



Research Day

12 April at 8:00am

Richard A. Gillepsie College of Veterinary Medicine



SCHEDULE

8:00 a.m. - 8:30 a.m.

Registration

First Floor Atrium CVM
(Poster Presentations set up at 10:00am)

8:30 a.m. - 10:15 a.m.

Oral Presentations

CVM 332 and CVM 335

10:15 a.m. - 11:30 a.m.

Poster Presentations

CVM Atriums 2nd and 3rd Floors

11:30 a.m. - 12:30 p.m.

Faculty: Mentorship Program Information Session
Students: Lunch on your own

1:30 p.m. - 3:05 p.m.

Oral Presentations

CVM 332

3:15 p.m. - 4:30 p.m.

Poster Presentations

CVM Atriums 2nd and 3rd Floors

RESEARCH DAY COMMITTEE MEMBERS

Adam Gromley, Committee Chair

Professor of Molecular/Cellular Biology, DCOM

Michael Neff

Instructor of Mathematics

Joshua Engle

Data and Quality Assistance Manager

Amanda Rainey

Assistant Professor of Veterinary Science

Stephen Everly

Chair for the Department of Chemistry

Ben Carson

Assistant Professor of History

Susanna Kitts-Morgan

Associate Professor of Physiology, CVM

Carolyn Gulley

Director of Health Sciences Research & Grants

Emily Gambrel

Post Award Grants Manager, ORGSP

Natalie Sweet

Executive Director, ORGSP



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A letter from the Executive VPAA



Dear LMU Community,

Congratulations on participating in LMU's eighth annual Research Day. From innovative scientific exploration to thought-provoking social analyses, each presentation given today underscores the breadth of expertise and creativity found within Lincoln Memorial University. Your commitment to exploring new ideas and seeking solutions to complex problems exemplifies academic excellence. By sharing your work, you are not only expanding our collective understanding here in Harrogate, Tennessee, but you are also taking the initial steps to shape insight within your respective fields. Your contributions serve as a testament to the intellectual vitality found among our students, faculty, and staff. Thank you for your personal commitment to excellence.

I would also like to express my appreciation to the organizers, volunteers, and supporters who worked tirelessly behind the scenes to ensure the success of Research Day. Your efforts in facilitating meaningful dialogue, fostering interdisciplinary connections, and promoting a culture of inquiry are invaluable in nurturing our growing research community.

As we reflect on the accomplishments of LMU Research Day, let us celebrate not only the outcomes but also the journey of discovery and learning that it represents.

R. Jay Stubblefield, PhD
Executive Vice President for
Academic Affairs

Morning Oral Presentations

CVM 332 and CVM 335

CVM 332

8:30am - 8:45am:

Joshua Boldon

Synthesis and Physicochemical Properties of a Trifluoroacetamido Derivative of Acetaminophen

8:50am - 9:05am

Sadie Alvis, Alex Giuera, Sandro Pacheco Perez, Charlie Hamilton, Rachel Taylor, and Ashlyn Thomas

Marketing needs for a rural non-profit organization operating in the healthcare industry

9:10am – 9:25am

Erick Moberg

Prevalence of Plaques Discovered in The Spinal Cord Region of Human Anatomical Donors After Completing a Full Laminectomy Procedure

9:30am – 9:45am

Krista Meredith and Mary Beth Babos

Evaluation of Camellia sinensis Anxiolytic Effect in Danio rerio

CVM 335

8:30am - 8:45am:

Stewart Thacker and Christian Piercy

Overview of Coastal Marine Trophic Diversity and How Trophic Diversity Affects Ecosystem Health

8:50am - 9:05am

Matthew Lewis

Levels of hybridization between sympatric Redeye Bass and Alabama Bass

9:10am – 9:25am

Abigail Heiniger

The Magic of Patwa in Bluebeard and Brer Anancy: Colonial Oppression and the Transgressive Power of Language

9:30am – 9:45am

Cheryl Hild and Joshua Ray

A Framework for Developing Analytical Thinking for Business Decision-Making

Morning Poster Presentations

CVM Atriums 2nd and 3rd Floors

10:15am – 11:30am

1. Preston Akers

Synthesis and lipophilicity of a fluorinated derivative of N,N'-diacetyl-p-phenylenediamine

2. Gabriel Crumley

Synthesis and lipophilicity of the trifluoroacetamido derivative of lacosamide

3. Isabella Morris and Maggie Kingman

Synthesis of Light-responsive Vitamin B12 Conjugates of Selumetinib and Temozolomide

4. Phoebe Racicot and JeanPaul Santamaria

Synthesis of Light-responsive Vitamin-B12 Conjugates of SN38 and Toremfene for Targeted Cancer Therapy

5. Savannah Telemeco, Cody Lane, Abagayle Auvil, and Matthew Kolp

Survey of dog parks in Central Appalachia for canine intestinal parasites

6. Adam Dean

Collaborative Media Projects Across Disciplines

7. **Mackenzie Amouruex**
The Effects of a Multi-Generational Work Force in Today's Society
8. **Kassidy Miller, Katy Pozzuto, Alex James, Jantai Malataev**
Strategic Analysis: JPMorgan Chase & Co. (NYSE: JPM)
9. **Steven Stone**
Primary social media and website platforms frequently used by LMU students for shopping
10. **Rachel Taylor**
The Effectiveness of Social Media for Small Businesses
11. **Elijah Wilson, Casey Michael, Caelyn Asher, and Caitlin Thomas**
Impact of strategic management on competitive advantage and performance
12. **Madison Moyers**
Yoga as Therapeutic Treatment Modality for PTSD and other Trauma Related Disorders
13. **Grant Boxey, Brent Thompson, and Tony Harper**
Medical Neuroanatomy Survey of Student Confidence: A Principal Coordinate Analysis of Course Objectives
14. **Erinn Conlin, Mariah Bartz, and Donna Hermey**
A Case Report of Right Gonadal Vein Anatomical Variation with Drainage into Right Renal Vein
15. **Zachary D. Cutright, Mark T. Cutright, and Jeffrey S. Martin**
Determining the Accuracy of the Stryker MAKO Robotics System in Achieving Target Acetabular Component Placement During Total Hip Arthroplasties
16. **Alexandra Dailey**
Trends related to socioeconomic hurdles and mental health in pregnant women with substance use disorder
17. **Hannah Diehr**
Environmental Challenges and changes in population dynamics and survivability among calanoid copepods
18. **Kaitlyn Geers and Albert Vasquez**
The Utility of Osteopathic Manipulative Treatment (OMT) for Improving Flexibility, Proprioception and Balance for Injury Prevention in Collegiate NCAA Division II Men's and Women's Lacrosse Athletes: Pilot Study
19. **Christopher Gray, Dedeepya Gullapalli, Sai Kommineni, Avinash Vangara, Subramanya Shyam Ganti, and Stanley Marlowe**
What is Growing in the Garden? A Severe Case of Blastomycosis in Uncontrolled Diabetes Mellitus
20. **Jonathan Greene**
Physicians and Nurses' Perceptions of In Situ Simulations in Rural Tennessee hospital Emergency Departments
21. **Cory Gritton, Jeffrey Chesnut, Adam Kolatorowicz, and Tony Harper**
Visuospatial Ability, Psychomotor Ability, and Educational Outcomes of Ultrasound Training in Conjunction with Medical Gross Anatomy: A Randomized Controlled Trial in First Year Osteopathic Medical Students
22. **Grace Love and Amber Kilgore under the mentorship of Howard Herrell**
Neonatal Abstinence Syndrome Considerations in the Management of

*Opioid Use Disorder During
Pregnancy: A Systematic Review*

- 23. Kayla C. Medline and Lauren Wisnieski**
The association between early childhood pet and livestock ownership and the development of asthma and allergies
- 24. Nicole Neiman, Justinas Joksas, Erica Sickel, and Anne Marie Zeller**
Health Professional Students Receiving Osteopathic Manipulative Treatment: An Interdisciplinary and Interprofessional Activity to Improve Attitudes Towards Osteopathy and Interprofessional Collaboration
- 25. Annemarie Phemister, Abbey Hinton, Lauren Phemister, James Carter, Erin Hood, and Jennifer Phemister**
Treatment Options for Hypertriglyceridemia Pancreatitis
- 26. Ian Schultheiss, Sharon Adekanabi, and Brent Thompson**
Fenestration of the Brachial Vein by the Posterior Circumflex Humeral Artery
- 27. Stephen Scott**
Aortic Aneurysm in the Context of Type IV Loeys-Dietz Syndrome: a Case Report
- 28. Kaitlin Sons and Anne Marie Zeller**
An Osteopathic Approach to COVID-19 Patient Care
- 29. Megan L. Weidenbach**
Cultured Lactobacillus Crispatus Sourced from The Human Vulvovaginal Microbiome In The Process Of Novel Farmstead Cheese Making

Afternoon Oral Presentations CVM 332

CVM 332

1:30pm – 1:45pm

Trevor Holt

Construction of a biomass gasifier and testing for natural disasters and emergencies

1:50pm – 2:05pm

Devin Lynch and Mary Kabir

Investigative Dissection of a Neonatal Sperm Whale Head

2:10pm – 2:25pm

Max Spitzer, Hannah Diehr, Mohamed Ibrahim, and Stan Kunigelis

CGM: A Simple, Economical, and Efficient Assay for Isolating Copepod Gut Microbiome

2:30pm – 2:45pm

Martin Sellers

Healthcare in the United States; Conflict, Confusion, and Cost

2:50pm – 3:05pm

Joshua Boone

A Generalization of the Triangular Numbers via an Interesting Probability Question

Afternoon Poster Presentations

CVM Atriums 2nd and 3rd Floors

3:00pm – 4:30pm

1. **Cole Presley and Briana Martinez**
Synthesis and lipophilicity of the para fluorinated derivative of phenytoin
2. **Keira Eaton, Raegan Gulley, Olivia Nichols, & Harley Brooks with Dr. Lee Gilroy, Faculty Advisor**
The Impact of Smartphone & Social Media Use on Behavior in College Students
3. **Raegan Gulley**
Understanding mTBI's impact on mood, cognition, brain development, and quality of life to change recovery outcomes
4. **April Anderson and Cheryl Hild**
Comparing AI-Generated Text Responses Based on Type and Complexity of Question Prompt
5. **Usama Aljameey, Cason Still, Blaine Marie, Carson Black, Julia Dane, Tyler Allsage, and Adam Kolatorowicz**
Variation in the Great Posterior Radiculomedullary Artery: Relation to the Artery of Adamkiewicz and Importance in Spinal Procedures
6. **Oladele Ariyo**
Bridging the gaps: Exploring potential harms of antimalarial nutrient depletion
7. **Tej Brahmhatt**
Malignant Melanoma Case Report
8. **Jeffrey Bransky**
Unit 731 and the critical value of ethics in medical research
9. **Andrew Browning**
Comparing blood glucose levels in night shift and day shift nurses
10. **Brandon Buck, Jessica Bui, and Annette Yates**
Advancing Equity in Lung Cancer Screening Referrals: A Focus on Asian, Native, Alaskan, Hawaiian, and Pacific Islander Communities
11. **Eint Ei and Mary Beth Babos,**
Standard management practices for people who have Vitamin B12 deficiency due to long-term use of Proton Pump Inhibitors
12. **Nathaniel Erickson and John Gassler**
Morphological Variations of the Cystic Artery Among Human Donors of the Southern Appalachian Region
13. **Aaron Garner and Creighton Adams**
Effect of knee OA on structural compensation at the subtalar joint
14. **Sky Hart, Kaitlin S. Walker, Jonathan D Guihert, Anthony Harper, Jun Wang, and Brent J. Thompson**
Understanding Anotia in a Cadaveric Donor: Micro-CT Reconstruction of the Inner Ear and Histopathological analysis of Kidneys
15. **Kristina Hoy and Zachary King with Murielle Brohez**
Early Appendicitis in De Garengot Hernia: A Case Report
16. **Annie Le, Hannah Caldwell, and Jun Wang**
Additional EGFR mutations in T790M retained osimertinib resistant non-small cell lung cancers

- 17. Bernadeta Joksaite and Mahdi Budayr**
Multiple Medical Conditions May be Construed into a New Syndrome
- 18. Katherine McCoy and Lindsey Miller**
Investigating the role of Epigallocatechin gallate (EGCG) on lymphatic endothelial cells (LECs) following exposure to tumor necrosis factor alpha (TNF- α)
- 19. Dustin M. Nelson, Tony Harper, Adam Kolatorowicz, Jeffrey Chesnut, Cory Buenting Gritton**
Visuospatial Ability and Hands-On Ultrasound Training in Osteopathic Medical Students: A Pilot Study
- 20. Christopher Nguyen and Justin Lapollo**
Sustained Pain Relief for Chronic Pain Patients with Topical TMS and iTBS
- 21. Kurtis Orrson and Muthu Dharmasena**
Antimicrobial Properties of EuZnO(1hr), EuZnO(15min), ZnO, and CaF₂ Against Methicillin-Susceptible Staphylococcus aureus, Methicillin-Resistant Staphylococcus aureus, and Escherichia coli
- 22. Jessica Samuel and Adam Gromley**
Analyzing the Role of Centrosome Proteins in the Development of Melanoma
- 23. Ian Schultheiss, Tyler Cameron, Cody Carr, Conor McGrew, Eric Moberg, and John Gassler**
Efficacy of 3D Printed Models in Anatomic Education
- 24. Jessica Rosner, Shalin Naik, Ethan Thakran, Srikethan Mahavadi, and Sarah Kemp**
Antiproliferative effects of Dutasteride and Bardoxolone-methyl (CDDO-me) combination in Prostate Cancer (PCa) cells
- 25. Srivastava Niharika and Sushana Sudhi**
Investigation of Methylsulfonylmethane (MSM) on Lymphatic Endothelial Cell Function
- 26. Courtney Vanophem**
Pediatric Wernicke's Encephalopathy Induced by Avoidant Food Intake Disorder
- 27. Hannah Welp and Lori McGrew**
Anxiolytic Effects of Valerian Root on Zebrafish Species
- 28. Kristen Whitaker**
Understanding the prominent factors causing work dissatisfaction and burnout in equine veterinarians
- 29. Alexis Adams**
Paws and Pricing: A Study on the Website Transparency of Veterinary Costs of U.S
- 30. Alexandra Imbach**
Veterinary Workforce Dashboard of Appalachia
- 31. Nimit Patel**
What is the most plausible mechanism for metformin related b12 deficiency: disruptions of calcium mediated absorption or influence of the microbiome?

Scholarship from the School of Mathematics and Sciences

Preston Akers

Synthesis and lipophilicity of a fluorinated derivative of N,N'-diacetyl-p-phenylenediamine

As people age, there is a prevailing presence of chronic low-grade inflammation, a factor potentially influential in the onset of cognitive issues and the development of neurodegenerative conditions, such as Alzheimer's and Parkinson's. In an effort to address this inflammation and mitigate the risk of cognitive decline there is significant interest in N,N'-diacetyl-phenylenediamine (DAPPD), which is structurally similar to anti-inflammatory molecules like acetaminophen. A fluorine derivative of DAPPD was synthesized because of its potential to be better able to traverse the blood brain barrier (BBB) than DAPPD, which is critical for the drug to reach target areas in the brain. Substituting fluorine atoms for hydrogen atoms of drugs has been demonstrated to increase the lipophilicity of the molecule, which is important for bioavailability and for ability to cross the BBB. Using an octanol-water partition, which is a standard model for lipid membranes, was determined that the fluorinated derivative of DAPPD is approximately 85 times more lipophilic than DAPPD. This enhanced lipophilicity is anticipated to enhance the bioavailability of the molecule, and more importantly, potentially improve the ability of the drug to cross the BBB, which would make it more effective for treating neurodegenerative conditions.

Joshua Boldon

Synthesis and Physicochemical Properties of a Trifluoroacetamido Derivative of Acetaminophen

Acetaminophen (N-acetyl-para-aminophenol, APAP) effectively relieves pain when taken at therapeutic doses but causes severe liver damage when taken at overdose quantities. APAP induced liver damage is a result of Cytochrome P-450 (CYP) enzyme catalyzed conversion of APAP to N-acetyl-p-benzoquinoneimine

(NAPQI), a toxic metabolite. NAPQI reacts with the thiol side of glutathione, which results in glutathione depletion leading to cell death. A trifluoroacetamido derivative of acetaminophen (3F-APAP) was synthesized and the physicochemical properties of the molecule were compared to those of APAP. Based on measured octanol-water partition coefficients 3F-APAP is five times more lipophilic than APAP, which suggests that 3F-APAP is likely more bioavailable than APAP. Importantly, 3F-APAP is oxidized by the CYP proteome of Sprague-Dawley rat liver microsomes at the half rate that APAP undergoes oxidation. Based on this difference in CYP catalysis rates 3F-APAP is potentially less toxic than APAP.

Joshua Boone

A Generalization of the Triangular Numbers via an Interesting Probability Question

Suppose an urn contains an unknown number of green stones and red stones, but somehow you know that drawing two matching colors is k times as likely as drawing different colors. Follow me on a wild journey through algebra, recursion, and iteration as we attempt to find a general solution to this problem. Don't be surprised if we encounter some interesting patterns on our adventure.

Cole Presley and Briana Martinez

Synthesis and lipophilicity of the para fluorinated derivative of phenytoin

Phenytoin (Dilantin) is an anti-epileptic drug. Substituting fluorine atoms for hydrogen atoms often improves drug activity. Therefore, there is significant interest in fluorinated derivatives of bioactive molecules. Several decades ago, researchers observed that the phenytoin derivative with fluorine atoms at the para position of the aromatic rings had drastically reduced activity relative to phenytoin. They noted that factors other than metabolic deactivation, such as sterics, electronics, and partitioning, must contribute to the poor activity of the para fluorinated derivative of phenytoin. A phenytoin derivative with fluorine atoms at the para position was synthesized by a novel route and its lipophilicity was studied using an

octanol-water partition, which is a standard model for the lipid membranes. There is no significant difference in the partitioning of phenytoin and its para fluorinated derivative. Therefore, the reduced activity of the phenytoin derivative with fluorine atoms in the para position is not a result of differences in partitioning.

Gabriel Crumley

Synthesis and lipophilicity of the trifluoroacetamido derivative of lacosamide

Lacosamide is an anti-seizure drug that acts on the central nervous system of the body by interfering with the voltage gated sodium channels of the nervous system. Lacosamide has a low octanol-water partition coefficient, which is an important property for the bioavailability of drugs. Substituting fluorine atoms for hydrogen atoms has been shown to improve the properties of drugs, such as lipophilicity and bioavailability. Therefore, a lacosamide derivative with a trifluoroacetamido group will be synthesized because it would potentially have improved lipophilicity relative to lacosamide. Lipophilicity of lacosamide and the fluorinated derivative of lacosamide will be compared using an octanol-water partition, which is a standard model for lipid bilayers.

Trevor Holt

Construction of a biomass gasifier and testing for natural disasters and emergencies

This research project strived to identify various materials that can be used in a biomass gasifier to produce synthetic gas to fuel a generator and provide electricity in emergency situations. This research also determined the feasibility of someone with little metal fabrication skills to create such a system and estimated cost. I evaluated multiple materials in a tabletop gasifier system to get precise measurements (temperature, burn time, mass converted) of the reaction. This is a time-tested technology that was developed in the 1870s. It was used during World War II in the fuel shortage and is now being looked at as an alternative to fossil fuels. This research looked specifically at wood products that would be found after a natural

disaster that could be used to benefit the community by creating fuel for cooking or electricity production while cleaning up debris. Any biomass can be used, but material must be dry and be able to fit into the reaction chamber of the system. This means that some preprocessing would be required before they are used in the system.

Matthew Lewis

Levels of hybridization between sympatric Redeye Bass and Alabama Bass

Hybridization by introduced taxa is one of the main threats to the diversity among the black basses (*Micropterus* spp.) and particularly relevant to the Redeye Bass (*M. coosae*, REB). The Mobile River Basin in Alabama contains one of the largest populations of native Redeye Bass; however, little is known about the levels of hybridization between sympatric Redeye Bass and Alabama Bass (*M. henshalli*, ALB) in this system. We used 64 diagnostic SNP loci to determine the extent of hybridization in 2,679 fish collected from 135 sites across three major river systems. Overall, 28% were identified as hybrids, 42% were identified as pure REB, and 21% were identified as pure ALB, and the remaining individuals were identified as pure Largemouth and Smallmouth Bass. We found evidence of hybridization at 54% of the sites with only 46% of sites having no evidence of hybridization. We found that hybridization rates varied both among river drainages and among streams within those drainages. Most hybrids (76%) were between REB and ALB, although multiple hybrid combinations were detected. Our results support the hypothesis that hybridization between REB and sympatric ALB is occurring at levels that equal and in some cases, exceed hybridization rates between previously allopatric black bass populations. Additionally, genetically pure Redeye Bass populations are identified that should be prioritized for implementation of conservation and management plans.

Krista Meredith and Mary Beth Babos
Evaluation of Camellia sinensis Anxiolytic Effect in Danio rerio

The primary aim of this project is to evaluate the efficacy of a standardized *Camellia sinensis* (green tea) extract as an anxiolytic using zebrafish (*Danio rerio*) as a model organism. Anxiolysis will be determined using the novel dive tank test, a well-established test for anxiety in zebrafish. EthoVision XT® software will be used to track the swimming patterns of the test subjects. To the best of our knowledge, standardized green tea extract has never before been tested for anxiolysis, though the isolated green tea constituent L-theanine has demonstrated anxiolysis. Due to the presence of the stimulant caffeine in the test extract, the relationship may be complex. Additionally, whole-plant extract may contain other constituents that impact anxiolysis. Therefore, dose-response relationships for decaffeinated standardized extract and whole plant extract will be established for comparison.

Isabella Morris and Maggie Kingman
Synthesis of Light-responsive Vitamin B12 Conjugates of Selumetinib and Temozolomide for Targeted Cancer Therapy

The development of light-responsive molecules has been of interest for their potential to improve the treatment of diseases. Photoresponsive molecules have the potential to afford the control of drug activity, which would mitigate harmful side effects. When modified with a fluorophore alkylcobalamins, which are structurally related to Vitamin B12, are responsive to light wavelengths that are capable of penetrating skin. In addition, alkylcobalamins are an interesting molecular scaffold for drug delivery because cobalamins are actively transported across the blood-brain barrier (BBB). Therefore, alkylcobalamin-drug conjugates could potentially be used as a means of transporting a drug across the BBB. We have been developing the synthesis of vitamin B12 conjugates of selumetinib, a mitogen-activated protein kinase kinase, and temozolomide, a DNA methylating agent. Selumetinib is used to treat children with neurofibromatosis type 1

(NF-1) who have plexiform neurofibromas that cannot be removed by surgery. While temozolomide is used to treat some kinds of brain cancer. This research has the potential to improve chemotherapeutic treatment of cancers associated with nerve tissue.

Phoebe Racicot and JeanPaul Santamaria
Synthesis of Light-responsive Vitamin-B12 Conjugates of SN38 and Toremifene for Targeted Cancer Therapy

For decades there has been interest in using light-responsive molecules to control the localization of cancer drug activity to malignant cells. Harmful side effects of chemotherapeutics result from off-target interactions of the toxic cancer drugs with healthy cells. The use of light-responsive molecules for activation of the cancer drug affords the ability to localize the effect of the drug to an area of interest. Alkylcobalamins, which are structurally related to Vitamin B12, have been studied for developing molecular scaffolds for releasing active cancer drugs when exposed to light wavelengths that are capable of penetrating skin. We have been developing the synthesis of vitamin B12 conjugates of SN38, a topoisomerase inhibitor, and toremifene, a selective estrogen receptor modulator. This research has the potential to improve chemotherapeutic treatment of cancer by reducing harmful side effects.

Stewart Thacker and Christian Piercy
Overview of Coastal Marine Trophic Diversity and How Trophic Diversity Affects Ecosystem Health

Trophic levels structure our understanding of environments and break down the levels of predation within the environment. Interspecific dependence is often correlated with trophic levels. Interspecific dependence varies widely across different ecosystems and often expresses quality of sustainability. Inadequate performance in one or any trophic level can be detrimental to ecosystem health as a whole. With marine ecosystems being the largest ecosystem in the world, trophic levels are vital in sustaining populations of all biotas. Marine ecosystems provide astounding diversity in individual

trophic levels and niches. Marine fish diversity often expresses the widest variability of uniqueness when organisms fill certain niches in the environment. Understanding of this can prove useful in analysis of community ecology and management of coastal marine trophic levels.

Savannah Telemeco, Cody Lane, Abagayle Auvil, and Matthew Kolp

Survey of dog parks in Central Appalachia for canine intestinal parasites

Most people view dog parks in a positive light. Dog parks are advertised as safe, enclosed spaces for dogs and owners to exercise and socialize; however, dog parks have the potential to become contaminated with parasites. Canine intestinal parasites can be contracted through direct contact with poop piles abandoned by dog owners and contaminated soil or water sources. Parasites can cause numerous complications within the gastrointestinal tract of pets and lead to weight loss, vomiting, diarrhea, and a weakened immune system. Furthermore, many common parasites are zoonotic, meaning they can be passed from pet to owner. The intent of this pilot study was to evaluate the prevalence of parasites in abandoned poop piles at dog parks in Central Appalachia, including parks in both rural and urban counties. Factors such as location, pet health, and owner lifestyle were considered for future testing. This study identified three main parasite taxa (*Ancylostoma caninum* [hookworm], *Trichuris vulpis* [whipworm], and *Toxocara canis* [roundworm]) found across seven dog parks, with a higher prevalence of contamination (40% of samples) in rural county parks compared to urban counties (19%). Future work will involve a survey of dog owners to identify lifestyle and health factors of both dog and owner that explain parasite infection. The overall goal of this study was to provide information regarding both owner and pet safety so that owners could make a more informed decision when considering dog parks.

Scholarship from the Paul V. Hamilton School of Arts, Humanities, and Social Sciences

Adam Dean

Collaborative Media Projects Across Disciplines

Classes in which this G.I.F.T. can be used: communications arts, history and culture, social work, and in the sciences. The approach lends itself most readily to community service projects that demonstrates a need for documentation and/or publicity.

This is an innovative G.I.F.T. because it seeks to fulfill photography, documentary, oral history and digital design needs in local and regional communities through student service activities. While communications and arts students may specifically have a focus on media creation within their majors, such skills are often requested in community service projects regardless of students' disciplines and majors. This G.I.F.T. offers a "real-world client" approach to service-based coursework and/or student organizations, and can be adapted to the media constraints of the students and facilities. While the media component is the consistent link with the community partner, there is often an activity, event or larger project that is the subject of the documentation. This makes the model quite flexible across disciplines, and provides an opportunity for several classes to take on different roles while working together on large-scale community projects. Keys to success for this G.I.F.T. have been:

- 1) active coordination between the instructor and the client
- 2) student empowerment and inspiration to create media that matters
- 3) project closure in the form of a film screening, launch party, public announcement or client presentation
- 4) real-world feedback from the client and/or community as part of a reflection on the completed project

The approach is strengthened by building in a media "boot camp" or location scouting

intended to learn the tools that will be used to document, photograph, design and/or publish media for the client. The poster presentation for this G.I.F.T. will provide past project examples from LMU's Communication and Media program as well as external examples where the model has also been used in study abroad programs.

Keira Eaton, Raegan Gulley, Olivia Nichols, & Harley Brooks with Dr. Lee Gilroy, Faculty Advisor

The Impact of Smartphone & Social Media Use on Behavior in College Students

The prevalence of smartphone use in contemporary society is readily evident. This is particularly apparent among the population of college students, for which smartphone and social media use has increased significantly over the past decade and now is an integral part of their everyday lives. However, an increasing number of studies reveal a variety of deleterious effects of smartphone/social media use on behavior. The purpose of the present study was to measure incidence and awareness of these negative outcomes. To that end, we surveyed current LMU students regarding their smartphone/social media habits and the potential negative impacts on behavior. Results are discussed regarding a number of behavioral dimensions, including cognitive mechanisms, physiological processes, mental health, and overall well-being.

Raegan Gulley

Understanding mTBI's impact on mood, cognition, brain development, and quality of life to change recovery outcomes

A mild traumatic brain injury (mTBI) or concussion occurs due to an indirect or direct force causing the brain to move and hit the skull. When the brain undergoes trauma, its operational abilities change and require appropriate treatment like any other bodily injury. The well-known idea is that somatic mTBI symptoms are immediate and abate shortly after injury. However, cognitive, emotional, and social impairments from a mTBI may arise, become chronic, or worsen. The

current treatment plan for mTBIs is inadequate. Treatment implementations for preventing persisting symptoms include proper check-ups, longer recovery time, and clinical innovations. Research can target specific symptoms and propose future solutions. Therapeutic practices like medication and counseling can address emotional, behavioral, and social issues. Clinicians must include better information, treatment, and preventative options for those experiencing concussion symptoms. Acknowledging mTBI's impact on mood, cognition, brain development, and quality of life could change recovery outcomes.

Abigail Heiniger

The Magic of Patwa in Bluebeard and Brer Anancy: Colonial Oppression and the Transgressive Power of Language

Caribbean Renaissance author the Rt Hon Dr Louise Bennett-Coverley (1919-2006) went by 'Miss Lou' for most of her artistic career. Her Jamaican vernacular poetry, stories, songs, and performances were nothing short of revolutionary in colonial Jamaica. In 1949, Bennett-Coverley put that power on stage in the first Caribbean pantomime, Bluebeard and Brer Anancy. Bennett-Coverley brought the power of Patwa and traditional Jamaican folklore to the imported British fairy-tale tradition, initiating a new era of Caribbean pantomimes in the British Caribbean. Bennett-Coverley's character Anancy intervenes in the linguistic and narrative tradition of the imported British pantomime. Vernacular language endows this working-class trickster-hero with the verbal versatility to evade the rigid colonial power Bluebeard, the judicial system, and the police. This triumvirate of colonial authority is limited to standard British English (St. BrE) and easily tricked by Anancy's vernacular word play, making humor a revolutionary transgressive force in this watershed pantomime.

Martin Sellers

Healthcare in the United States; Conflict, Confusion, and Cost

Healthcare policy in the United States is confusing, disjointed, unfair, and too

complicated for the political system to join the many aspects of healthcare into meaningful and understandable policy. Healthcare costs and related issues may be grouped into five main content areas: Costs/quality/satisfaction/prices (costs), insurance/payors/providers (insurance), illness specific costs, systemic programs, and SDoH (Social Determinants of Health). The study of healthcare costs includes persons who have no insurance, catastrophic insurance, employee benefit insurance, government insurance, or who pay costs themselves. In addition, the study of healthcare costs includes those who are paid for their services or products such as providers, hospitals, pharmaceutical companies, therapy organizations, and a myriad of specialists. It is a myth that the US healthcare system self-regulates as do companies in the businesses sector that charge economically derived prices and collect revenue depending upon the natural movement of supply and demand. This simply does not and cannot happen the way the system is set up today. This article will show how the US system of healthcare creates costs and revenues and how a redesign would benefit everyone.

Scholarship from the School of Business

Sadie Alvis, Alex Giuera, Sandro Pacheco Perez, Charlie Hamilton, Rachel Taylor, Ashlyn Thomas

Marketing needs for a rural non-profit organization operating in the healthcare industry

This presentation of a student business consulting project aims to address the marketing needs of a rural non-profit organization operating in the healthcare industry. The non-profit is in an underserved rural community and plays a vital role in providing healthcare services and support. The organization faces challenges of engaging with its target audience, raising awareness of its services, and securing funding to sustain operations. The organization seeks to enhance client visibility, community outreach, and engagement with stakeholders to support its mission and achieve sustainable growth. Through a comprehensive analysis of current marketing strategies, target audience, and competitive landscape, this project identified opportunities and offers tailored recommendations to optimize marketing efforts.

Key areas of focus included organizational branding, digital marketing strategies, community outreach initiatives, and stakeholder engagement. By leveraging data-driven insights, best practices, and industry benchmarks, the project can empower the non-profit to enhance marketing effectiveness, expand its reach within the rural community, and amplify its impact on key stakeholders. The proposed recommendations are actionable, practical, and align with the organization's values, ensuring a sustainable approach. Ultimately, this consulting project aims to equip the non-profit organization with the tools, knowledge, and strategies needed to thrive in the rural community it serves.

Mackenzie Amouruex

The Effects of a Multi-Generational Work Force in Today's Society

This poster presentation will serve the purpose of bringing awareness to the unprecedented diversity in today's workforce, where multiple generations coexist. Because of this diverse workforce, there are challenges and opportunities to enhance workplace satisfaction. Today's managers must find a leadership style that is acceptable to each generation, as they are all shaped by their values, attitudes, and events that require a versatile approach to ensure the best success. Challenges such as communication barriers, generational resistance, and stereotypes are some examples of those challenges. Opportunities such as diverse perspectives and customer satisfaction can enhance opportunities for organizational success. While the complexity of a multigenerational workforce can be challenging, its successes can be achieved with the assistance of a diverse, all-inclusive workforce.

April Anderson and Cheryl Hild

Comparing AI-Generated Text Responses Based on Type and Complexity of Question Prompt

This study examines the consistency and repeatability of responses generated by three AI platforms and evaluates the effect of question prompt complexity as well as the type of question in generated responses. Three levels of complexity are evaluated against four types of question prompts including creative ideation, fact-based information gathering, problem-solving and analysis, and opinion-seeking question types. The study uses a balanced, incomplete block design with repeated measures to explore the effect of question type by AI platform. Text analytics is used to explore the unstructured data generated from the three different responses and identify prevailing associations, patterns, and key differences across the three generative AI systems. By critically analyzing the responses in terms of repeatability, relevance, and factual accuracy, the study seeks to uncover how different types of questions used in query prompts impact performance characteristics of the AI systems. Limitations

inherent in AI-generated responses, particularly within the context of problem-solving, will be identified and discussed. Ultimately, this study explores the impact of considering question design in optimizing the effectiveness and reliability of AI-generated responses.

Cheryl Hild and Joshua Ray

A Framework for Developing Analytical Thinking for Business Decision-Making

The development of analytical thinking skills is essential for any future business leader. While analytical tools and methodologies are advancing rapidly, the use of these tools for decision-making is not advancing at the same rate among business managers. Evidence indicates that managers are not taking advantage of advanced methods in day-to-day decisions and problem-solving (Wang and Hild, 2021). The ability to think analytically and critically is a critical component of any decision-making and problem-solving role. The challenge presented is how to equip current and future managers with the ability to think analytically and critically with respect to the application of the methods while also developing in-depth expertise and knowledge of specific tools and techniques. This research differentiates critical and analytical thinking and defines the attributes of decision processes that utilize key elements of analytical thinking. In this research, the chasm between the methods of decision sciences and the ability to reason quantitatively and appropriately to apply analytical thinking to business problems and decisions is presented within the context of developing analytic thinking processes. The research focus is on analytic thinking as a trained skill through an established framework that integrates quantitative and analytical reasoning skills amongst organizational decision-makers.

Kassidy Miller, Katy Pozzuto, Alex James, Jantai Malataev

Strategic Analysis: JPMorgan Chase & Co. (NYSE: JPM)

This research-based case analysis examines the impact of strategic management on competitive

advantage and performance, focusing on JP Morgan and Chase Inc. as a global leader in consumer and community banking, corporate and investment banking, commercial banking, and asset and wealth management. The analysis evaluates JP Morgan's strategy, strengths, weaknesses, opportunities, and threats, alongside its economic, social, and environmental performance using the triple bottom line approach. Findings reveal nearly \$4 trillion in assets with a market cap of over \$545 billion. Some of the challenges involve lacking R&D, slow innovation, and fierce competition. Recommendations include advancing AI, prioritizing data security, fraud protection, and expanding into profitable markets for a competitive edge. JP Morgan should also invest more in environmental sustainability and social responsibility. Its diversification strategy aims to sustain brand equity and shareholder value while underscoring commitment to growth and innovation. By delivering exceptional client service, acting with integrity, and investing in communities and employee development, JP Morgan will continue to set industry standards and drive economic growth.

Steven Stone

Primary social media and website platforms frequently used by LMU students for shopping

In today's world of technology many college students at LMU use social media and other website platforms to shop, as a result, many advertisements are seen on these platforms. This study targets where advertisements are seen the most by LMU students and analyzes the preferences and behaviors of the students.

Rachel Taylor

The Effectiveness of Social Media for Small Businesses

Social media is a readily available tool for consumers to know about various information from small businesses right in front of them. It is important that small businesses use social media to its full potential to influence consumers to choose a small business, while also influencing them to keep coming back. Accessing what kind of social media apps consumers use, what posts

draw them in, and what posts make them want to come back helps determine how effective a social media presence is towards small businesses gaining more attention.

Elijah Wilson, Casey Michael, Caelyn Asher, and Caitlin Thomas

Impact of strategic management on competitive advantage and performance

The purpose of this research-based case analysis was to examine the impact of strategic management on a firm's competitive advantage and performance, focusing on Amazon.com, Inc. as a global leader in e-commerce, cloud computing, digital streaming, and artificial intelligence. The analysis assessed Amazon's strategy, strengths, weaknesses, opportunities, and threats, alongside its economic, social, and environmental performance using the triple bottom line approach. Findings reveal challenges like subpar inventory turnover, increasing long-term obligations-to-assets ratio, decreasing return-on-asset ratios, low margins on retail business, fierce competition, and data security concerns. Recommendations include optimizing inventory management, investing in property and equipment, expanding into profitable markets, and introducing new services for a competitive edge. Furthermore, Amazon should utilize its investment in artificial intelligence to make progress on their ambitious environmental pledges and social responsibility. Amazon's diversification strategy aims to mitigate technology risk while sustaining its competitive edge in e-commerce, retail, and cloud computing industries, underscoring its commitment to continued growth and innovation. If Amazon can stick to its four-guiding principles (customer obsession, passion for invention, commitment to operational excellence, and long-term thinking), the company will continue its successful operational trajectory.

Scholarship from the Carter and Moyers School of Education

Madison Moyers

Yoga as Therapeutic Treatment Modality for PTSD and other Trauma Related Disorders

Yoga originated in the Eastern region of the world over thousands of years ago. It holds many benefits for physical, mental, and spiritual health. Research supports findings of yoga practice creating a positive change in neuropsychological states of participants with neurological disorders¹. The research in the counseling and psychology field continues searching for education on yoga implications in a therapeutic setting for individuals struggling with various psychological disorders. This approach is outside the traditional talk-therapy scope and opens more opportunities for individuals struggling with finding resilience from trauma in a traditional talk-therapy environment. Research found that there is a positive correlation with level of resilience and ability to overcome trauma in those suffering with PTSD and trauma related disorders². This literature review implements empirical findings of the correlation of practicing yoga and increase resilience for individuals who are suffering from a traumatic experience and the increase of resilience through yoga lowers the effects of symptomatology impacted by trauma prior to practicing yoga³. The purpose of this literature review is to educate and encourage mental health professionals to study yoga and use it as a potential treatment modality for trauma victims who struggle with cooperating in traditional talk-therapy environments.

Scholarship from the DeBusk College of Osteopathic Medicine

Usama Aljameey, Cason Still, Blaine Marie, Carson Black, Julia Dane, Tyler Allsage, Adam Kolatorowicz

Variation in the Great Posterior

Radiculomedullary Artery: Relation to the Artery of Adamkiewicz and Importance in Spinal Procedures

Introduction: As spinal cord surgeries increase in prevalence, the significance of arteries supplying the spinal cord, like the great anterior radiculomedullary artery (GARA) and the great posterior radiculomedullary artery (GPRA), increase. While studies observing the GARA have improved anatomical understanding, there is a gap in the knowledge pertaining to the GPRA, increasing the risk of post-operative ischemia. This study aims to bridge this gap by evaluating the link between the GARA and GPRA to improve surgical outcomes. Methods: This observational study used convenience sampling of formalin-fixed whole-body anatomical donors aged 60-85 years (n=10) from the DeBusk College of Osteopathic Medicine. After a laminectomy, the GPRA was followed to the abdominal aorta segmental artery, and abdominal wall dissections were completed with donors in the supine position. Digital sliding calipers were used to measure artery diameter three times to minimize observer error. Results: Results showed a 50% GPRA prevalence, with origins ranging between T9 and T11. Left-sided origins were more common (60%) than right-sided (40%), with an average diameter of 0.71 mm. Conclusion: These findings suggest GPRA variability and highlight the need for cautious surgical approaches to prevent spinal cord ischemia. Continued research into GPRA anatomy is necessary to improve surgical outcomes.

Oladele Ariyo

Bridging the gaps: Exploring potential harms of antimalarial nutrient depletion

Malaria is a major source of morbidity and mortality, particularly in resource-poor areas, thus malnutrition often complicates the disease process. Little is known about the potential for antimalarial medications to deplete micronutrients. We performed a systematic review of primarily literature identified in PubMed published since 2000. The aim of this review was to identify gaps in knowledge related to antimalarial medication-induced depletion of micronutrients. Such knowledge may help to improve outcomes in this devastating disease.

Ava Azizi, Mary Beth Babos, Devon Hart, Cesar Saint-Hilaire, and Samaria Elder

*Investigating the Anxiolytic Properties of *Crocus sativus* in Human Clinical Trials*

Saffron, derived from the stigmas of *Crocus Sativus*, is a spice utilized in a multitude of applications including medicinal treatments. The essential bioactive markers responsible for saffron's medicinal properties include crocin, crocetin, picrocrocin, and safranal. Crocin and crocetin, carotenoids that impart saffron's distinctive golden color, cross the blood-brain barrier via passive transcellular diffusion (Lautenschläger et al., 2015); suggesting a direct pathway through which saffron exerts its effects on the central nervous system. These compounds have shown to modulate neurotransmitter levels, inhibit neuroinflammation, and reduce oxidative stress, thereby possibly alleviating symptoms of depression and anxiety (Lopresti et al., 2015). Previous research indicates *Crocus Sativus*' anxiolytic and antidepressant effects may be mediated by upregulation of norepinephrine and dopamine, as well as mimicry of serotonin's chemical effects (Hosseinzadeh & Nassiri-Asl, 2013).

This meta-analysis is a systematic review of clinical trials to further explore the pharmacological effects of saffron on anxiety. A computerized search of published articles was conducted with exclusion criteria of observational studies, and inclusion for clinical trials published in English, French, or Farsi

comparing anxiolytic effects of saffron or constituents to standard therapy or placebo. The medical subject heading (MeSH) search to index articles for the MEDLINE®/PubMed® database was conducted through the National Library of Medicine's controlled vocabulary thesaurus. The words "Crocus" or "Colchicum" and "anxiety/ antianxiety" were entered in the MeSH search. Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines were followed, and risk of bias analysis and data extraction were performed independently by five reviewers. It was hypothesized that Saffron produces a greater than or equal effect in comparison to standardized/placebo anxiolytic therapies.

Grant Boxey, Brent Thompson, and Tony Harper

Medical Neuroanatomy Survey of Student Confidence: A Principal Coordinate Analysis of Course Objectives

Medical Neuroanatomy is an integrative course taught within the first-year medical school curriculum. The study aimed to identify specific course learning objectives that students are least confident in. To accomplish this, survey data was assessed by the novel application of Principal Coordinate Analysis (PCoA). Two anonymous 5-point Likert scale surveys were implemented Spring 2023 to assess confidence pertaining to 113 lecture objectives for each of the 38 lectures. Forty students completed both surveys. Because the use of categorical variables precludes the use of many statistical ordination methods, PCoA, based on Jaccard distances between respondents, summarized sources of variation and patterns of covariation.

The mean for all learning objectives was 4.22, with a range of 3.5-4.85. The first two principal coordinates are described, representing 35% of total variance. The PC1 values corresponded with student self-confidence, with almost all learning objectives having positive loadings. PC2 values separated less-confident responders into two groups: one that was unconfident in CNS tracts and pathways (PC2 loadings ≥ 0.30), and one unconfident in neuro-ophthalmology (PC2 loadings ≤ -0.42).

These findings provide a foundation for creating future laboratory experiences. To our knowledge, this is the first study demonstrating the application of PCoA for medical school course assessment.

Tej Brahmhatt

Malignant Melanoma Case Report

This case report details a 55-year-old woman presenting with left inguinal swelling, ultimately diagnosed with melanoma of unknown primary origin (MUP) manifesting as isolated splenic metastasis. The rarity of such cases poses challenges in determining optimal treatment strategies. The patient underwent a splenectomy and received pembrolizumab, but subsequently developed hypophysitis, leading to treatment interruption and initiation of prednisone. Resumption of pembrolizumab was followed by negative imaging for recurrence. Isolated splenic metastasis in melanoma is exceptionally uncommon, and treatment options remain limited, emphasizing the need for further research. This case highlights the importance of recognizing atypical metastatic patterns and managing immune-related adverse events during immunotherapy. Additional investigations with larger cohorts are essential to elucidate the efficacy of combined immunotherapy in improving outcomes for patients with MUP and isolated splenic metastasis.

Jeffrey Bransky

Unit 731 and the critical value of ethics in medical research

Unit 731 was a clandestine Imperial Japanese military faction that existed from the mid 1930's, until the end of World War II in 1945. Their actions during this time included extensive medical research on imprisoned human beings, largely in occupied China. This research was done in the fields of epidemiology, microbiology, surgery, immunology, and reproductive sciences. Unit 731's actions are largely unknown to the general public, especially in the Western Hemisphere, mostly due to elaborate cover-ups by Japan and the United States. The actions of Unit 731 should be taught to students, and their contributions to

medicine at the expense of thousands of innocent human subjects should be criticized and discussed in every higher education academic setting. This discourse is critical because the results of the experiments have yielded valuable medical information in all of the aforementioned subjects. Their practices and atrocities should be discussed in the arena of medical ethics, through the lens of scientific advancement in the absence of morality. Recognizing the contributions of the victims of Unit 731 to medical sciences can serve as a permanent tribute to their tragic fates and will serve as a glaring reminder of the critical value of ethics in medical research.

Andrew Browning

Comparing blood glucose levels in night shift and day shift nurses

Emergent, inpatient, and assisted-living medical facilities all rely on night shift nurses to deliver high quality patient-centered care. Important to consider is the essential work they do is not without cost, as night shift work has been linked to negative health outcomes such as disrupted circadian rhythm, chronic fatigue, and diabetes mellitus. The purpose of this project is to compare blood glucose levels in night shift and day shift nurses and determine if glucose fluctuations are more closely linked to a specific shift type.

A total of 22 nurses completed the study. A Dexcom G6 continuous blood glucose monitor (CGM) was worn over a 6-day period, data was collected without interruption. Diet was not controlled in this study. Glucose levels were averaged over the total 6-day duration of the study, the 3-day on shift, and the 3-day off shift. Averages were then compared between the night shift and day shift nurses. Collected data showed no statistically significant difference between the blood glucose measurements of day and night shift nurses. However, different trends were observed between groups. As no statistically significant differences were measured in this study, it cannot be stated at this time that blood glucose levels differ between day and night shift nurses. Potential remains for clinical significance.

Brandon Buck, Jessica Bui, and Annette Yates
Advancing Equity in Lung Cancer Screening Referrals: A Focus on Asian, Native, Alaskan, Hawaiian, and Pacific Islander Communities

Previous studies have shown that lung cancer screening programs have the potential to positively impact the overall management and outcomes of lung cancer. To expand on previous investigations, the goal of this study is to identify disparities in lung cancer screening programs across race and ethnicity, while also accounting for smoking history and daily alcohol consumption. Data collected from the National Lung Screening Trial (NLST), analyzed using bivariate logistic regression, demonstrates higher odds of being recommended to continue lung cancer screenings especially in Asian, Native American, Alaskan Native, and Hawaiian or Pacific Islander populations. While the majority of individuals in the NLST were Caucasian, analysis revealed that participants who identified as Asian had 3.758 higher odds of being referred to continue participation while those who identified as Native American, Alaskan Native, Hawaiian, or Pacific Islander had 2.264 higher odds. This data demonstrates the importance for close follow-up across all races and ethnicities and underscores the need for culturally sensitive approaches in healthcare delivery and outreach efforts to ensure equitable access to preventive measures such as lung cancer screenings.

Erinn Conlin, Mariah Bartz, and Donna Herme
A Case Report of Right Gonadal Vein Anatomical Variation with Drainage into Right Renal Vein

Background: The left gonadal vein drains blood from the left gonad into the left renal vein, while the right gonadal vein drains blood from the right gonad directly into the inferior vena cava (IVC). Drainage of the right gonadal vein into the right renal vein is an anatomical variation that has been found in 8-10% of patients in case studies.

Objectives: To describe a venous anomaly found on routine dissection and explore the prevalence and clinical implications of this venous anomaly.

Method: Routine dissection was performed during Medical Gross Anatomy, revealing the anatomical variation. Photographs were taken and a literature review was performed.

Conclusions: Variations in ovarian vein drainage can be a possible cause for pathology, such as venous reflux and pelvic congestion syndrome. Bringing awareness to these anatomical variations will provide insight into possible causes of chronic pelvic pain as well as provide knowledge of the different locations of ovarian veins for procedures and imaging involving the posterior abdominal wall and pelvis.

Zachary D. Cutright, Mark T. Cutright, and Jeffrey S. Martin

Determining the Accuracy of the Stryker MAKO Robotics System in Achieving Target Acetabular Component Placement During Total Hip Arthroplasties

The MAKO robotics system for Total Hip Replacement (THR) was introduced into orthopedic surgery to provide more accurate positioning of the acetabulum component of the implanted joint. This study sought to determine accuracy of the MAKO robotics system in achieving predetermined (i.e., target) degrees of anteversion and abduction during THR procedures. Procedure data was collected from two surgeons along with patient age, sex, and BMI for each case. Relative differences from target anteversion and abduction angles achieved during THR procedures using the MAKO System were evaluated. A one-way analysis of variance was used to evaluate the data with data presented as relative change (i.e., directional), not absolute change. Data analysis revealed that BMI was a significant covariate ($p=0.05$) in the model, but surgeon, age and sex were not. Notably, BMI was negatively correlated with difference from target angle using the MAKO robotics system for both anteversion (-0.22) and abduction (-0.25). Overall, the achieved angle was significantly different than target angle for both anteversion ($-1.24 \pm 0.26^\circ$, $p=0.01$) and abduction ($-0.29 \pm 0.24^\circ$, $p=0.02$). Surrounding soft tissues may force the robotic arm out of position during impaction

Alexandra Dailey

Trends related to socioeconomic hurdles and mental health in pregnant women with substance use disorder

Background: Infant mortality rate has been an area of concern for the United States for years. Many attributing factors, including psychosocial influences, have been identified. Pregnant patients with substance use disorder in particular have been shown to experience poor birth outcomes.

Objective: This study examines trends related to socioeconomic hurdles and mental health in pregnant women with substance use disorder.

Methods: Databases were searched to find resources that outlined the relationships of interest. Study designs were assessed, and associations were compared to look for trends.

Results: Several patterns were observed, including an increased risk of adverse birth outcomes with higher maternal stress and lower socioeconomic status. In pregnant women with substance use disorder, post-traumatic stress and social stigma resulted in negative effects on mental health. Substance use-related pregnancy anxiety was amplified by triggers that resulted in feelings of fetal detachment and substance cravings.

Conclusions: Most literature focused on pregnant patients with active addiction; however, triggers may have a powerful effect on women who become pregnant while in recovery. This population would benefit from a screening tool that identifies high-risk events like PTSD, psychological stress, and substance use triggers and intervention that includes evidence-based mental health resources.

Hannah Diehr

Environmental Challenges and changes in population dynamics and survivability among calanoid copepods

Phytoplankton are primary producers while Zooplankton are primary consumers. Copepods form the basal trophic level upon which higher level consumers are energy and nutrient dependent (Mauchline, 1998).

Calanoid copepods were studied in the Apalachicola Estuary of the northern Gulf of

Mexico, along the Florida Panhandle. As an estuary, many pelagic species begin their life in a nursery-like environment which is nutrient rich, protected from predation, with optimal physiochemical aquatic parameters (Turner, 2004).

While seven species of calanoid copepod are residential, there are seasonal population fluctuations in numbers of individuals and species diversity. Recent weather extremes, attributed to global warming, have altered population demographics. It has become critical that we establish a baseline of residential species diversity, population dynamics, and basic morphology. These basal parameters will facilitate a clearer understanding of niches and their responses to environmental stressors. Morphological, dietary, and behavioral specializations of these copepod species define distinct niches. How will environmental challenges change population dynamics and survivability of each species, and therefore, the entire estuarine community?

Eint Ei and Mary Beth Babos *Standard management practices for people who have Vitamin B12 deficiency due to long-term use of Proton Pump Inhibitors*

Proton pump inhibitors (PPIs) are commonly prescribed medications for the treatment of increased gastric acid production, and their long-term use is commonly associated with an increased risk of vitamin B12 deficiency. Despite the common association, controversy exists over the causality of this relationship; therefore, a standard approach to evaluation and management is lacking. This systematic review aims to evaluate the available evidence for risks, screening, diagnosing, and managing PPI-related vitamin B12 deficiency.

Nathaniel Erickson and John Gassler, *Morphological Variations of the Cystic Artery Among Human Donors of the Southern Appalachian Region*

More than 1.2 million cholecystectomies are performed in the United States each year in which the cystic duct and cystic artery are clamped, ligated, or cut and cauterized. There

presents several morphological variations of the cystic artery which could lead to possible complications of cholecystectomies including hemorrhage or hepatobiliary injury. The purpose of this study is to examine the anatomical variations of the cystic artery among the human donors homogenous to the rural Southern Appalachian region of the United States to further educate general surgeons of any significant cystic artery variation among this patient population to improve surgical safety. Data was collected from forty previously dissected donors by analyzing the anatomical origin and positioning of the cystic artery in relation to adjacent hepatobiliary structures. From the data collected: 74.3% of cases had a single cystic artery and 25.7% had a double cystic artery. The cystic artery originated from the right hepatic artery in 78.1% of cases and from non-RHA origins in 21.9% of cases. The cystic artery crossed anteriorly to the common hepatic duct in 31.3% of cases and passed posteriorly in 68.7% of cases. The results of this study are comparable to figures retrieved from previous studies.

Aaron Garner and Creighton Adams

Effect of knee OA on structural compensation at the subtalar joint

Knee osteoarthritis (OA) has been shown to have a negative effect on the range of motion at the ankle joint. The study's focus is to determine the effect of knee OA on structural compensation at the subtalar joint. Factors including age, BMI, and activity level were examined to determine if a relationship is present. 290 individuals from the Donated Skeletal Collection at The University of Tennessee were selected. OA was diagnosed by the tactile and visual presence of osteoarthritic lipping. A binomial logistic regression analysis was used to evaluate the effects of age, BMI, activity level, and knee OA on the likelihood that individuals would have ankle OA. A ROC curve analysis gauged the sensitivity and specificity of using knee OA as a predictor of ankle OA. The regression model is poorly sensitive (0.518) but highly specific (0.816) for ankle OA. The ROC curve suggests the presence of knee OA could predict ankle OA better than

chance (0.604). An individual with knee OA, with increased age and higher BMI, is more likely to have ankle OA. This supports the understanding that osteoarthritis is a multifactorial condition that not one element can proceed OA, but with factors combined increases risk.

Kaitlyn Geers and Albert Vasquez

The Utility of Osteopathic Manipulative Treatment (OMT) for Improving Flexibility, Proprioception and Balance for Injury Prevention in Collegiate NCAA Division II Men's and Women's Lacrosse Athletes: Pilot Study

This study assesses the utility of OMT as an adjunctive tool in sports injury prevention. This pilot randomized control trial investigated the impact of OMT on both injury risk assessments and injury outcomes throughout a collegiate lacrosse season. Each participant (n=23) underwent an evaluation consisting of a Modified Star Excursion Balance Test (YBT), Functional Movement Screen (FMS), and the Sit and Reach Test (SRT) prior to the start of the competitive season. The participants were randomized into the control and OMT groups. The OMT group received 20 minutes of OMT each month until the end of their competitive season. Both control and OMT groups were encouraged to maintain their current rehabilitation and prevention behaviors (i.e. foam rolling, stretching, strength training, etc.). At the end of the competitive season, re-evaluation of the risk assessment measures (SRT, YBT, FMS) upon completion of the competitive season. Data on injuries throughout the season, collected by athletic trainers, and risk assessment scores will be compared between groups. We hypothesize that the OMT group will experience less injuries over the competitive season and will have reduced risk of injury as indicated by the injury assessment scores when compared to the control group.

Christopher Gray, Dedeepya Gullapalli, Sai Kommineni, Avinash Vangara, Subramanya Shyam Ganti, and Stanley Marlowe

What is Growing in the Garden? A Severe Case of Blastomycosis in Uncontrolled Diabetes Mellitus

Blastomycosis caused by Blastomycosis dermatitidis, is an endemic fungal infection in Ohio, Mississippi River Valleys, and southeastern United states. It is known as the “Great Pretender” because it mimics many pulmonary disorders such as tuberculosis, typical and atypical pneumonia, and lung cancers. The major risk factors for severe blastomycosis infection are immunodeficiency, diabetics, and obesity.

This case shows the importance of a good history when considering differential diagnosis with worsening pneumonia. It was discovered a household member was an avid gardener. The soil around the home was the likely source for his infection. Pulmonary blastomycosis should be considered in patients with uncontrolled diabetes, who reside in an endemic area. Traditionally presenting as pneumonia, where the conventional treatment is ineffective and can develop into a rare complication of ARDS.

Uncontrolled diabetes creates an immunosuppressive state providing favorable conditions for the yeast to grow and cause insulins. Diagnosed by seeing the broad-based budding yeast by direct microscopic examination of specimen stained with KOH. Treatment for severe Blastomycosis is Amphotericin B for 1-2 weeks, followed by Itraconazole for 6-12 months.

Jonathan Greene

Physicians and Nurses’ Perceptions of In Situ Simulations in Rural Tennessee hospital Emergency Departments

There was limited literature and research regarding in situ simulations (ISS) in rural Tennessee hospital emergency departments. Within the research that existed, there were issues in rural Tennessee hospital emergency departments including safety, communication, effective teamwork, funding, adequate resources, and qualified simulation facilitators.

The purpose of this study was to reveal perceptions from trained physicians and nurses on ISS in rural Tennessee hospital emergency departments. The conceptual framework I used was the Interprofessional Education Collaborative Core Competencies that included four domains including values and ethics, roles and responsibilities, communication, teams, and teamwork. Twenty-eight total participants responded to the Qualtrics XM questionnaire. Rural Tennessee hospital emergency department physicians (11) and nurses (15) made up the total sample of the respondents. The major finding in my study was 11 (100%) of physicians and 14 (82%) of nurses perceived the use of in situ simulations improved teamwork and team dynamics; furthermore, nurses believed ISS improved team dynamics specifically because it could be conducted in familiar environments. Implementing in situ simulations with quality facilitators, administrators, directors, and executive officers in rural Tennessee hospital emergency departments would improve patient care outcomes including safety, interprofessional team dynamics, teamwork, collaborations, and communication.

Cory Gritton, Jeffrey Chesnut, Adam Kolatorowicz, and Tony Harper

Visuospatial Ability, Psychomotor Ability, and Educational Outcomes of Ultrasound Training in Conjunction with Medical Gross Anatomy: A Randomized Controlled Trial in First Year Osteopathic Medical Students

Ultrasound (US) training is often implemented into undergraduate medical education, especially in gross anatomy coursework. Few research studies have evaluated the relationship of US training with visuospatial ability and psychomotor ability. Thus, the study objective was to evaluate hands-on anatomy centered ultrasound (HOACUS) training of first year osteopathic medical students (OMS-I) based on anatomy knowledge, US knowledge, visuospatial ability, and psychomotor ability. OMS-I students were recruited in the first semester for this IRB exempt study. Participants completed three initial assessments: 1) a 15-item MCQ quiz with five non-spatial US items, five

non-spatial anatomy items, and five items combining US, anatomy, and spatial knowledge; 2) a Mental Rotation Test (MRT), and 3) a Purdue Pegboard Test (PPBT). Participants were randomized into experimental or control groups. The experimental group received an introduction to US session and three HOACUS sessions scheduled alongside the Medical Gross Anatomy (MGA) course, while the control group did not receive supplemental training during MGA. At MGA conclusion, both groups completed three final assessments.

A total of 105 participants completed the study (control group n=46; experimental group n=59). Statistical analysis indicated group as a significant predictor, as were covariates of initial non-spatial US, initial MRT, and initial PPBT.

Sky Hart, Kaitlin S. Walker, Jonathan D Guihert, Anthony Harper, Jun Wang, and Brent J. Thompson

Understanding Anotia in a Cadaveric Donor: Micro-CT Reconstruction of the Inner Ear and Histopathological analysis of Kidneys

Introduction: Anotia is a congenital malformation leading to the absence of the external ear. To our knowledge, this is the first study of anotia and associated renal pathologies in an anatomical donor.

Methods: Temporal bones were extracted to perform high resolution Micro-CT scans, and a 3-D reconstruction. Samples of donor kidneys and a transplant kidney were collected for histopathological evaluation.

Results: The dimensions of the semicircular canals, middle ear, and cochlea were within the normal populations range, as was the area of the stapes footplate. Histopathological analysis of the native hypoplastic kidneys revealed glomerular sclerosis, interstitial fibrosis, an onion-skin thickening, and significantly fewer glomeruli, in comparison to the transplant kidney.

Discussion: While this donor lacks external ear structures, Micro CT scans revealed that the middle and inner ear anatomy was within the normal range. The donor had hypoplastic kidneys with significant pathologies and healthy transplanted kidney This donor study allows a

higher resolution assessment of pathologies than would be possible in a clinical setting.

Bernadeta Joksaite and Mahdi Budayr

Multiple Medical Conditions May be Construed into a New Syndrome

Introduction: An accurate diagnosis is an important aspect of getting the right treatment plan, prognosis and impacting the patient's life in general. When a patient presents with non-specific symptoms and findings, it presents as a challenge to the clinician to deduce the right diagnosis.

Case Description: A 27-year-old white female presented with multiple chronic, recurrent, inflammatory necrotic nodules in multiple locations of the body. Review of systems was noncontributory. Laboratory results were negative for inflammatory markers. Past medical history includes dystonia, juvenile RA, Clostridium difficile colitis, IBS, inappropriate sinus tachycardia and hyperlipidemia. Past medical history also includes paroxysmal kinesigenic dyskinesia, autoimmune disorder, inappropriate sinus tachycardia amongst others. Multiple debridement with pathology reports revealed ischemic changes, necrosis, and ulcerations without infectious etiology. She has been seen by multiple tertiary medical centers and multiple specialists without a diagnosis.

Discussion: While literature does describe in detail many of these conditions separately, this case is a unique constellation of symptoms and disorders. We propose the possibility of a new syndrome being described in this case report, stemming from an autoimmune etiology although other possibilities cannot be ruled out.

Kristina Hoy and Zachary King with Murielle Brohez

Early Appendicitis in De Garengot Hernia: A Case Report

When the contents of a femoral hernia sack contain the vermiform appendix, it is called a De Garengot hernia. Femoral hernias account for only 3% of all abdominal wall hernias[1,6-7]. De Garengot hernias account for approximately 1% of all femoral hernias[6]. Acute appendicitis inside a femoral hernia occurs in only 0.08% to

0.13% of all cases[6]. Since these hernias were first described in 1731, there have been fewer than 225 published cases. Of these cases, less than 25 were treated laparoscopically by a transabdominal preperitoneal hernia repair (TAPP)[6]. We present a case of De Garengeot hernia with subclinical acute appendicitis in a 72-year-old woman which was laparoscopically treated with TAPP. This hernia was discovered incidentally on CT allowing for early intervention. We found the TAPP approach to be a safe and effective option when repairing a De Garengeot hernia when identified early and treated in a nonemergent setting.

Annie Le, Hannah Caldwell, and Jun Wang
Additional EGFR mutations in T790M retained osimertinib resistant non-small cell lung cancers

T790M mutation of epidermal growth factor receptor (EGFR) can mediate resistance to first and second generation tyrosine kinase inhibitors (TKIs) in non-small cell lung cancers. Osimertinib, a third generation TKIs, is used in patients resistant to first and second generation TKIs, especially those carrying T790M. However, resistance to osimertinib has been widely reported. Loss of T790M is associated with osimertinib resistance. To investigate osimertinib resistance mechanisms in patients with retained T790M, a systemic review is conducted. Published studies of clinical outcomes of osimertinib were collected through PubMed. 16 studies are included after screening for studies with molecular analysis of patients after tumor progress. Retention of T790M is identified in all studies, ranging from 20-78%. Concurrent EGFR mutations are frequently identified, most commonly C797S, ranging from 17-80%. C797S is predominantly in cis position with T790M, from 67-100%. These findings suggest that concurrent EGFR mutations may contribute to resistance to osimertinib. Majority of C797S are in cis position with T790M, indicating that an altered binding activity to target position of EGFR by osimertinib. Since these molecular changes precede disease progress, monitoring these mutations may effectively predict resistance and guide treatment adjustment.

Grace Love and Amber Kilgore under the mentorship of Howard Herrell

Neonatal Abstinence Syndrome Considerations in the Management of Opioid Use Disorder During Pregnancy: A Systematic Review

Opioid use disorder (OUD) is a growing concern nationwide, with highest prevalence in rural Southern Appalachia, specifically East Tennessee. During pregnancy, OUD treatment includes naltrexone, methadone, and buprenorphine, which reduces the risk of overdose and withdrawal in the mother. Fetal benefits include prevention of adverse effects that have been associated with traditional opioids, including preterm labor and fetal growth restriction. However, these medications can still disrupt placental maturation and cross the placental membrane to directly affect the fetus. Although present, the risk of neonatal abstinence syndrome (NAS) is decreased compared with traditional opioids. This paper serves as a systematic review of current literature comparing the effectiveness of naltrexone, methadone, and buprenorphine in the treatment of OUD during pregnancy and the subsequent rate and severity of NAS. Data demonstrates that methadone and buprenorphine are equally effective in the treatment of OUD with good patient compliance, while naltrexone data is inconclusive due to limited compliance. In terms of neonatal abstinence syndrome, buprenorphine administration demonstrates a lower diagnostic rate of NAS and fewer associated symptoms. The most recent literature analysis displays evidence supporting the use of buprenorphine over methadone in the treatment of OUD due to associated lower risk of NAS development.

Katherine McCoy and Lindsey Miller

Investigating the role of Epigallocatechin gallate (EGCG) on lymphatic endothelial cells (LECs) following exposure to tumor necrosis factor alpha (TNF- α)

The lymphatic system has a multitude of physiological functions in the body such as lipid absorption, immune response and fluid balance. Disturbance in these processes thus causes

disease. A high saturated fat diet disrupts lymphatic function in the mesentery by increasing permeability and leakage. This disruption causes an inflammation cascade and is linked to pathology such as visceral obesity and insulin resistance. The first goal of our investigation was to induce a stress response in lymphatic endothelial cells similar to that of a high saturated fat diet or chronic inflammation. We wanted to verify an increase in permeability and leakage on lymphatic endothelial cells. Our second goal was to expose the lymphatic endothelial cells to therapeutic interventions such as Epigallocatechin gallate (EGCG) which has known anti-inflammatory effects. We then tested if EGCG had any protective effects on lymphatic endothelial cells when exposed to external stressors.

Kayla C. Medline and Lauren Wisnieski
The association between early childhood pet and livestock ownership and the development of asthma and allergies

This research is aimed at exploring the association between early childhood exposure to pets and livestock and the later development of allergies and asthma in a large longitudinal study. Using data from the National Children's Study, we assessed the development of allergies and asthma by 42 months of age (early childhood). Pets involved in this analysis include cats, dogs, small mammals, birds, fish, reptiles, and others. Livestock involved in this analysis include chickens, cows, ducks, geese, goats, guineafowl, hens, horses, mules, peafowl, pigs, pigeons, rabbits, roosters, sheep, turkeys, and others. Statistical analysis was performed in SPSS and a mixed logistic regression will be used for all multivariable analyses. We will include moderators such as indoor/outdoor status and pet sleep location. The first objective is to assess the association between pet ownership during early childhood and the development of asthma and allergies. The second objective is to assess the association between livestock ownership during early childhood and the development of asthma and allergies. The third objective is to assess how pet sleep location and indoor/outdoor status moderate the association between early childhood exposure to pets and

the development of asthma and allergies. We expect our results to show a reduced risk of developing allergies and asthma when living in a home that owns pets/livestock. Additionally, we expect children that have an indoor pet and those that sleep in the room with a pet to have even greater protection from the development of allergies and asthma (especially those that share a bed with the pet). The data will be presented upon completion of statistical analysis. This knowledge can be used to educate parents about the benefits of pet and livestock ownership. The results of this study will hopefully minimize the risk of rehoming and relinquishment of pets due to misconceptions about allergies and asthma prevalence, which will preserve the human-animal bond.

Erick Moberg
Prevalence of Plaques Discovered in The Spinal Cord Region of Human Anatomical Donors After Completing a Full Laminectomy Procedure

Laminectomy procedures are commonly performed in the Medical Gross Anatomy course for educational purposes. Laminectomies help educators and students visualize the internal features associated with the spinal cord. While performing the special dissections on human donors, we periodically find plaques tightly adhered to the dura mater. Past studies have identified these plaques as arachnoid calcifications. Future projects will seek to confirm this finding in our samples based on scanning electron microscopy, histological staining, and mass spectrometry. The purpose of this study is to further analyze the plaques to determine specific locations and potential links to the cause of death in our human donor sample population. To address these questions, our team completed 30 full laminectomies from the cervical to the sacral regions. We observed plaques within 16 of our 30 donors. Plaques were predominantly located on the posterior side of the spinal cord, specifically in the thoracic and lumbar regions. Of note, we saw an increased prevalence of plaques when "neoplasm" was mentioned in the cause of death. By performing this study, it will help increase our understanding related to the prevalence of the plaques and their potential impact on patients.

Nicole Neiman, Justinas Joksas, Erica Sickel, Anne Marie Zeller

Health Professional Students Receiving Osteopathic Manipulative Treatment: An Interdisciplinary and Interprofessional Activity to Improve Attitudes Towards Osteopathy and Interprofessional Collaboration

Introduction: Perceptions and attitudes towards osteopathic manipulative medicine (OMM)/osteopathic manipulative treatment (OMT) by health professionals can affect interprofessional collaboration. This study aims to explore how receiving OMT (as a non-osteopathic medical student (OMS) health professional student) by 2nd year OMS impacts 1) their attitudes towards osteopathic medicine, 2) confidence relating to different applications of OMM, and 3) interprofessional collaboration. Methods: A pre-post study was conducted with 30 health professional students attending Student American Academy of Osteopathy sponsored interdisciplinary clinics. All participants completed a demographics/background survey, and pre-post surveys for Attitudes Towards Osteopathic Medicine Survey (ATOMS), understanding of OMM, and Interprofessional Attitudes Survey (IPAS) subscales: Teamwork, Roles, and Responsibilities (TRR), and Interprofessional Biases (IB). Paired t-tests were conducted.

Results: Analyses revealed the interdisciplinary OMT clinic improved attitudes towards osteopathic medicine ($p=0.002$), and increased confidence in understanding of OMM ($p<0.001$), discussing principles of OMM with patients ($p<0.001$), explaining OMM to someone unfamiliar with it ($p<0.001$), and recommending OMM as a pain management option ($p<0.001$). There were no statistically significant improvements in TRR and IB.

Conclusion: Study results demonstrate preliminary support for non-OMS receiving OMT in interdisciplinary clinics to improve their attitudes towards OMM, and confidence in different applications relating to OMM.

Dustin M. Nelson, Tony Harper, Adam Kolatorowicz, Jeffrey Chesnut, and Cory Buenting Gritton

Visuospatial Ability and Hands-On Ultrasound Training in Osteopathic Medical Students: A Pilot Study

Visuospatial ability (VSA) has been correlated with spatial anatomy knowledge in medical gross anatomy in multiple studies and VSA has been associated with ultrasound (US) performance and other clinical tasks. In this IRB-exempt pilot study, a prospective cohort convenience sample of second-year osteopathic medical students at Lincoln Memorial University – DeBusk College of Osteopathic Medicine-Knoxville participated in a one-day hands-on US training assisted by trained facilitators. Pre-US training baseline data was collected using a survey of US perceptions and previous experience, US and anatomy knowledge assessment quiz, Mental Rotation Test, and Lafayette Instrument Purdue Pegboard Test. Participants then completed four, 1-hour US sessions: 1) Introduction & Knobology, 2) Cardiac, 3) Abdominal, and 4) Pelvic. Post-US training data collection was performed using the same pre-training instruments. Finally, subjects finished a 1-hour extended Focused Assessment with Sonography for Trauma (eFAST) training followed by performance assessment. Five total participants completed the study. Data analysis indicated no significant difference between initial and final test variables ($p>0.05$). The results demonstrated no variables were significant predictors of eFAST exam performance. Further research with a larger sample size comprising multiple health professional programs is needed to accurately identify any relationship between VSA and US performance.

Christopher Nguyen and Justin Lapollo
Sustained Pain Relief for Chronic Pain Patients with Topical TMS and iTBS

The utilization of transcranial magnetic stimulation (TMS) in conjunction with iTBS (intermittent theta burst stimulation) is an emerging treatment modality for patients suffering from chronic pain. We report the case of a 27-year-old male with a history of herniated discs and chronic neuropathic pain secondary to a weightlifting injury in 2018. He trialed

multiple forms of conservative treatment including physical therapy, pregabalin, and underwent arthroscopic microdiscectomy with no sustained relief. During this time, the patient reports acts of daily living being impacted due to pain in his lower back, which he rated a consistent 7/10. After discussion with neurosurgery, he was presented with the option of subsequent surgery or epidural steroid injections for symptomatic relief; however, he preferred a more noninvasive approach. Following evaluation in our office, the patient agreed to trial a 6-week course of TMS followed by 20 additional sessions of iTBS treatment. By week 3 of his TMS treatment, patient was reporting 3/10 pain. Upon introduction of iTBS, patients pain subsided to 0.5/10. He continues to receive occasional booster treatments and at 6 month follow-up, he reports minimal pain to his back. This clinical trajectory underscores the efficacy of iTBS therapy in managing chronic lower back pain.

Kurtis Orrson and Muthu Dharmasena

Antimicrobial Properties of EuZnO(1hr), EuZnO(15min), ZnO, and CaF₂ Against Methicillin-Susceptible Staphylococcus aureus, Methicillin-Resistant Staphylococcus aureus, and Escherichia coli

Nanoparticles have shown promising antimicrobial potential to combat multi-drug resistant bacteria such as methicillin resistant *Staphylococcus aureus* (MRSA) and *Escherichia coli* (EC). Proposed mechanisms include interrupting the cellular membrane, protein/DNA synthesis, and generating reactive oxygen species. The aim of this research is to determine the antimicrobial activity of europium-doped zinc oxide (EuZnO), zinc oxide (ZnO), and calcium fluoride (CaF₂) nanoparticles against methicillin sensitive *Staphylococcus aureus* (MSSA), MRSA, and EC. Two-fold serial dilutions of EuZnO(1hr), EuZnO(15min), ZnO, and CaF₂ nanoparticles at concentrations of 12.5ppm-6,400ppm were tested against MSSA, MRSA, and EC using micro-broth dilution method. Minimal inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) were recorded for three trials. MIC was determined by turbidity. For

MBC, one loop taken from each well after MIC point was streaked on Tryptic Soy Agar (TSA) and incubated. EuZnO 1hr and 15min recorded the lowest MIC and MBC values of all respective nanoparticles. The average MIC of EuZnO (1hr/15min) was lower for MSSA and MRSA than for EC. However, the average MBC of EuZnO (1hr/15min) was similar when comparing all cultures. Results suggest that gram-positive bacteria are more susceptible to inhibition of growth by nanoparticles but require similar bactericidal concentrations to gram-negative bacteria.

Annemarie Phemister, Abbey Hinton, Lauren Phemister, James Carter, Erin Hood, and Jennifer Phemister

Treatment Options for Hypertriglyceridemia Pancreatitis

Hypertriglyceridemia pancreatitis is a complex etiology causing severe morbidity and mortality. The pathophysiologic process involves buildup of excess triglycerides and fatty acids in the vascular beds of the pancreas causing inflammation and ischemia. This can result from primary genetic predisposition or secondary lifestyle effects such as diabetes, alcohol use, or certain medications. A case of a 45-year-old female with past medical history of hypertension, hyperlipidemia, hypertriglyceridemia pancreatitis, and diabetes mellitus presented with concerns for persistent acute abdominal pain for the past 24 hours. She denied any fever or chills but had not been able to eat since the symptoms began. Upon workup, labs displayed elevated amylase, lipase, and triglycerides. CT with contrast showed diffuse fatty replacement in the liver and edematous changes surrounding the pancreas highly suspicious for pancreatitis. Patient received intravenous fluids, insulin, analgesics, bowel rest and admission to the intensive care unit. Over the course of 48 hours, the patient improved on insulin drip, was transferred to oral medications, and discharged within a few days. This study will review the successful treatment options to adequately control this unique condition.

Jessica Samuel and Adam Gromley
Analyzing the Role of Centrosome Proteins in the Development of Melanoma

This project aims to identify any potential roles that specific centrosome proteins play in disrupting cell cycle controls responsible for the development of melanoma. Our preliminary results suggest that the loss of the centrosome protein, centriolin, leads to cell cycle arrest in rhabdomyosarcoma cells, a type of soft tissue sarcoma, and either induces programmed cell death or prevents the cells from differentiating. As a follow-up to these studies, we wish to determine if these effects are specific to centriolin or if the disruption of other centrosome proteins produces the same results in melanoma cells.

Ian Schultheiss, Sharon Adekanabi, and Brent Thompson

Fenestration of the Brachial Vein by the Posterior Circumflex Humeral Artery

During a routine anatomic dissection in a Medical Gross Anatomy course, we discovered the posterior humeral circumflex artery (PHCA) fenestrating the brachial vein in a human donor. Limited documentation of this variation was found during literature review.

Ian Schultheiss, Tyler Cameron, Cody Carr, Conor McGrew, Eric Moberg, and John Gassler

Efficacy of 3D Printed Models in Anatomic Education

Background: Clinical Correlates are important learning objectives that are essential concepts for professional healthcare students. With the wide availability of 3D Modeling and 3D printers, it is now feasible to print common clinical correlates to assist students in understanding the anatomic relationships involved. For example, lesions of the posterior circumflex humeral artery are classically associated with surgical neck fractures of the humerus. We aim to assess the efficacy of a novel 3D printed patient model of a surgical neck fracture.

Objectives: We aim to assess the efficacy of a novel 3D printed patient model of a surgical neck fracture in an examination environment. We also hoped to show that 3D printed anatomic models are a more cost-effective and more widely available option for anatomical education

Results: Using a T-test, no significant differences were found in overall performance between groups. Two models showed no differences in performance, and the undersize arm performed significantly worse.

Conclusions: 3D printed models of common Clinical correlates are a comparable or potentially more effective method of identifying anatomic structures.

Stephen Scott

Aortic Aneurysm in the Context of Type IV Loeys-Dietz Syndrome: a Case Report

We present a 45-year-old male diagnosed with pathogenic TGFB2 variant consistent with Loeys-Dietz Syndrome (LDS), a recently discovered autosomal-dominant connective tissue disorder with various musculoskeletal and extracardiac vascular manifestations. Clinical features include rapidly progressing aortic aneurysms, arterial tortuosity, and marfanoid habitus, with other notable physical findings. Lesser-known symptoms include unexplained sensorineural or conductive hearing loss, which could be indicative for screening for LDS in *younger patients*. Aortic dissection is the leading cause of death in LDS patients, and current outpatient management is multi-disciplinary for strict cardiovascular optimization. This patient with history of progressive sensorineural hearing loss and unexplained nephropathy presented for testing after his son was diagnosed with LDS, and further workup revealed extensive valve-sparing aortic root dilation for which the patient elected aortic root repair. It is unknown whether this patient's hearing loss is due to LDS. Additionally, LDS has never been associated with nephropathy, however due to the pathogenic nature of the disease, we believe our patient would benefit from a renal biopsy to look for evidence of glomerular basement membrane disease. This case study suggests expanding the screening criteria for LDS would better

recognize patients without classic presentation that may have serious underlying cardiovascular disease.

Jessica Rosner, Shalin Naik, Ethan Thakran, Srikethan Mahavadi, and Sarah Kemp

Antiproliferative effects of Dutasteride and Bardoxolone-methyl (CDDO-me) combination in Prostate Cancer (PCa) cells

Prostate cancer (PCa) is a leading cause of cancer-associated morbidity and mortality in men in the United States. Androgens play a pivotal role in prostate cancer's growth. Monotherapies have resulted in androgen resistant tumors and recurrence of highly aggressive PCa. We investigated the combined effects Enzalutamide, Dutasteride, and CDDO-me have towards maximum tumor suppression. Objectives: A combination treatment regimen of the three drugs tested synergistic effects on PCa growth.

Methodology: The PCa C4-2B cell line in 24 well plates (~0.25 x 10⁶ cells/well) overnight was exposed to Enzalutamide (0-50 μ M), CDDO-Me (0-500 nM) or Dutasteride (0-62.5 μ M), individually or in different two/three-drug combinations of varying concentrations. Cell viability was measured after 48 hours with XTT. Cells were washed with phosphate buffered saline and images were captured. Percent change in cell proliferation was calculated and statistical analysis was done.

Results: Enzalutamide did not show significant suppression in cell growth, but CDDO-me and Dutasteride were cytotoxic. Subsequent proliferation assays were done with lower doses of the agents.

Conclusion: In vitro experiments showed that two clinically approved anti-cancer agents that target AR signaling at lower doses achieve significantly anti-proliferative effects in PCa cells and may decrease side-effects to suppress prostate tumors.

Kaitlin Sons and Anne Marie Zeller

An Osteopathic Approach to COVID-19 Patient Care

Introduction: Osteopathic manipulative techniques (OMT) have historically been

beneficial to improving infectious disease prognosis. OMT is believed to be used in adjunct with pharmacologic management to potentiate healing and support symptom management in COVID-19 patients. This study aims to identify current research regarding manipulative techniques for COVID patients through application of the five models of osteopathic medicine with treatment protocol development.

Methods: A search utilizing PubMed, Journal of Osteopathic Medical Association, and Google Scholar was conducted with searching "osteopathic manipulative techniques", "cranial", "therapy", "nutrition" or "physiotherapy" with "COVID". Articles were reviewed and cross referenced to develop a treatment protocol.

Results: Treating COVID-19 utilizing the 5 models of osteopathic medicine includes: rib raising, MFR of the respiratory diaphragm, CV4 hold, sutural BMT, lymphatic pumps, vitamin supplementation, and mindfulness therapy.

Conclusion: Utilizing the five osteopathic models of treatment can provide adjunctive care to patients with COVID-19. As an adjunctive treatment, OMT has been shown to decrease healing time and decrease severe outcomes and length of stay in hospitals. More research is needed to understand OMT's effect in COVID patients.

Max Spitzer, Hannah Diehr, Mohamed Ibrahim, and Stan Kunigelis

CGM: A Simple, Economical, and Efficient Assay for Isolating Copepod Gut Microbiome

Investigating the gut microbiome of small, marine invertebrates is every bit as important as studying the small invertebrates themselves. This allows researchers to unravel the intricate threads of an ecosystem's food chain, commensal organisms, and provides a way for researchers to move toward an (eco) systems-based approach, as opposed to studying organisms in isolation. The food chain provides an excellent axis upon which to understand the impact of exogenous forces, such as global warming and pollution, on marine ecosystems. Tools such as NextGeneration Sequencing (NGS), ribosomal RNA (rRNA) assays, and

marine metabarcoding have made this easier than ever. However, a significant hurdle to adopting a holistic, systems-based approach is a straightforward, efficient, and cost-effective method for isolating the copepod gut microbiome. In our previous work, we introduced the CAROLE Assay (Copepod Analysis Retaining (the) Outermost Lining (for) Evaluation). Now, we are pleased to announce another milestone: the development of the Copepod Gut Microbiome (CGM) assay, which allows researchers to preserve gut contents for downstream analysis, and by doing so brings the marine ecosystem to the laboratory bench.

Srivastava Niharika and Sushana Sudhi

Investigation of Methylsulfonylmethane (MSM) on Lymphatic Endothelial Cell Function

The lymphatic system plays a key role in homeostasis by maintaining the fluid balance and immune response. Pathologic inflammatory signaling results in disruption of lymphatic function and can be linked to many disease states, including obesity and insulin resistance. The objective of this project is to determine whether methylsulfonylmethane (MSM), an anti-inflammatory compound, demonstrates protective effects and improves lymphatic epithelial cell (LEC) permeability when faced with inflammatory exposure. We hypothesize that the approach of reversing lymphatic dysfunction with anti-inflammatories, such as MSM, can be a therapeutic approach and prevent the pathologic effects related to lymphatic dysfunction. LECs will be treated with TNF- α , TNF- α + MSM, and MSM alone. Primary outcomes will include measures of cell barrier function by transepithelial electrical resistance (TEER) and transwell permeability assay, and assays of cell death and viability. Additionally, mRNA transcript expression of inflammatory markers will be analyzed with real-time quantitative PCR. With our findings, this project has the potential to advance the understanding of the lymphatic system to further aid in prevention of cardiometabolic diseases.

Courtney Vanophem

Pediatric Wernicke's Encephalopathy Induced by Avoidant Food Intake Disorder

Wernicke's Encephalopathy (WE) is caused by a thiamine deficiency, commonly in patients with alcohol misuse disorder. Although rare, it's important to consider other options as an etiology such as, post-bariatric surgery and hyperemesis gravidum¹. Common nutritional deficiencies within the pediatric population should also be considered due to the higher prevalence of eating disorders, especially within the 13–18-year-old age group². The “classic triad” of WE; gait, ocular, and memory abnormalities, can easily be diagnosed and treated, but understanding the etiology is more difficult. In this patient presentation, she had the classic WE triad that, for unknown reasons, did not improve with thiamine supplementation. Upon a detailed history during the second hospital admission, the diagnosis of avoidant food intake disorder (AFID) was made. AFID is a newer addition to the DSM-5 and relatively unknown, but it can be concluded that early detection of any eating disorder is vital through a detailed history. From this case, we can learn that any pediatric patients with long-standing eating disorders should be screened for nutritional deficiencies to prevent complications, such as WE.

Megan L. Weidenbach

Cultured Lactobacillus crispatus Sourced From The Human Vulvovaginal Microbiome In The Process Of Novel Farmstead Cheese Making

The human vulvovaginal microbiome relies on the fermentative properties of Lactobacillus to inhibit the growth of opportunistic pathogens such as Candida albicans¹. These same properties are utilized to produce fermented foods such as cheese. Mixed-strained starter-cultures traditionally used in farmstead cheesemaking consist of, “Lb. helveticus, Lb. delbrueckii subsp. Lactis, and L. delbrueckii subsp. bulgaricus.”² These species perform lactic acid fermentation, giving the product its flavor.² Here, we explore Lactobacillus harvested from the human vagina in the context of farmstead cheesemaking to determine if crossover exists between the two environments. A sample derived from the vagina of the subject, a 21-year-old female experiencing secondary amenorrhea as a result of oral

contraceptives, was cultured on MRS agar and incubated at 37°C in microaerophilic conditions. *Lactobacillus* spp. colonies were identified via gram stain and PCR testing confirmed the sample was dominated by *Lb. crispatus*. A starter culture was developed by inoculating the isolated *Lactobacillus* into 120 mL of pasteurized milk incubated at 37°C over 72 hours. The use of a traditional farmstead cheese recipe resulted in approximately 400 grams of product. This approach to determining the production value of human-sourced *Lactobacillus* provides insight into the versatility of this genus.

Hannah Welp and Lori McGrew

Anxiolytic Effects of Valerian Root on Zebrafish Species

Extracts from the plant *Valeriana officinalis* have been promoted for insomnia and anxiety among other uses. This project assessed the efficacy of valerian root supplements to reduce anxiety in *Danio rerio* as measured by the novel dive tank (NDT) paradigm. Commercially available extract of valerian root was dissolved in fish system water to a concentration of 10 mg/L. The zebrafish were immersed in the solution for 10 minutes, followed by a 10-minute resting period in fish system water. To collect the data, the zebrafish were then placed in the testing tank and recorded for seven minutes. The recordings were analyzed to determine velocity, mobility, and relative vertical position of the fish. The NDT recognizes the innate behavior of the fish in that vertical position in the testing tank correlates to anxiety as anxious fish will spend more time in the lower half of the tank. The results suggest that the zebrafish were more lethargic rather than less anxious. Since valerian extract includes components that increase GABA receptor activity, the sedative effect suggests that this dose may be more hypnotic than anxiolytic. To further test valerian root, lower dose concentrations can be used to determine if that shows improvement with anxiety.

Kristen Whitaker

Understanding the prominent factors causing work dissatisfaction and burnout in equine veterinarians

Objective: The objective of this study was to understand the prominent factors causing work dissatisfaction and burnout in equine veterinarians.

Sample: Thirty-seven equine veterinarians (current and former) were recruited via snowball and convenience sampling.

Methods: Semi-structured focus groups were used with questions on work history, work-life balance, and perceptions of equine practice. Transcripts were analyzed in Delve and coded in the context of the Conservation of Resources (COR) theory, which posits that completing work tasks requires multiple resources and replenishing these resources helps avoid stress and burnout. There are four main types of resources: object, condition, personal, and energy.

Results: Of the four types of resources in the COR theory, condition resources were the most frequently mentioned as causing work dissatisfaction. These included issues with discrimination due to factors such as age, race/ethnicity, and gender, unpredictable and long hours, and a heavy workload. Object resources, such as equipment, were rarely mentioned. Energy resources, including pay and student loan debt, were influential. Personal resources, such as traits like problem-solving and enjoyment with helping others, improved job satisfaction.

Clinical Relevance: This study highlights areas for intervention to improve the equine veterinary field, such as higher pay, rural practice incentives, and DEIB programs.

Scholarship from the Richard A. Gillespie College of Veterinary Medicine

Alexis Adams

Paws and Pricing: A Study on the Website Transparency of Veterinary Costs of U.S

This study investigates the transparency of veterinary service pricing online, utilizing a geographically stratified approach within the United States. The country is divided into four divisions based on the U.S. Census, with two randomized states selected from each division. As per Census definitions, five distinct zip codes are chosen within these states, comprising two urban, two rural, and one suburban area. The research aims to evaluate the extent of online veterinary service pricing information, considering geographic variations and demographic characteristics. By employing a randomized sampling strategy, the study seeks to provide a representative overview of transparency levels in different regions and community types. Services such as core vaccinations, nail trims, dental procedure, and sterilization procedures are looked for on the designated websites for that zipcode. Through this regional analysis, the research aims to contribute valuable insights into online transparency in veterinary medicine, offering implications for pet owners and practitioners. The findings of this study may guide efforts to enhance communication and trust within the veterinary industry, ultimately benefiting consumers in making informed decisions about their pets' healthcare across diverse geographic settings.

Alexandra Imbach

Veterinary Workforce Dashboard of Appalachia

The current shortage of rural and large animal veterinarians across all specialties reduces access to care and affects many facets of animal health and food and agricultural systems. Estimating workforce deficits is difficult but necessary to improve animal health and productivity, disease surveillance, and disaster

response and management. Past attempts to calculate veterinarian supply and demand have often reached different conclusions, likely due to differences in methods and lack of standardized definitions. In addition, equations, assumptions, and methods used to calculate supply and demand were not always reported in a transparent and reproducible way. We have previously shown a shortage of veterinarians in Appalachia, which inspired us to create a data-driven, online dashboard that quantifies veterinary full time equivalent (FTE) needs across 13 Appalachian states.

Devin Lynch and Mary Kabir

Investigative Dissection of a Neonatal Sperm Whale Head

Despite having a unique anatomy and unparalleled acoustic abilities, the anatomic study of sperm whales (*Physeter macrocephalus*) has been limited due to the logistical challenges posed by their colossal proportions. In 2002, a male calf beached at Gold Beach, Oregon, providing a unique opportunity for the preservation and study of this species. As only the skull and associated soft tissues were conserved, the aims of this study focused on the exploration of the nasal passages and preservation of gross anatomic structures. The nasal cavity was endoscopically explored and prepared for computed tomography imaging using barium sulfate contrast medium. Further study led to the gross dissection and formalin-fixed preservation of the spermaceti and junk organs, ocular tissues, nasal passages, and associated musculature, as well as the maceration of the exploded neonatal skull. Notable observations include the expansive capabilities of the nasal structures and the distinct asymmetry of the head. The future goals of this project include articulation of the neonatal skull guided via computed tomography three-dimensional modelling and the plastination of unique, sound-production organs. Preserved structures will be returned to the Marine Mammal Institute of Oregon State University for educational and research purposes.

Scholarship from the School of Medical Sciences

Nimit Patel

What is the most plausible mechanism for metformin related b12 deficiency disruptions of calcium mediated absorption or influence of the microbiome?

This review investigates the influence of long-term Metformin use on Vitamin B12 levels in type 2 diabetes patients and the clinical implications of potential Vitamin B12 depletion. Metformin, a first-line treatment for type 2 diabetes, has been associated with decreased Vitamin B12 absorption, leading to deficiency in some patients. Such deficiency can result in significant clinical issues, including neuropathy, neuropsychiatric disorders, and anemia, which can deteriorate the patient's quality of life. The review emphasizes the importance of monitoring Vitamin B12 levels in patients undergoing long-term Metformin therapy and suggests supplementation to mitigate the risks associated with its depletion. Through a systematic examination of existing studies, the review aims to provide a comprehensive understanding of the complex relationship between Metformin therapy and Vitamin B12 levels, guiding clinical practice and enhancing patient care.

NOTES

