



27TH ANNUAL ONE HEALTH SYMPOSIUM

14TH ANNUAL
PHI ZETA RESEARCH DAY



THEME: *Advancing One Health Through Technology*



MONDAY, SEPTEMBER 14, 2026

One Health Symposium | 9:00 a.m. – 5:00 p.m.



TUESDAY, SEPTEMBER 15, 2026

Phi Zeta Research Day | 9:00 a.m. – 5:00 p.m.



PATTERSON HALL AUDITORIUM

College of Veterinary Medicine
Tuskegee University

Dr. Mark A. Brown '86
10th President and CEO of Tuskegee University



Dr. Mark Brown was appointed the tenth president and CEO of Tuskegee University. His tenure began on July 1, 2024. Dr. Brown's selection was the first time in Tuskegee's nearly 143-year history that an alum was selected to lead the university. This retired Air Force Major General agreed to take the helm after the retirement of Dr. Charlotte P. Morris, the university's ninth president.

His extensive executive experience includes the Harvard University Kennedy School of Government, the University of Virginia Darden School of Business, and the Eli and Edythe Broad Academy for Urban School Superintendents, now hosted at the Yale School of Management. Dr. Brown, who received his bachelor's from Tuskegee in accounting in 1986, earned a Master's Degree in Public Administration from Troy University, a Master's of Strategic Studies from the Air Command and Staff College, a Master's in National Security Strategy from the National War College, and his doctorate in Education from Baylor University. His experience in education is varied and distinguished.

While a Major General in the Air Force, Dr. Brown served as Deputy Commander of Air Education and Training Command, Joint Base San Antonio-Randolph, Texas. AETC recruits, trains, and educates Air Force personnel. His command included the Air Force Recruiting Service, two numbered Air Forces, and two fully accredited graduate and doctoral degree-granting universities: Air University and the Air Force Institute of Technology. AETC operates more than 1,400 trainer, fighter, and mobility aircraft, 23 wings, 10 bases, and five geographically separated groups. The command trains more than 293,000 Airmen annually, with approximately 60,000 active-duty, Reserve, Guard, civilian, and contractor personnel.

After retiring from the Air Force with 32 years of service, Dr. Brown expanded his educational service as the chief operating officer of the U.S. Department of Education Office of Federal Student Aid, which had a lending portfolio of \$1.7 trillion equivalent to that of the nation's five largest consumer lending banks. As COO, he was responsible for all of the nation's Title IV funding. Most recently, he has served as president and chief executive officer of the Student Freedom Initiative based in Washington, D.C. The Student Freedom Initiative is the vision of billionaire philanthropist Robert F. Smith after his historic gift to eliminate the student loan debt of the Morehouse College class of 2019.

As the first President and Chief Executive Officer, he and his staff provide four components to 63 HBCUs, which also includes two Tribal Colleges and Universities and Minority Serving Institutions. The capabilities include agreements to fund any educational attendance requirements beyond what is paid for through Federal programs, such as Pell Grants, Work-Study, and Federal Student Loans. SFI is also focused on elevating the communities around its school by providing critical resources such as access to high-speed broadband, cybersecurity upgrades, affordable living spaces and solar energy.

Dr. Brown was commissioned through the Tuskegee University Air Force ROTC program in 1986. He served in comptroller, command, and staff positions at all U.S. Department of Defense levels, including two assignments as congressional liaison to the United States House of Representatives.

His global experience includes serving in the Philippines, Spain, England, Turkey and Iraq. In addition, he has commanded four times at ascending levels, deploying in support of operation Provide Comfort, and served as the Assistant Executive Officer for the 17th Air Force Chief of Staff. He was also the Financial Management Senior Military Assistant in the Office of the Secretary of Defense and Chief Financial Officer for Air Force Materiel Command, responsible for a portfolio greater than \$60 billion, 38 percent of the Air Force budget.

Dr. Brown is married to Gwendolyn Jackson Brown, his wife of 33 years. They have two adult children, Mark II and Michael.

Thierno Thiam, PhD

Provost and Senior Vice President for Academic Affairs



Dr. Thierno Thiam was selected as the new Provost and Senior Vice President for Academic Affairs for Tuskegee University, effective February 3, 2025.

Previously, Dr. Thiam served in several other capacities at Tuskegee University. His previous positions included the following: Special Advisor to two Tuskegee University presidents, a full tenured professor, a Chair of the Department of History and Political Science, and Co-Director of the Integrative Public Policy and Development PhD program.

Dr. Thiam returned to Tuskegee University to serve in his new position after serving as the Provost and Chief Academic Officer for Johnson C. Smith University in Charlotte, North Carolina. Dr. Mark A. Brown, 10th President and CEO of Tuskegee University, gave a powerful commission to Dr. Thiam as Provost/Senior Vice President for Academic Affairs to help move the university forward.

He said, “Dr. Thiam is empowered to do a full review of the Academic offerings at Tuskegee to ensure we remain aligned with societal trends in skills and employment needs in industry and government. In addition, Dr. Thiam will have an intense focus on our road map to being a high research-based university with R2 status as well as our desire to grow our undergraduate international student population.”

Dr. Brown has a “**Students First**” focus as the center platform of his Presidency and therefore Dr. Thiam has an intense focus on “**Students First**” in all initiatives he promotes as Provost and Senior Vice President for Academic Affairs.





COLLEGE OF VETERINARY MEDICINE
Office of the Dean



Dear Colleagues, Students, and Guests,

It is my pleasure to extend warm greetings on behalf of the Tuskegee University College of Veterinary Medicine as we proudly host our **27th annual One Health Symposium** and **14th annual Phi Zeta Research Day**. The One Health Symposium celebrates the interconnectedness of human, animal, and environmental health and the importance of collaborative approaches to addressing complex health challenges. This year's theme, **"Advancing One Health Through Technology,"** highlights the increasingly important role of technology and innovation in strengthening our ability to prevent disease, improve health outcomes, protect our environment, and respond to emerging health threats.

Technological advances are rapidly transforming veterinary medicine, human healthcare, public health, biomedical research, and environmental health. Artificial intelligence can translate to data analytics, advanced diagnostics, telehealth, precision medicine, disease surveillance, and other emerging tools which can provide new opportunities to better understand the connections among people, animals, and their shared environments. At the same time, these advances challenge us to consider how technology can be used responsibly, collaboratively, and equitably to improve health and well-being across communities.

We are especially proud to feature Phi Zeta Research Day as a platform for our students to showcase their scholarly work through oral and poster presentations. Their research, curiosity, and pursuit of new knowledge represent the future of veterinary medicine, biomedical research, and public health. We commend their accomplishments and encourage them to continue exploring innovative approaches that will contribute to scientific discovery and improve the health of animals, people, and communities.

These annual symposia reflect our College's commitment to advancing biomedical research, fostering interdisciplinary collaboration, and preparing future professionals to address evolving global health challenges. Throughout this event, distinguished speakers, faculty, students, researchers, and other participants representing a variety of disciplines will share knowledge, discoveries, and innovative approaches that demonstrate how technology can strengthen and advance the One Health mission. As a College, we remain committed to advancing interdisciplinary research, strengthening healthcare delivery, embracing innovation, and preparing the next generation of veterinarians, scientists, and public health leaders. This symposium provides an important forum to exchange ideas, explore emerging technologies, build meaningful partnerships, and envision new possibilities for advancing One Health.

I extend my sincere appreciation to the One Health Symposium Co-Chairs, Dr. Asseged Dibaba and Dr. David Hodge and the Phi Zeta Research Day Co-Chairs, Dr. Gemechu Wirtu and Dr. Sherein Salem, and the committee members, judges, speakers, faculty, students, participants, and attendees whose time, expertise, and dedication make this event possible. Thank you for joining us for this year's One Health Symposium and Phi Zeta Research Day. I look forward to the discoveries, meaningful discussions, and collaborations that will emerge as we collectively explore how technology can help shape a healthier future for animals, people, and our shared environment.

Sincerely,

Ebony Gilbreath, DVM, PhD, DACVP
Dean, Tuskegee University College of Veterinary Medicine

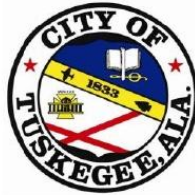
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Chris Lee is a proud native son of Tuskegee. He is a husband, a father, an entrepreneur, and a dedicated public servant currently serving as Mayor of the City of Tuskegee.

Mayor Lee was elected on September 23, 2025, and officially assumed office on November 3, 2025. Prior to his election as mayor, he served for 13 years on the Tuskegee City Council, most recently as Mayor Pro-Tem. Mayor Lee is a consistent advocate for the community and plays a hands-on role as a mentor and coach within the Tuskegee Parks and Recreation Department.

Before returning home to Tuskegee in 2012, where he became the youngest elected official in Macon County history, Mayor Lee interned at the White House Office of Presidential Correspondence under President [Barack Obama](#) and worked on Capitol Hill advocating for Historically Black Colleges and Universities.

Mayor Lee is a 2010 graduate of [Hampton University](#), where he was initiated into the Beta Chi Chapter of Kappa Alpha Psi Fraternity, Incorporated, in 2008. He also earned his Juris Doctor from [Faulkner University–Jones School of Law](#) in 2016.

Rooted in faith, driven by service, and inspired by the legacy of those who came before him, Mayor Chris Lee stands as a bridge between Tuskegee's proud past and its promising future, leading with purpose, vision, and a deep love for the city he calls home.



COLLEGE OF VETERINARY MEDICINE



Welcome to the “27th annual One Health Symposium”, ‘Advancing Health with Health Technology’, where we embrace the One Health approach to address the interconnected challenges facing people, animals, and our shared environment. As we convene today, we recognize that the health of our communities is inextricably linked to the resilience of our ecosystems and the well-being of the animal populations with which we share this planet.



Our gathering is driven by the urgent need to bridge the gap between scientific innovation and policy implementation. We have brought together decision makers, technical experts (from community organizations and state and federal agencies), academicians, researchers, graduate students, vendors, and community leaders/members. We are here to explore how transformative emerging digital tools—including artificial intelligence, drone-based surveillance, sterile insect techniques, telehealth, genomics, and GIS—can be integrated to tackle complex threats like vector-borne diseases and climate-related health risks. Our agenda reflects the multidisciplinary nature of this challenge, bridging the gap between cutting-edge research and the realities of frontline care. By moving beyond siloed approaches, we seek to strengthen our surveillance systems, foster the multidisciplinary partnerships necessary for early detection and coordinated response, and a deep understanding of the structural infrastructure—the data governance, workforce readiness, and clinical workflows—necessary to turn technological promise into real-world impact.

As we explore these technologies, we remain grounded in the goal of delivering consistent, expert, and predictive care for all. Innovation in this space is not merely technical; it is a commitment to creating sustainable, preventive measures that protect our global public goods. Whether we are mapping disease patterns to inform planning or utilizing genomics to understand pathogen persistence, our shared goal remains the same: to build a more resilient, technology-enabled future. Thank you for your dedication to this holistic vision; let us use this time to learn, collaborate, and define the next generation of public health strategies.

We wish to acknowledge the support of Dr. Mark Brown, President, Tuskegee University, and all his Cabinet and staff members, Dr. Ebony Gilbreath, Dean, College of Veterinary Medicine, Tuskegee University, and Dr. Cordelia Nnedu, Dean, College of Nursing and Allied Health. Special thanks are due to Ms. Beatrice Frazier, Ms. Karen Hopkins, and all the staff of Macon County Health Care Administration.

Sincere and heartfelt thanks are due to the following individuals for their support during the planning phase of the Symposium: Dr. Temesgen Samuel, Associate Dean for Research and Advanced Studies; Dr. Torhonda Lee, Head, DGPH; and Dr. Brandon Insome, Assistant to the Director, National Center for Bioethics, Tuskegee University. Thank you, our speakers, for your dedication to this vital work. Today, we move beyond asking whether we should use innovative tools, and instead focus on these solutions safely, equitably, and at scale within our existing health systems. Together, let us leverage this opportunity to build a more resilient, technology-enabled public health future. Sincerely,

David A. Hodge, Sr., Ph.D., D. Min., M.Ed., M.T.S.,
Director (Interim), The National Center of Bioethics

Asseged B. Dibaba, DVM, MSc (Vet. Epi.)
Associate Professor, DGPH & Pathobiology

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TUSKEGEE
UNIVERSITY
COLLEGE OF VETERINARY MEDICINE



We are pleased to welcome you to the 14th Annual Phi Zeta Research Day, to be held on September 15, 2026, in conjunction with the 27th Annual One Health Symposium at the Tuskegee University College of Veterinary Medicine (TUCVM).

This year's theme, "Advancing One Health Through Technology," highlights the growing impact of innovation and emerging technologies on veterinary medicine, biomedical research, education, and the health of animals, humans, and the environment. From artificial intelligence and digital technologies to innovative approaches in research, diagnostics, and education, these advances are creating new opportunities to address complex One Health challenges.



Phi Zeta Research Day provides an important platform for our DVM and graduate students, faculty, and researchers to present their scholarly work, exchange scientific ideas, and strengthen interdisciplinary collaboration. Through oral and poster presentations, our students will showcase research across a broad range of scientific disciplines while developing the communication and professional skills essential to their future careers.

We are also delighted to welcome our invited speakers, whose expertise will bring valuable perspectives on emerging technologies, innovation, and their responsible application in veterinary medicine, research, and education. Their participation enriches the scientific program and provides our students and faculty with opportunities to engage with leaders and innovators beyond our immediate academic community.

We extended a warm invitation to faculty, staff, students, alumni, collaborators, industry partners, and friends of Tuskegee University to join us in celebrating research and discovery. Whether presenting research, mentoring students, judging presentations, participating as a sponsor, or simply attending, your involvement contributes to the collaborative spirit and success of Phi Zeta Research Day.

We are sincerely grateful to our faculty mentors, judges, invited speakers, sponsors, committee members, staff, and volunteers whose commitment and support make this event possible. Most importantly, we congratulate our student researchers for their hard work, curiosity, and dedication to advancing scientific knowledge.

We look forward to welcoming you as we celebrate research excellence, encourage new collaborations, and explore how technology can help shape the future of One Health.

Best regards,



Dr. Gemechu Wirtu
Co-Chair Phi Zeta Research Day
Professor
Department of Biomedical Sciences



Dr. Sherein Salem
Co-Chair Phi Zeta Research Day
Associate Professor
Department of Pathobiology

KNOWLEDGE - LEADERSHIP - SERVICE
Tuskegee, Alabama 36088

27th Annual One Health Symposium

Theme: Advancing One Health Through Technology

Tuskegee University, College of Veterinary Medicine

Monday, September 14, 2026

TIME	SPEAKERS
9:00 am – 9:05 am	Opening Session: Co-Chairs, Asseged Dibaba , DVM, MSc, Associate Professor, Department of Graduate Public Health, Tuskegee University and David A. Hodge, Sr. , Ph.D., D.Min., M.Ed., M.T.S, Interim Director, Lead Ethicist, Research Professor, National Center for Bioethics in Research and Health Care, Tuskegee University
9:05 am – 9:20 am	• Greetings: Mark Brown, PhD, President, Tuskegee University • Greetings: Thierno Thiam, PhD, Provost & VP Academic Affairs, Tuskegee University • Welcome: Ebony Gilbreath, DVM, PhD, DACVP, Dean, CVM, Tuskegee University • Greetings: Honorable Frank “Chris” Lee, Mayor, City of Tuskegee
	SESSION I: AI, Drones, Sterile Insect (SIT) Technologies Moderator: Robin Burke , Director of Comparative Medicine Resource Center, College of Veterinary Medicine, Tuskegee University
9:20 am – 10:00 am	Keynote Speaker: David A. Hodge, Sr. , Ph.D., D.Min., M.Ed., M.T.S, Interim Director, Lead Ethicist, Research Professor, National Center for Bioethics in Research and Health Care, Tuskegee University <i>The Algorithmic Belmont Problem: From Human Subjects to Human Beings in the Ethics of Artificial Intelligence</i>
10:00 am – 10:25 am	Adrienne Dunham , DVM, MPH, DACVPM, USDA Animal and Plant Health Inspection Service’s Office of International Services <i>Control and Eradication of New World Screwworm in the Americas</i>
	SESSION II: Genomic Research & Biotechnology Innovation Moderator: Tomeshia Hubbard , DVM, Assistant Clinical Professor, Veterinary Dermatology Section Chief, Community Practice and Shelter Medicine, College of Veterinary Medicine, Tuskegee University, Owner Alabama Veterinary Allergy and Dermatology Service
10:25 am – 10:50 am	Deepa Bedi , MD, PhD, Professor and Director, Center for Biomedical Research, College of Veterinary Medicine, Tuskegee University <i>Building Genomic Research Capacity at Tuskegee: Workforce, Community, and Health Disparities</i>
10:50 am – 11:00 am	BREAK – VISIT VENDORS TABLE AND POSTERS
11:00 am – 11:30 am	Marceline Egnin , PhD, Professor, Plant Biotech & Genomics Research Laboratory, Department of Agricultural & Environmental Sciences (DAES), College of Agriculture, Environment & Nutrition Sciences (CAENS), Tuskegee University <i>Advancing One Health Through Biotechnology Innovation, Public Engagement, and Regulatory Reform</i>

	SESSION III: Disease Mapping and Climate Analytics Moderator: Deja Perkins, PhD, Assistant Professor of Forestry & Extension Forestry, Wildlife, Fisheries Program, Department of Agriculture & Environmental Science Tuskegee University
11:30 am – 11:55 am	Alexis Hynes, MPH, Epidemiologist, and Jasmine Kennedy, MPH, Epidemiologist, Infectious Diseases and Outbreaks Division, Alabama Department of Public Health <i>Mapping the Connections: Disease, Environment, and One Health</i>
11:55 am – 12:20 pm	Gamal El Afandi, PhD, Professor, Department of Agricultural & Environmental Sciences (DAES), Tuskegee University <i>Leveraging Climate Analytics, Artificial Intelligence, Environmental Monitoring, Remote Sensing, and Predictive Modeling for Climate-Resilient Public Health</i>
12:20 pm – 1:10 pm	LUNCH BREAK – VISIT VENDORS TABLE AND POSTERS
1:10 pm – 1:30 pm	Recognition of Vendors: Isabella Burnett, MPPA, CMA, CPhT, Director, Holistic Campus Wellness, Tuskegee University
	SESSION IV: Tele(mental) Health and Telemedicine Moderator: Cordelia Nnedu, PhD, APRN, CNM, WHNP-BC, ANEP, FAAN, Dean and Professor, School of Nursing and Allied Health, Tuskegee University
1:30 pm - 1:55 pm	Bernice L. Frazier, B.S., Chair, Macon County Health Care Authority (MCHCA) <i>Telehealth in Macon County and Surrounding Rural Areas: A Presentation of Rural Access, Coordination and Care Across the Lifespan</i>
1:55 pm - 2:20 pm	Angel Walker, MS, PhD, Macon-Russell Community Action Agency, Inc., Strategic Training and Resource Solutions (STARS) <i>Telehealth: Closing Gaps in Rural and Underserved Care</i>
2:20 pm - 2:45 pm	Lloyd Sirmons, Georgia Rural Health Association (GRHA) and the Southeastern Telehealth Resource Center (SETRC) <i>Telehealth and AI: The Next Evolution of Virtual Care</i>
2:45 pm – 3:00 pm	BREAK – VISIT VENDORS TABLE AND POSTERS
3:00 pm - 3:25 pm	Seli Fakorzi, LPC-S, Director, Mental Health Operations, TimelyCare <i>Mental Health at the Speed of Student Life</i>
	SESSION V: Community Session Moderator: Kim R. Ortiz, Ed.S., M.A., M.P.A., Director, Alumni Engagement, College of Veterinary Medicine, Tuskegee University
3:25 pm - 4:50 pm	<i>The Role of Health Technologies in Advancing Health in Underserved Communities: Availability/Access, Perception, Adoption, and Ethical Viewpoints</i> Panelists • Bernice L. Frazier, Macon County Health Care Authority • David A. Hodge, Sr., National Center for Bioethics in Research and Health Care • Angel Walker, Macon-Russell Community Action Agency, Inc. • Marcelline Egnin, (CAENS), Plant Biotech & Genomics Research Laboratory
4:50 pm - 5:00 pm	Closing Remarks: Co-Chairs: Asseged Dibaba DVM, MSc and David A. Hodge, Sr., PhD, D.Min., M.Ed., M.T.S.

14th Annual Phi Zeta Research Day

Theme: Advancing One Health Through Technology

Tuskegee University, College of Veterinary Medicine

Tuesday, September 15, 2026

TIME	SPEAKERS
9:00 am – 9:05 am	Opening Remarks Co-Chairs: Gemechu Wirtu , DVM, PhD, Head Department of Biomedical Sciences, Professor, College of Veterinary Medicine, Tuskegee University Sherein Salem , BVSc, MVSc, PhD, Associate Professor, Department of Pathology, College of Veterinary Medicine, Tuskegee University
9:05 am – 9:10 am	Welcome: Ebony Gilbreath , DVM, PhD, Diplomate-ACVP, Dean, Tuskegee University College of Veterinary Medicine
9:10 am – 9:40 am	Asim Ali , PhD, Executive Director, Biggio Center for the Enhancement of Teaching Learning, Auburn University <i>Preparing the Next Generation for An Ai-Enabled One Health Future</i>
9:45 am – 10:15 am	Ryan Gibson , DVM, M Ed, DACVIM, Veterinary Educator & Neurologist, Auburn University <i>Responsible Use and Critical Evaluation of Emerging Technology in Veterinary Medicine and Research</i>
10:20 am – 10:35 am	Alexis Smith , BS, MPH, Interdisciplinary Pathobiology PhD Graduate Student, College of Veterinary Medicine, Tuskegee University <i>Assessing Tick-Borne Rickettsia Risk in Alabama: Implications for One Health</i>
10:35 am – 10:50 am	Fentahun Abate , DVM, MSc, Interdisciplinary Pathobiology PhD Graduate Student of Veterinary Medicine, Tuskegee University <i>Characterization of the Origin and Alteration in Six2 Progenitor Derived Gastric Mesenchymal Cells in a PKA Driven Gastric Preneoplasia Model</i>
10:50 am – 11:00 am	BREAK
11:00 am – 12:00 pm	Keynote Speaker: Michael Q. Bailey DVM, DACVR, AAAS/AVMA Fellow, Immediate - Past President American Veterinary Medical Association <i>One Health in Action: The Essential Role of Veterinarians and Veterinary Team as One Health Caregivers</i>
12:00 pm – 1:30 pm	LUNCH BREAK AND POSTER PRESENTATIONS
1:35 pm – 1:55 pm	Kailee Pierce , 3 rd Year Veterinary Student, University of Georgia, College of Veterinary Medicine, Department of Small Animal and Surgery, Athens, GA <i>3D Virtual and Printed Models in Veterinary Education: Improving Echocardiogram Interpretation of the Feline Heart</i>
1:55 pm – 2:35 pm	Hibret Addisu , DVM, MSc, PhD, DVSc, ACVP, Director of Pathology, Clinical Pharmacology and Safety Sciences, AstraZeneca <i>Within and Beyond the Scope: The Pathologist in the Pharmaceutical Industry</i>

2:35 pm - 2:50 pm	BREAK
	Tuskegee Veterinary Scholars Program (TVSP) Summer Research Student Speakers
2:50 pm – 3:10 pm	Khori Smith , 2 nd Year DVM Student, College of Veterinary Medicine, Tuskegee University <i>The Pathophysiological Significance of Erythrocyte Deviations in Veterinary Peripheral Blood Assessments</i>
3:10 pm – 3:30 pm	Jenima Fertil , 2 nd Year DVM Student, College of Veterinary Medicine, Tuskegee University <i>Gremlin1 Overexpression in Six2⁺ Nephron Progenitors Causes Premature Exhaustion of the Nephrogenic Zone</i>
3:30 pm – 3:50 pm	Dheaven Angeletti , 2 nd Year DVM Student, College of Veterinary Medicine, Tuskegee University <i>Evaluating the Mammary Gland and the Impact of Staphylococcus Aureus Mastitis</i>
3:50 pm – 4:10 pm	Dorian McFarley , 2 nd Year DVM Student, College of Veterinary Medicine, Tuskegee University <i>Surveillance of Norovirus in Vegetables, Stagnant Water, and Sewer in Selected Counties in Alabama</i>
4:10 pm – 4:30 pm	Gerard J. Jefferson , 2 nd Year DVM Student, College of Veterinary Medicine, Tuskegee University <i>Metagenomic Characterization of Antibiotic Resistance Genes in Lake Tuskegee</i>
4:30 pm – 5:00 pm	Awards and Closing: Co-Chairs: Gemechu Wirtu , DVM, PhD and Sherein Salem , BVSc, MVSc, PhD



One Health Symposium Keynote Speaker



David Augustin Hodge, Sr., PhD, D.Min., M.Ed., M.T.S.,
National Center for Bioethics in Research and Health Care, Tuskegee University

Dr. David Augustin Hodge, Sr. is Interim Director, Lead Ethicist, and Research Professor at the National Center for Bioethics in Research and Health Care at Tuskegee University and Editor of the *Journal of Healthcare, Science, and the Humanities*. A philosopher, theologian, educator, and bioethicist, his scholarship examines the intersections of race, health, ethics, structural injustice, empathy, care, and institutional trustworthiness. Dr. Hodge plays a central role in the development of the Tuskegee Report, a contemporary reconsideration of the limitations of the Belmont framework and the ethical obligations owed to human beings and communities affected by research and public-health institutions. His work in Black Bioethics advances a relational approach to justice attentive to history, power, vulnerability, and community. He previously served as Visiting Faculty-in-Residence at Harvard Medical School's Center for Bioethics and serves on the Board of Directors of Public Responsibility in Medicine and Research (PRIM&R).

The Algorithmic Belmont Problem: From Human Subjects to Human Beings in the Ethics of Artificial Intelligence

Artificial intelligence ethics increasingly relies on principles such as justice, autonomy, transparency, accountability, and beneficence, yet these principles often remain difficult to operationalize and may obscure the institutional and historical conditions in which AI systems act. This talk names that problem the Algorithmic Belmont Problem: the tendency to treat ethical principles and procedural compliance as sufficient evidence of justice. Drawing on the Tuskegee Report, Black Bioethics, pragmatic ethics, and care ethics, I argue that AI ethics must move from protecting abstract algorithmic “subjects” toward recognizing historically situated human beings. Ethical evaluation should therefore examine not only technical fairness or accuracy, but also structural vulnerability, institutional power, historical moral memory, relational accountability, community participation, and repair. I propose a Human-Being Standard for AI ethics that asks how algorithmic systems affect persons embedded in unequal social worlds and whether their deployment contributes to genuinely just, trustworthy, and humane institutions in lived practice.



One Health Symposium Speakers



Adrienne Dunham, DVM, MPH, DACVPM

USDA Animal and Plant Health Inspection Service's Office of International Services

Dr. Adrienne Dunham is a Critical Issues Manager within USDA Animal and Plant Health Inspection Service's Office of International Services. She is currently supporting the Panama – U.S. Commission for the Eradication and Prevention of Screwworm in Livestock (COPEG) in Pacora, Panama. In her current detail, she assists the Office of the Deputy Administrator in advancing COPEG's General and Technical Directorate's goals to ensure operational continuity and technical excellence for New World Screwworm control and eradication. Dr. Dunham has a strong background in executive leadership support, incident management, and international program development. She previously served as Deputy Incident Commander for the NWS outbreak response and has held key leadership positions in APHIS International Services, including Chief of Staff and Deputy Chief of Staff, Branch Chief for the International Technical and Regulatory Capacity Building/APHIS International Visitors Center, and as Critical Issues Manager. Her expertise covers project and program management, regulatory oversight, supervisory leadership, technical assistance, and promoting resilience and innovation in international agricultural systems. Dr. Dunham is a proud graduate of Tuskegee University, holding a Bachelor of Science in Animal and Poultry Sciences and a Doctor of Veterinary Medicine degree. She earned a Master of Public Health at the University of Iowa and is a Diplomate of the American College of Veterinary Preventive Medicine. Dr. Dunham is originally from Birmingham, Alabama.



Deepa Bedi, MD, PhD

Center for Biomedical Research, College of Veterinary Medicine, Tuskegee University

Dr. Deepa Bedi holds the position of Professor at the College of Veterinary Medicine, Tuskegee University (TU) and serves as Director of Center for Biomedical Research at TU. She earned her MD degree from Tashkent State Medical Institute (TASHMI) in Tashkent, Uzbekistan, and completed her PhD at Auburn University in 2007. Dr. Bedi has been at the forefront of breast cancer disparity research at Tuskegee University for over 10 years. Her pioneering work has garnered substantial funding from a diverse array of organizations, including NIH, NIGMS and BCRFA, totaling more than \$40M. She proudly serves as a Principal Investigator of the Research Centers at Minority Institutions (RCMI) at TU and has been recently funded to open a "Carver Genomic Research Center" at TU.



Marceline Egnin, PhD

Plant Biotech & Genomics Research Laboratory, Department of Agricultural and Environmental Sciences (DAES), College of Agriculture, Environment & Nutrition Sciences (CAENS), Tuskegee University

Dr. Marceline Egnin's research centers on plant biotechnology and biosafety, genetic engineering, phenomics, and biopharming, focusing on areas such as plant development, tissue culture, somatic embryogenesis, regeneration, agricultural molecular genetics, bioengineering & CRISPR gene editing. Some of her notable research includes genome structure/sequencing of disease-resistant motifs, development of high-protein sweet potato

lines to provide food for astronauts in the Bioregenerative Life Support Systems for Human Exploration of Space program, establishment of the plasmid-based & RNP-based CRISPR/Cas9 system in sweet potato, efficient editing of sweet potato *ibPDS*, & *ibeIF(iso)4E* Family. These have been presented at national & international conferences and published in peer-reviewed journals. One of her key interests is the expression of valuable agronomic traits and bioactive products in transgenic plants.

Dr. Egnin is the recipient of several awards including: 2026 SIVB Distinguished Scientist, Outstanding Faculty Performance Award in Research, Learning & Service; Sigma-XI Russel Brown Outstanding Honor Research Award; The Honor Society of Agriculture; USDA/CSREES: Group Honor Award for Professional Excellence in Research & Outreach, & Invited Success Stories; Salzburg Fellow, & many more. She is deeply committed to education and has established the acclaimed Innovative Plant Breeding Experiential Education & Training initiative for Minority undergraduates (iBREED) and serves as a Board member of the Council of Agricultural Science & Technology (CAST) & the Plant Breeding Coordination Committee (PBCC). Her involvement in initiatives like FNS at Tuskegee University aims to address health & nutritional disparities in access to training & research experience, particularly for underserved communities.



Alexis Hynes, MPH

Alabama Department of Public Health

Alexis Hynes, MPH, is a public health epidemiologist with the Alabama Department of Public Health (ADPH), specializing in infectious disease epidemiology, vector-borne disease surveillance, outbreak response, and One Health. She currently serves as a Flexible/Vector-Borne Epidemiologist and leads workforce development activities while supporting statewide vector-borne disease surveillance, wastewater activities, outbreak investigations, and One Health initiatives.

Throughout her career, Ms. Hynes has led and supported more than 124 outbreak investigations and has facilitated statewide collaboration among public health professionals and partners across human, animal, and environmental health sectors. She has played an active role in advancing Alabama's One Health efforts, including co-leading the establishment of the Alabama One Health Work Group. Her work focuses on strengthening surveillance, fostering multidisciplinary collaboration, and translating epidemiologic information into meaningful public health action.

She is actively engaged with national public health organizations and multidisciplinary workgroups, including the Council of State and Territorial Epidemiologists (CSTE), National Association of Vector borne Disease Control Officials (NAVCO), and the Association of State and Territorial Health Officials (ASTHO) One Health initiative. Ms. Hynes has presented at national, regional, and state conferences and symposiums, including CSTE, InFORM, Alabama Vector Management Society, CDC Vector Week, and the Tuskegee One Health Symposium.



Jasmine Kennedy, MPH

Alabama Department of Public Health

Jasmine Kennedy is an epidemiologist with the Alabama Department of Public Health's Infectious Diseases and Outbreaks Division. She holds a Master of Public Health from Liberty University and a Bachelor of Science in Health Education from the University of South Alabama. Her expertise includes vector-borne diseases, infectious disease surveillance, data analysis, and outbreak investigations involving foodborne, waterborne, respiratory, and multidrug-resistant organisms. Ms. Kennedy is actively engaged in national public health

organizations and multidisciplinary workgroups, including the Council of State and Territorial Epidemiologists (CSTE), and the Association of State and Territorial Health Officials' (ASTHO) One Health initiative. She has presented findings from outbreak investigations at national, state, and regional conferences, contributing to the advancement of infectious disease surveillance and public health practice.



Gamal El Afandi, PhD

Department of Agricultural & Environmental Sciences (DAES), Tuskegee University

Dr. Gamal El Afandi serves as a Professor of Meteorology, Climate Science, and Environmental Sciences at Tuskegee University, bringing over 30 years of expertise in atmospheric science, climate research, and environmental modeling. His interdisciplinary research synthesizes climate analytics, artificial intelligence (AI), environmental monitoring, remote sensing, and predictive modeling to tackle intricate challenges at the nexus of climate variability, sustainability, public health, and agricultural resilience.

Throughout his career, Dr. El Afandi has led and collaborated on numerous federally funded research projects with prestigious agencies such as the NSF, USDA, NOAA, NASA, and UCAR. His research endeavors are centered on the development of innovative, data-driven methodologies aimed at enhancing climate resilience. He focuses on improving decision-making processes regarding environmental factors and establishing early warning systems for weather anomalies, air quality issues, drought, and health risks. Utilizing advanced modeling approaches and geospatial technologies, he advocates for the operationalization of climate intelligence to bolster community preparedness and adaptive capacities.

A proponent of the One Health framework, Dr. El Afandi investigates the synergistic links between human health, environmental health, and ecosystem sustainability. His work harnesses emerging technologies such as AI, machine learning, Earth observation systems, and environmental sensor networks to enhance public health outcomes and inform data-driven policymaking, particularly in vulnerable and underserved populations.

In addition to his research contributions, Dr. El Afandi is deeply involved in graduate education, international scientific collaborations, and workforce development initiatives. He has authored numerous peer-reviewed publications, presented widely at major national and international forums, and received multiple accolades that recognize his contributions to research, innovation, outreach, and academic leadership.

Leveraging Climate Analytics, Artificial Intelligence, Environmental Monitoring, Remote Sensing, and Predictive Modeling for Climate-Resilient Public Health

Dr. El Afandi will explore the integration of cutting-edge technologies to anticipate climate-related health threats, enhance resilience, and support sustainable public health systems amidst a changing climate.



Bernice L. Frazier, B.S.

Macon County Health Care Authority, Tuskegee, AL

Bernice L. Frazier is Chairwoman of the Macon County Health Care Authority. An experienced executive with considerable expertise in nonprofit organization management, philanthropy, policy analysis, volunteer management and more, Ms. Frazier is also a certified grant writer. Before entering the nonprofit industry, Ms. Frazier worked as a manager of transportation for Dayton Public Schools, where she served between 1996 and 2000. Additionally, she excelled as a student advisor for Senegalese students attending universities in the United States and as a television producer for such shows as “Frasier,” “A Few Good Men” and “Hearing Impactful Voices.” Throughout her career, Ms. Frazier has promoted women’s empowerment in leadership roles, while maintaining her nurturing spirit. Ms. Frazier holds a Bachelor of Science degree in mass communications and media studies from Central State University, which she earned in 1991. She is active with the Tuskegee chapter of Alpha Kappa Alpha Sorority Inc. and was honored as Woman of the Year through the National Association of Professional Women in 2011 and 2012. She also was Woman of the Year through the Optimist Club of Tuskegee-Macon County. In 2013, she was also recognized with a Certificate of

Accomplishment and Appreciation through the National Park Foundation. Moving forward, Ms. Frazier wishes to influence and support younger generations about service to humanity and their communities.



Angel Walker, BS, MS, PhD

Macon-Russell Community Action Agency, Inc., Strategic Training and Resource Solutions (STARS)

Dr. Angel Walker is the Executive Director of Macon-Russell Community Action Agency, Inc. in Alabama. She is the CEO/owner of Strategic Training and Resource Solutions (STARS), a training and consulting company. She has earned Bachelor's Degrees in both Human Services and Industrial/Organizational Psychology. She also has an Executive Master's Degree in Business Administration and PhD in Strategic Leadership and Organizational Management. She is a Nationally Certified Master ROMA (Results Oriented Management and Accountability) trainer, (CCAP) Certified Community Action Professional, Certified Bridges Out of Poverty trainer, Certified Life Skills trainer, Certified Trauma Informed Care trainer, Family Centered Coaching trainer, Certified Mediator, Environmental Justice Train the Trainer, Certified Project Management Professional and a trainer and consultant in various other management and leadership

areas. She is the President of the Tuskegee Area Chamber of Commerce, the Vice President for the Community Action Association of Alabama, 3rd Vice President for the National Community Action Partnership, the Secretary of the United Way Emergency Food and Shelter Board in Russell County, Alabama, 1st Vice President of the River Region Continental Societies, and the Treasurer for the Troy University Riverfront Toastmasters. She also sits on several boards and committees in the State of Alabama, regionally, and nationally. Dr. Walker is a proud member of Zeta Phi Beta Sorority Incorporated, Alpha Xi Zeta Chapter, where she is the Basileus.



Lloyd Sirmons

Georgia Rural Health Association (GRHA) and the Southeastern Telehealth Resource Center (SETRC)

Lloyd Sirmons is a rural health and digital health executive with more than 16 years of experience advancing healthcare access, telehealth adoption, and workforce development across the Southeast. He serves as Executive Director of the Georgia Rural Health Association (GRHA) and the Southeastern Telehealth Resource Center (SETRC), where he leads initiatives focused on strengthening rural healthcare systems, expanding access to care, and supporting healthcare providers through education, advocacy, and innovation. Through his leadership at SETRC, Mr. Sirmons provides strategic direction for telehealth programs serving Alabama, Florida,

Georgia, South Carolina, Puerto Rico, and the U.S. Virgin Islands. He works closely with healthcare organizations, policymakers, educators, and community leaders to advance the effective use of digital health technologies and improve healthcare delivery in underserved communities. Before entering healthcare leadership, Mr. Sirmons built a successful career in information technology and healthcare systems and spent nearly fourteen years in pastoral leadership. This unique blend of technical expertise, organizational leadership, and community engagement enables him to bridge the gap between technology and patient care. A frequent speaker at state and national conferences, Mr. Sirmons is passionate about developing innovative, sustainable solutions that improve healthcare access and outcomes for rural populations.



Seli Fakorzi, LPC-S

TimelyCare

Seli Fakorzi serves as the Director of Mental Health Operations for TimelyCare. She is a practicing supervising clinician with experience in inpatient and outpatient psychiatric services, crisis intervention, and clinician development. Ms. Fakorzi has also served as the director of psychiatric services for multiple youth residential treatment centers. Prior to becoming a licensed clinician, she focused her career in the area of human resources and organizational development servicing aerospace and defense companies. Ms. Fakorzi has also served as a consultant to small and mid-size businesses for human resources, organizational development, employee retention, and diversity best practices. Ms. Fakorzi has a BA in Business Management and Public Relations from Coe College, and a Master of Counseling from Dallas Baptist University.



One Health Symposium Moderators



Dr. Robin Burke is a Professor of Laboratory Animal Medicine at Tuskegee University College of Veterinary Medicine and a retired U.S. Army Colonel with 22 years of active-duty service. She is board certified by both the American College of Laboratory Animal Medicine and the American College of Veterinary Preventive Medicine. Dr. Burke completed her laboratory animal medicine residency at the U.S. Army Medical Research Institute of Infectious Diseases, where she gained extensive experience in ABSL-3 and ABSL-4 biocontainment. During her military career, she served as a senior consultant to both the Army and Air Force Surgeons General.

Dr. Burke is an active member of the laboratory animal medicine community and serves as an ad hoc Specialist for AAALAC International, evaluating animal care and use programs worldwide. She is passionate about the humane and scientifically sound use of animals in biomedical research and brings a practical, collegial approach to solving challenges in research environments.



Dr. Tomeshia Hubbard, a native of Birmingham, AL, received her Doctor of Veterinary Medicine degree from Tuskegee University's College of Veterinary Medicine in 2002 and went on to complete a rotating small animal medicine and surgery internship at Indianapolis Veterinary Specialist and Animal Emergency Center in Indianapolis, IN (2004). She also completed a 3-year veterinary dermatology residency at the Atlanta Veterinary Skin and Allergy Clinic in Atlanta, GA, with adjunct training at the University of Georgia. Dr. Hubbard is currently practicing in the state of Alabama where she sees patients at her privately owned, referral-based, veterinary dermatology practice, the Alabama Veterinary Allergy and Dermatology Service in Birmingham, AL. Dr. Hubbard is also an assistant clinical professor of veterinary dermatology at the Tuskegee University College of Veterinary Medicine and serves as the Section Chief of Community Practice

and Shelter Medicine.

Dr. Hubbard is president of the Tuskegee Veterinary Medical Association and an executive board member of the Alabama Veterinary Medical Association. She is a member of the American Academy of Veterinary Dermatology, the Alabama Veterinary Medical Association, the Jefferson County Veterinary Medical Association, the American Veterinary Medical Association and is licensed in the states of Alabama, Georgia and Indiana. Dr. Hubbard served as co-chair of the Tuskegee University College of Veterinary Medicine's Annual Symposium for seven years. She has also served as co-chair of the Alabama Professional Wellness Committee. Recently, Dr. Hubbard was appointed to the Alabama State Board of Veterinary Medical Examiner by Governor Kay Ivey.



Isabella Burnett currently serves as Director of Holistic Campus Wellness at the historic Tuskegee University. This includes administration of the Counseling Center, Emergency Response, Tiger's Den Food Pantry and wellness initiatives. Her journey with Tuskegee began as a student under Tuskegee Institute. While at Tuskegee she joined the Army and returned as a trained laboratory technician to work at the John Andrew Hospital which has since been converted to Kenney Hall containing the Bioethics Center. Ms. Burnett was privileged to provide healthcare service to the remnant survivors of the Tuskegee Syphilis Experiment at John A. Hospital here on campus. She is a graduate of Northwestern University with a Master of Public Policy and Administration, healthcare focused, and her career has spanned a wide breadth in both healthcare and education.



Dr. Cordelia Nnedu is the Dean of the School of Nursing and Allied Health (SONAH) at Tuskegee University. Over her 48-year career, Dr. Nnedu has built a powerful legacy of empowering underrepresented students to become professional registered nurses. She has secured over \$3.9 million in grants for minority student support and founded the Future Nurses of America Organization (FNAO) mentorship program.

An expert in maternal health and telehealth innovation, she currently serves as Co-PI on a \$2.3 million grant to establish the Tuskegee University Research Center for Rural Maternal, Child, and Family Health. Dr. Nnedu's profound impact on nursing education and healthcare equity has been honored by the American Academy of Nursing, the National League for Nursing, and the National Black Nurses Association.



Kim R. Ortiz, Ed.S., M.A., M.P.A., '92 serves as the Director of Alumni Engagement for the College of Veterinary Medicine. Ortiz has contributed to the College's annual One Health Symposia, moderated various community health panel discussions, and co-chaired a health awareness and prevention campaign. Moreover, she is an inaugural cohort mentor for the Association of Veterinary Advancement Professionals Mentorship Program (2026-2027). In the celebration of Tuskegee University's College of Veterinary Medicine 80th Anniversary (2025), she co-chaired the 59th Annual Veterinary Medical Symposium and the 60th Annual "Diamond" Symposium (2026). She is the recipient of the 2026 Tuskegee Veterinary Medical Alumni Association President's Award; Annie Singleton Award from Alpha Phi Alpha Fraternity, Incorporated, Gamma Phi Chapter, at Tuskegee University; and the Excellence in Service to Students Award from the Tuskegee University Chapter of

Sigma Alpha Pi, The National Society of Leadership and Success.

Prior to her role at Tuskegee University, Ortiz was the Coordinator for Community Development/Grants for the City of Tuskegee, Alabama, and Project Director for the City's three-year, \$3 Million U. S. Department of Health and Human Services Office of Minority Health-awarded Advancing Health Literacy Grant. With community-facing outreach to eight towns in five Alabama Black Belt counties, the AHL Grant was in partnership with Tuskegee University. In addition, with a standfast commitment to the holistic well-being of the Tuskegee community, Ortiz concurrently managed a three-year, \$300,000 U.S. Environmental Protection Agency Brownfields Assessment Grant and worked collaboratively with the EPA and the Alabama Department of Environmental Management.



Dr. Deja Perkins is an Assistant Professor of Forestry at Tuskegee University's College of Agriculture, Environment, and Nutritional Sciences. Drawing on her background in geospatial analytics and participatory science, she partners with communities to co-create knowledge on how forests, green spaces, and coastal ecosystems can support biodiversity, mitigate extreme weather impacts, and promote community health.



One Health Symposium Poster Presenters

Increasing Gremlin1 Dosage in SIX2⁺ Nephron Progenitors Exhausts the Nephrogenic Zone and Compromises Nephrogenesis

Esraa Alnahrawy¹, Fentahun Abate¹, Kendall Walden¹, Jenima Fertil¹ and Pawan Puri¹

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Developing therapies for chronic kidney disease (CKD) requires experimental models that define regulation of nephron development, as nephron endowment influences disease risk. CKD affects more than 37 million adults in the United States, according to the CDC. Nephron organoids provide a promising platform for studying kidney development and disease, but limited maintenance of nephron progenitors (NPs) restricts their potential. Previous studies have implicated Gremlin1, a secreted antagonist of bone morphogenetic protein (BMP) signaling, in renal development and CKD. Despite Gremlin1's developmental and pathological significance, Gremlin1 has an undefined role when overexpressed in NP lineage. Therefore, we hypothesized that excessive Gremlin1 would impair NP expansion and nephrogenesis. We utilized Six2-Cre-mediated recombination to induce Grem1 overexpression in NPs, generating SG1 mice with one conditional Grem1 overexpression allele and HGS mice with two alleles. By postnatal day 1, both mutants showed smaller kidneys and fewer glomeruli, proximal tubules, and loops of Henle, with more severe defects in HGS kidneys. Histological and co-immunofluorescence analyses revealed disrupted renal cortex and narrowed nephrogenic zone, with fewer NP caps, ureteric buds, and early epithelial derivatives. To determine whether altered lineage fate contributed to NPs loss, genetic lineage tracing was performed using the Rosa26-CAG-LSL-tdTomato reporter. Preliminary analyses revealed no evidence of transdifferentiation of Six2-lineage cells into stromal cells or endothelial cells in SG1 or HGS kidneys. Reduced Phospho-histone H3 immunostaining revealed impaired proliferation in both mutants compared with controls. Together, these findings demonstrate a dosage-dependent effect of Gremlin1 within the Six2 lineage that impairs NP expansion and nephrogenesis. Defining these developmental pathways will provide insights into the mechanisms that contribute to CKD and congenital kidney disease, supporting a One Health approach to improve kidney health in humans and animals.

Research Grant Support: This research was supported by grants from NIGMS# 5R16GM149389(PP), NIGMS# 1SC2GM130475, NIH T35OD010432, DHHS/HRSA D34HP00001-35-00, and NIH/NIMHD RCMI grant # U54MD0075, the first author was supported by a fully funded scholarship awarded by the Ministry of Higher Education and Scientific Research, Cultural Affairs and Missions Sector, Egypt.

One Health Assessment of Flash Flood Impacts in Alabama

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Flash floods are among the most devastating natural events in Alabama, with wide-ranging impacts on ecosystems, livestock, wildlife, and human communities. Conventional flood analyses focus on individual sectors, overlooking interconnected effects on environmental, animal, and human health. This study applies a "One Health" approach to assess flash flood impacts in Alabama and identify the most vulnerable communities, integrating indicators for the environment (water pollution, pathogen load, turbidity, soil erosion, habitat loss, vegetation damage), animal health (livestock mortality, disease outbreaks, wildlife displacement, disrupted water and feed supplies), and human health (injuries, hospitalizations, waterborne diseases, mortality, mental health impacts). Social vulnerability factors, including poverty, rural location, healthcare access, limited mobility,

elderly population share, and CDC Social Vulnerability Index metrics, determine community susceptibility and adaptive capacity.

A composite “One Health Flood Risk Index” (OHFRI) was developed to assess cumulative flooding impacts across Alabama's counties, integrating flood exposure, environmental degradation, animal health risks, human health impacts, and socioeconomic vulnerability to identify priority areas. Case studies from multiple counties illustrate regional disparities in flood risk and resilience. Findings show flooding impacts extend beyond physical damage, triggering cascading effects on environmental quality, animal welfare, public health, and community well-being. The study highlights integrated risk reduction strategies, including early warning systems, wetland restoration, green infrastructure, livestock protection, water quality monitoring, healthcare preparedness, and community resilience programs. This “One Health” framework offers a comprehensive method for understanding and mitigating flash flood risks in Alabama, serving as a scalable model for flood resilience planning worldwide.

Keywords: One Health; Flash Flooding; Alabama; Environmental Health; Human Health; Animal Health; Social Vulnerability; Flood Risk Index; Climate Resilience; Disaster Preparedness.

The Relationship Between FAMACHA Scores and Body Condition Score (BCS) in Goats

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College of Veterinary Medicine, Department of Biomedical Sciences, Tuskegee University

Gastrointestinal parasites, particularly *Haemonchus contortus*, are a major health concern in goat production due to their ability to cause anemia, weight loss, reduced productivity, and poor body condition. FAMACHA scoring is a practical on-farm tool used to estimate the severity of anemia, while body condition scoring (BCS) provides an assessment of an animal's nutritional and physical condition. The objective of this study was to examine the relationship between FAMACHA scores and BCS in goats and determine whether increased anemia severity was associated with poorer body condition. Routine herd health assessments were conducted under practical farm management conditions using the standardized FAMACHA scoring system and a 1–5 body condition scoring system. Data were analyzed descriptively and comparatively, with correlation analysis used to evaluate the strength and direction of the relationship between FAMACHA scores and BCS. Linear regression was also used to evaluate whether FAMACHA score could predict body condition outcomes. The results indicated a negative relationship between FAMACHA scores and BCS, with higher FAMACHA scores associated with lower body condition scores. The regression analysis also demonstrated a negative coefficient for FAMACHA score. These findings support the use of FAMACHA scoring in combination with BCS as practical tools for monitoring herd health and identifying goats at risk for parasite-related health decline. Combining these assessment methods may also support targeted selective treatment strategies, reduce unnecessary deworming, and improve parasite management in goat production systems.

Diabetes-Associated Alterations in *Gper1* Chromatin Accessibility in Male Gastric and Colonic Smooth Muscle: Evidence from Single-Cell Atac-Seq

Rania Mohamedelhassan, Sunila Mahavadi

Department of Biology, Tuskegee University, Tuskegee, AL

Background: G protein-coupled estrogen receptor 1 (GPER1) regulates gastrointestinal smooth muscle function. Our studies demonstrated reduced GPER1 expression in gastric and colonic smooth muscle of *db/db* mice, a model of type 2 diabetes, with altered activating histone modifications H3K4me3 and H3K27ac. However, diabetes-associated chromatin accessibility at the *GPER1* locus in male gastrointestinal smooth muscle remains poorly understood.

Aim: To characterize diabetes-associated chromatin accessibility and the regulatory landscape of *GPER1* in the stomach and colon of male WT and *db/db* mice.

Methods: Single-cell assay for transposase-accessible chromatin sequencing (scATAC-seq) was performed on gastric and colonic nuclei from male WT and *db/db* mice. After quality control, clustering, and cell-type identification, we analyzed smooth muscle populations for differential and *GPER1* locus-specific chromatin accessibility.

Results: A total of 1,212 gastric nuclei (606 WT, 606 *db/db*) and 2,266 colonic nuclei (1,133 WT, 1,133 *db/db*) were analyzed. UMAP revealed genotype-associated accessibility states. Differential analysis identified 1,250 significant peaks in stomach (104 WT-enriched; 1,146 *db/db*-enriched) and 6,628 in colon (3,249 WT-enriched; 3,379 *db/db*-enriched). *We identified GPER1-associated accessible regions at chr5:139,422,766–139,423,775 in the stomach and chr5:139,422,900–139,423,926 in the colon*, with genotype-dependent accessibility.

Conclusion: Type 2 diabetes is associated with extensive chromatin remodeling in male gastrointestinal smooth muscle, including altered *GP**ER1* accessibility. Together with reduced *GP**ER1* expression and altered activating histone modifications, these findings support epigenetic remodeling as a potential mechanism underlying *GP**ER1* dysregulation and gastrointestinal smooth muscle dysfunction in diabetes.

This work is supported by R01-DK124269.

Evaluating Marine-Derived Antimicrobial Materials for Biodegradable Food-Packaging Films

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Department of Material Science and Engineering, Tuskegee University, Tuskegee, AL

Foodborne pathogens, including *Escherichia coli* O157:H7 and *Staphylococcus aureus*, pose significant risks to food safety and can proliferate during food processing, storage, and distribution. Conventional plastic packaging provides a physical barrier against environmental contamination but generally lacks active antimicrobial properties and contributes to persistent plastic waste. Biodegradable polymers such as polyhydroxybutyrate-co-valerate (PHBV) offer a more sustainable alternative; however, their limited intrinsic antimicrobial activity may reduce their effectiveness in controlling foodborne pathogens. This study investigates the potential of marine-derived biomaterials, including coral, algae, and seaweed, as natural antimicrobial additives for biodegradable food packaging applications. Coral was evaluated for its calcium carbonate content and potential antimicrobial activity following thermal treatment, which promotes the formation of calcium oxide, an alkaline compound with documented antibacterial properties. Marine-derived materials were incorporated into polymer-based film systems and evaluated for their antimicrobial activity against *E. coli* O157:H7 and *S. aureus*. Antimicrobial performance was assessed using microbiological assays, while structural and physicochemical properties were characterized using techniques including scanning electron microscopy, X-ray diffraction, and thermal analysis. The incorporation of marine-derived materials is expected to provide antimicrobial functionality while maintaining the desirable properties of biodegradable packaging films. This research demonstrates the potential of marine resources as sustainable antimicrobial agents for active food packaging and may contribute to the development of packaging systems that improve food safety while reducing reliance on conventional petroleum-based plastics.

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Student Support: U.S. National Science Foundation Research Traineeship Program NSF S-STEM #NRT-2125606

Molecular Detection and Virulence Characterization of *Escherichia coli* O157 in Lake Tuskegee: Implications for Waterborne Risks to Human and Animal Health

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Waterborne pathogens remain an important public health concern because contaminated surface water can serve as a reservoir for microorganisms capable of causing disease in humans and animals. Environmental waters contaminated with fecal material may harbor pathogenic *Escherichia coli*, including Shiga toxin-producing *E. coli* (STEC) and serotypes such as *E. coli* O157, which are associated with gastrointestinal illness and, in severe cases, systemic complications. Recreational and community-associated water sources may therefore represent important routes of exposure, particularly for individuals and animals with frequent contact with contaminated water. Monitoring environmental water for pathogenic *E. coli* and associated virulence determinants is important for assessing potential health risks and improving water-quality surveillance. This study investigated the occurrence and virulence potential of *E. coli* in Lake Tuskegee. A total of 150 water samples were collected from various locations around the lake and analyzed for *E. coli*. Molecular detection targeting the 16S rRNA gene identified *E. coli* in 79 (52.7%) samples. Further molecular characterization identified the virulence-associated genes *ae**aA* in 8 (10.1%), *stx1* in 29 (36.7%), and *stx2* in 19 (24.1%) of the 79 *E. coli*-positive samples. The detection of these virulence-associated genes indicates the presence of potentially pathogenic STEC in the aquatic environment. These findings highlight Lake Tuskegee as a potential environmental reservoir of pathogenic *E. coli* and underscore the importance of continued water-quality surveillance to assess potential waterborne risks to human and animal health.

Student and Research Support: College of Veterinary Medicine and NIH/NIMHD RCMI grant # U54MD00758

Impact of Meteorological Parameters on COVID-19 Mortality Across Different Climatic Zones in the United States

Santosh Sapkota and Gamal El Afandi

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The COVID-19 pandemic, driven by SARS-CoV-2, has led to significant morbidity and mortality across the United States. While prior research has explored the relationships between meteorological factors and COVID-19 outcomes, there has been a scarcity of studies addressing how these associations vary across different climatic regions. This research aims to elucidate the impact of meteorological parameters on COVID-19 mortality across the diverse Köppen-Geiger climate zones in the U.S. Counties are categorized based on their predominant Köppen-Geiger climate type, allowing for a detailed comparison of two counties with the highest and two with the lowest non-zero COVID-19 mortality rates within each climate zone. To mitigate biases related to population size, mortality rates are standardized per 100,000 individuals. A range of meteorological variables, including temperature, relative humidity, wind speed, and precipitation, are systematically analyzed to unveil their roles in influencing COVID-19 mortality. Advanced statistical methodologies and machine-learning techniques will be employed to identify key meteorological predictors and assess their relative contributions to mortality rates. Moreover, distributed lag non-linear models (DLNMs) will be utilized to investigate potential non-linear and temporally lagged relationships between meteorological exposures and mortality outcomes. Comparative analyses will be performed on high- vs. low-mortality counties both within and across climatic zones, with the intent of discerning whether the meteorological influences exhibit variability under differing climatic conditions. This study aims to provide an in-depth understanding of climate-dependent meteorological dynamics affecting COVID-19 mortality, thereby enhancing region-specific public health strategies and informing climate-sensitive disease risk management protocols. This study examines the influence of environmental and climatic conditions on human infectious-disease mortality, supporting an integrated understanding of the interactions among environmental change, human health, and population-level disease risk.

Blueberry Supplementation Attenuates High-Fat Diet-Induced Molecular Remodeling in Colonic Smooth Muscle

Jossy O. Onuoha, Aishat Adejoh, John O. Onuh, PhD,

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Background: High-fat diet (HFD)-induced obesity is associated with gastrointestinal dysfunction and molecular remodeling of colonic smooth muscle. Blueberries contain polyphenols and anthocyanins with antioxidant and anti-inflammatory effects; however, their effects on obesity-associated colonic smooth muscle remodeling remain unclear. We investigated whether blueberry supplementation attenuates HFD-induced alterations in molecular markers associated with smooth muscle contractile phenotype, calcium homeostasis, extracellular matrix (ECM) remodeling, and oxidative stress.

Methods: Animals were maintained under standardized conditions across groups to minimize environmental confounding. Fifty male C57BL/6 mice received control AIN-93G or HFD for 12 weeks, followed by HFD alone or HFD supplemented with 5%, 10%, or 15% blueberry powder for 13 weeks. Body weight was monitored weekly. Gene expression of contractile markers (MYH11, SM22 α , smoothelin, caldesmon, TPM1), SERCA2b, ECM markers (CTGF, collagen I, collagen III), and NOX4 was measured by quantitative real-time PCR in isolated colonic smooth muscle.

Results: HFD significantly increased body weight compared with control (50.01 ± 0.89 vs. 37.45 ± 0.69 g, $P < 0.0001$), while blueberry supplementation did not significantly alter body weight. HFD downregulated contractile phenotype genes, SERCA2b, collagen I, collagen III, and CTGF, and increased NOX4 expression. Notably, 15% blueberry supplementation partially restored MYH11 and SM22 α , increased SERCA2b, collagen I, and collagen III, and suppressed HFD-induced NOX4 expression. CTGF was further reduced by 5% and 10% blueberry supplementation.

Conclusion: Blueberry supplementation, particularly at 15%, attenuated HFD-induced colonic smooth muscle remodeling independently of weight loss. These findings highlight the One Health potential of dietary strategies to mitigate obesity-associated gastrointestinal dysfunction in humans and animals.

Research Support: Biology Department Research Fund; Genomics Grant Fund (Grant No. 1UG3HG013553-01); USDA Grant No. 36-22091517-71000

Reducing 30-Day Hospital Readmission Rates among Minority Patients through Culturally Tailored Discharge Education Compared to Standardized Discharge Education

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Tuskegee University School of Nursing

Hospital readmissions remain a key indicator of healthcare quality, with minority populations experiencing higher rates due to disparities in communication and health literacy. This review examines whether culturally tailored discharge education reduces 30-day readmissions compared to standard education among Black, Asian, and Hispanic patients. Evidence from five studies, levels I–V, shows that language barriers and poor-quality discharge instructions decrease patient understanding and increase readmissions. Patients with limited English proficiency had lower comprehension and higher readmission rates. In contrast, culturally tailored interventions, including language-concordant care and personalized discharge planning, improved understanding, follow-up adherence, and outcomes. A randomized controlled trial reported a 30 percent reduction in hospital utilization. Overall, culturally tailored discharge education is more effective in reducing readmissions and improving health equity.

Benefits of Delayed Umbilical Cord Clamping in Newborns

KaiSeanna Andrews, Ebonè Edwards, Anjanae Latchinson, and Desiree Steele
Tuskegee University School of Nursing

Delayed umbilical cord clamping has started to become a major topic in neonatal care. Data confirms it can improve initial outcomes for newborns. This paper combines evidence from five research studies that matched delayed cord clamping with early cord clamping in both term and preterm infants. The studies analyzed the effects, such as hemoglobin levels, bilirubin levels, and other adverse events. Overall, the data show that delayed cord clamping is associated with higher hemoglobin levels and increased early blood volume in newborns. Although some studies recorded slightly higher bilirubin levels, there wasn't as big an increase, and it did not require as much treatment. Evidence also shows that preterm infants could benefit more from delayed cord clamping because it can reduce the demand for blood transfusions and control exposure to other specific complications. Taking all evidence into account, waiting to clamp the cord is safe and improves outcomes.

Effects of Exclusive Breastfeeding on Neonatal Immunity and Infection Rates

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Center for Rural Maternal, Child, and Family Health, Tuskegee University School of Nursing

Background and Objective: Exclusive breastfeeding (EBF) demonstrates profound protective effects on neonatal immune development and infection susceptibility. This review of research reveals consistent exposure response relationships between EBF and neonatal immunity, infection rates, and any underlying biological mechanisms.

Methods: This analysis examined research findings from multiple studies such as prospective cohorts, cross-sectional studies, and systematic reviews ranging from 2021-2024 that incorporated EBF's effects on the immunity and infection rates in neonates in populations ranging from 150 to 1949 participants across various geographical regions, with follow up periods extending from six months to four years. The outcomes measured encompassed immune biomarker concentrations, microbiome composition, hospitalization rates, and long-term respiratory outcomes.

Results: Systematic review of evidence derived from 70 studies exhibited positive associations between EBF and reduced infection risk in 86% of investigations. The largest prospective cohort (n=1,949) revealed significant exposure response relationships: each four weeks of EBF reduced lower respiratory tract infection odds, allergic rhinitis, and four year asthma by 5%. EBF increased IFN- α , IFN- γ , and interleukin-17A concentrations significantly, which indicate enhanced immune activation. Cross-sectional analysis of 390 children showed a decreased infection rate regarding: colds by 32%, pneumonia by 39.7%, and diarrhea by 40%. A 450 infant cohort confirmed lower illness frequency (0.45 vs 0.6 episodes per infant). Mechanistic studies revealed that EBF influences microbiome diversity, with gut microbiome changes mediating asthma protection (p=0.03). Breast milk provides dynamically trained immunity through immunoglobulins, antimicrobial peptides, and adaptive microRNAs.

Conclusions: Exclusive breastfeeding demonstrates a considerable amount of protection against a variety of infectious diseases via enhanced immune programming and microbiome reformation, with evident dose response relationships supporting the recommendation of breastmilk use for extended durations. Evidence implies a potential prevention of roughly 800,000 childhood deaths universally.

Living with Ticks: A One Health Investigation of Occupational, Environmental, and Human Risk Factors in Rural Alabama and Southeast

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Tick-borne diseases (TBDs) are zoonotic infections transmitted through the bite of infected ticks carrying bacteria, viruses, or parasites. These diseases are an increasing threat to human and animal health, livestock production, and ecological sustainability, particularly in rural communities across the southeastern United States. Alabama has reported growing incidences of TBDs and other emerging vector-borne illnesses. However, few studies have integrated statewide human disease data with demographic, socioeconomic, and environmental information to evaluate these risks at the population level.

Methods: This retrospective cohort study analyzed electronic health record data from the NIH All of Us Research Program involving individuals diagnosed with or treated for tick-borne diseases in the southeastern United States. Mixed-effects regression models were used to examine associations between TBD diagnoses and related risk factors. Employment status and related socioeconomic indicators were used as proxy measures of occupational exposure.

Results: Among identified cases, 95.3% of tick-borne diseases were bacterial in origin, while the remainder were associated with viral or toxin-mediated conditions. Significant associations were observed between TBD occurrence and residential location ($p < 0.0001$), geographic region ($p < 0.0001$), perceived stress level ($p = 0.0002$), and age group ($p < 0.0001$). No significant differences were found by sex ($p = 0.4012$), and ethnicity ($p = 0.0562$).

Conclusions: Findings suggest that environmental context, place of residence, and occupationally related socioeconomic conditions may influence the risk of tick-borne diseases more strongly than individual demographic characteristics. These results support a One Health approach to surveillance and prevention.

Funding Source: This work is supported by the USDA/NIFA Research through the Tuskegee University Cooperative Extension projects and Carver Integrative & Sustainability Center Researches.

Risk of Aflatoxin Exposure from Maize Used as a Complementary Food Among Children Aged 6–24 Months in Southern Tanzania

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Maize is a major complementary food in Tanzania and is highly susceptible to Aflatoxin (AFT) contamination. However, limited information is available on dietary AFT exposure among young children in Southern Tanzania, which contributes 33% of the country's maize production. This study assessed dietary AFT exposure and associated health risks among children aged 6–24 months consuming maize as a complementary food in Mbeya, Southern Tanzania. Probabilistic AFT exposure and risk modeling was conducted using the approach described by Kimanya (2010). AFT exposure was estimated from maize consumption and contamination levels using @RISK v7.6 software (Lumivero, Denver, CO), with 10,000 Monte Carlo iterations. AFT intake was estimated for the study population and by age group. Cancer risk associated with AFT exposure was assessed using the Margin of Exposure approach. AFT exposure was widespread among children in the study population. Mean estimated AFT intake was 13.8 ng/kg body weight/day (range: 0.5–411.9 ng/kg body weight/day). Children aged 6–12 months had higher estimated AFT exposure (31.9 ng/kg body weight/day) than those aged 13–24 months (21.7 ng/kg body weight/day). All children (100%) had estimated exposures exceeding the health-based level used for risk characterization. Estimated population cancer risk associated with consumption of AFT-contaminated maize ranged from 0.02 to 14.03 cancers per year per 100,000 persons. Children in Rungwe District were exposed to substantial AFT levels, with younger children experiencing higher exposure. Targeted interventions, including caregiver education, food-safety programs, dietary diversification, and strengthened AFT monitoring, are needed to reduce exposure among vulnerable children.

Research Support: USDA/NIFA Grant # 2022-38821-37296; NI251445XXXXG011

Beyond the Digital Divide: A Framework for Evaluating Readiness for Technology-Enabled One Health Interventions in Rural Communities

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Background: Digital technologies increasingly support veterinary care, animal-disease surveillance, human health, food safety, environmental monitoring, and cross-sector communication within One Health systems. Existing scholarship identifies persistent implementation challenges involving infrastructure, users, data integration, capacity, policy, and sustainability. In rural communities, technology availability alone may therefore be an insufficient indicator of readiness for technology-enabled One Health interventions.

Objective: This conceptual study proposes structured readiness assessment for rural communities to implement and sustain technology-enabled One Health interventions in human, animal, and environmental systems.

Approach: Informed by established One Health and digital One Health scholarship and emerging evidence on technology implementation challenges, the framework applies public policy, program evaluation, and community-development perspectives across four interrelated domains: (1) **infrastructure readiness**—availability, affordability, connectivity, and reliability; (2) **user and community readiness**—accessibility, digital capability, trust, and stakeholder participation; (3) **cross-sector integration readiness**—the capacity to connect veterinary, human-health, agricultural, food-system, and environmental actors, information, and systems; and (4) **outcomes and sustainability readiness**—the capacity to assess effects on animal welfare, disease prevention and response, cross-sector coordination, equity, and community resilience over time.

Significance: The framework reframes technology readiness from a question of technology availability to a systems-level assessment of whether rural communities are prepared to adopt, integrate, evaluate, and sustain technology-enabled One Health interventions effectively.

Conclusion: A structured readiness assessment may help identify implementation gaps before deployment and inform the design, evaluation, and sustainability of technology-enabled One Health interventions in rural communities.



History of Phi Zeta Research Day

Phi Zeta Research Day in the College of Veterinary Medicine at Tuskegee University was envisioned by Dr. Ruby L. Perry in September 2012 as part of the annual Biomedical Research Symposium, which is now recognized as the One Health Symposium. Through Dr. Perry's vision, Phi Zeta Research Day has grown into a hallmark annual scientific event. The inaugural event was chaired by Dr. Ebony Gilbreath, who has continued to play a pivotal role in advancing its mission. As Dean, Dr. Gilbreath has further strengthened this initiative, ensuring its continued impact in fostering research, scholarship, and innovation within the veterinary medical community.

Students will explore career prospects in research and post-graduate educational programs. Students benefit from learning about how the connectivity of healthy people, good environment, and healthy animals is critical in influencing the future direction of healthcare and biomedical research in conjunction with the One Health Symposium. The yearly event also serves as a forum for scientists and educators to interact and share information to advance translational research toward disease treatments and prevention in human and animal health. Phi Zeta Research Day is designed and integrated with the Phi Zeta Honor Society's goal, which is to "recognize and promote scholarship and research in matters pertaining to the welfare and diseases of animals". The Rho Chapter of Phi Zeta Honor Society was established at Tuskegee University in 1967. Students at Phi Zeta Research Day are honored with research awards, research scholarships, and other recognitions. From 2012 through 2025, hundreds of students and guests participated, and many students presented their research work in the form of posters and oral presentations.

Objectives of the event are to:

1. Encourage students to share their research with scientific community
2. Enhance the pertinent skill of being able to present and translate research data to a diverse audience
3. Provide a forum for the presentation of research being performed at Tuskegee University College of Veterinary Medicine and facilitate collegial interactions and networks

We are excited and honored to present the 14th Annual Phi Zeta Research Day at Tuskegee University College of Veterinary Medicine. It is our pleasure to present the research of TUCVM students. It is our hope that all the participants of the Biomedical Research Symposium will enjoy the scientific endeavors shown by our students.



Phi Zeta Keynote Speaker



Michael Q. Bailey DVM, DACVR, AAAS/AVMA Fellow

Immediate-Past President American Veterinary Medical Association

Dr. Michael Q. Bailey Sr. is a board-certified veterinary radiologist, educator, researcher, innovator, and national veterinary leader whose career spans academic medicine, specialty practice, public policy, telemedicine, artificial intelligence, and organized veterinary medicine.

Dr. Bailey earned his undergraduate degree from Rutgers University's College of Agriculture and Environmental Science and his DVM from the College of Veterinary Medicine at Tuskegee University. He completed his radiology residency at Michigan State University and became board-certified by the American College of Veterinary Radiology.

His academic career included faculty appointments at Michigan State University and Tuskegee University, as well as service as a tenured Associate Professor at The Ohio State University. He taught veterinary, resident, and graduate students; provided diagnostic imaging services for small and large animals; conducted externally funded research; and received multiple teaching awards. He has authored more than 50 peer-reviewed publications and presented internationally on diagnostic imaging, radiation safety, radiation therapy, and related areas of veterinary and human medicine.

Dr. Bailey's clinical and entrepreneurial career has included establishing a veterinary specialty imaging practice featuring Ohio's first veterinary-specific CT scanner, developing advanced imaging services for companion-animal referral and emergency care, and creating an equine imaging facility. He later served as lead radiologist for a veterinary organization with more than 1,000 locations, helping modernize and integrate its diagnostic imaging infrastructure.

As an AAAS/AVMA Congressional Fellow, Dr. Bailey served as a scientific advisor on Capitol Hill, applying veterinary and scientific expertise to public policy and legislative matters.

Most recently, he served as Director of the Commercial Center of Excellence for Telemedicine Consulting at IDEXX, focusing on diagnostic imaging, telemedicine systems integration, and artificial intelligence. His collaborative work in imaging technology and AI led to two U.S. patents.

Dr. Bailey was elected President-Elect of the American Veterinary Medical Association in 2024 and completed his term as AVMA President in July 2026, bringing a career-long commitment to advancing veterinary medicine, One Health, innovation, and the veterinary profession to the role.



Phi Zeta Speakers



Asim Ali, PhD

Biggio Center for the Enhancement of Teaching and Learning, Auburn University

Asim Ali, PhD, is Executive Director of the Biggio Center for the Enhancement of Teaching and Learning at Auburn University, where he leads university-wide efforts in teaching innovation, online learning, learning experience design, educational technology, and artificial intelligence in education. He chairs the Education Committee for Auburn University's AI initiative and has led the development of faculty and student AI education programs used both at Auburn and by institutions nationally. Dr. Ali also teaches in Auburn's Harbert College of Business and works with higher education leaders and organizations on strategies for responsibly integrating AI into teaching, learning, and institutional practice.

Preparing the Next Generation for an AI-Enabled One Health Future

Artificial intelligence is rapidly changing how professionals learn, conduct research, make decisions, and work across disciplines. For future veterinarians, researchers, and other One Health professionals, the challenge is no longer simply learning how to use AI tools, but developing the judgment, literacy, and adaptability needed to use them responsibly and effectively. This presentation will explore how AI is reshaping higher education and professional preparation, what these changes mean for faculty and students, and how we can prepare graduates to thrive in an increasingly AI-enabled world while preserving the distinctly human expertise that matters most.



Ryan Gibson, DVM, M.Ed, DACVIM

College of Veterinary Medicine, Auburn University

Ryan Gibson (@thebraindogtor) is a veterinary educator and neurologist from Auburn University. His teaching focuses on foundational neuroscience, applications in clinical neurology, and microanatomy. His virtual consulting services are aimed at improving access to care for neurological patients and supporting general practitioners. Dr. Gibson collaborates with researchers in exploring new drugs for neuropathic pain, translating the age of the neurological system across species, seizure therapies, and use of Artificial Intelligence in veterinary education.



Alexis Smith, MPH

Interdisciplinary Pathobiology Student, College of Veterinary Medicine, Tuskegee University

Assessing Tick-Borne *Rickettsia* Risk in Alabama: Implications for One Health

Alexis Smith¹, Michael Mayfield², Temesgen Samuel¹, Rawah Faraj^{1*}

1. Department of Pathobiology, College of Veterinary Medicine, Tuskegee University.
2. Bureau of Communicable Disease, Alabama Public Health Department.

Spotted fever group (SFG) *Rickettsia*, including *Rickettsia rickettsii*, which causes Rocky Mountain Spotted Fever, represents a growing public health concern in the southeastern United States. The wooded and rural environments of Alabama provide suitable ecological conditions for tick vectors, increasing the likelihood of pathogen maintenance and

transmission. This study aimed to determine the prevalence of *Rickettsia* spp. in ticks collected from multiple counties in Alabama using PCR targeting the *ompA*, *ompB*, *htrA*, and *gltA* genes. A total of 75 ticks were collected from wooded and grassland environmental sites across 20 counties in Alabama between December 2024 and June 2026. All ticks were morphologically identified before individual genomic DNA extraction. PCR assays targeting the outer membrane proteins *ompA* and *ompB*, high-temperature requirement A (*htrA*), and citrate synthase (*gltA*) genes were used for molecular detection of *Rickettsia* spp. We detected *Rickettsia* DNA in 38 of 75 (50%) tick samples collected from environmental sites. The findings indicate widespread circulation of SFG *Rickettsia* in Alabama tick populations, including *Rickettsia rickettsii* and another related *Rickettsia* spp. The *gltA* and *htrA* genes demonstrated high sensitivity for detecting *Rickettsia* infection, while the *ompA* and *ompB* genes improved differentiation among SFG *Rickettsia* species. Overall results confirm that infected ticks are widely distributed across multiple counties in rural Alabama. This study suggests a high prevalence of *Rickettsia*-infected ticks in rural Alabama and underscores the associated public health risk to individuals exposed to tick-infested wooded environments. The detection of *Rickettsia* spp. in the area highlights the need for continued molecular surveillance, improved diagnostic awareness, and strengthened public health education. These efforts are essential for early detection, prevention, and control of tick-borne rickettsial diseases in these counties.

Student and Research Support: College of Veterinary Medicine, NIH/NIMHD RCMI Grant #U54MD007585



Fentahun Abate, DVM, MSc

Interdisciplinary Pathobiology, Student, College of Veterinary Medicine, Tuskegee University

Characterization of the Origin and Alteration in Six2 Progenitor Derived Gastric Mesenchymal Cells in A PKA Driven Gastric Preneoplasia Model

Fentahun M Abate, Esraa Alnahrawy, Rachel Elder, Gabriella Turnipseed, Pawan Puri

Department of Biomedical Sciences, Tuskegee University,
College of Veterinary Medicine

Mesenchymal–epithelial crosstalk (MEC) is essential for gastric homeostasis, and its dysregulation contributes to gastric pathologies, including polyposis and cancer. Although gastric mesenchyme plays a critical role in disease progression, the developmental origins and identities of its cellular constituents remain poorly defined. We previously generated a conditional mutant mouse model, Six2-Cre^{+/−}; PKAcaR fl/wt (CA-PKA), in which constitutively active protein kinase A (PKA) is expressed in gastric mesenchyme. CA-PKA mice develop gastric preneoplastic lesions, including chronic inflammation, oxyntic atrophy, metaplasia, and invasive glands. We hypothesized that Six2⁺ progenitors generate distinct mesenchymal populations that undergo pathological remodeling following PKA activation. Lineage tracing using Six2-Cre;Rosa26-CAG-LSL-tdTomato mice identified Six2-lineage cells within the gastric mesenchyme, including ACTA2⁺smooth muscle cells in the lamina propria, muscularis mucosae, muscularis externa, and vascular smooth muscle. In contrast, CD31⁺ vascular endothelial cells were not Six2-derived. Podoplanin (PDPN) was expressed by subsets of mesenchymal and lymphatic endothelial cells and was increased in CA-PKA stomachs, as demonstrated by RNA sequencing, Western blotting, and co-immunofluorescence. A subset of PDPN⁺ mesenchymal cells was Six2-lineage derived. ICAM-1, a mediator of immune cell recruitment and stromal–immune interactions, was also significantly increased in CA-PKA stomachs. Given reported links between PDPN signaling and ICAM-1 expression in fibroblastic stromal cells, these findings suggest a potential role for PDPN⁺ Six2-lineage mesenchymal cells in inflammatory remodeling. Collectively, our findings define previously uncharacterized gastric mesenchymal populations and demonstrate their remodeling during PKA-driven gastric preneoplasia.

Research Grant: This research was supported by grants from NIGMS# 5R16GM149389(PP), NIGMS# 1SC2GM130475, NIH T35OD010432, DHHS/HRSA D34HP00001-35-00, and NIH/NIMHD RCMI grant # U54MD007585



Kailee Pierce

3rd Year Veterinary Student, University of Georgia, College of Veterinary Medicine,
Department of Small Animal Medicine and Surgery, Athens, GA

3D Virtual and Printed Models in Veterinary Education: Improving Echocardiographic Interpretation of The Feline Heart

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Echocardiographic interpretation can be challenging for veterinary students, specifically when attempting to translate three-dimensional (3D) cardiovascular structures into two-dimensional (2D) ultrasound views. We hypothesized that the combination of 3D virtual and printed models will improve students' ability to comprehend normal heart ultrasound imaging and anatomy compared to conventional 2D teaching methods. Objectives: 1) Create 3D feline cardiac models from computed tomography angiography (CTA) datasets. 2) Evaluate the effectiveness of 3D models in improving student comprehension of basic echocardiography. Methods: A CTA of a healthy cat was used to create 3D virtual and printed heart models using Materialize Mimics, 3-Matic, Cinema 4D, and Form Labs software. An interactive workshop was conducted with two groups of students. Group 1 had access to conventional 2D echocardiographic image planes. Group 2 had access to the same 2D images and 3D virtual and printed heart models. A pre- and post-workshop subjective survey and post-workshop objective assessment was taken to evaluate effectiveness of the learning tools. Results: A total of 32 veterinary students participated in the workshop. On the 13 question post-workshop assessment, students in group 1 had a median (IQR) of 8 (5-10) total questions correct, compared to 9.5 (7-12) in group 2 ($p=0.04$). In the post-workshop survey, group 2's means self-reported confidence level was 0.8 higher than group 1 on a 5-point scale ($p=0.007$). Conclusion: 3D feline cardiac models were successfully generated, and when combined with conventional 2D teaching methods, improved students' comprehension and confidence in interpreting heart ultrasound imaging.



Hibret Addisu, DVM, MSc, PhD, DVSc, DACVP

AstraZeneca

Dr. Hibret Adissu, is Director of Pathology, Clinical Pharmacology and Safety Sciences at AstraZeneca. He is a veterinary pathologist with extensive expertise in comparative, discovery, and toxicologic pathology. He earned his veterinary degree in Ethiopia, followed by an MSc in Experimental Medicine as a Fulbright Scholar at the University of Tennessee, a PhD in Cancer Biology from Purdue University, and a DVSc with postdoctoral training in Comparative Pathology at the University of Guelph and the University of Toronto. He is a Diplomate of the American College of Veterinary Pathologists.

Hibret has worked across academia, government, and industry, including at Addis Ababa University, the University of Toronto, the National Institutes of Health, and AstraZeneca. His work focuses on cancer research, comparative and experimental pathology, and toxicologic pathology. He serves as an Associate Editor for Veterinary Pathology, leads its Animal Models of Human Disease section, and has held leadership roles within the ACVP and the Society of Toxicologic Pathology. He co-chairs the Comparative Pathology Consortium and its Scientific Interest Group and has authored more than 40 peer-reviewed publications and a book chapter. Outside of work, he enjoys tennis, comedy, and gardening.

Phi Zeta Student Speakers



Khori Smith

2nd Year Veterinary Student, College of Veterinary Medicine, Tuskegee University

The Pathophysiological Significance of Erythrocyte Deviations in Veterinary Peripheral Blood Assessments

Khori Smith, Athema Etzioni

Department of Pathobiology, Tuskegee University College of Veterinary Medicine

Poikilocyte is the general terminology used to notate a red blood cell (RBC) that is abnormal in shape, inclusive of acanthocytes, echinocytes, and spherocytes, among others. Current literature does notate that feline and equine often display abnormalities while clinically healthy; however, little research relating to the presence of these abnormalities with disease exists. The presence, type, and total number of poikilocytes in both large and small animal peripheral blood smears, serve as reliable and specific biomarkers of an underlying clinical or pathophysiological disease and or disorder. In this study, small and large animal peripheral blood smears were analyzed for evidence of poikilocytes, recorded, and compared to the patients' diagnosis to correlate found RBC abnormalities to the overall health of the animal. Blood smears were prepared; Wright's stained, air dried, and cover slipped prior to analysis. Results show canines have moderate dacrocytes and moderate to marked echinocytes. In felines, moderate to marked dacrocytes, elliptocytes, and echinocytes were reported, while equine showed slight degmacytes and echinocytes, and marked rouleaux. In ovine and caprine, moderate elliptocytes and echinocytes were recorded, while caprine also reported moderate to marked acanthocytes and schistocytes. At this stage, there is enough evidence to support diagnoses of poor dehydration and liver function, most notably in the canine population. Such data underscores the diagnostic necessity of manual smear examinations for naming morphological deviations. Future investigations involving larger animal cohorts must definitively categorize these cellular biomarkers in relation to patient diagnoses.



Jenima Fertl

2nd Year Veterinary Student, College of Veterinary Medicine, Tuskegee University

Gremlin1 Overexpression in SIX2⁺ Nephron Progenitors Causes Premature Exhaustion of the Nephrogenic Zone

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Background: Chronic kidney disease (CKD) affects more than 37 million U.S. adults, and reduced nephron endowment is a risk factor. Bone morphogenetic protein (BMP) inhibitors are widely used to expand nephron progenitors (NPs) in cultures and organoids; however, the effects of sustained BMP inhibition in vivo remain poorly understood. Gremlin 1 (GREM1), a secreted BMP antagonist, is essential for kidney development, as global Grem1 deletion results in renal agenesis. However, the consequences of excessive GREM1 expression in the NP lineage remain unknown.

Hypothesis: We hypothesized that sustained overexpression of GREM1 in Six2⁺ NPs disrupts nephrogenesis.

Objectives: To determine the effects of GREM1 overexpression on the development of NPs and their derivatives into nephrons.

Methods: Conditional mutant mice overexpressing *Grem1* in Six2⁺ NPs and their derivatives were generated to produce *Six2-Cre^{+/-};Grem1^{OvExpress/Wt}* (SG1) and *Six2-Cre^{+/-};Grem1^{OvExpress/OvExpress}* (HGS) mice. Kidneys from newborn mice were analyzed by histology and co-immunofluorescence using markers for NPs (WT1/ITGA8), early epithelial derivatives (NCAM1/LHX1), ureteric buds (EpCAM1/TROMA1), glomeruli (WT1/Nephrin1), proximal tubules (PT) (LTL-lectin), and thick ascending limbs (TAL) (NKCC2).

Results: SG1 and HGS mice exhibited GREM1 dose-dependent reductions in kidney size and nephrogenic zone thickness. Analyses revealed marked reductions in NP caps, early epithelial derivatives, ureteric buds, glomeruli, PTs, and TAL, consistent with premature exhaustion of the nephrogenic zone.

Conclusions: Excessive GREM1 expression in the NP lineage causes premature exhaustion of the nephrogenic zone, resulting in gene dosage-dependent renal hypoplasia and reduced nephron endowment. These findings demonstrate that precise regulation of BMP signaling is essential for NP maintenance and differentiation.

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Student Support: DHHS/HRSA D34HP00001-35-00, Boehringer Ingelheim Veterinary Scholars Program,
Field of Research: Developmental Biology



Dheaven Angeletti

2nd Year Veterinary Student, College of Veterinary Medicine, Tuskegee University

Evaluating the Mammary Gland and the Impact of *Staphylococcus aureus* Mastitis

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Mastitis is one of the most devastating infectious diseases the dairy industry faces. It is mainly caused by *Staphylococcus aureus*, leading to inflamed mammary glands, altered milk composition, decreased milk production and animal welfare. As an antibiotic resistant, it is critical to diagnose its infections early to avoid economical losses and maintain production efficiency. We hypothesize that the Mastitis infection will negatively impact the quality and quantity of milk produced by infected dams. To test this, we isolated and quantified *Staphylococcus aureus* CFUs in milk samples, assessed SCC, measured milk pH, and established correlations between these parameters and the health status of the mammary gland. Eight dams were used in the study (2 negative and 3 positive controls, 3 treatment group). Twenty-four hours after inoculation through the mammary duct, infection was confirmed. Goats were milked and treated twice daily for seven days. Treatment group received IgY+VitD3 combination; control group received PBS. Milk samples were cultured for *S. aureus* and analyzed. Data was analyzed with Graph Pad Prism and One-Way ANOVA test was used. Significant value was declared where p-value ≤ 0.05 . Findings showed that mastitis-infected dams had increased CFUs/mL, elevated milk pH, altered milk composition, and reduced milk quality. Study provided insights into the impact of *S. aureus* mastitis on mammary gland health and milk production. These findings improved the understanding of *S. aureus*-associated mastitis and provided a basis for enhancing its diagnosis, treatment, prevention, and management to improve milk quality, productivity, and the welfare of dairy goats.

Funding Sources and Student Support: DHHS/HRSA D34HP00001-35-00, NIH/NIMHD RCMI grant # U54MD007585, and National Institute of Food and Agriculture (NIFA) (Grant # 2022-3882137363)



Dorian McFarley

2nd Year Veterinary Student, College of Veterinary Medicine, Tuskegee University

Surveillance of Norovirus in Vegetables, Stagnant Water, and Sewer in Selected Counties in Alabama

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Background: Norovirus is the leading cause of acute viral gastroenteritis worldwide and is commonly transmitted through contaminated food and water. Information regarding the occurrence of norovirus in foods and environmental samples in Alabama is limited.

Hypothesis: Norovirus (genogroups GI and GII) is present in vegetables, stagnant water, and sewer samples collected from selected counties in Alabama, with sewer samples expected to have the highest prevalence due to fecal contamination.

Objectives: 1) Determine the presence of norovirus in food, water, and sewer from selected counties of Alabama. 2) Determine the genotype of norovirus in isolates

Methods: Eleven samples consisting of mixed leafy vegetables, stagnant water, and sewer were collected from Macon, Lee, Montgomery, and Bullock counties. Samples were processed by homogenization, centrifugation, and filtration. Viral RNA was extracted using the MagMAX™ Viral RNA Isolation Kit, reverse transcribed into cDNA, and analyzed by TaqMan real-time RT-PCR to detect norovirus GI and GII.

Results: Norovirus was detected in 2 of 11 samples (18.2%). Both positive samples originated from sewer, resulting in a 50% positivity rate among sewer samples (2/4). No vegetable or stagnant water samples tested positive.

Conclusion: Norovirus was detected exclusively in sewer samples, suggesting environmental sewage as a potential reservoir for viral contamination in Alabama. These findings support continued surveillance using molecular methods to better characterize the distribution of norovirus and strengthen public health monitoring programs.

Funding Sources & Student Support: Student and Research Support: DHHS/HRSA D34HP00001-35-00, and NIH/NIMHD RCMI grant # U54MD007585



Gerard Jefferson

2nd Year Veterinary Student, College of Veterinary Medicine, Tuskegee University

Characterization of Antibiotic Resistance Genes in Lake Tuskegee

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Antimicrobial resistance (AMR) is a growing global health concern, and freshwater environments have been recognized as important reservoirs for antibiotic resistance genes (ARGs). Metagenomic sequencing provides a culture-independent approach for characterizing microbial communities and identifying resistance genes within aquatic ecosystems. This study hypothesized that Lake Tuskegee harbors diverse microbial communities containing detectable antibiotic resistance genes that can be identified through metagenomic sequencing of environmental DNA. The objective was to characterize the microbial community of Lake Tuskegee and identify antibiotic resistance genes from weekly environmental water samples collected over a five-week period. Water samples were collected weekly from Lake Tuskegee over five weeks and subcultured in nutrient broth prior to genomic DNA extraction using a Qiagen

DNA extraction kit. DNA quality and concentration were assessed before Illumina metagenomic sequencing and downstream bioinformatic analysis. Metagenomic sequencing identified diverse microbial taxa and antibiotic resistance genes within Lake Tuskegee, providing a comprehensive characterization of the environmental resistome across the sampling period. This study provides essential baseline data on microbial diversity and the presence of antibiotic resistance genes in Lake Tuskegee, highlighting the effectiveness of metagenomic sequencing for environmental monitoring. These findings enhance One Health initiatives by deepening our understanding of antimicrobial resistance at the intersection of environmental, animal, and human health.



Phi Zeta Poster Presenters

Doctor of Veterinary Medicine Students

Characterization of Maxillary First Molar Morphology in Dogs Using Cone-Beam Computed Tomography: Evaluation of an Assessment Method

Olivia Greenwood Marc Alkhal, and Noriko Aoi

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Extraction of the maxillary first molar (MXM1) is a common procedure in dogs. Because this tooth has three roots, surgical extraction requires tooth sectioning, making a thorough understanding of furcation anatomy essential. Conventional dental radiography, the most used imaging modality for surgical planning, provides only two-dimensional images and may be limited by superimposition of anatomical structures, particularly in the caudal maxillary region. In contrast, advanced imaging, such as cone beam computed tomography (CBCT), provides three-dimensional visualization of the maxillary first molar, allowing for more accurate assessment of furcation anatomy and facilitating preoperative planning for surgical extraction. Medical records and CBCT images from 25 dogs that underwent imaging at a specialty practice between 2025 and 2026 were retrospectively reviewed. Linear and angular measurements characterizing the furcation and its relationship to the mesial, distal, and palatal roots of the maxillary first molar were obtained from the CBCT images. Each maxillary first molar tooth was independently evaluated by each author using CBCT images, and the average of each measurement was calculated. The percentage of the maximum value and minimum value deviating from the average were then also calculated. Analysis of these measurements indicated higher variations in angular measurements compared to the tooth width, which showed less variations between evaluators. This study identified challenges in characterizing maxillary first molar furcation morphology using CBCT. Refining the protocol may improve measurement consistency and surgical planning. Future studies will evaluate morphological variation among skull conformations.

Research Support: DHHS/HRSA D34HP00001-35-00, NIH/NIMHD RCMI grant # U54MD007585, Boehringer Ingelheim Veterinary Scholars Program, Hospital Veterinary Dentistry & Oral Surgery, Matthews, North Carolina

Effect of Kisspeptin on the Cryosurvival of Canine Epididymal Spermatozoa

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Canine sperm cryopreservation is an important reproductive technology used for assisted reproduction, genetic preservation, and breeding programs. However, cooling and freezing can cause cold shock, oxidative stress, and membrane damage, resulting in reduced sperm motility, viability, and fertility. Kisspeptin-10 (KP-10), a neuropeptide involved in reproductive physiology, may possess antioxidant properties that could help protect sperm during cryopreservation. We hypothesized that supplementation of cryopreservation extenders with KP-10 would reduce oxidative stress and improve post-cooling sperm quality in a concentration-dependent manner. The objective of this study was to evaluate the effects of varying KP-10 concentrations on post-cooling canine sperm quality by assessing motility, kinematic parameters, membrane integrity, morphology, and oxidative stress. Semen was collected from the tail of the epididymis of canines, evaluated for initial quality, and cryopreserved using extenders supplemented with varying concentrations of KP-10. Following cooling, sperm motility and kinematic parameters were evaluated using computer-assisted sperm analysis (CASA), while membrane integrity, morphology, and oxidative stress were assessed using standard laboratory techniques. Statistical analyses were performed to compare treatment groups. Data analysis demonstrated concentration-dependent differences in post-cooling sperm quality among treatment groups, with selected KP-10 concentrations showing improved motility and kinematic characteristics compared with untreated controls. These findings support the potential use of KP-10 as a cryoprotective additive for canine sperm preservation. Identifying an effective KP-10 concentration may improve post-cooling sperm quality and contribute to enhanced reproductive outcomes, genetic conservation, and future applications of canine assisted reproductive technologies.

Research Support: DHHS/HRSA D34HP00001-35-00, and NIH/NIMHD RCMI grant # U54MD007585

In Silico Reverse Vaccinology Identification of Anti-Tick Targets in Texas Wildlife

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Ticks are major ectoparasites of Texas Wildlife. White-tailed deer functions as an ecological reservoir that serves as a host for ticks. To support development of cross-species anti-tick vaccines, we applied an in silico reverse vaccinology framework to identify immunogenic tick antigens and evaluated their predicated compatibility with host major histocompatibility complex (MHC) alleles in deer and cattle. Because deer MHC haplotypes are poorly characterized, custom DNA probes were designed to detect and differentiate these alleles from whole-blood samples. We hypothesized that specific white-tailed deer MHC class II haplotypes detected using custom probes would demonstrate predicted binding compatibility with computationally identified tick antigen epitopes and show similarity to cattle BoLA binding profiles. Genomic DNA was extracted from deer whole-blood samples and quantified prior to qPCR amplification using custom probes targeting deer MHC class II loci. Probe-positive samples were sequenced to characterize MHC haplotypes. Tick transcriptomic and proteomic datasets were screened to identify secreted and surface exposed proteins with high antigenicity. Predicted epitopes were evaluated for binding affinity to deer MHC haplotypes and cattle BoLA alleles. Custom probes successfully detected multiple deer MHC class II haplotypes. Computational screening identified several tick proteins with high predicted antigenicity and epitope-MHC binding compatibility across deer and cattle. This integrated approach demonstrates how Texas wildlife immunogenetics and computational vaccinology can be combined to prioritize anti-tick antigen targets. Further research will refine deer MHC haplotype characterization and validate epitope to MHC interactions to support future vaccine development.

Research Support: USDA-Agricultural Service Boehringer Veterinary Scholars Summer Program

Unlocking Transdermal Delivery of Maropitant: Synthesis, Characterization, and in Vitro Assessment of Solid Lipid Nanoparticles

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Maropitant (an anti-emetic) is standard for treating feline nausea, but oral doses fail during active emesis, and injections cause painful stinging. Transdermal drug delivery offers several advantages, including increased patient compliance, enhanced bioavailability, reduced gastrointestinal irritation, and sustained drug release. This study aims to investigate the hypothesis that formulating Maropitant into a Solid-Lipid-Nanoparticle (SLN) loaded gel would yield enhanced skin permeation/absorbance and encapsulation efficiency compared to a non-SLN gel. We prepared optimized formulations of Maropitant-loaded SLN's using lipid-based carriers and aqueous surfactants by employing emulsification, extrusion, sonication, and Carbopol gel formulation. This was achieved by preparing a uniform SLN (~100nm) composed of Maropitant and evaluating particle size, zeta potential, encapsulation efficiency, and drug release profile. Moreover, an in vitro skin permeation assay of Maropitant-loaded SLN gel was evaluated across a STRAT-M® membrane using a Franz diffusion cell. Further, permeation parameters, including cumulative drug permeation, steady-state flux (J), lag time (t_{lag}), permeability coefficient (K_p), and percentage of dose permeated at 24 hours, were calculated to assess transdermal performance. Maropitant SLN formulation demonstrated gradual, sustained permeation across the Strat-M membrane over the 24-hour study period. The optimized MP-SLN gel (-26.89 mV) significantly outperformed standard gels, delivering over 3x more drug (22.8% vs. 7.3%) and reducing lag time from 14.4 to just 2.66 hours. Therefore, we identified that formulating Maropitant as SLN-gel yields enhanced permeation compared to regular gel. Future studies will engineer positively charged nanoparticles to enhance skin permeation and transition testing to excised feline skin to expand veterinary transdermal drug delivery.

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Field of Study: Pharmacology

Uncovering Silent Liver Disease: Histopathologic Characterization of Hepatic Lesions in Multispecies Necropsy Cases

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Hepatic lesions are frequently identified during necropsy examinations and may occur in animals without a documented history of liver disease. Multispecies necropsy examinations reveal diverse hepatic lesions that can be characterized through routine histopathologic evaluation. The aim of the study is to characterize hepatic lesions identified in multispecies necropsy cases and document the spectrum of hepatic pathology encountered. Liver samples from 100 necropsied animals were examined grossly and histologically using hematoxylin and eosin staining. Species included canine (n=29), feline (n=13), equine (n=9), porcine (n=1), caprine (n=4), poultry (n=36), rabbit (n=1), rat (n=5), ferret (n=1), and giraffe (n=1). Representative lesions were evaluated and categorized according to their histopathologic features. A broad spectrum of hepatic lesions was identified across species, including fibrotic and biliary lesions, inflammatory lesions, degenerative and necrotic lesions, vascular lesions, and granulomatous/parasitic lesions. Representative findings included portal fibroplasia, bridging fibrosis, biliary hyperplasia, lymphohistiocytic hepatitis, vascular congestion, hemorrhage, hepatocellular degeneration, centrilobular necrosis, vacuolar change, and parasitic hepatic nodules. Notable findings included chronic fibrosing hepatobiliary disease characterized by bridging fibrosis and biliary hyperplasia, as well as parasitic migratory lesions in a porcine liver associated with nodular inflammatory and fibrotic changes. Chronic inflammatory and degenerative lesions were observed across multiple species, often in animals without a documented history of primary liver disease.

Diverse hepatic lesions were identified across multiple animal species through routine necropsy examination. Histopathologic evaluation provided valuable insight into the nature and distribution of hepatic disease processes, emphasizing the importance of postmortem investigations in comparative veterinary pathology.

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Profile and Detection of Antibiotic Residues in Retail Chicken Meat: A Metabolomics Approach

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Background: Antibiotics are widely used in poultry production to improve animal health and production efficiency. However, improper use can leave drug residues in edible tissues, contributing to food safety concerns and antimicrobial resistance. NMR spectroscopy and mass spectrometry (MS) are metabolomics techniques that enable comprehensive metabolite identification and quantification.

Hypothesis: We hypothesized that antibiotic-related metabolites and residues could be detected in chicken meat using NMR and MS, supporting the need for improved monitoring and regulatory strategies.

Objectives: This study aimed to (1) profile metabolites using NMR, (2) quantify the antibiotic residuals using MS, and (3) evaluate the application of these techniques in chicken meat metabolomics and food safety research.

Methods: Ten chicken meat samples were extracted using ethylenediaminetetraacetic acid (EDTA) and 10% acetonitrile (ACN), followed by vortexing, cold incubation, centrifugation, vacuum concentration, and reconstitution with ACN and deuterium oxide (D₂O). Samples were analyzed by NMR and complementary LC-MS.

Results: Metabolites involved in amino acid, energy, nucleotide, and osmotic regulation pathways were identified, with measurable differences in abundance among samples. The combined use of NMR and MS provided complementary qualitative and quantitative metabolite information, demonstrating the utility of this workflow for chicken metabolomics.

Conclusion: Antibiotic residues in animal-derived foods remain a significant global food safety concern. This study demonstrates that integrated NMR and MS metabolomics provides an effective approach for characterizing chicken meat metabolites and establishes a foundation for future investigations of biomarkers associated with antibiotic exposure, improved residue monitoring, and enhanced food safety practices.

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Field of Research: Food Safety, Metabolomics

Detection of Antibiotic Resistant *Staphylococcus Aureus* in Lake Tuskegee, Alabama: Implications for Public Health

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Staphylococcus aureus is a Gram-positive opportunistic pathogen that causes a wide range of infections in humans and animals, and the presence of antimicrobial-resistant strains, particularly methicillin-resistant *S. aureus* (MRSA), in aquatic environments represents an important public health concern because contaminated water can serve as a reservoir for antibiotic-resistant bacteria. This study aimed to determine the prevalence of *S. aureus* and selected antimicrobial resistance determinants in Lake Tuskegee. A total of 50 water samples were randomly collected from various locations around the lake between May and June 2026. Presumptive *S. aureus* isolates were recovered using selective culture media and Gram staining, followed by DNA extraction and PCR amplification targeting the species-specific *nuc* gene and the antimicrobial resistance-associated genes *mecA* and *blaZ*. Five isolates (10.0%) were confirmed as *S. aureus* based on amplification of the *nuc* gene. Of these, two isolates (40.0%) were positive for *mecA* and classified as MRSA, while the remaining three isolates were classified as methicillin-susceptible *S. aureus* (MSSA). The *blaZ* gene was detected in two isolates, representing 4.0% of the total water samples and indicating the presence of β -lactamase-mediated resistance. These findings demonstrate the occurrence of both MRSA and MSSA, including *blaZ*-positive isolates, in Lake Tuskegee. The detection of antimicrobial-resistant *S. aureus* in surface water highlights a potential public health concern and underscores the importance of continued environmental surveillance of antimicrobial-resistant bacteria in recreational and aquatic environments.

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Phi Zeta Poster Presenters

Graduate Students

Kaiso-Mediated Regulation of the Androgen Response Pathway in Prostate Cancer

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Kaiso (ZBTB33) is a dual-specificity transcription factor involved in multiple cancer-related pathways and can act as either a transcriptional activator or repressor depending on cellular and genomic context. We investigated its role in androgen-responsive transcription, a central feature of prostate cancer biology, using integrated CUT&RUN sequencing, DNA methylation profiling, and RNA sequencing in LNCaP models with Kaiso overexpression or knockdown. CUT&RUN revealed reproducible genome-wide Kaiso occupancy, with enrichment at promoter-proximal regions, CpG islands, and established Kaiso-binding motifs. Altering Kaiso expression substantially remodeled the transcriptome, with 2,305 differentially expressed genes, including 463 direct Kaiso targets, following overexpression and 1,610 differentially expressed genes, including 277 Kaiso targets, following knockdown. Unbiased pathway analysis identified androgen response as the most significantly enriched pathway in both models, indicating convergence of Kaiso activity on the androgen receptor (AR) transcriptional network. Across four independent human prostate cancer datasets, positive Kaiso activity was associated with greater AR pathway activity, supporting the clinical relevance of these findings. DNA methylation profiling further showed that Kaiso expression reshapes the prostate cancer methylome. Together, these findings identify Kaiso as an epigenomic regulator linking chromatin occupancy, DNA methylation remodeling, and androgen-responsive transcription, with implications for prostate cancer heterogeneity and therapeutic resistance.

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Assessing the Human Health Impacts of Afforestation and Deforestation in Alabama Through Air Quality, Climate Regulation, and Carbon Dynamics

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Forests are critical for ecosystem services that directly affect human health, particularly through climate regulation, carbon sequestration, air pollution mitigation, and local thermal environment modification. However, forest loss and afforestation have opposing effects on these services, and their cumulative impact on human health remains poorly understood, especially at regional scales.

This review synthesizes current literature on the health implications of deforestation and afforestation, with a focus on Alabama. A comprehensive evaluation of studies on tree planting, forest cover dynamics, air quality metrics, temperature variations, population exposures, and mortality outcomes was conducted to identify key environmental-health pathways and highlight research gaps.

Evidence indicates that greater tree and forest canopy cover reduces concentrations of fine particulate matter (PM_{2.5}), ozone (O₃), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂). Moreover, exposure to greener environments and tree planting initiatives is associated with lower rates of non-accidental and cardiovascular mortality. In contrast, deforestation is linked to higher local surface temperatures and greater heat exposure, contributing to increased morbidity and mortality from heat stress. Deteriorating air quality, particularly from vegetation burning following forest loss, further complicates health outcomes.

Beyond these immediate exposure pathways, afforestation enhances carbon storage and sequestration, while deforestation diminishes carbon stocks and increases atmospheric carbon emissions. This dynamic links forest management practices to long-term climate-related health risks.

Despite growing evidence on these individual pathways, integrated assessments that simultaneously consider forest gain and loss, carbon dynamics, thermal exposure, air quality, and health outcomes remain scarce, particularly in Alabama. Future research should integrate remote sensing technologies, meteorological data, air quality indices, carbon assessments, demographic factors, and epidemiological records to quantify these relationships and pinpoint vulnerable populations. Such comprehensive data could significantly bolster initiatives in forest conservation, urban greening, climate resilience, and public health planning across Alabama.

Keywords: Afforestation; Deforestation; Human Health; Carbon Sequestration; PM2.5; Heat Exposure; Air Quality; Climate Change; Alabama

Research Support: USDA National Institute of Food and Agriculture (grant no. 2022-67023-36364) and National Science Foundation (grant no. 2115712)

Dissemination of Antimicrobial Resistance and Virulence Plasmids Across Genetically Diverse Shiga Toxin-Producing *Escherichia coli*

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Shiga toxin-producing *Escherichia coli* (STEC) is a major foodborne pathogen, yet the contribution of plasmids to the combined dissemination of antimicrobial resistance (AMR) and virulence remains incompletely understood. We analyzed 10,755 high-quality STEC genomes representing 47 serotypes and 202 multilocus sequence types collected in the United States. Resistome and virulome profiles were identified using ABRicate with ResFinder and VirulenceFinder. At the same time, plasmids were reconstructed and characterized using MOB-suite to evaluate sequence relatedness, mobility, host distribution, and temporal patterns. Acquired resistance genes representing 10 antimicrobial classes were detected. Aminoglycoside resistance determinants were most frequent, occurring in 2,626 genomes (24.4%), followed by trimethoprim (13.9%), phenicol (13.1%), and β -lactam (10.1%) resistance determinants. Among 36,469 reconstructed plasmids, 432 (1.18%) carried both AMR and virulence genes. Their source-normalized prevalence increased from 2.64% in 2022 to 4.66% in 2025. Although most AMR–virulence plasmids originated from clinical isolates, prevalence was 3.56% in clinical genomes and 7.31% in environmental/other genomes after accounting for unequal sampling. Whole-sequence-based clustering identified related plasmid groups distributed across multiple serotypes and sequence types, suggesting dissemination beyond individual clonal backgrounds. Mobility prediction classified these plasmids as conjugative, mobilizable, or non-mobilizable, indicating multiple mechanisms of persistence and spread. These findings demonstrate how plasmid-resolved genomic surveillance can identify mobile genetic elements linking AMR and virulence across diverse STEC populations. Integrating genomic technology into One Health surveillance may strengthen detection of emerging food-safety and animal-health threats and support targeted AMR prevention strategies.

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Student Support: Graduate fellowship support was provided through the Integrative Biosciences (IBS) PhD Program, Tuskegee University.

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Comparative Evaluation of Two Viability Dye-qPCR Systems for Discriminating Live and Dead *Salmonella* Typhimurium Cells

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Rapid detection of viable foodborne pathogens is important for food safety and One Health surveillance. Conventional PCR detects bacterial DNA but cannot reliably distinguish viable cells from dead cells whose DNA remains amplifiable. Viability dyes can reduce amplification of DNA from membrane-compromised cells, potentially improving the specificity of molecular detection for viable bacteria. This preliminary study compared two commercial viability dye-qPCR systems for their ability to discriminate between live and dead *Salmonella* Typhimurium cells.

Live- and dead-cell preparations adjusted to a 0.5 McFarland standard were treated with PMAXx at 25 µM or Promega viability dye at 10 µM, following the respective recommended working concentrations. Corresponding untreated preparations served as controls. Dye-treated and untreated samples were subsequently analyzed by quantitative PCR. Discrimination between live and dead cells was assessed descriptively using the difference in quantification cycle values, defined as $\Delta Cq = Cq_{\text{dead}} - Cq_{\text{live}}$.

For PMAXx-treated samples, the mean Cq values were 16.62 for live cells and 28.08 for dead cells, yielding a ΔCq of 11.46. For Promega dye-treated samples, the corresponding mean Cq values were 16.18 and 25.61, yielding a ΔCq of 9.43. Untreated live- and dead-cell preparations showed comparatively little separation in Cq values.

Both viability dyes increased qPCR discrimination between live and dead *S. Typhimurium* cells relative to untreated preparations. Under the conditions evaluated, PMAXx produced a larger descriptive separation between live- and dead-cell signals than the Promega viability dye. Because this was a preliminary comparison, additional studies incorporating biological replication, measures of variability, culture-based confirmation of viability, and statistical testing are needed. Optimization across bacterial concentrations, inactivation methods, foodborne species, and sample matrices will be necessary before either system can be applied routinely to food-safety monitoring within a One Health framework.

Keywords: viability qPCR; PMAXx; Promega viability dye; *Salmonella* Typhimurium; food safety; One Health

Research Support: National Institute of Food and Agriculture, United States Department of Agriculture (NIFA-USDA): 2025-38821-45482; 2022-67017-36982; 2022- 1115, 1116, 38821-37362.

Exploiting Genomic Variability in *Listeria* for The Development of Molecular Diagnostic Markers

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Listeria, a genus of gram-positive bacteria, is one of the four major foodborne pathogens with significant global public health implications. Accurate detection methods, including PCR, rely on robust gene-specific targets for species-level identification in food safety applications. This study employed pan-genomic and core-genomic analyses to characterize *Listeria* spp. to identify genetic variations that can inform molecular diagnostics. A total of 33 high-quality genomes representing 10 *Listeria* species were retrieved from NCBI and curated using CheckM. Genomes were annotated and analyzed with the Roary ILP Bacterial Annotation Pipeline (RIBAP). Candidate species-specific targets were extracted from the RIBAP presence/absence matrix, validated via NCBI MegaBLAST, and functionally annotated with the Genome Annotation and Information Analysis (GAIA) platform. Substantial interspecies genomic diversity was observed, with core gene counts decreasing at higher nucleotide identity thresholds: 856, 665, 362, 89, and 16 core genes at 60%, 70%, 80%, 90%, and 95% identity, respectively.

At 95% identity, conserved genes such as rpmG2, mnmE, rplP, and rpsS were identified, each linked to essential cellular functions. Accessory gene counts increased from 10,400 at 60% identity to 25,486 at 95% identity, underscoring extensive genomic variability. Several gene-specific targets, many of which encode hypothetical proteins, demonstrated strong diagnostic potential, with 90% sensitivity and 98–100% specificity. These findings highlight the extensive genomic diversity within the *Listeria* genus and support the development of improved molecular diagnostics and enhanced surveillance strategies for foodborne pathogens, with potential applications in veterinary health, food safety, and public health within a One Health framework.

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