male) completed a brain MRI with T1-weighted imaging measuring regional grey matter volumes at multiple time points across 5 years. ANOVAs compared differences between NC and MCI on regional cerebral tissue volumes. The MCI group experienced a faster rate of atrophy in the hippocampus ($F(1, 257)=7.3, p=0.007$) and medial temporal lobe ($F(1, 257)=16, p<0.001$). The rate of atrophy did not differ between the NC and MCI groups in the frontal, lateral temporal, parietal, or occipital lobes (all p -values > 0.05). Results show that after a diagnosis of MCI, rates of atrophy increase in the hippocampus and surrounding area, which is the region most susceptible to neurodegeneration in AD. These findings highlight the need for more research identifying older adults at risk for AD before MCI since atrophy increases significantly during this stage.

Mental Health and the Church: Are We Leaving a Beneficial Impact?

Abby Myers and Dave Morgan, Psychology, Counseling, and Family Science

Mental health is becoming a more prominent issue as the stigma around it disintegrates. When integrating mental health into the church, however, there is still a perceived demeanor around the topic or the people affected. How can we come as we are if the church is unwilling to be accepting of an illness? This is a project that revolves around informing the people of the church about mental health, its effects, and how it manifests (specifically in adolescents). The research will be mainly focused on anxiety and depression, seeing as the biggest rise in cases has been in these two categories of mental health. This is a subject that is so important in understanding people and having empathy for situations, even if they do not directly affect

our own brains. In order to be people who look more like Jesus, we must educate ourselves on not only the facts but also on being ministers of presence.

White Matter Hyperintensities in Nondemented Older Adults

Luke Schueler, Kaitlynn Logsdon, Kacie, John Cole Sueuy, Camdynn, Shelby Leonni, and Katie Osborn Spirko, Psychology, Counseling, and Family Science

White matter hyperintensities (WMH) are a common neuro radiological finding in older adults thought to reflect small vessel ischemia, and higher volumes of WMHs are observed in Alzheimer's disease (AD). However, WMHs also exist in cognitively normal older adults. This study compares WMH volumes in older adults with normal cognition (NC) and mild cognitive impairment (MCI) in frontal, temporal, parietal, and occipital lobes. Vanderbilt Memory & Aging Project participants ($n=299,72 \pm 7$ years, 58% male) completed a multimodal 3T brain MRI, with fluid attenuated inversion recovery (FLAIR) to quantify WMHs. ANOVAs compared differences between participants with NC and MCI on regional and total WMH volumes. WMHs were present across both groups, but the MCI group had significantly greater volumes in every region, with frontal ($F(1, 296)=19, p<0.001$), parietal ($F(1, 296)=8.8, p<0.003$), temporal ($F(1, 296)=12, p<0.001$), and occipital ($F(1, 296)=13, p<0.001$). Findings suggest the mere presence of WMHs do not necessarily confer any change in cognitive status, but as overall volume of WMHs increase, there is a greater risk for decline in cognitive status, suggesting a potential link to AD. Future research should assess middle age populations prior to initial formation of WMHs to better understand when and how they start to progress.

Cruel and Unusual Punishment: Banning the Death Penalty in the United States

Calah Gipson and Amy Crossland, Social Work and Sociology

The social work profession is one that strives to uphold justice, defend the basic human rights of all people, and to advocate for those who may not have a voice. These virtues reign true in even the most ostracized and alienated populations. Those who have been incarcerated, especially those on death row, are often looked down upon in society and can easily be denied rights because of their position. According to the Death Penalty Information Center, the death penalty is a practice that should be banned in the United States. It has proven to be inhumane, often the result of a miscarriage of justice, and not an effective deterrent to crime. Of the most commonly used methods of administration for capital punishment, excluding firing squad, all have a botched execution rate ranging from 2% (electrocution) to 7% (lethal injection) (“Botched Executions”). Lethal injection, believed to be the most humane administration method, is considered the most painful and the feeling caused by various proposed mixtures has been compared to burning (Neilson) and drowning (Segura). Regarding who receives the death penalty, one statistic estimates that if all death-sentenced defendants remained under sentence of death indefinitely, at least 4.1% would be exonerated (Gross). Other statistics have shown that capital punishment is proven to not deter crime and is actually an extremely expensive and wasteful program (Roeder). The abolition of the death penalty is a first step in repairing a breach of rights and may help change the views of a dehumanized population.

The Intersection of Social Work and Social Enterprise: Innovations for Justice

Grace Boucher, Cayce Watson, Social Work and Sociology

Social enterprise is the medium by which a traditional non-profit and business interface to address unmet complex social or environmental needs (Social Enterprise Alliance, 2020). The mission of social work as a profession is to promote the well-being of individuals and alleviate social problems with a focus on social justice (NASW, 2017). Despite the compatibility between the values of these disciplines (Kay et al., 2016; NASW, 2017), the profession of social work is seemingly absent from the discussion around social innovation (Berzin, 2012; Germak & Singh, 2010). Social work practitioners are trained as change agents to intervene in multi-level systems, transform social policy, and implement evidence-based social

programming. As such, social workers are uniquely poised for leadership in social innovation. However, in an increasingly competitive market with limited resources and charitable donations shaped by the rise of fiscally conservative politics, social service agencies and non-profits are finding it progressively more difficult to sustain their missions (Germak & Singh, 2010; Kay et al., 2016; Nandan & Scott, 2013). In response to these trends, social work administrators, organizations, and academics must pivot and innovate by embracing an entrepreneurial mindset to produce creative and sustainable business models. This poster will define social enterprise and its relationship to social work practice and social innovation. The intersection between social work values and social enterprise principles will be highlighted. Finally, strategies for social work as a discipline to leverage its role in the conversation surrounding social entrepreneurship will be explored.

Graduate Students Oral Presentation Abstracts

Efficacy of Mebendazole and Albendazole on Soil Transmitted Helminth Infections Using Synchronized L1 Stage of N2A *Caenorhabditis elegans* Strain as a Model

Opeyemi Duyile, Jasmine Milligan, and Brian Ellis, Biology

Soil-transmitted helminths (STHs) are parasitic intestinal worms that infect about 1.5 billion people of the world. These worms include *Ascaris lumbricoides*, whipworm (*Trichuris trichiura*) and hookworm (*Ancylostoma duodenale*, *Ancylostoma ceylanicum*, and *Necator americanus*). They are transmitted via soil that is contaminated with these worms in areas with poor sanitation. Helminthic infections are mostly found in tropical climates amongst the poorest people, especially burdening children and pregnant women. The World Health Organization (WHO) currently approves only four drugs for mass drug administrations (MDA) whose mechanisms of action fall into two classes: benzimidazoles (albendazole and mebendazole) and nicotinic acetylcholine receptors agonists (pyrantel and levamisole). Albendazole is mainly used for MDA. These drugs were originally developed for veterinary use which calls their efficacy into question. There is also a growing issue of resistance which calls for the development of new drugs with varied mechanisms of action. It is imperative that the efficacies of the known drugs be studied in a model organism.

Preliminary data shows that Albendazole inhibits the health and motility of L4-staged *Caenorhabditis elegans* when administered in increasing doses. Based on their findings, treating synchronized L1 stage *C. elegans* with mebendazole and albendazole in increasing doses should reveal a steady decline in the health of worms, and, potentially, overall worm survival.

Macular Degeneration and the Effects of Complement and DICER1

Daniel Jordan and Brian Ellis, Biology

Macular degeneration is a debilitating eye disease that affects the elderly. Macular degeneration comes in two main subtypes: dry and wet. With wet form being a later-stage than the dry form, different symptoms arise. In dry macular degeneration, drusen spots accumulate in the eye causing blurry vision and in wet macular degeneration, blood vessels grow into the region of the retina and leak fluid and blood into the retina which causes more vision loss. There are different treatments and therapies that are being explored, such as use of monoclonal antibodies, antibiotics, promotion of autophagy and control of complement proteins.

Examining Differential Apoptotic Biomarkers in Inflammatory Bowel Disease for Increased Diagnostic Accuracy

Olivia Marvel and Amanda D. Williams, Biology

Ulcerative colitis (UC) and Crohn's colitis (CC) are two diseases of the large intestine commonly known as Inflammatory Bowel Disease (IBD) and can be diagnostically indistinguishable. Crohn's disease can affect all layers of the intestinal lining as well as other parts of the digestive tract, while CC, a form of Crohn's disease, and UC affect only the mucosal layer of the large intestine. Thirty percent of patients affected by IBD cannot be accurately diagnosed, particularly when trying to determine whether the patient has CC or UC. This is significant because each disease has a different treatment protocol: surgery is often prescribed for UC, while contraindicated for CC. Previous microarray testing indicates that there are differential expressions of various genes in UC and CC tissues, but differential biomarkers between the two diseases are still being explored. In this research, I focus on genes involved in apoptosis and attempt to discover if cells affected by UC or CC undergo differential modes of programmed cell death, namely ARHGAP21 and PAK2 upregulated in UC versus CC affected cells. By running a series of Western blots, I aim to examine and compare the presence of these apoptotic proteins in UC and CC as well as in diverticulitis controls. The results of this research will provide further understanding of IBD diseases so that patients affected by IBD can be accurately diagnosed and receive the proper treatment.

The Downstream Effects of Mutations in the von Willebrand Factor Protein and How it Leads to von Willebrand Disease Type 1

Stephanie Green and Amanda D. Williams, Biology

Von Willebrand disease is a disease that causes the formation of blood clots. Those who suffer from this often have prolonged bleeding after minor injuries, excessive bruising from everyday activities, and extreme blood loss after surgeries, or in women after their menstrual cycle. This disease not only affects humans, but it has become fairly prevalent in the canine population, causing similar symptoms. It is caused by a defect in the von Willebrand Factor protein, which is a clotting factor often associated with Factor VIII to stop bleeding. This defect or mutation has three outcomes depending on the severity of it; Type 1 is a decrease in vWF present in plasma; type 2 is a mutation that affects functionality and can be further broken down into four other subtypes; and type 3 is a complete lack of any vWF protein in the plasma at all. Type 1, being the least severe is more common and causes about 80% of all human and 90% of canine cases today. Treatments like desmopressin which acts as a replacement for vWF have been successful in humans, however there is not much information about treatments for dogs, as other treatments are still in the works. In this paper, I plan to explore the specific mutation of the von Willebrand factor protein that leads to type

1 von Willebrand disease, specifically focusing on the D3 region to better understand how this disease develops over time.

U.S. Health Care: Market Justice and Social Justice

Drew Dameron, Tim Tant, and Donita Brown, College of Business

Access to health care along with cost and quality of healthcare in America is a national debate. Resolving this debate requires a look at the evolution and social framework of the American HealthCare System. This paper explores two critical concepts: market justice and social justice. Those concepts direct the thinking behind public and private payments for health care and influence this public debate. The relationship between market and social justice in health care is complex and, in America, operates unlike other developed nations. This paper examines health care rationing; public and private financing; and reforming the system as whole. Market justice and social justice are the foundations for the mixed model of public and private health care financing in America. Understanding these models is essential.

The "Green" Plan for Healthcare Facilities

Hanyi Yin and Donita Brown, College of Business

Healthcare systems and facilities are continuously seeking solutions to reduce overall costs while also becoming more environmentally friendly. Sustainable healthcare facilities offer significant financial and environmental benefits to organizations. Leaders often view sustainability as a cost and do not realize the strategic advantages that stem from pursuing sustainability. Sustainability initiatives are not a cost but a long term investment for organizations, especially in the healthcare setting. Healthcare facilities should commit to sustainable efforts in a range of ways and for a wide variety of reasons. Those organizations that do improve their environmental profiles obtain an array of successes, greater financial stability, increased efficiency, expanded capabilities, and positive effects on population health. By being environmentally conscious, hospitals can save thousands of dollars that can be spent on patient care or medical research, which will lead to lower healthcare costs for the overall healthcare system and increase service quality. Keywords: Healthcare, Sustainability, Green Hospitals

Measles Rash Image Recognition Using a Convoluted Neural Network Approach

Alesha Harmon, Andre Louie, Charlie Napier, and Todd Gary, Computing and Technology.

The goal of this research paper was to propose a machine-learning approach towards the identification of the measles virus. The disease, which was declared eliminated in the US in 2000, is currently spreading across multiple states. It is the largest outbreak since 1994. Globally, it remains as one of the leading causes of vaccine-preventable illness and death, claiming more than 100,000 lives each year. The approach of this paper utilizes a type of deep learning image-recognition algorithm known as a convolutional neural network (CNN) to distinguish the distinctive measles rash from a variety of other skin conditions. The images were retrieved by a web-parsing algorithm and stored in a database for training and testing purposes. The significance of this research will show how the use of a measles image detection model can increase the competency of physicians, improve the quality of care, and identify this highly contagious disease at an earlier state, thus reducing its spread.

Designing a data science exploration of 125,000 US wildfires to lower cost, save lives, and increase efficiency.

Janaar Harbour, Olivia Samples, Kun Zhao, and Todd Gary, Data Science

Wildfire size, frequency, severity, and associated fatalities have up-surged at an alarming rate over the past 25 years, resulting in steep budget increases. A model that predicts the optimal number of personnel needed for fire suppression would significantly trim this firefighting budget, allowing for the focus to be redirected

to land management and preventative efforts. By utilizing a unique dataset of 125,367 US wildland fire incidents recorded within a five-year span, we propose a real-time model that will predict the optimal number of personnel needed to effectively fight fires. Our project is designed to increase efficiency and help lower the cost of the US Department of Agriculture's rapidly growing firefighting budget through accurate forecasting of personnel needs dependent on understanding the impact of regional differences, wet and dry seasons, and preventative methods on fire frequency.

A Multigraph-based Approach for Improved Music Recommendation Systems by Connecting the Artistic Relationships of Musical Groups

JR Waggoner, Randi Dunkleman, Laura Gau, and Todd Gary, Computing & Technology

With the transition from physical to digital music distribution, music recommendation systems have become an important part of the user-centric online music listening experience. However, current automated systems often do not explore the full range of a song catalogue, and as a consequence, discovering new, diverse music requires considerable user effort. A review of current research was conducted and found that current music recommendation systems generally require significant artist metadata, user listening history, or a combination of the two, to generate relevant music recommendations. As a result, streaming services' recommendations are typically a list of greatest hits. We propose representing artist-to-artist relationships as both simple multigraphs and more complicated multidimensional networks as an alternative to traditional content-based and collaborative recommendation methods. Using data gathered from the MusicBrainz open music encyclopedia and PageRank, we demonstrate the ability of artist-based networks to efficiently produce more diverse and relevant artist recommendations thus simplifying user effort and minimizing the data required. The significance of this research is to provide a more diverse listening experience for users while maintaining their level of interest.

Reverse Transfer: A Mixed-Methods Study Examining the Graduation Rates of Reverse Transfer Students and Their Motivations and Perceptions of the Process

Alex Atkinson, Prentice Ashford, and Emily Mofield, College of Education

Reverse Transfer aims to increase degree attainment for the associate and bachelor's degrees in Tennessee for students transferring from a Tennessee community college to a participating four-year state institution or private college or university. The purpose of this study will determine if students who participated in the Reverse Transfer process graduated at a higher rate than students who did not participate in the Reverse Transfer process at the six participating Tennessee Independent Colleges and Universities Association (TICUA) member institutions. The researchers sought to discover the perceptions of and motivating factors that influence students to opt-in to the Reverse Transfer Process. The researchers used a quantitative dominant mixed-methods approach supported by qualitative research to answer the Research Questions. The quantitative methods involved a causal-comparative methodology to determine reasons and causes for students to opt-in the reverse transfer process. Researchers will determine if there are statistically significant differences in bachelor degree completion rates between students who participated in the Reverse Transfer Process and students who did not participate in the Reverse Transfer Process. The qualitative portion of this study involved a phenomenological methodology, including a questionnaire and interviews, to examine the perceptions of students participating in the program. The population for this study includes students who transferred from a Tennessee community college to one of the six TICUA member institutions that participated in the Reverse Transfer process between the Spring 2015 and Spring 2019. Findings from initial data analyses will be shared. Recommendations for best practices and future research will be discussed.

The Impact of ACT Preparation Courses on Student ACT Performance

Alesha Harmon, Sheryl Rae Reid, Yvette Mallory, and Emily Mofield, Education

The purpose of the study is to analyze the impact of two computer-based ACT preparation programs, ePrep and Naviance, student ACT growth, and performance. The population consists of 1400 high school junior students from 7 high schools in a Tennessee school system from 2018 to 2020. The researchers explore factors that potentially contribute to differences in student performance through consideration of the following: type of preparation program, student demographics, and teacher perception of the effectiveness of the preparation programs. The researchers used a quantitative dominant, mixed-methods approach to answer the research questions for this study. The study involved a comparison of three groups; student performance of those participating in Naviance, ePrep, and those participating in both programs. Researchers determined if there were statistically significant differences between students' projected and actual ACT scores, benchmark scores, ACT by content area, composite scores among ACT preparation programs used, and students from different subgroups. Specific subgroups analyzed included socio-economic status, race, gender, military status, and school campus. Quantitative data will be analyzed using JMP software. Qualitative methods, including a questionnaire and interviews, were used to examine teacher perceptions of ACT preparation programs. The population for the qualitative portion of the study includes 100 teachers who taught an ACT preparation course. Phenomenology allowed the researchers to construct the universal meaning of the teacher experience with the preparation programs without bias. Qualitative data analysis will include the use of JMP software. Findings from initial data analyses will be shared. Implications for practice and future research discussed.

Effects of Writer's Workshop on Students' Writing Skills

Kristin Sessler and Lonnie Cochran, Education

With greater emphasis being placed on reading and comprehension in the school district, there has been an absence of instructional time to teach writing. The purpose of this mixed-methods study was to learn the effects writer's workshop had on first-grade students' writing skills and attitudes and interest for writing. The goal of this study was to advocate for explicitly teaching writing using a writer's workshop approach. Participants in the study included nineteen first-grade students within the treatment group and thirteen first-grade students within the control group. This ten-week study took place within a first-grade classroom in a suburban elementary school comprised of 965 students. Of the students, 45% are Caucasian, 31% are African-American, 2% are Pacific Islander, 5% are Asian, and 1% are American Indian or Alaskan Native. Data were collected using surveys, writing interviews, writing rubrics, writing samples, writing checklists, and observational and conferencing notes. Quantitative data were analyzed using descriptive statistics and t-tests whereas inductive analysis was used for qualitative data. The study revealed using a writer's workshop approach to teaching writing had significant positive effects on students' writing skills and students' attitudes with some shifts in students' interest for writing. When writer's workshop is implemented strategically with set expectations, routines, and procedures students' writing skills showed significant growth from pre- to post-writing samples. In accordance with the data, teachers should be trained on the writer's workshop model and create time in their daily schedule to explicitly teach writing using a writer's workshop approach.

How Students' Self-Reported Test Anxiety Correlates to Student Test Grades

Emma Woody and Lonnie Cochran, Education

For some learners, high stakes, summative evaluations, known to many as tests, can cause debilitating test anxiety and thus reflect poorly on the true mastery level of a skill. This study aimed to further understand the relationship between middle school students' self-perceived test anxiety and math achievement. The purpose of this quantitative study was to (1) examine how test anxiety correlated to student performance concerning grades, (2) fill the literature gap in how test anxiety affected middle-school aged students, (3) evaluate how 6th grade mathematicians handled and viewed their own perceptions of test anxiety through quantitative data when given a test, and (4) contribute to the educational discourse community regarding test anxiety. The research was conducted using quantitative data collection from the 23 statement self-

reflective survey and three summative tests covering sixth grade math standards. The 82 sixth grade math participants in the study were selected through non-probability convenience sampling. At the time of the study, this sample of urban students came from a school population of 46% White, 31% Black, 15% Hispanic, and 8% Asian. There were a total of 980 students, who spoke more than 31 languages, in grades 5-8.

K Modes Algorithm Software for Submolecular Protein Structure Prediction

Thomas Townsley, Kirk Durston, James T. Wilson, Harrison Akers, Salvador Cordova, T.L. Wallace, and Joe Deweese, College of Pharmacy and Health Sciences

Introduction: Recent advances in computational methods for evaluating protein structure have led to a deepened understanding of how aligned sequences of amino acid chains infer structural relationships. The K modes algorithm is in a class of unsupervised machine learning algorithms used to predict features of submolecular protein structure, but there are no currently available bioinformatics software tools that employ this algorithm. **Methods:** A K modes software tool was developed with the python programming environment. Written with an emphasis on procedural style, performance, and testable modules, the program is designed to encourage cross-disciplinary collaboration and validate the algorithm on multiple sequence alignments, predicting amino acid pairs and groupings that may represent structural features. **Results:** The software was validated with test-driven development techniques using a multiple sequence alignment for the protein ubiquitin. The structure of ubiquitin is well-known and served as a base case for validating the amino acid pairs and groupings identified by the algorithm. The algorithm was able to correctly group amino acids into clusters representing the major folding domains of the three dimensional structure of ubiquitin. **Conclusions:** The software tool employs the K modes algorithm, which allows the researcher to predict features of submolecular protein structure. Additional studies are currently being pursued to apply the software tool to other proteins.

Analysis of a Multimodal Technology-Based Solution for American Public Transit

Emily Rutter, Ahmed Alhaddad, and Dodd Galbreath, Institute for Sustainable Practice

This paper proposes and examines a multifaceted, technology-centric solution aimed at alleviating problems at the root of declining American public transit ridership, and analyzes the potential of particular emerging technology to positively shape the future of American mobility. The final outcome is the recommendation of a comprehensive plan to revitalize struggling public transit systems. Specifically, this study examines issues of safety, reliability, cleanliness, and socially-constructed views and determines their role in affecting public transit. Further, it proposes and analyzes the financial impact of technology-based solutions. Multiple methods were used in constructing this paper. First, due to the expanse of existing data, multiple secondary research articles were used to compile a current-state analysis, and an overview of critical issues affecting public transit ridership declines. Second, this paper proposes technology-based solutions, derived from emerging technology studies and experiments, to each of the previously identified problems and considers their potential impact on American public transit systems. Secondary research, as well as original interviews and surveys, are used to supplement these findings. Third, a financial analysis is utilized to examine the viability of the proposed solutions. This portion of the research seeks to answer the question: will investing in the identified transformative technology produce positive cost-benefit impacts for both public transit operators and riders? Overall, this paper found a positive cost-benefit impact of investing in transformative technology for improving public transit. With this information, it is determined that investing in solutions to existing public transit systems have a positive impact on system sustainability.

Comparing Bariatric Surgical Outcomes in Patients with Diabetes

Josh Davenport and Matthew Steidl, Physician Assistant Studies

Objective: To demonstrate that type 2 diabetes may be improved or even cured in some patients with substantial weight loss from certain bariatric surgical procedures and that compared to pharmacological therapy, bariatric surgical interventions have given the best outcomes in treating obesity and improving type 2 diabetes. **Methods:** Three different bariatric procedures are compared in the submission, all of which have been proven to cause significant weight loss in the morbidly obese and modification and improvement or remission of the disease. The articles referenced were found on PubMed and Google Scholar. **Results:** 36 articles were found. The analysis of these articles indicates that Roux-en-Y outcomes, both long and short-term, are better than gastric sleeve and gastric band procedures. **Conclusion:** The Roux-en-Y gastric bypass appears to have the best outcomes and longest-lasting results in diabetic populations overall when compared to other forms of bariatric surgery. **Keywords:** Diabetic, outcomes, bariatric, surgery

Modified Geriatric Depression Scale (GDS) Scores Among Individuals with Mild Cognitive Impairment

Shelby Leoni, Kaitlynn Logsdon, Camdyn Gilbert, John Cole Suey, Kacie Pennington, Luke Schueller, and Katie Osborn Spirko, Psychology, Counseling, and Family Science.

Mild cognitive impairment (MCI) is associated with higher rates of depression among older adults. The Geriatric Depression Scale (GDS) is a common depression screening tool for adults aged 65 years and older, which is often used in research assessing late life depression. Given that depression can include cognitive symptoms, especially in older adults, multiple items on the GDS address cognitive symptoms. The GDS can therefore artificially inflate reported depression symptoms among individuals with MCI or dementia who experience cognitive symptoms not attributable to depression. The following study assessed whether GDS scores were different between older adults with normal cognition (NC) and MCI when the cognitive symptom items were omitted from the score. Vanderbilt Memory & Aging Project participants ($n=299,72\pm 7$ years, 58% male) completed the GDS as part of a larger study on longitudinal aging. Items 14, 26, 29, and 30 of the GDS were removed from score totals. ANOVAs compared modified GDS scores between NC and MCI groups. Among the NC group, the average GDS score was 1.7 ± 2.3 , whereas the MCI group's average score of 3.3 ± 3.3 was significantly higher ($F(1, 297)=24, p<0.001$). These findings support the notion that MCI confers an increased risk of depression. Future research should explore whether higher depression rates in MCI are merely in response to psychological and social stressors of the diagnosis versus resulting from the same underlying neurodegenerative changes that cause the cognitive symptoms.

Moderators of Cerebrospinal Fluid and Plasma Biomarkers of Neurodegeneration in Relation to Cognitive Decline

Katie Bowder and Katie Osborn Spirko, Psychology, Counseling, and Family Science

Accumulating evidence supports the use of cerebrospinal fluid (CSF) biomarkers of Alzheimer's disease (AD; A β 42, tau), synaptic dysfunction (neurogranin), and axonal integrity (neurofilament light; NFL) in predicting cognitive decline among older adults prior to onset of clinical dementia. More research is needed to determine factors that may influence the extent to which these biomarkers predict worsening cognitive symptoms in older adults. This study examined baseline cognition, mood, and Apolipoprotein E-e4 (APOE-e4) carrier status (i.e., a strong genetic risk factor for AD) as modifying factors in the association between the aforementioned CSF biomarkers and longitudinal decline in neuropsychological functioning. Participants from the Vanderbilt Memory & Aging Project, a longitudinal cohort of older adults ranging from normal cognition to mild cognitive impairment ($n=335, 73\pm 7$ years) were leveraged for this study. As part of a larger cognitive aging study, participants underwent fasting lumbar puncture at baseline, and comprehensive neuropsychological assessment at baseline and 18- to 24-month intervals for five years.

Linear regression models assessed whether each biomarker predicted change in neuropsychological performance over time, adjusting for age, race/ethnicity, and education. Interaction analyses were performed for baseline neuropsychological performance, sex, APOE-e4 status, and depressed mood. APOE-e4 carriership, female gender, and lower baseline cognition strengthened the associations between all assessed CSF biomarkers and neuropsychological decline (p-values<0.05). Depressed mood did not modify biomarker associations. These results suggest that early neurodegenerative changes may prompt clinical symptoms more quickly among individuals at greater risk for AD due to predisposed vulnerabilities.

Redemption Begins with Women

Hunter Maerz and John Mark Hicks, Theology and Ministry

The resurrection of Jesus is the climax of the Christian narrative. Through the resurrection, a new hope was given to humanity: the hope that this broken world is not the end of the story. This hope is a central and foundational Christian belief. In all four resurrection stories, women were the first to hear the news of Jesus' resurrection. Was the greatest hope ever experienced revealed to women first by chance, or was this an intentional choice by God? Jesus' ministry was his life. His death did not stop or pause that ministry. The crucifixion and resurrection of Jesus were not in company with his ministry, it was part of his ministry. As it is with the resurrection, so it is with the revelation and hope of the resurrection. The revelation and hope of the resurrection are part of the ministry of Jesus. That ministry is the same ministry we, as Christians, are called to participate in since Jesus lives within us. This paper explores the hope of the resurrection, the importance of women in the revelation of that hope, and the impacts it still holds for us today.

Graduate Students Poster Presentation Abstracts

Clinical Impact of a Free Diabetes Management Program at a Clinic for Uninsured Patients

Kristine Hoang and Sarah Uroza, Department of Pharmacy Practice

Diabetes is a chronic condition affecting 9.4% of the US population in 2015. With regular screenings as suggested by American Diabetes Association guidelines and a high pill burden, diabetes is costly to manage. In 2012, 16% of diabetic adults were uninsured. For them, the costs of healthcare present a barrier to managing diabetes. Faith Family Medical Center is a primary care clinic that serves primarily uninsured patients. They offer a bimonthly Diabetes Day, where patients can receive free, comprehensive diabetes services including diet counseling, dental and eye exams, foot exams, and a focused provider visit. The objective of this study is to evaluate the clinical impact of Diabetes Day by comparing attendees' outcomes with those of diabetic nonattendees. The following lab values were collected through chart review: HbA1C, fasting blood glucose, blood pressure, body mass index, lipid panels, serum creatinine and eGFR. Statin use will also be assessed. The patients' medication adherence was self-reported. For patients attending Diabetes Day, we also surveyed them on their perceptions of the service, and whether they followed up with dental appointments. Diabetic patients who do not attend a Diabetes Day within the study period were asked if they have been to the service previously, and if they have gotten the recommended yearly screenings. The results from this study will elucidate areas of improvement within the program, provide feedback on its clinical utility, and provide other clinics with information they could use in designing their own chronic disease management programs.

Can a Voice Call Improve Adherence Rates in Patients Using Oral Antidiabetic Medications

Christopher Deshawn Bowens, Richard Randolph, and Benjamin Gross, College of Pharmacy and Health Sciences

The purpose of the study is to replicate a previous study on non-compliant diabetic patients with a greater sample size with the aim to increase generalizability. We are examining patients that are non-compliant that have taken at least one oral antidiabetic medication. A proportion of days covered (PDC) assesses compliance. The primary outcome is to improve the PDC value of each patient that has low adherence. The secondary analysis is to examine the reason why people are non-adherent and to evaluate the effectiveness of the intervention. The pharmacist calling serves as the intervention in this quality improvement study. Pioneer Rx software is used to filter patients that meet the requirement of being non-adherent to oral antidiabetic medications, which is defined as having a PDC value between 0 and 79 percent. Patients are then further filtered based on exclusion criteria. Once eligibility is determined before the voice call, the PDC value is recorded for each patient. For the next 20 days, the pharmacist will call each patient and use the abbreviated Drug Adherence Work-UP (DRAW) tool to conduct the interview and continue to screen for eligibility. After 120 days post-intervention, the PDC's are calculated and recorded again. With the pre- and post-PDC data, a paired t-test is performed using an alpha of <0.05 for significant difference in the group overall and for each individual patient. We hope to show that there is improvement in adherence with a phone call.

Evaluating the effects of the diabetes prevention program teaching style, group versus one-on-one education sessions, on weight loss and A1C reduction

Jasmin Valentin and Benjamin Gross, College of Pharmacy and Health Sciences

Research has shown that delivering a diabetes prevention program can prevent and or delay the onset of type 2 diabetes. Due to an increasing amount of people developing prediabetes at an earlier age, the Centers for Disease Control and Prevention (CDC) are strongly invested in expanding diabetes prevention programs around the United States. These programs are mostly delivered in group settings, and very few have focused in one on one setting. Therefore, the purpose of our study is to establish the first diabetes prevention program in Lebanon, Tennessee. The program will involve both teaching styles, group versus one on one-education sessions to determine any insight about which teaching style may be more appropriate for our population.

Implementation of a Pharmacist-Led Smoking Cessation Service for Chronic Obstructive Pulmonary Disease (COPD) Patients in a Primary Care Clinic

Hannah Boren and Benjamin Gross, College of Pharmacy and Health Sciences

The Global Initiative for Chronic Obstructive Lung Disease guidelines state that the therapy with the greatest capacity to alter the course of COPD is smoking cessation. There is also a correlation between the intensity of counseling and the rate of cessation success. The objective of this project is to assess the effectiveness of a pharmacist-led smoking cessation service in a primary care clinic on outcomes for COPD patients recently discharged from the hospital. This study is a prospective cohort review in which patients discharged from an associated hospital with diagnoses of COPD and nicotine dependence will be referred to the pharmacy team at a primary care clinic for smoking cessation management and COPD education. The pharmacist intervention will include intensive motivational interviewing and counseling on nicotine dependence, associated disease states, and inhaler adherence and technique. Patients willing to quit will be offered appropriate behavioral support resources and first line pharmacological therapy for nicotine dependence. The pharmacist will follow up with patients via phone call within one week of the target quit date and in clinic or via phone call every 4 weeks for 12 weeks. At the end of 12 weeks, an additional 12 weeks of treatment will be considered. The primary outcome is difference in 30-day hospital readmission rates between patients enrolled in the service compared to patients declining the service. Secondary outcomes include 60-day hospital readmission rates, quit rates at 12 and 24 weeks, and changes in COPD assessment test scores.

Impact of Independent Community Pharmacies Creating and Implementing E-clinical Care Plans, Based on Flip the Pharmacy (Ftp) Transformation Models, on Patient Health and Economic Outcomes

Meron Tegete and Benjamin Gross, College of Pharmacy and Health Sciences

Background/Purpose: Flip the Pharmacy is a community pharmacy transformational project which aims to usher more than 1,000 pharmacies through a two-year transformation process with the objective of reinventing the community pharmacy. The goal of Ftp is to turn community pharmacies into sustainable care and business process among clinically integrated networks. The objective of this study is to assess clinical, humanistic, and economic outcomes of incorporating clinical services into independent community pharmacies based on Flip the Pharmacy transformation change package over 6 months' period from October 2019 to March 2019. Once incorporated into workflow, pharmacies can provide a greater variety of comprehensive services to our patients, increase our outreach to the community and collaborate with prescribers in collaborative practice agreement. **Methodology:** Perform retrospective analysis of e-care plans submitted to CPESN-USA from multiple independent community pharmacies a part of the Flip the Pharmacy transformation team. Each month follow and implement Flip the Pharmacy transformation models into each participating pharmacy. Assess outcome measures of common chronic disease states such as diabetes, hypertension, asthma, COPD, and others. Identify interventions submitted by the team. Gather information regarding patient demographics, A1c baseline and baselines, blood pressure reduction, adherence, medication error, immunization, drug duplication, side effects, recommendation of addition of therapy, natural medicine, and cost-savings. Cost-savings will be assessed using the SNOMED codes submitted with the care plan.

Intraleural Alteplase Prescribing on an Academic Trauma Service

Samuel J. Schiltz and Susan Hamblin, Pharmacy

Alteplase is a fibrinolytic medication that leads to digestion of fibrin within a thrombosis. Intraleural alteplase is a minimally invasive treatment option for patients with intraleural disease processes such as empyema or retained hemothorax. Different doses and regimens are indicated for each condition. The purpose of this evaluation was to describe the indications and outcomes associated with various intraleural alteplase regimens used in trauma patients over a one-year period at Vanderbilt University Medical Center (VUMC). This analysis was a single-center, IRB-approved, retrospective cohort study. Patients included were admitted to the multidisciplinary trauma service at VUMC between October 2018 and October 2019 who received at least 1 dose of intraleural alteplase. Data collection included the indication, dose and duration of alteplase therapy, the need for surgical intervention, chest tube output on each day of therapy, and incidence of bleeding. After evaluating 9 total patients, 5 patients met inclusion criteria. Of the 5 included patients, 3 received doses of alteplase 24 mg once daily for retained hemothorax and 2 received doses of alteplase 10 mg twice daily for empyema. The median duration of therapy was 2 days. No patients required subsequent surgical intervention for retained hemothorax or empyema. Chest tube output increased from a median of 15 mL before alteplase to 340 mL on day 1 of therapy. No patients experienced a bleeding episode during therapy. While overall use was infrequent during this 1-year period, intraleural alteplase was given at the correct dose and for the appropriate indication on the trauma service.

The Efficacy of Topical Silicone Products in the Prevention of Hypertrophic Scarring

Maia Matyas, PA-S and Susan Hamblin, Pharmacy

Objectives: The objective of this literature review was to describe the evidence for use of silicone products in the prevention of hypertrophic scars. **Methods:** A literature search was conducted using PubMed, ScienceDirect, and Cochrane database with search terms including silicone, silicone gel, silicone gel sheeting, topical silicone, hypertrophic scar, scar prevention, scar reduction, wound healing, and laceration repair. The article search was limited to those published in the last five years. **Results:** A total of 11 relevant

articles were selected from a search yielding 104 articles. Significant difference in overall appearance of hypertrophic scars has been found with the use of topical products. In a clinical study use of silicone products applied for a minimum of 4 hours daily for at least 3 months show statistically significant improvement in scar coloration, dimension, moisture retention, as a solitary treatment option or in combination with pressure therapy on scars up to 2 years old. Conclusion: Silicone products are easy to use, accessible, and an affordable option for patients. While additional research should be completed on a larger scale with all skin types and to determine outcomes if used during primary wound closure, silicone products are a validated first-line treatment for hypertrophic scars. Keywords: Silicone Gel Sheeting, Hypertrophic Scars, Scar Prevention

Pediatric Physical and Emotional Effects from Smart Device Use

Jana Reichenberger and Susan Hamblin, Pharmacy

Objective: To review the physical and emotional effects of smart device use on pediatrics and prevention of these effects. Methods: A literature search was performed using PubMed, ScienceDirect and Google Scholar databases with search terms smart devices, health, brain changes, and obesity. Filters include “within the last five to ten years” and “clinical review articles.” Results: Result articles were narrowed down to 10 relevant articles and a systematic review article was performed. The majority of these articles discuss the physical or emotional effects that smart devices have on adolescents. These articles also discussed ways to prevent these potential effects. The other articles that were chosen were guidelines or parental education on how to limit the smart device use in children and teens and tips for parents on how to help with the physical and emotional effects smart devices cause. Conclusion: Multiple studies have been performed on the effects of smart devices on children and teens. Studies show smart devices do affect multiple aspects of a child’s or teen’s life. Educating parents on recognizing or preventing signs of obesity, depression or anxiety can impact an adolescent's life in a positive way. Keywords: Smart devices, Childhood Obesity, Depression, Anxiety, Screen Time

Risk and Benefits of Fecal Microbiota Transplant in Immunocompromised

Athena Reese and Susan Hamblin, Pharmacy

Objective: To understand the importance of symbiosis in immunocompromised patients and discuss the risk and benefits of Fecal Microbiota Transplants (FMT) when used for treatment and remission of diseases in immunocompromised. Methods: A literature search was performed using PubMed, Science Direct, and The New England Journal of Medicine. Search terms included Fecal Microbiota Transplant, Ulcerative Colitis, Crohns, and Clostridium difficile. The filters placed were “clinical trials,” “Randomized Control Trials,” and “within the last 5 years.” Results: Remission of Clostridium difficile was achieved in 68% of patients with donor FMT versus 41% with autologous FMT by 8 weeks (P=0.042). Clinical cure was defined as lack of Clostridium difficile recurrence without antibiotics for 8 weeks. Remission of ulcerative colitis was achieved in 81% of patients with donor FMT versus 18% with placebo by 7 weeks (P=.03). Clinical cure was defined as a Mayo score of 0. Remission of Crohns was achieved in 68% of patients with repeated donor FMT by 15 months. Clinical cure was defined by a Harvey- Bradshaw Index score = 4. FDA reported 2 SAEs that were linked to extended-spectrum beta-lactamase producing organisms. Conclusions: Evidence that supports the use of FMT for treatment of recurrent CD infection in immunocompromised patients, Crohns (CD), and Ulcerative Colitis (UC) were found. This included minimal rates of serious adverse events (SAEs) in immunocompromised patients. Within this review, an average of 62.4% of the patients achieved remission. Risks were mainly found in not having a standardized process for donor stool collection.

Evaluation of Mechanical Circulatory Support Device use in Cardiogenic Shock Following Acute Myocardial Infarction

Michelle Karp and Susan Hamblin, Pharmacy

The purpose of this clinical review article is to review current evidence for recommendations and the use of mechanical circulatory support devices used in cardiogenic shock (CS) after myocardial infarction (MI). Currently, CS is treated with inotropes and vasopressors to maintain SBP > 90mmHg, early revascularization with percutaneous coronary intervention (PCI), and possibly mechanical circulatory support devices (MCS) if refractory. These devices can maintain organ perfusion, reduce LV volume, decrease myocardial oxygen consumption, and increase myocardial perfusion. Despite current therapy, the mortality for patients with CS after MI remains elevated, around 50%. Data for this review was collected by performing a literature search using PubMed and Science Direct, including search terms cardiogenic shock, mechanical circulatory support devices, intra-aortic balloon pump, Impella, TandemHeart, and Extracorporeal Membrane Oxygenation. Historically, intra-aortic balloon pump (IABP) has been utilized in this scenario, but the recommendation for its use has been downgraded after studies revealed no decrease in mortality in comparison to medical therapy alone. Alternative MCS devices, such as Impella, TandemHeart, and Extracorporeal Membrane Oxygenation (ECMO), have been shown to provide superior hemodynamic effects compared to IABP; however, this has not been correlated with a decrease in mortality and has been associated with a higher number of complications. Recent studies suggest early use of Impella, before revascularization and medication use, may lower mortality rates in these patients. Keywords: cardiogenic shock, mechanical circulatory support, intra-aortic balloon pump, Impella, TandemHeart, Extracorporeal Membrane Oxygenation.

Impact of BioFire Filmarray Rapid Blood Culture Identification on Antimicrobial Use in Community Hospital

Jessica Daniell and Jonathan Pouliot, Pharmacy Practice

Background: BioFire Filmarray blood culture identification (BCID) is utilized to rapidly identify microorganisms through polymerase chain reaction (PCR) analysis. Previous literature has shown that BCID is able to facilitate optimized empiric treatment in hospitalized patients. Identifying blood cultures early is important to effectively direct antimicrobial therapy for patients and improve outcomes. The primary objective of this study is to evaluate the time to appropriate usage of antibiotics including escalation, de-escalation, dose optimization, continuation or discontinuation of unnecessary antibiotics. **Methods:** A retrospective single-center chart review was completed for patients with positive blood cultures post-implementation (September 1, 2018 to August 31, 2019) of the BCID system in the emergency department at a small community hospital. Additional data was collected such as duration of antimicrobial therapy, hospital length of stay, intensive care unit (ICU) length of stay, demographics, and antimicrobial stewardship program (ASP) intervention. **Results:** Descriptive statistics will be used to report the results of the impact of BCID on patient care. Data collection is ongoing and will be completed by the time of the Student Scholars Symposium. **Conclusions:** Conclusions will be developed based on the outcomes seen in the study.

Diuretic Total Nephron Blockade to Overcome Diuretic Resistance: Leveraging the Diuretic Armamentarium in the 21st Century

Mary Katherine Cella, Brent Tucker, and Zac Cox, Pharmacy Practice

Background: Loop diuretics are commonly utilized to reduce congestion in patients hospitalized with hypervolemic acute heart failure (AHF). Diuretic resistance occurs in patients who remain hypervolemic from inadequate response to loop diuretic therapy. Patients who do not achieve adequate decongestion before discharge experience a higher rate of 1-year mortality and heart failure exacerbations requiring rehospitalization. Total nephron blockade, defined as using multiple diuretics acting in different segments of the nephron, can be used in patients resistant to loop diuretic therapy to achieve decongestion, but evidence for this practice is lacking. The purpose of this study is to evaluate the efficacy and safety of total nephron blockade in patients hospitalized with AHF complicated by diuretic resistance. **Methods:** We

performed a retrospective observational analysis in patients hospitalized with AHF who received a total nephron blockade diuretic regimen. Data was collected from the Vanderbilt University Medical Center's electronic medical record at the patient level from November 2017 to July 2019. Total nephron blockade included a loop diuretic, carbonic anhydrase inhibitor, thiazide diuretic, and an aldosterone antagonist. Patients receiving renal replacement therapies at baseline were excluded. Outcomes evaluated include in-hospital mortality, urine output, weight loss, laboratory changes from baseline, and new renal replacement therapies. Results: Results are in progress. Baseline characteristics and interim results will be presented.

Incorporating Rare Chronic Drug-Disease Interaction Alerts from a Commercially Available Database into a Medical Center EHR Platform

Catherine Amey, Phuong Dollar, Carson Villa, and Beth Breeden, College of Pharmacy and Health Sciences

The implementation of clinical decision support systems has provided healthcare systems with meaningful tools to improve the medication use cycle and patient safety. Some of these tools include computerized alerts such as drug-allergy, drug-drug, and drug-disease warnings that provide guidance on dosing to providers when ordering medications. While these alerts are helpful, providers are often overburdened and become desensitized by them, resulting in alert fatigue that can hinder patient outcomes. Alert fatigue can be decreased by providing critical information to the right provider in a timely fashion to aid in making clinical decisions at the point of care. Vanderbilt University Medical Center (VUMC) currently uses First DataBank (FDB), a commercially available third-party integrated drug information database in its EPIC EHR (Electronic Health Record) prescribing system. Additionally, VUMC utilizes a Tableau data visualization software tool to perform various data analytics for the organization. Lipscomb University student pharmacists worked alongside inpatient informatics pharmacists within the VUMC Pharmacy Portfolio - Health IT Department to categorize transient rare and chronic disease states and identify contraindications and severe warnings for drug-disease interactions (DDIs) that are associated with certain medications for its patients. Rare and chronic disease states were identified and classified using tertiary information resources including the NIH's Genetic and Rare Disease Information Center, Lexicomp etc. The drug-disease alerts accompanying those medications were sourced from both FDB and VUMC's Tableau software tool. The final report will be used by VUMC to make recommendations for drug-disease alerts that may be useful to optimize the clinical decision support life cycle for DDIs.

Translation and Optimization of Clinical Decision Support to Prevent High-risk Medication Prescribing in the Elderly

Mike Friebe and Beth Breeden, College of Pharmacy and Health Sciences

Purpose: Our goal is to migrate clinical decision support (CDS) related to preventing high-risk medication prescribing for elderly patients from Vanderbilt University Medical Center's (VUMC) legacy electronic health record (EHR) to a new vendor EHR system. The CDS alerts warn prescribers about potentially inappropriate medications (PIM) in elderly patients, according to American Geriatrics Society (AGS) recommendations, and provide alternative therapy options if available. Methods: Pharmacists, subject-matter experts, and stakeholders will review e-prescribing CDS already migrated from VUMC's legacy EHR system to its new system, and identify gaps with the 2019 AGS recommendations (Beer's Criteria). Review results will be used to remedy any missing CDS and update existing CDS as needed to ensure that we have consistent alerting and recommendations when e-prescribing. Actions prescribers can take after an alert displays include: ignoring the alert, cancelling the order, continuing with the original medication, or accepting an alternative option. We will compare prescription rates of PIM between the two EHR systems using a quasi-Poisson regression model. We will use descriptive statistics to describe acceptance rates of current CDS and describe the patient population. Prescribing rates will be normalized per 1,000 face-to-face encounters where a medication was prescribed in patients = 65 years of age to account for increases in

patient encounter visits over time. Results & Conclusion: Currently in progress and preliminary findings will be presented during the poster presentation at the conference.

Lack of Medication Refill Synchronization in Patients with Heart Failure: Quantification of Burden and Effects on Adherence

Shahristan Rashid and Zac Cox, College of Pharmacy and Health Sciences

Objective: We aimed to quantify medication refill synchronization, defined as coordinating medications to refill on the same day, and its association with medication adherence in patients with heart failure (HF). **Methods:** We prospectively enrolled patients hospitalized at Vanderbilt University Medical Center who were diagnosed with HF for at least six months and had a minimum of six chronic medications. We quantified all prescription medications and pharmacy visits over 6 months. The primary outcome was the mean six-month medication refill consolidation score (RCS), calculated as: $1 - (\text{total the number of prescription medications each month}) / (\text{number of pharmacy visits each month})$. An RCS of 0.5 is the population average for patients with non-HF chronic cardiovascular conditions. Medication adherence was measured using the Cumulative Medication Gap (CMG) equation with > 0.20 defined as non-adherence. **Results:** We enrolled 35 patients characterized by a mean age of 64.7 ± 11.4 years, 57% male, and 57% HFrEF with 74% hospitalized in the past 6 months. The mean number of prescription medications over 6 months was 20 ± 6 , comprised of a mean of 12 ± 4 chronic prescription medications of which 5 ± 2 were for HF. The mean 6-month RCS was 0.29 ± 0.14 , with 80% below the average consolidation score. The mean CMG was 0.22 ± 0.08 indicating non-adherence was frequent. Low medication synchronization by RCS had no correlation with non-adherence ($r = 0.13$, $p < 0.47$). **Conclusion:** Patients with HF have low medication synchronization, but this was not associated with increased nonadherence.

The effects of digestive enzymes on amino acid response to resistance exercise in trained males

Jaelyn Morimune and Jeremy Townsend, Exercise and Nutrition Science

The aim of the current study was to examine the efficacy of whey protein ingestion with or without a digestive enzyme complex on amino acid (AA) availability following acute lower-body resistance exercise. Following an overnight fast, ten resistance trained men performed lower-body acute resistance exercises consisting of four sets each of the leg press and leg extension exercises followed by consumption of one of three drinks of equivalent volume, taste, and appearance which consisted of either: (a) 26g whey protein + 250 mg protease supplement + whey (PW) (b) 26g whey protein (W), or (c) a non-caloric flavored water drink (PL). Results showed significant main effects for time ($p < 0.001$) and time x group interactions ($p < 0.001$) were found for leucine, BCAA, and EAA. WPH drink resulted in significantly greater plasma leucine, BCAA and EAA concentrations at 30 min compared to PL ($p < 0.001$) while not different than W. Leucine was significantly elevated at 30min ($p = 0.007$) and EAAs at 180min ($p = 0.004$) compared to 0min for WPH. The AUC for WPH and W were both significantly elevated groups for leucine, BCAAs and EAAs compared to PL ($p < 0.001$). While no significant differences were found between the W and WPH supplementation groups during the 3-hr period after resistance training; the WPH group produced significantly greater leucine concentrations at 30min and in EAAs at 180min than PL compared to 0m. Results indicate that WPH may provide a more rapid absorption and longer lasting concentration of AAs in the blood after exercise compared with W or PL.

Low-dose Vitamin D Supplementation Does Not Prevent 25(OH) Vitamin D Decline in College Students

Grace A. Zimmerman and Jeremy Townsend, Exercise and Nutrition Science

Vitamin D deficiency is prevalent among active adults; therefore, multivitamin products are consumed to correct this deficiency, but many multivitamins are often under-dosed compared to current evidenced-based recommendations. **PURPOSE:** To compare the effects of two different forms of low-dose multivitamins on

25(OH) vitamin D status following 10-weeks of supplementation. **METHODS:** Thirty-two healthy males (n=15; 20.1y, 163cm, 71.7kg) and females (n=19; 22.1y, 153.4cm, 69.9kg) participated in this randomized, double-blind, placebo-controlled study. At the beginning of the 10-week intervention, participants provided a resting, fasted baseline blood sample and were randomly assigned to a liquid multivitamin supplement (LIQ; n=11), multivitamin capsule (CAP; n=11), or placebo group (PL; n=12). Participants took their respective supplement daily for 10 weeks. The LIQ and CAP supplement both contained 268 IU of Vitamin D. After the 10-weeks, all participants reported back to the laboratory for a resting, fasted blood sample. Plasma samples were assayed for 25(OH) vitamin D concentrations. Data were analyzed using a 2-way repeated measures analysis of variance (ANOVA). **RESULTS:** There was a main effect for time ($F=11.86$, $p=0.002$, $\eta^2=0.227$) with 25(OH) vitamin D concentrations significantly lower ($-7.8\pm 14.9\text{ng/mL}$) at post-testing. Further, there were no significant differences between treatments ($F=0.200$, $p=0.820$, $\eta^2=0.013$) in 25(OH) concentrations suggesting no benefit of LIQ or CAP supplementation over PL. **CONCLUSION:** It appears that a chronic low dose of vitamin D in liquid or capsule form is insufficient to maintain or elevate 25(OH)D concentrations in healthy, college-aged adults. Consumers should evaluate the dosing of their multivitamins compared to current evidence-based recommendations.

The Effects of Caffeine Dose on Lower Extremity Muscle Fatigue in Resistance Trained Individuals Sam Washington, Grace Ann Zimmerman, Rachel Mullen, Stephen Lunney, and Laurel Littlefield, Exercise and Nutrition Science

Introduction: Caffeine has been used as a chief substance to enhance exercise performance. Vast evidence exists detailing the effect of caffeine consumption on improving aerobic performance, yet, research is scarce in explaining performance effects on resistance training and anaerobic systems. More work is needed to determine caffeine's effect on resistance training in recreationally active individuals. **Purpose:** The purpose of this investigation is to determine the effects of caffeine supplementation on repetitions to fatigue during a leg extension and leg press exercise. This study will provide an overview on the influence that caffeine has on the human body, its ergogenic effect, and specifically, its anaerobic influence. **Methods:** A blinded, randomized, repeated measures design will be used. The sample in this study will include 10-12 males and females who regularly consume caffeine and are resistance trained. Each participant will fill out a PAR-Q+ prior to completing a one repetition maximum (1RM) test for the leg press and leg extension. Repetitions to fatigue will be performed 45-minutes after drinking either placebo (maltodextrin), 3mg/kg, or 7mg/kg of caffeine anhydrous. Repetitions to fatigue will consist of participants completing as many repetitions as possible at 80% of 1RM. Data analysis will be performed through the JMP software system by a repeated measures ANOVA test. **Hypotheses:** It is hypothesized that the effects of caffeine will delay fatigue on anaerobic performance using resistance exercises for lower extremity muscles.

Acute Protease Supplementation Does Not Alter the Endocrine Response To Resistance Exercise in Trained Males

Megan D Jones, Jaclyn Morimune, Dr. Laurel Littlefield, and Jeremy Townsend, Exercise and Nutrition Science

Proteases aid in the hydrolysis of proteins into smaller peptides and oral protease supplementation may alter the endocrine response to exercise, promoting improved recovery. **PURPOSE:** To determine if protease supplementation immediately after an exercise session influences circulating testosterone, cortisol, insulin, insulin-like growth factor-1 (IGF-1), and growth hormone (GH) concentrations. **METHODS:** Ten resistance-trained males ($24.1\pm 4.1\text{yr}$, $69.6\pm 6.8\text{ kg}$ $179\pm 8.6\text{ cm}$) completed 3 acute lower-body resistance exercise sessions consisting of 4 sets of leg press and leg extension exercises in a randomized, crossover fashion. Each exercise was performed at 75% of each participant's previously determined one repetition maximum, for 8-10 repetitions, with 90 seconds of rest between sets. Following exercise, participants consumed one of 3 treatments (W: 26g whey; PW: 26g whey + 250mg of a protease enzyme blend; PL: non-caloric control). Blood draws were obtained at baseline (BL), immediately-post (IP), 1-hour (1H) and

3-hours post-exercise (3H) and analyzed for testosterone, cortisol, insulin, IGF-1, and GH. Data for each hormone were analyzed with a 2-way repeated measures analysis of variance (ANOVA). RESULTS: Significant main effects for time ($p<0.05$) were observed for all hormones. There was a significant decrease in testosterone at 1H ($p=0.007$), 1H ($p<0.001$), and 3H ($p<0.001$). There was a significant decrease in cortisol at all time points ($p<0.001$) compared to BL. There were significant increases in insulin, IGF-1, and growth hormone at all time points ($p<0.001$) following exercise. CONCLUSION: Neither protease nor protein supplementation appear to alter the endocrine response to resistance exercise in trained males compared to a control.

Step It Up: A Physical Activity Intervention Study

Drew Howerton, Helen Shaw, Madelin Willerer and Laurel Littlefield, Kinesiology

Introduction: Cardiovascular risk factors such as hypertension, abdominal obesity, and high body fat are associated with sedentary behavior and lack of physical activity (PA). Some studies have shown that increasing PA, specifically in the form of increasing number of steps per day, can lower cardiovascular risk factors such as blood pressure (BP) and waist circumference (WC). Methods: This 4-week PA intervention will analyze the effects of increased daily steps on BP, WC, and body fat percentage in 11 healthy adults currently taking fewer than 10,000 steps per day. A baseline week of daily steps will be measured using a pedometer and a daily average will be calculated. Baseline BP, WC (measured in duplicate at the level of the umbilicus), and body fat (measured using InBody 570) will be obtained. Participants will then be asked to increase their average daily steps by 3,000 for 4 weeks while maintaining all usual dietary and activity habits. BP, WC, and body fat will then be reassessed. The data collected will be analyzed using dependent sample t-tests. Hypothesis: We hypothesize that an increase in daily PA will significantly lower BP, WC, and body fat over the course of the intervention. Discussion: Previous research has demonstrated that a modest, short-term increase in PA may lead to improved markers of cardiovascular health in the average sedentary adult. We aim to contribute to this body of knowledge through our intervention examining the effects of increasing PA by 3,000 steps per day.

Mindful Eating Behaviors and Food Insecurity Status in College Students

Seena Curry, Lindsey Keenan, and Tracy Noerper, Nutrition

The purpose of this study was to compare mindful eating practices and food security status of public versus private college students. Food insecurity, the lack of access to healthy foods, is a real issue facing the college-aged population. Mindful eating behaviors could be effective in improving health and creating interventions for students who are food insecure. In this study, data on mindful eating behaviors and food insecurity status was collected via an online survey which included the validated Mindful Eating Questionnaire (MEQ) and Food Insecurity Screening tool. Mindful eating was assessed based on scores across 5 MEQ subscales (awareness, distraction, disinhibition, emotional, external). Higher MEQ scores indicate higher mindful eating behavior. Eighty-two college students participated in the survey, of which 59.8% attend private schools and 40.2% attend public schools. The prevalence of food insecurity was 21.6% overall, with a higher incidence of food insecurity in public schools (24.2%) versus private schools (20.4%). Results showed males and females had different total MEQ scores with females having a significantly higher score ($p=0.022$). There were no significant differences found between undergraduate and graduate, food insecure and food secure, or private and public school students with regards to mindful eating behaviors. Results suggest more education is needed to promote mindful eating behaviors in all student populations, especially the male population.

24-hour Carbohydrate Intake May Not Improve Resistance Exercise Performance

Jaclyn Morimune and Tracy Noerper, Nutrition

The body's main source of dietary energy comes from carbohydrates (CHO); thus adequate CHO intake is particularly important for physical activity. The aim of this research project was to observe the relationship

between exercise performance and CHO in the previous 24 hours. Six resistance-trained male volunteers (24.4±4.1 years; 1.74±10.9m; 90.1±11.9kg), with at least 1 year of resistance training experience participated in this study. Following an overnight fast, participants performed a lower-body acute resistance exercise bout consisting of 4 sets of the leg press and leg extension exercises (up to 10 repetitions at 75% of 1-repetition maximum for each set). Participant 24-hour dietary recalls were collected to identify CHO gram (g) consumed per kilogram (kg) of body weight (g/kg) during the previous day. Macronutrient analyses were performed using MyFitnessPal. Exercise performance was indicated by percent of repetitions completed per set for each exercise. Spearman correlation coefficient analysis identified weak correlations between CHO g/kg consumed and repetitions completed for both leg press ($r_s = 0.0304$; $p = 0.9545$) and leg extension exercises ($r_s = 0.0870$; $p = 0.8699$). No significant relationships were identified. These data suggest that CHO intake over the previous 24 hours is not related to resistance exercise performance in males; however, the application of these findings is likely limited due to the small sample size.

Health Professional Students' Knowledge and Perception of Plant-based Diets

Kayla Huff, Ellen Jones, Alyssa Fauth, and Tracy Noerper, Nutrition

The increasing popularity of plant-based diets (e.g. vegetarian and vegan) may stem in part from research connecting those eating patterns to health benefits such as a reduced risk of heart disease, diabetes, and certain cancers. A vegetarian diet is defined as a diet excluding meat, poultry, or seafood whereas a vegan diet excludes all animal-derived products including dairy, eggs, and honey. The purpose of this study was to determine the knowledge and perception of vegetarian and vegan diets among current health professional students. Data was collected via an online survey from students enrolled in allied health professional programs (Nursing, Dietetic Undergrad and Interns, Physician Assistant, Pharmacy, Exercise Physiology, and Mental Health Counseling) at Lipscomb University (N=34). Results show that 32% (n=11) and 38% (n=13) of respondents incorrectly identified components of a vegetarian and vegan diet, respectively. Furthermore, 23.5% (n=8) of respondents perceived a balanced vegetarian diet as inappropriate for the general public. Almost half (47%) of the respondents reported having not participated in a nutrition course within the past 5 years. Thirty-two percent of subjects (n=11) indicated being somewhat uncomfortable consulting with a patient who follows a plant-based diet and 6% (n=2) indicated being very uncomfortable. Based on these study results, continued nutrition education regarding plant-based diets is needed for students in health professional fields.

Nutrition Focused Physical Exam Usage by Registered Dietitians in Tennessee

Anna Novak, Julia Della Torre, and Tracy Noerper, Nutrition

Nutrition Focused Physical Examination (NFPE) is a tool used by Registered Dietitians (RDs) to evaluate the nutritional status of patients at risk of malnutrition. Clinical markers of malnutrition can range from edema, wasting of muscle mass or subcutaneous fat, to signs of micronutrient deficiencies. Performing NFPEs on patients allows RDs to diagnose patients with malnutrition, which can be predictive of clinical outcomes and mortality. The purpose of this study was to determine whether RDs with <10 years of experience use NFPEs more frequently than RDs with ≥10 years of experience. Data was collected via an online survey shared on social media. Survey results reveal that participants (N=45) practice in a variety of facilities (e.g. community hospitals, long-term acute care, outpatient clinics) ranging from 23 to 800 beds. Data was divided based on the number of years as a practicing RD as it was supposed that RDs with ≥10 years of experience did not perform NFPEs as frequently in comparison to RDs with <10 years of experience due to more recent education of the NFPE process. Chi-square analysis ($X^2=0.0473$, $df = 1$, $N=45$, $p=0.82$) indicates that RDs with <10 years of experience and RDs with ≥10 years of experience are not significantly different in their frequency of performing NFPEs. Future research is needed to further examine variations between generations of RDs and their frequency in usage of NFPEs as well as identifying barriers to routinely performing NFPEs.

The Promises and Pitfalls of the Macrobiotic Diet

Grace Hooker, Alana Agnone, and Tracy Noerper, Nutrition

The macrobiotic diet has gained traction within the holistic nutrition community for its possible healing effects as an anti-inflammatory diet for chronic diseases such as cancer. The macrobiotic diet includes food groups such as whole grains and local, in-season produce while purportedly avoiding the "toxins" that come from dairy products, meats, and animal-based fat sources. The macrobiotic diet is not currently recognized as a therapeutic diet by the Academy of Nutrition and Dietetics. The purpose of this research study was to evaluate dietetic professionals' (e.g. registered dietitians, dietetic technicians, dietetic interns and students) current knowledge of the macrobiotic diet as well as their level of interest in learning more about it. Data was collected via a 12-question online survey available from November 2019 to January 2020 (N = 55). Results indicate that of the participants responding 41.51% were familiar with the macrobiotic diet, and 72.72% reported that their knowledge level on the diet was average or good. Only 3 respondents answered "yes" to the question which asked if they've had patients or clients inquire about wanting to try the macrobiotic diet; however, the majority of respondents (n = 48) indicated they were interested in learning more about the diet. Overall, study results suggest that practicing and future dietitians or technicians could benefit from further education on the various components of the macrobiotic diet.

Protein Intake of Division I Baseball Athletes at Lipscomb University

Tricia Hart, Jeremy Townsend, and Tracy Noerper, Nutrition

Protein is a macronutrient used for building and repairing tissues in the body. The purpose of this study was to analyze protein intake of Division I collegiate baseball players during the fall off-season. Twenty-one Lipscomb University baseball players (19.7 ± 1.4 yrs; 183.9 ± 7.6 cm; 19.7 ± 6.2 % BF; 87.9 ± 8.6 kg) completed 3 dietary recalls on 2 weekdays and 1 weekend day. Participants received education on determining portion sizes along with an informational handout and dietary intake form instructions. Dietary intake forms were collected, reviewed, and clarified for credibility and accuracy. Protein intake was determined by averaging consumption of the 3 days collected, and analyzed with the nutrition database, Nutritionix. Protein requirements were defined at 2 g/kg/d based on recommendations from the Academy of Nutrition and Dietetics. Data analysis revealed athletes consumed 2.0 ± 0.6 g/kg/d protein on average. Further analysis revealed that 10 out of 21 (47.6%) athletes did not meet the recommended 2 g/kg/d of protein, and 6 of 21 (28.6%) did not meet 1.8 g/kg/d. It appears that Lipscomb University baseball players are not consuming adequate dietary protein for muscle growth considering the rigorous weight-lifting and training programs mandated. This study emphasizes the need for sports dietitians in optimizing muscle protein synthesis for athletes. Future research can investigate if baseball players meeting protein needs execute better in various performance measures.

Evaluation of Participants' Perspectives of Emergency Food Boxes

Katelyn McCormack and Tracy Noerper, Nutrition

Food insecurity, defined by USDA, is a reduced access by households to enough food for an active, healthy life. Poverty, unemployment and inconsistent access to adequate healthy food can lead a household towards food insecurity, which affected 11.1% of U.S. households in 2018. The Emergency Food Box (EFB) program is one initiative that addresses food insecurity through the distribution of typically pre-made food boxes (e.g. peanut butter, canned goods, bread, etc.) to those enrolled. The aim of this study was to assess Middle Tennessee Second Harvest Food Bank EFB program participants' perspectives of the emergency food boxes they receive. Five Nashville-area EFB distribution sites were visited during October and November 2019. A 10-question survey collected participant data (N=45) including frequency of receiving a food box, how much food is typically eaten from the box and how long the food lasts the household. Results indicate that 49% of clients (n=22) receive an EFB 3-5 times per year, 31% of clients (n=14) report an EFB lasts 2-3 days, and 49% of clients (n=22) indicate they consume all the food provided by the program. Study results appear consistent with Second Harvest Emergency Food Box standards for a household receiving 3-5 boxes per year that lasts them 2-3 days, and from which they eat all the food. More research is warranted to evaluate additional client feedback on food boxes from other EFB sites in Middle Tennessee.

Acceptability of Aquafaba as a Substitution for Eggs in Brownies

Anna Wilke, Nicole Fowler, and Tracy Noerper, Nutrition

Consumers are increasingly interested in discovering recipe modifications which add nutritional value, decrease food waste, or accommodate allergy and/or plant-based dietary patterns. One potential recipe modification ingredient is aquafaba. Aquafaba, the liquid portion of canned chickpeas, is low in protein but can be used as an egg substitute for those who are vegan, have allergies, or need to limit dietary protein. The aim of this research was to test the acceptability of aquafaba as a substitute for eggs in a brownie recipe. Data was collected through a blind taste test of 2 brownies by employees at 2 middle Tennessee healthcare sites (N=70). A standardized brownie recipe was prepared 2 ways: 1 with eggs and 1 with aquafaba in place of eggs. Participants were asked to taste both brownie samples and evaluate (1=worst to 5=best) 4 acceptability categories: taste, texture, appearance, and overall satisfaction. Results show that when comparing Brownies A (aquafaba) and B (egg) a larger mean score difference was found for appearance

(.43) while taste (.26) and texture (.1) had smaller mean score differences. The overall satisfaction mean score for Brownie A (M=3.56, SD=1.12, N=70) was smaller than Brownie B (M=3.81, SD=0.68, N=70). Using a two-sample *t*-test, $t(130) = -1.61$, $p=0.11$, results suggest that the brownie samples may be similar in overall satisfaction. Future research is needed to further explore potential uses for aquafaba as an economical and functional ingredient.

Factors Contributing to Uncontrolled Glucose Levels in Nutrition Support Patients

Marissa Licalzi and Tracy Noerper, Nutrition

Total parenteral nutrition (TPN) is a mode of feeding that bypasses the gastrointestinal tract and administers nutrients into a vein. The purpose of this study was to evaluate factors contributing to uncontrolled glucose levels (above 180 mg/dL) in hospitalized TPN patients. Charts of hospitalized patients (N=38) from October to December 2019 were reviewed and 17 clinical variables were recorded for each patient (e.g. gender, age, race, BMI, steroid usage, insulin prescription, etc.). Upon TPN initiation, 34.2% of patients were prescribed steroids and 15.8% had a diabetes diagnosis which is consistent with clinical expectations of elevated glucose levels under those circumstances. Overall, 31.6% of patients were found to have uncontrolled glucose levels and of those, 33.3% of patients received insulin initially with their TPN while 41.6% had insulin added after TPN initiation, and 25.1% never had insulin added. Chi-square analysis indicates that males and females ($X^2=4.656$, $df=1$, $N=38$, $p=0.031$) differ significantly in whether or not they experience uncontrolled glucose levels while receiving TPN. Not surprisingly, patients with or without a diabetes diagnosis are significantly different in whether or not they experience uncontrolled glucose levels ($X^2=8.833$, $df=1$, $N=38$, $p=0.008$) while receiving TPN. Additional research is needed to explore how early administration of insulin to TPN patients can better manage blood glucose levels and ultimately improve clinical outcomes.

A Sports Nutrition Department's Influence on Collegiate Athletes' Nutrition Knowledge

Grace White, Wil Keener, Caroline Klinger, and Tracy Noerper, Nutrition

The purpose of this study was to evaluate the effectiveness of the sports nutrition resources available to collegiate student athletes by assessing change in nutrition knowledge according to the frequency of interactions with the Sports Nutrition Department (SND) (e.g. Registered Dietitians, Dietetic Interns, and Graduate Assistants). Data was collected from 4 athletic teams (N=32) using the validated 49-item Sports Nutrition Knowledge Instrument (49-SNKI) during two survey periods: baseline (week 0) and mid-year (week 23). Researchers maintained documentation of all nutrition-related interactions in which nutrition knowledge was shared by the SND with study participants. The number of interactions was then used to group the 4 athletic teams into low (25-49 interactions), medium (50-74 interactions) and high (75-100 interactions) SND interaction categories. A dependent *t*-test revealed statistically significant ($p < 0.05$) improvements in mean 49-SNKI scores in each of the interaction groups, with the greatest mean improvement shown in the high interaction group (M = 12.16, SD = 2.14, $t = 5.65$). The results of this study suggest increased athlete utilization of sports nutrition resources results in significant increases in nutrition knowledge. Future research should further examine the interaction type, duration of interactions, and personalized interaction between the athlete and SND staff in relation to changes in overall nutrition knowledge.

Demonstrating Community Pharmacist Value Through Innovative Workflow Enhancement

Cailin Harris and Justin Kirby, Pharmacy Practice

A growing challenge within community pharmacy is demonstrating the wealth of services pharmacists can provide to patients. More so than filling prescriptions, pharmacists in the community are well-poised to help manage a patient's comprehensive care. This is done through medication therapy management (MTM) services. This concept is well-researched, and it is widely believed that pharmacists can benefit all parties involved when they practice to the full potential of their licensure. What limits the impact a community

pharmacist can make is the amount of time the pharmacists perceive these services take, and the lack of pharmacists available to champion these services. This proposed observational study aims to observe whether technician-identification of medication therapy management opportunities can accelerate patient intervention, allowing pharmacists to save time, and be proactive problem-solvers. This study accomplishes this by adding increased identification of MTM opportunities into daily pharmacy workflow, and enrolling these patients into "Perkins Plus". This is a patient program that places additional attention on patients taking maintenance medications. Technicians, often positioned closest to patients, would engage patients in directed MTM questioning about their maintenance medicines. If issues arise that call for pharmacist intervention, technicians will pass on the concern to a pharmacist, either immediately or within the following days. The pharmacist will help the patient by providing advanced pharmacy services, such as complete medication reviews, targeted medication reviews, and disease-state education courses. Data collection for this study will include the number and type of interventions identified by technicians, and the results of the interventions initiated.

Development of Dantrolene as a Novel Antiarrhythmic Drug

Amakia Gibson, Matt Vergne, Benjamin Shoemaker, Bjorn Knollman, Wendell Akers, and Wendell Akers, Pharmaceutical Sciences

Ventricular arrhythmias account for up to 20% of sudden cardiac arrests per year in patients with structural heart disease. Implantable cardioverter defibrillators (ICDs) are effective in preventing sudden cardiac death due to ventricular tachycardia and ventricular fibrillation. However, patients with an ICD are at risk of frequent shocks, heart failure and recurrent ventricular arrhythmias. Current antiarrhythmic drugs targeting cardiac sodium and potassium channels are associated with significant adverse effects or have been shown to increase mortality. However, recent evidence in pre-clinical models suggest that ryanodine RyR2 receptor hyperactivity may lead to changes ventricular refractoriness and conduction, which promote ventricular arrhythmias. The overall goal of this research is to evaluate dantrolene as a novel treatment strategy to inhibit RyR2 activity and reduce ventricular arrhythmias in patients with structural heart disease. Aim 1 is to develop and validate an analytical method to quantitate dantrolene in human plasma. Aim 2 is to design a drug sampling strategy to evaluate the pharmacokinetic-pharmacodynamic relationship of dantrolene on electrophysiologic parameters in patients undergoing ventricular tachycardia ablation. A robust LC-MS/MS method to quantitate dantrolene and its metabolite, 5-hydroxydantrolene, was developed with a lower limit of quantitation of 5 ng/ml. Intravenous administration of dantrolene in a pilot group of patients undergoing cardiac ablation resulted in a mean dantrolene and 5-hydroxydantrolene peak plasma concentration of 2000 ng/ml and 300 ng/ml, respectively. An ongoing clinical trial will test the hypothesis that RyR2 blockade with dantrolene reduces the inducibility of ventricular arrhythmias in patients with structural heart disease.

High-dose Montelukast Pharmacokinetics in Children with Acute Asthma Exacerbations

Vivian Truong, Donald H. Arnold, Jennifer C. King, and Wendell Akers, Pharmaceutical Sciences

BACKGROUND: Childhood asthma exacerbations remain an enormous public health burden despite the availability of systemic corticosteroids (CCS) and inhaled beta-agonists. Recent studies indicate that children with asthma have a differential responsiveness to corticosteroids that is related to leukotriene-mediated inflammation. During the commercial development of montelukast, an intravenous (IV) formulation caused a rapid and sustained improvement of lung function in adults with moderate and severe exacerbations, without selecting for CCS non-responsiveness. Unfortunately, the IV formulation is unavailable for clinical use and is associated with higher peak plasma concentrations than approved oral formulations of montelukast. **PROJECT AIM:** The aim of this project is to determine the systemic exposure and safety of high dose oral montelukast in 15 children aged 5 to 12 years presenting to the emergency department with acute asthma exacerbations. The primary outcome is to evaluate the proportion of subjects achieving a target maximum montelukast plasma concentration (C_{max}) of 1700 ng/ml or greater. **RESULTS:** No adverse effects were noted in the subjects receiving high dose oral montelukast. Preliminary pharmacokinetic data of the first 12 subjects demonstrated that 30 mg of oral montelukast achieved a median C_{max} of 1,418 ng/ml [IQR 684, 1,909] with 25% of subjects achieving a C_{max} = 1,700 ng/ml. **CONCLUSIONS:** Safety data and drug levels from this pilot study support the design of a weight-based, dose-finding study aimed at selecting an optimal dose for a clinical trial that will assess the efficacy of high dose oral montelukast in children with moderate to severe asthma exacerbations.

Classics in Chemical Neuroscience: Benztropine

Riley S. Binkowski, Sean Wilson, Kevin R. Flatt, Melica F. Nikahd, and Nate Daniels, Pharmaceutical Science Research

Benztropine received FDA approval in 1954 under the brand name Cogentin and has since been instrumental in improving extrapyramidal symptoms (EPS) from Parkinson's disease (PD) as well as drug-induced EPS from neuroleptic medications. Benztropine is an anticholinergic agent with antiparkinsonian properties that inhibit central cholinergic receptors in order to regulate cholinergic transmission in the basal ganglia. It is thought to be one of the first agents to block dopamine reuptake in presynaptic neurons, leading to an increase in dopaminergic activity. Benztropine's dual effects prove its importance in parkinsonisms, cocaine abuse, psychostimulant abuse, and neurological disorders. In this Review, we will discuss the synthesis, drug metabolism, pharmacology, adverse effects, history, and the importance of benztropine to neuroscience and describe its role in therapy.

Role of Kidney, Lung, and Intestine in the Metabolism and Clearance of Aldehyde Oxidase Substrates

Taylor Thompson, Paige Barnes, Jennifer Bissada, and Rachel Crouch, Pharmaceutical Sciences

The absence of reliable methods to predict the clinical pharmacokinetics of aldehyde oxidase (AO) substrates is a barrier to the development of new therapeutics susceptible to metabolism by AO. Consequently, several drug candidates have failed out of clinical trials due to unexpected AO metabolism. Because AO is present in several human tissues, extra-hepatic AO metabolism is hypothesized as a reason why in vitro liver models under-predict in vivo clearance. However, the role of extra-hepatic AO in the metabolism and clearance of AO substrates is poorly understood. Thus, the goal of this research is to test the hypothesis that AO-mediated metabolism in human kidney, intestine, and lung tissues contributes to the total body clearance of AO substrates. Human in vivo clearances of the AO substrates selected for these studies (zaleplon, zoniporide, O6 benzylguanine, BIBX1382) are under-predicted by in vitro liver models, indicating that they may undergo extra-hepatic metabolism in vivo. We used these substrates to measure AO metabolite formation in subcellular fractions of each human tissue (liver, lung, kidney, intestine). Future studies will include the use of human subcellular tissue fractions to estimate individual organ

clearances of each substrate. These measurements will then be compared to their reported in vivo human clearance values in order to estimate the percent contribution of each organ to the total body clearance of the substrate.

Quantitation of Chiral Propafenone Enantiomers in Plasma by Liquid Chromatography-tandem Mass Spectrometry

Kangjun Li, Matt Vergne, Benjamin Shoemaker, Bjorn Knollman, and Wendell Akers, Pharmaceutical Sciences

Approximately 90% of pharmaceutical products are manufactured as racemic mixtures of chiral compounds that exhibit marked differences in receptor selectivity. Propafenone is an antiarrhythmic drug composed of equal amounts of (S)- and (R)-enantiomers that differ in their ability to block specific heart ion channels and receptors. The purpose of this project was to develop an analytical method using high performance liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS) to quantify propafenone enantiomers in plasma. A stock solution of R- and S-propafenone enantiomers were used to develop an 8-point standard curve in human plasma (Range: 5 ng/ml ? 5000 ng/ml). Propafenone extraction from each standard was performed by diluting 50 ?l of plasma with 150 ?l of acetonitrile containing deuterated propafenone as an internal standard. Samples were processed with protein precipitation filter plate and 10 ?l of the supernatant was injected into the LC-MS/MS instrument for separation and quantitative analysis of each enantiomer. Chiral separation was achieved with an amylose-1 HPLC column (5 ?m, 250 X 4.6 mm) with solvents amenable for electrospray ionization (ESI) MS. The mobile phase consisted of 85% ammonium hydroxide (0.2%) and 15% ammonium bicarbonate (5 mM) with a 0.5 mL/min flow rate. The (S)- and (R)-enantiomers eluted at 7.5 min and 9.5 min, respectively, with a total run time of 15 min. The standard curve had a good correlation (R-squared 0.99). This method will be used to support propafenone pharmacokinetic studies for each enantiomer and the development of a single enantiomeric drug product.

Quantitative Analysis of Ifetroban in Patients with Duchenne Muscular Dystrophy

Breyanne Bannister, Ryan Morrison, Leo Pavliv, Ines Macias-Perez, and Wendell Akers, Pharmaceutical Sciences

Duchenne Muscular Dystrophy (DMD) is a genetic disorder characterized by progressive muscle degeneration that leads to cardiomyopathy and premature death. Ifetroban is a potent and selective inhibitor of the thromboxane-prostanoid receptor that may be useful in treating DMD cardiomyopathy by reducing myocardial inflammation and cardiac fibrosis. The purpose of this project is to develop an analytical method to quantitate ifetroban and its metabolite, ifetroban glucuronide, in human plasma using liquid chromatography coupled to tandem mass spectroscopy (LC-MS/MS). Stock solutions of ifetroban and ifetroban glucuronide were used to develop a standard curve (Range: 20000 ng/ml ? 10 ng/ml) in human plasma using plasma collection discs. Ifetroban and ifetroban glucuronide was extracted from samples by incubating plasma collection discs with 300 ?L of acetonitrile containing deuterated desipramine. Samples were shaken, centrifuged, and the supernatant was dried down with nitrogen gas. Samples were reconstituted with mobile phase and injected into the LC-MS/MS instrument for analysis. The mobile phase consisted of 0.1% formic acid in water and 100% methanol with a flow rate of 0.5 mL/min and a C-18 column (50 x 2.1 mm, 1.7 ?m). Ifetroban and ifetroban glucuronide eluted at 2.2 min and 1.8 min, respectively, with a total run time of 3.5 min. Standard curves had a good correlation (R-squared 0.99) and both compounds demonstrated short-term stability at -20 degrees C for up to 5 weeks. This method will be used to support a current phase II trial to determine the safety, pharmacokinetics, and efficacy of oral ifetroban in subjects with DMD.

Methods for Reducing the Spread of *Clostridioides difficile*

Jordan Schenk and Patricia Eaton, Physician Assistant Studies

Objective: The goal of this literature review was to introduce current and emerging methods for decreasing the incidence of *Clostridioides difficile* infections (CDIs) in healthcare facilities. | | **Methods:** Article searches were completed using PubMed, PubMed Central, Science Direct, and Google Scholar. The search terms included were *C. diff*, *Clostridium difficile*, infection, pathology, management, treatment, disinfection, and control. The searches were limited to articles “within 5 years,” “full text,” and “free full text.” **Results:** Due to the resistant nature of the spore, *C. diff* was found to be very difficult to prevent and eradicate from hospital rooms. Ultraviolet C light and most disinfectants did not help decrease the incidence and presence of *C. diff* in hospital settings. Improved Hydrogen Peroxide (IHP) disinfectant showed promise with sporicidal properties as well as disinfection. A study was done to compare recent guideline antibiotics oral fidaxomicin and oral vancomycin. Fidaxomicin was shown to be more effective at decreasing the recurrence rate in CDI patients. **Conclusion:** The incidence of *C. diff* infections has caused an increase in research to develop ways to reduce the spread of hospital-acquired infections. The use of sterilization solutions like IHP and Ultraviolet C technology may be effective methods of management for hospital room cleaning. The use of these methods combined with proper handwashing, antibacterial stewardship, and community education are all crucial parts of management. Infections require a multi-targeted approach to decrease the spread and burden on healthcare. **Keywords:** *Clostridioides difficile*, Prevention, *C. diff* infection

Disease Modifying Advancements in the Treatment of Parkinson Disease

Madelaine Blankenship and Matthew Steidl, Physician Assistant Studies

Background: Parkinson disease is a progressive movement disorder that only has pharmacologic therapy for symptom control. The disease is characterized by a resting tremor, bradykinesia, rigidity and eventually postural instability. Advancements in research have led to two trials that have the potential to become disease-modifying management. Isradipine is a calcium channel blocker that has been linked to a

Comparing the Conservative and Arthroscopic Procedures of the Hip’s Labrum

Scout Monteith and Matthew Steidl, Physician Assistant Studies

Objectives: To review and compare the indications and outcomes of conservative and operative (debridement, repair, reconstruction, and augmentation) treatments on the labrum of the hip. **Methods:** A systematic search was conducted to locate secondary knowledge sources within published literature using the following databases: PubMed, Google Scholar, and Lipscomb University Library Database. Filters used to refine the search were “within the last 10 years” and “humans.” **Results:** Analysis of 11 research articles revealed conservative measures demonstrated improvement in symptoms; however, arthroscopic management of labral tears exceeded the outcomes of conservative treatment. Arthroscopic labral repair has emerged as the leading operative treatment option for most tears regardless of the etiology due to an increase in HHS, HOS, and patient satisfaction, along with a decrease in VAS. **Conclusions:** Although arthroscopic labral repair is the leading operative treatment, the surgical style preferred is highly variable. Ultimately, the type of labral surgery depends on both the surgeon’s training, skillset, and confidence, as well as, the patient’s characteristics, goals, and expectations. **Keywords:** Labral Tears, Hip, Vasculature, Repair, Debridement, Reconstruction, Augmentation.

Analyzing Outcomes with and Injuries Sustained from Mechanical Chest Compressions Versus Manual Chest Compressions during Cardiac Arrest

Jessica Krupinski and Marie Patterson, Physician Assistant Studies

Objectives: To understand if mechanical chest compressions are superior to manual chest compressions in regards to patient outcomes and injuries sustained during CPR initiated by cardiac arrest. **Methods:** A literature search was performed using Science Direct, PubMed, and Google Scholar databases with search terms including mechanical chest compressions, manual chest compressions, CPR, outcomes, cardiac arrest, risks, and benefits. The filters used include “within the last 5 years” and “research articles.” **Results:**

Searches on Science Direct yielded 175, 237, and 325 results. Various searches on PubMed provided 19 and 68 results. The search on Google Scholar offered 3,090 results. Twelve research articles were selected to be utilized in this literature review. A randomized controlled trial, prospective observational trials, and systematic reviews and meta-analyses on short term survival after cardiac arrest found mechanical chest compression devices were not superior to manual chest compressions outcomes. A randomized controlled trial on long term outcomes after cardiac arrest discovered no significant difference between the use of mechanical and manual chest compressions. Retrospective trials, systematic reviews and meta-analyses, and prospective observational trials on injuries sustained during CPR showed little to no significant difference between the utilization of mechanical and manual chest compressions during cardiac arrest. Conclusions: This literature review is able to conclude that at this time the FDA approved mechanical chest compression devices cannot be recommended as a replacement for traditional manual chest compressions. Keywords: manual compressions, mechanical compressions, CPR, cardiac arrest

Comparing First and Second Line Treatments for Severe Pediatric Immune Thrombocytopenia Purpura

Cory Oegema and Patrecia Eaton, Department of Physician Assistant Studies

Objective: To compare recent research on the acute effects of Intravenous Immunoglobulin, high-dose methylprednisolone and the chronic use of thrombopoietin receptor agonists such as romiplostim and eltrombopag in pediatric patients with severe immune thrombocytopenia purpura (ITP). Methods: A literature review was performed through the PubMed database using key terms chronic immune thrombocytopenia, acute immune thrombocytopenia, treatment, pediatrics, and steroids. The filter used was “within the last five years.” Results: A total of 66 articles were found and 12 were relevant. Several studies have shown that the first line treatments of high-dose methylprednisolone, intravenous immunoglobulin, or observation for pediatric acute immune thrombocytopenia all raise platelet counts to low-normal levels within a year of being diagnosed to control symptoms while seeing if remission will occur. If first line treatments are unsuccessful, then the second line treatments are thrombopoietin receptor agonists eltrombopag and romiplostim, splenectomy, danazol, or the anti-CD20 drug rituximab. However, the side effects and complications of splenectomies, danazol, and rituximab excluded them from this literature review. Eltrombopag had more adverse effects needing monitoring but has less severe bleeding incidents. Eltrombopag is cost effective and can be taken orally; however, it has specific dietary restrictions. Romiplostim is more expensive but has no liver or diet restrictions. However, it involves weekly subcutaneous injection. Conclusion: The decision is multifactorial and based on the patient’s preference of administration, liver and ophthalmologic health, financial stability, and ability to follow dietary restrictions.

Melatonin and its Efficacy in the Treatment of Insomnia

Benjamin R Crisp and Matthew Steidl, Physician Assistant Studies

Objective: To review the effectiveness of Melatonin use on the treatment of Insomnia. Methods: A literature search was conducted using PubMed with the search terms: Melatonin, Insomnia, and Sleep. The articles were narrowed down to those that were “published in the last 10 years.” Results: The research showed subjective evidence and some mild scientific evidence that supported the use of Melatonin in the treatment of insomnia, but the evidence was overall inconclusive. Conclusion: Melatonin has a limited side effect profile; it is safe to consider for use in treating insomnia, but further research needs to be done in regards to the long term side effect profile and the full extent of Melatonin’s effectiveness in the treatment of insomnia.

A Comparison of Robotic-assisted versus Conventional Manual Total Knee Arthroplasty

Cade C. England and Kelly Smart, Physician Assistant Studies

Objectives: To review the differences between robotic-assisted and conventional manual total knee arthroplasty (TKA), while comparing the efficacy, functional outcomes, radiographic outcomes, surgery accuracy, survivorship and complications, and cost between the two techniques. **Methods:** A literature search was performed using PubMed and ScienceDirect with search terms total knee arthroplasty, robotic-arm assisted, and conventional manual. The filters used included “Full text” and “Published in the last 10 years.” **Results:** A total of twelve relevant articles were found, analyzed, and recorded. Compared with conventional manual TKA, robotic-assisted TKA showed reduced postoperative pain ($p < 0.001$) and analgesic requirements ($p < 0.001$). Robotic-assisted TKA final bone cuts were 5.0 times more precise, whereas final component positions were 3.1 times more precise, than the results of the manual TKA. Robotic-assisted TKA patients had a 90-day readmission reduction of 33% ($p=.0423$) and length of stay reduction of 0.7 days ($p<0.0001$). Average 90-day Medicare Episode of Care costs were \$2,391 less for robotic-assisted TKA patients than manual TKA patients. **Conclusions:** While some of the reviewed articles did not find a significant difference between the two techniques, none of the articles found conventional manual technique to be superior to robotic-assisted technique. In comparison to conventional manual TKA, robotic-assisted TKA showed superior accuracy of the procedure, decreased pain, decreased analgesic requirements, decreased readmission rates, reduced blood loss, earlier hospital discharge, earlier functional recovery, and overall lower costs. **Keywords:** Total Knee Arthroplasty, Robotic-assisted TKA, Conventional Manual TKA.

Teplizumab Drug Therapy in Type 1 Diabetes Mellitus

Shannon Postle and Lauren Webb, Physician Assistant Studies

Objectives: Review the epidemiology, pathology, and current treatments of type 1 diabetes mellitus (T1DM) and understand the therapeutic role of teplizumab in the prevention and management of this disease. **Methods:** Literature review search performed using Bison Search accessed through Lipscomb University’s Library website. The search was limited to publications within the last 10 years and studies that have been peer reviewed. The search terms Teplizumab, Type 1 Diabetes Mellitus, Treatment, and Therapy were used to narrow down the search. **Results:** Teplizumab has a significant role in prolonging C-Peptide levels and postponing the onset of T1DM in recently diagnosed and high-risk patients, respectively. **Conclusion:** T1DM is a complex disease that causes many adverse systemic effects on the body. These effects are linked to the duration of diagnosis and the quality and consistency of glycemic control, of which HbA1C is a measurement. Teplizumab, when finished with its trial phases, should be used in healthy newly diagnosed type 1 diabetics to prolong C-Peptide markers. The benefits of teplizumab can help decrease mortality and morbidity that coincides with a diagnosis of T1DM. There are a few patient subgroups that teplizumab risks may outweigh the benefits. These patient subgroups include a history of dermatologic, bone blood or bone marrow reactions, or a personal or family history of leukemia. The benefits of teplizumab outweigh the risks in most health patients who do not have specific risk factors that increase the probability of adverse drug events. **Keywords:** Teplizumab, Type 1 Diabetes Mellitus, Treatment, Therapy

Treating Adolescent Polycystic Ovarian Syndrome

Ashton Perez and Matthew Steidl, Physician Assistant Studies

Objectives: To review polycystic ovarian syndrome and discuss the potential treatment options in the adolescent population. **Methods:** A literature search was performed using PubMed, AACE journals, and Google Scholar databases with search terms including polycystic ovarian syndrome, treatment, and adolescents. The filter used includes “within the last five years.” Additional searches were conducted with the same databases and filters using the treatment options found in the previous search for more details about the use and efficacy. **Results:** A total of 11 relevant articles were found. Oral contraceptives were found to have significant data in treating acne and reducing infertility. Metformin was found to have significant data in treating insulin resistance and dyslipidemia. Metformin was also found to assist in weight loss. **Conclusion:** Multiple studies have shown the use of oral contraceptives, metformin, and lifestyle modifications have been effective at controlling polycystic ovarian syndrome symptoms. The treatment of symptoms that are associated with polycystic ovarian syndrome can help improve the quality of life. The early stages of PCOS typically present during adolescence. Early treatment can improve future outcomes with fertility and reduce pregnancy complications. Controlling disease progression can help patients prevent developing type 2 diabetes and having cardiovascular events later in life. **Keywords:** Polycystic Ovarian Syndrome, Metformin, Combined Oral Contraceptive Pills, Adolescents, Treatment.

Managing Acute Appendicitis with Antibiotics Compared to Appendectomy

Elizabeth Mathers and Kelly Smart, Physician Assistant Studies

Objectives: To review more conservative management of acute appendicitis and discuss the possibility of using antibiotics rather than surgical intervention. **Methods:** A literature search was performed using the PubMed and ScienceDirect databases with search terms, including “treat adult acute appendicitis with antibiotics first.” The search was narrowed to include publication dates within the past five years. After searching ScienceDirect with the initial search terms, the database provided article recommendations, and the related articles were included if they met the criteria. **Results:** The advantages of using antibiotics rather than surgical intervention for appendicitis include less expense, minimal additional complications such as perforation, and prevention of unnecessary surgery. Disadvantages include risk of recurrence, potential antibiotic resistance, and the current lack of a standard protocol. **Conclusion:** Multiple studies have shown that an antibiotics-first approach in the treatment of acute uncomplicated appendicitis is safe, cost-effective, and less invasive compared to traditional appendectomy. Treating patients with antibiotics has not been found to increase the risk of complications associated with appendicitis. However, because of the variety of antibiotics used and the varying durations of antibiotics, further research should be conducted to discover which antibiotic treatment protocols work best at treating acute uncomplicated appendicitis. **Keywords:** Uncomplicated Acute Appendicitis, Antibiotics, Treatment.

The Role of Hyperbaric Oxygen Therapy in the Management of Diabetic Foot Ulcers

Terra Lomber and Lauren Webb, Physician Assistant Studies

Objective: The purpose of this paper is to research if using Hyperbaric Oxygen Therapy (HBOT) as an adjunct therapy with conventional treatment in the management of diabetic foot ulcers is more effective than conventional treatment alone. **Methods:** Michigan State Library Database, JWOCN, and UpToDate were searched to identify randomized control trials, meta-analysis, and systematic reviews on patients with diabetic foot ulcers comparing conventional treatment to conventional treatment with HBOT. **Results:** Results were based on 14 relevant articles. In a meta-analysis, 11 trials showed fewer major amputations in the HBOT group compared to the control group ($P < 0.01$), 5 trials showed no significant difference in minor amputations between the control and HBOT group. Zhao et al, reviewed 9 RCTs that resulted in greater ulcer size reduction in the HBOT group compared to the control group ($P = 0.04$). Three articles showed a significant difference in complete ulcer healing favoring the HBOT group compared to the control

group. Fedorko et al., showed no significant difference in complete ulcer healing or amputation rate between the control and HBOT group. Conclusion: The majority of studies showed that HBOT as an adjunct therapy with conventional treatment increased the overall healing rate of ulcers and decreased the number of amputations compared to conventional treatment alone. A smaller amount of studies showed that there was no significant difference in complete ulcer healing and amputation rate between conventional treatment and HBOT with conventional treatment. Keywords: Diabetic Ulcers, Hyperbaric Oxygen Therapy, Wound Care

Protocols to Use in Consideration of the Optimal Timing of Palliative Care Implementation for the Oncology Patient

Payton Tidwell and Patrecia Eaton, Physician Assistant Studies

Objectives: To ascertain a clinically useful recommendation strategy for palliative care initiation in the oncology patient based on protocols highlighted in previous studies. Methods: A literature search was performed using the PubMed, Science Direct, and Cochrane database with the search terms palliative care, oncology, referral, and criteria. The filter “clinical trials” was used. Three of the articles found implemented a palliative care referral strategy for oncology patients. Results: The three studies varied greatly on what factors prompted referral for palliative care. Protocols utilized included criteria based on timing, patient symptom burden, and transitions in care. Additional studies have conducted literature searches and reached expert consensus on multiple factors that should prompt referral. Conclusions: Clinics should create palliative care referral protocols standardized on a multitude of factors. With the increase in utilization of palliative care services and a shortage of palliative care specialists, oncology teams need to be equipped with protocols to better match the number of patients that need palliative care to the number of specialized providers able to provide this much-needed service. Office protocols incorporating time-based, criteria-based, and setting-based frameworks offer a practical clinical tool to identify patients in need of referral as early as possible. Further research is needed to explore the validation of a universal protocol for palliative care referral. Keywords: palliative care, oncology, timing, referral, optimization, protocol, early

Animal-Assisted Therapy Treating Mental Health Disorders

Ashley Beyke and Linda Elrod, Physician Assistant Studies

Objectives: To help health care providers understand how animals are used to assist people. Also, to evaluate the effectiveness of using animals to alleviate mental health disorders such as dementia, post-traumatic stress disorder (PTSD), autism, and critically ill patients prone to anxiety and depression. Methods: A literature search was performed using Pubmed, ScienceDirect, and EBSCOhost databases. The search terms used were animal-assisted therapy, PTSD, autism, dementia, pediatrics, anxiety, and stress disorder. The filters used were “within the last five years,” “English,” and “full text.” Results: A clinical review article was written using 17 sources. PTSD, autism, and critically ill patients had statistically significant data. Both canine and equine sessions had a p-value of <0.05 for reducing PTSD symptoms. A randomized control trial with 53 autism patients showed canines increased social awareness and communication while decreasing stress and agoraphobia. Perceived stress showed a 95% confidence interval of -6.1 to -0.5 and a p-value of 0.02. The critically ill population showed people with HIV are less depressed if they own a dog with a p-value of <0.001. Limitations: The limitations in the research were biased data, small sample size, inability for double-blind studies, and a lack of standardization. Conclusion: The research showed benefits for patients with PTSD, autism spectrum disorder, and the critically ill. Minimal benefits were seen in dementia patients. Further research is needed to determine the risks/benefits and its use in other disease states. Keywords: Animal-Assisted Therapy, Mental Health, PTSD, Dementia, Autism, Critically ill, Treatment, Anxiety, Depression.

The Influence of Diet and Antibiotic Use on the Pathogenesis of Inflammatory Bowel Disease

Fariha Ghazi and Linda Elrod, Physician Assistant Studies

The main objective of this clinical review study is to explore the role of diet and antibiotic use on the gut microbiome and how it may contribute to the pathogenesis of inflammatory bowel disease (IBD). The interactions between the gut microbiome and inflammatory conditions of the GI tract are not fully understood, but gut dysbiosis is hypothesized to be associated with the onset of IBD. The microbiome plays an important role in the body's immune system, metabolism, and digestion. Many factors such as genetics, diet, and antibiotics have been shown to alter the microbiome. To examine these factors and how they relate to the pathogenesis of IBD, data from clinical trials and clinical reviews were explored. Multiple studies comprehensively showed that the effect of diet and antibiotics on the gut microbiome are significant. Some studies suggested that microbial reduction in biodiversity, especially within the Phyla Firmicutes and Bacteroides, are seen in patients with IBD. Other studies show that IBD patients exhibit reduced diversity in the fecal microbiome compared with healthy controls. Understanding microbiome alterations may be the key to potential therapeutics via manipulation of the microbiome.

Chimeric Antigen Receptor T-Cell Therapy

Timothy Schorkopf and Laruen Webb, Physician Assistant Studies

Chimeric Antigen Receptor (CAR) T-Cell Therapies are novel cancer treatments with proven success achieving complete remissions in certain Lymphomas and Myelomas. The essence of CAR-T cell therapy is reprogramming a patient's own immune system to fight cancer. A literature review through PubMed was performed to illustrate CAR-T cell manufacturing and administration, associated adverse event management, and potential future improvements in safety. The first step to manufacturing a CAR is leukapheresis, a process that separates and collects a patient's T-cells from their blood. These T-cells are manipulated at specialized labs to become CAR-T cells, which now have special receptors specific to the patient's tumor. The patient must become lymph depleted prior to administration of the novel CAR-T cells to improve the chance of the body accepting the treatment. This is typically done with chemotherapy 5 days prior to treatment. Once lymphodepletion occurs, the CAR-T cells are infused to the patient and the patient is observed inpatient to watch for Cytokine Release Syndrome and Neurotoxicity. If these adverse events occur, rapid administration of tocilizumab and dexamethasone improve outcomes. Methods to improve safety in CAR-T cell therapy include improving hospital preparedness, a "suicide gene" which terminates the CARs effectiveness, more accurate animal modeling, and utilizing CRISPR/Cas9 to improve manufacturing accuracies.

The Long-Term Effects of Concussions Sustained during Childhood, Adolescence or Young Adulthood

Matthew Thomas Beauregard and Linda Elrod, Physician Assistant Studies

Introduction: Concussions are a major concern in the general population. Research has focused heavily on the effects and management of concussions in the immediate period following the precipitating event. However, little research has been performed on the longitudinal effects. The goal of this review was to look at multiple articles addressing concussions throughout childhood, adolescence and young adulthood and to identify the long-term sequelae seen in older adults and/or retired athletes. Methods: A literature search was performed using PubMed as the major source of reference. Search terms including traumatic brain injury, concussions, long-term effects, neurological deficits and adolescence were used. Filters including "within the last 5 years", "review," "clinical trials" and "full text" were implemented. Results: A total of 11 scholarly articles were utilized in this review. In those individuals who sustained multiple concussions vs those who had not, there was a greater rate of depression ($p=0.006$), cognitive function ($p=0.005$) and executive function (0.018). Physiologically those individuals who suffered multiple concussions had decreased size of both the hippocampus and amygdala leading to poorer recall ($p=0.001$) and increased

aggression & irritability ($p=0.014$). Conclusion: Multiple concussions sustained over time leads to an increased risk for depression, neurodegeneration, emotional, cognitive and behavioral impairments in the long term. A single concussive episode has negative effects acutely but very little evidence showing any long-term effects. Rather it's the individuals who sustain multiple concussions over time that have poorer outcomes and increased side effects. | Keywords: Concussions, Traumatic Brain Injury, Long-Term Effects

Factor Xa Inhibitors versus Vitamin K Antagonists for Stroke Prevention in Patients with Atrial Fibrillation

Morgan Long and Lauren Webb, Physician Assistant Studies

Objective: The purpose of this clinical review article is to provide clinical recommendations for the pharmacological management of chronic anticoagulation in patients with atrial fibrillation to prevent stroke in the setting of family practice medicine. Methods: A literature search was performed using PubMed with search terms including non vitamin-K antagonists, vitamin K antagonists, and atrial fibrillation. The filters were "Custom Date Range 1/1/17 through 12/31/19?", "Meta-Analysis", and "Systematic Reviews". Studies were excluded if they were published before 2017 or if they focused on specific disease states. The focus was placed on nonvalvular atrial fibrillation. Results: A total of 94 articles were found which was narrowed down to two relevant articles. Factor Xa inhibitors were equally effective in preventing stroke when compared to warfarin, while also decreasing the incidence of major bleeds. Conclusions: While equally effective in preventing stroke, factor Xa inhibitors decreased the number of major bleeds and reduced the risk of intracranial hemorrhages when compared to vitamin K antagonists.^{4,5} When possible, factor Xa inhibitors should be chosen as first line for chronic anticoagulation. Apixaban should be recommended as the factor Xa of choice due to the reduced risk of mortality and GI hemorrhages when compared to warfarin.⁵ Other patient factors such as ease of use, time in therapeutic window, cost, and access to reversal agents should also be considered when deciding on chronic anticoagulation. Keywords: Atrial Fibrillation, Factor Xa Inhibitors, Nonvitamin K Antagonists, Vitamin K Antagonists, Stroke

Factors Decreasing Secondary ACL Injuries

Megan Knoernschild and Lauren Webb, Physician Assistant Studies

Objective: To look at the factors during rehabilitation that could decrease the possibility of a graft rupture after an ACL reconstruction. Methods: A literature search was performed, and articles were found on PubMed. Advanced searches including the keywords "ACL," "Re-injury," "Athlete," "Rehab," and "Criteria." Along with these keywords, the five-year filter was also added to narrow down the search. Results: A total of 11 relevant articles and one website were found. Result measures included return to sport time after surgery, passing specific functional knee tests, lower extremity muscle strength, knee flexion and range of motion, and psychological factors. Significance was found with knee flexion, where a flexion deficit of more than 5° lead to double the chance of reinjury. Significance was also found with unsymmetrical quadriceps strength; A limb symmetry index of >90% is ideal in order to prevent re-injury. Time taken to return to sport should be a minimum of 9 months to provide adequate soft tissue healing and was found to be significant. Conclusion: The articles studied involved many factors that may contribute to a successful return to sport and a decrease in re-injury for the athlete. The most important factors include total time spent resting after surgery, full knee flexion, and quadriceps strength. Keywords: ACL, re-injury, rehabilitation

Comparing the Efficacy of Vyvanse and Ritalin in ADHD Diagnosed Adolescent Patients

Evan Forhertz and Matthew Steidl, Physician Assistant Studies

Objectives: ADHD affects millions of people worldwide. About ten percent of all children and adolescents aged four to seventeen are diagnosed with ADHD. Over recent years several studies have compared the efficacy of different psychostimulants in the treatment of ADHD. In particular, Vyvanse and Ritalin have emerged as the two main choices with maximum efficacy. The purpose of this research was to compare the effectiveness of Vyvanse (Lisdexamfetamine) and Ritalin (Methylphenidate) in treating adolescents diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). **Methods:** A literature search was performed using the PubMed, Science Direct, and Google Scholar databases and a total of ten comparative clinical trials that had been published within the past five years were selected. All included studies reported results based on changes from baseline in each participant. **Results:** In the most comprehensive study known to date, the percentage of improved participants based on the CGI-I (Clinical Global Impressions-Improvement Scale) at the end of treatment was significantly greater with Vyvanse compared with Ritalin in the forced-dose study ($p = 0.0188$) but not in the flexible-dose study ($p = 0.6165$). **Conclusions:** Vyvanse has proven to be slightly more efficacious at treating ADHD than Ritalin, but also has a slightly higher risk for both minor and serious adverse events. All studies showed consistent findings regarding the safety and tolerability of both classes of psychostimulants. These findings further emphasize the benefit that both Vyvanse and Ritalin have shown in treating ADHD in adolescent patients.

Considerations for BMI Restriction in Lower Limb Arthroplasty

Destinee Fowler and Mathew Steidl, Physician Assistant Studies

Objectives: To discuss recent research relevant to obesity and lower limb arthroplasties and the increasing trend to place body mass index criteria for approval for lower limb arthroplasty surgery. Review research related to complication rates, access to care, weight loss before and after surgery, functional outcomes among different body mass index groups, and discuss possible solutions. **Methods:** A literature search was conducted using PubMed, PubMed, Center for Disease Control and Prevention (CDC) website, and the American Academy of Orthopaedic Surgeons (AAOS) website. The search terms included; body mass index, joint replacement, orthopedics, and obesity. The filters to narrow the search included “published within the last 10 years” **Results:** This researched showed that a strict body mass index criterion will cause an unnecessary denial of surgery to many obese patients who would have had complication-free surgeries, weight loss before surgery may not decrease complication rates, and joint arthroplasties conducted in the fast track setting may be a safer alternative. **Conclusions:** This research shows the decision for surgery should be an individualized discussion between the patient and the surgeon based on risks vs benefits versus a strict BMI cut-off. Having a strict BMI criterion will deny access to care to individuals who would otherwise have complication free surgeries. Further research should be conducted on the use of the fast tract setting to decrease the risks for obese patients.

Linking Asthma and Obesity

Will Bradshaw and Lauren Webb, Physician Assistant Studies

Objectives: To review the association between asthma and obesity and discuss bariatric surgery as an effective weight loss method. **Methods:** A literature search was performed using the PubMed and Google Scholar to find relevant data regarding asthma and obesity. The filters used include “within the last ten years,” “peer-reviewed,” and “full-text.” Useful diagnostic and indication criteria through the Mayo Clinic were found through a Google web search of “obesity diagnosis” and “bariatric surgery indications.” **Results:** A total of 10 relevant articles were found. 2 diagnostic criteria webpages were found. IL-6 is elevated in obese asthmatics at a P value of 0.013. Bariatric surgery for obese asthmatics showed a decrease in airway responsiveness at a P value of 0.03. Having asthma in concordance with obesity results in an increased CRP value at a P value of 0.003. **Conclusions:** Evidence to support a connection between asthma and obesity is

consistently growing. “Obese asthmatics” is becoming an increasingly used term to describe these patients. Having these two diseases concurrently has shown to drastically affect quality of life. Weight loss through methods such as bariatric surgery is currently being conducted to improve symptom management and symptom severity. Though weight loss can be very effective, recent research has found many cellular connections between asthma and obesity that eventually could be used to develop new treatment modalities. More studies need to be conducted to assess the effectiveness of new treatment options. Keywords: Obesity, Asthma, Bariatric Surgery, Weight Loss

Psychosocial and Sociocultural Modifiable Risk Factors of Postpartum Depression

Jessica Baker and Linda Elrod, Physician Assistant Studies

Objectives: To review psychosocial and sociocultural modifiable risk factors of postpartum depression. **Methods:** A literature search was performed using PubMed, limited to the last 10 years of randomized controlled trials. MeSH terms used were “Depression, Postpartum” and “Prevention and Control.” **Results:** The literature search returned 11 relevant articles. Because of methodological variations between reviews, standardized statistical aggregation was not possible. From the body of literature, several psychosocial and sociocultural risk factors emerged: lack of social support, low socioeconomic status, and interpersonal stress. **Conclusions:** Postpartum depression (PPD) is a common, serious complication of pregnancy. Historically, clinicians have viewed PPD as a hormonal imbalance following a drop in estrogen following pregnancy. However, multiple randomized controlled trials (RCTs) demonstrate that postpartum depression may be prevented by modifying risk factors. Psychosocial and sociocultural risk factors of postpartum depression can be effective in reducing the incidence and severity of PPD. More research should be devoted to studying prevention of postpartum depression through targeting these risk factors, especially in minority groups and women of low socioeconomic status. Keywords: postpartum depression, prevention, risk factors, psychosocial, sociocultural.

The Role of Vancomycin Powder in the Prevention of Surgical Site Infections

Jenny Muesing and Kelly Smart, Physician Assistant Studies

Objective: The concept of intra-site antibiotic powder for the prevention of surgical site infections (SSIs) has been around for decades but has been growing in popularity in the last couple of years. The use of antibiotic powder is not yet FDA approved and has proven to be a rather controversial topic. The purpose of this review is to present the current articles examining the efficacy of its use as well as any limitations. **Methods:** The use of the databases PubMed, Science Direct, the World Health Organization, and Cochrane were initially used to find articles related to the use of antibiotic powder. **Results:** Systemic reviews have shown that the use of intra-site vancomycin powder during surgery shows a statistically significant decrease in SSIs with little to no side effects. In addition, it was found that the cost of SSIs outweighs the cost of vancomycin powder, which ranges from \$12.00-\$49.40 per use. Several articles raised the concern that vancomycin powder could contribute to antibiotic resistance, however, there are no long term studies to confirm this yet. **Conclusion:** This study found that the use of intra-site vancomycin powder is useful in the reduction of SSIs as well as in the reduction of costs to hospitals. However, the biggest concern with vancomycin powder comes from its potential contribution to antibiotic resistance, therefore, it is important for providers to contemplate the individual risk factors for each patient when considering its use. **Key Words:** Surgical site infection, prevention, antibiotic powder, vancomycin powder, antibiotic resistance

Outcomes of Radial Vs Femoral Artery Access for Cardiac Catheterization

Haili Byington and Marie Patterson, Physician Assistant Studies

Objectives: Approximately every 40 seconds an American has a myocardial infarction (MI). The current AHA guidelines recommend immediate cardiac catheterization (CC) for the management of an acute MI. Historically, the femoral artery was considered the main route of access for CC, many of which resulted in access-site bleeds. Bleeding complications have been strongly associated with increased mortality. The radial artery has gained increasing interest due to its potential to decrease postprocedural complications, including bleeding complications. This comparison of post-procedural outcomes following transfemoral vs transradial access for cardiac catheterization was performed to determine which method has evidence supporting superior safety and better patient outcome. **Methods:** A literature search was performed using UpToDate and the articles were filtered by publishing date within the past ten years and American journals. **Results:** A total of ten articles were used. Multiple studies showed transradial access reduced net adverse cardiovascular events in comparison to transfemoral access. Transradial access also resulted in a significant reduction in access site bleeding as compared to transfemoral. Radial access showed greater success among centers with high radial expertise. Several randomized controlled trials and meta-analyses demonstrated reduced mortality, decreased major bleeding, access site complications, and reduced length of stay using a transradial approach. **Conclusions:** These research findings support the use of transradial access as the default approach for cardiac catheterization over the historically used transfemoral approach, due to the superior safety and overall decreased morbidity and mortality.

Testosterone Replacement Therapy and its Cardiovascular Effects

Jon Rapacz and Marie Patterson, Physician Assistant Studies

Objective: To review male hypogonadism and discuss the use of Testosterone Replacement Therapy (TRT) and its effects on cardiovascular health. **Methods:** A literature search was performed using the PubMed database with search terms including testosterone replacement and cardiovascular risk. The filters used included “within the last 5 years” for publication dates and “clinical trials” for article types. | **Results:** The mean difference in total cholesterol reduction between TRT and placebo was -6.1 mg/dL (P= 0.001). There was a greater reduction in HDL-C at -2.0 mg/dL and LDL-C at -2.3 mg/dL in TRT compared to placebo (P=0.001; P=0.051, respectively). There was an increased difference in average plaque volume of about 41 mm³ in the TRT group compared to placebo (P=0.003). There was no significant difference seen in the number of cardiac events between the 2 groups as a total of 14 events were split equally between groups. | **Conclusions:** Multiple RCTs have shown conflicting evidence regarding testosterone replacement therapy and its effects on objective markers of men's cardiovascular health. While testosterone has been shown to slightly decrease LDL cholesterol levels there is evidence of testosterone causing significant increases in non-calcified coronary artery plaque volumes, per CT angiography. This opposing evidence adds to the results of large coordinated clinical trials that have found no significant difference in the number of cardiac adverse events between testosterone and placebo groups. It stands that the decision to initiate testosterone relies on the clinician's assessment of a patient's risk factors and symptoms. **Keywords:** testosterone replacement therapy, cardiovascular risks

Vaping: A Rising Health Concern

Johnny Le and Lauren Webb, Physician Assistant Studies

Objective: To understand the rising concern of electronic cigarettes/E-cigs/Electronic Nicotine Delivery Systems, and the potential health effects. | **Methods:** A literature search was conducted on PubMed database with key terms: vaping, electronic cigarettes, health risks, and e-cigarettes. The filters used include “published in the last 5 years,” “English,” “free full text,” and “review.” An additional search was also done on the CDC website. **Results:** The CDC reported almost a 20% increase in e-cig usage within high school students. The Surgeon General’s report stated the popularity can be due to various distributing stores and the online market. During 2014 and 2015, sales were projected to increase by 40%. Demand for strict regulations posed an issue because the FDA did not have the authority to control this market; only local governments did. Lastly, the liquids used contained components that could injure the body by impairing lung functioning. Also, the CDC recently identified vitamin E acetate to be a direct link to EVALI, a respiratory illness caused by these devices. During the months of October-November, there was a 76% increase in reported cases and an 80% increase in mortality. **Conclusion:** Understanding the potential risks with these devices must be a priority, especially with the surge within the adolescent population. Until more research emerges, it is essential that medical providers continue raising awareness and educate patients on what is known and update them as more information appears. | **Keywords:** Vaping, Electronic cigarettes, Health risks.

The Efficacy and Safety of Ketamine Use on Depression and Suicidal Ideation

Kaitlin Dinh and Kelly Smart, Physician Assistant Studies

Objective: The recent rise in ketamine clinics in the United States has demonstrated that ketamine has a rapid-onset antidepressant effect in patients with treatment-resistant depression and suicidal ideation. The purpose of this study was to compare the results of multiple studies on the safety and efficacy of the adverse effects of ketamine use for depression and suicidal ideation. **Method:** A literature search was conducted through UpToDate with search terms including ketamine and depression. The article, “Ketamine and Esketamine for Treating Unipolar Depression in Adults: Administration, Efficacy, and Adverse Effects” was selected for this study. A total of 20 of those articles addressed the ketamine effects in depression and suicidal ideation. A clinical review on the results of the literature search was performed. **Results:** Ketamine's mechanism of action for the rapid antidepressant effects is not known. Some studies have hypothesized that ketamine has an affinity for the following receptors: opioid receptor, N-methyl-D-aspartate (NMDA) receptor, and alpha-amino-3-hydroxy-5-methyl-4-isoxazole propionic acid (AMPA) receptor. The most common side effects that patients reported were related to psychiatric, psychotomimetic or dissociative, cardiovascular, or neurological adverse effects. **Conclusion:** Studies have shown that the use of ketamine can be very effective in treatment-resistant depression and suicidal ideation. However, more research should be done to determine the most effective way of treating TRD and suicidal ideation with ketamine and side effects on the long-term use of ketamine. **Keywords:** Ketamine, Depression, Suicidal Ideation, Effects

Benefit in Treatment and Prevention of Cardiovascular Consequences in Rheumatoid Arthritis

Morgan Schroeder and Elise Eaton, Physician Assistant Studies

Objectives: To review rheumatoid arthritis (RA) and discuss the cardiovascular consequences of the disease process and possible prevention strategies. **Methods:** A literature search was performed using PubMed, ScienceDirect, and Google Scholar with search terms of rheumatoid arthritis, cardiovascular, and prevention. The filters included “within the last five years,” “review,” and “clinical trials.” **Results:** A total of 23 relevant articles were found for clinical trials, and a total of 47 relevant articles were found for review articles. Randomized Controlled Trials (RCTs) showed the vascular age of RA patients was consistently 10-15 years older than healthy persons of the same age. Cardiovascular abnormalities found in diabetes mellitus were virtually identical to RA patients. Trials have proven that early and aggressive disease control

can contribute to combating cardiovascular disease as well as using cardiovascular prevention medications to effectively treat and prevent cardiovascular adverse events. Conclusions: The significance of addressing the cardiovascular risk associated with RA has been deemed important in managing the disease process. The American College of Rheumatology recommends multiplying the cardiovascular risk calculation by 1.5 to account for the increased risk in RA patients. Further research should be done to determine specific recommendations to implement RA disease control protocols, specific medications, adequate doses, and optimal duration. Medical providers must be aware of the increased risk to appropriately manage RA and to provide guidance on prevention strategies similar to diabetes mellitus. Keywords: Rheumatoid Arthritis, Cardiovascular, Treatment, Prevention.

Trauma-Informed Compassion-Focused Therapy and Adult Victims of Sex Trafficking

Ana Paula Arévalo Laveaga and Chris Gonzalez, Psychology, Counseling, and Family Science

This work explores the intersection between Compassion-Focused Therapy and a trauma-informed, strengths-based approach to aid in the treatment of adult survivors of sex trafficking. Research on sex trafficking will be examined to provide a scope of the problem in today's society while Ecological Systems Theory will be used to analyze its impact on different societal levels. Studies report that survivors of sex trafficking experience feelings of guilt, shame, and self-criticism. Other clinical research on Compassion Focused Therapy shows that it can effectively reduce these symptoms in the general population. However, what has yet to be explored is whether Compassion Focused Therapy can be effectively used to treat those symptoms with this population. Furthermore, there is also evidence to support the fact that a strengths-based and trauma-informed approach can help these survivors in their healing process. The purpose of this paper is to propose the development of an integrated model of therapy, informed by Ecological Systems Theory, for the treatment of adult survivors of sex trafficking.

Faculty Mentors: Ninth Annual Student Scholars Symposium

Ninth Annual Student Scholars Symposium Faculty Mentors

First Name	Last Name	College/Department
Marcy	Binkley	Accounting
David	Fleer	Bible and Ministry
Lauren	White	Bible and Ministry
John Mark	Hicks	Bible and Ministry
Beth	Conway	Biology
Bonny	Millimaki	Biology
Brian	Ellis	Biology
Florah	Mhlanga	Biology
John	Lewis	Biology
Jon	Lowrance	Biology
Regine	Lane	Biology
Amanda	Williams	Biology
Jay	Brewster	Biology/Pepperdine University
Donita	Brown	Business
Stephanie	Vivod	Chemistry & Biochemistry

John	Smith	Chemistry and Biochemistry
Kent	Clinger	Chemistry and Biochemistry
Matt	Vergne	Chemistry and Biochemistry
Todd	Lynn	Civil & Environmental Engineering
Emily	Mofield	College of Education
Lonnie	Cochran	College of Education
Eric	Stars	College of Entertainment and the Arts
Tom	Bancroft	College of Entertainment and the Arts
Rocky	Horton	College of Entertainment and the Arts
Mandy	Rogers-Horton	College of Entertainment and the Arts
Sissy	Simmons	College of Entertainment and the Arts
Aerial	Ellis	Communication and Journalism
Todd	Gary	Computing and Technology
TL	Wallace	Computing and Technology
Qingguo	Wang	Computing and Technology
Chris	Simmons	Computing and Technology
Greg	Nordstrom	Electrical and Computer Engineering
John	Hutson	Electrical Engineering
Samuel	Wright	Engineering

Brandi	Kellett	English and Modern Languages
Brian	Cavitt	English and Modern Languages
Cecelia	Ramsey	English and Modern Languages
Greg	Carpenter	English and Modern Languages
Jan	Harris	English and Modern Languages
Kimberly	Reed	English and Modern Languages
Matt	Hearn	English and Modern Languages
Sonya	Green	English and Modern Languages
Richard	Goode	History, Politics and Philosophy
Lee	Mayo	History, Politics and Philosophy
Jeremy	Townsend	Kinesiology
Ruth	Henry	Kinesiology
Katie	Link	Mathematics
Kirsten	Dodson	Mechanical Engineering
Mark	Chandler	Mechanical Engineering
Joseph	Tipton	Mechanical Engineering
Richard	Gregory	Mechanical Engineering
Gail	Humes	Nursing
Mary	Koziura	Nursing

Tracy	Noerper	Nutrition
Halle	King	Nutrition and Dietetics
Nancy	Hunt	Nutrition and Dietetics
Laurel	Littlefield	Nutrition and Kinesiology
Nate	Daniels	Pharmaceutical Science Research
Joe	Deweese	Pharmaceutical Sciences
Kirk	Durstun	Pharmaceutical Sciences
Rachel	Crouch	Pharmaceutical Sciences
Wendell	Akers	Pharmaceutical Sciences
Susan	Hamblin	Pharmacy Practice
Benjamin	Gross	Pharmacy Practice
Beth	Breeden	Pharmacy Practice
Johnathan	Pouliot	Pharmacy Practice
Justin	Kirby	Pharmacy Practice
Zac	Cox	Pharmacy Practice
Sarah	Uroza	Pharmacy Practice
Elise	Eaton	Physician Assistant Studies
Kelly	Smart	Physician Assistant Studies
Linda	Elrod	Physician Assistant Studies

Marie	Patterson	Physician Assistant Studies
Matthew	Steidl	Physician Assistant Studies
Lauren	Webb	Physician Assistant Studies
Alan	Bradshaw	Physics
Randy	Bybee	Physics
Chris	Gonzalez	Psychology, Counseling, and Family Science
Dave	Morgan	Psychology, Counseling, and Family Science
Katie	Spirko	Psychology, Counseling, and Family Science
Christin	Shatzer	SALT
Amy	Crossland	Social Work and Sociology
Cayce	Watson	Social Work and Sociology
Dodd	Galbreath	Sustainability

