Veterinary Medical Scientist
Research Training Program
VETERINARY MEDICINE & BIOMEDICAL SCIENCES

VETERINARY MEDICAL SCIENTIST RESEARCH TRAINING PROGRAM

Symposium

FRIDAY, AUG. 1, 2025 | VENI 107A

Use QR Code to join via Zoom

Zoom meeting: 928 6474 7926

2025 SCHEDULE

8:30 am	**Welcome by Dean John August, Associate Dean Mike Criscitiello, and VMSRTP Directors**
	Session 1, Moderator: Dr. Dana Gaddy
8:45 am	**Annabelle Newton** SynthoPlate decreases clot formation time in canine thrombocytopenic blood **Mentor:** Dr. Thomas Edwards
9:00 am	**Deborah Ha** Evaluation of serum 25-hydroxyvitamin D and acute phase proteins in dogs with Heterobilharzia americana **Mentor:** Dr. Kathleen Aicher
9:15 am	**Anna Schmieding** Seasonal prevalence of Angiostrongylus cantonensis in rodents from a zoological facility in southeast Texas **Mentor:** Dr. Guilherme Verocai
9:30 am	**Noah Jefferson** Summarizing Antimicrobial Susceptibility in Uropathogens Isolated from Small Animal Patients **Mentor:** Dr. Sara Lawhon
9:45 am	**Kennedy Shalloup** Hemodynamic shock alters platelet mitochondrial respiration in dogs **Mentor:** Dr. Thomas Edwards
10:00 am	**Abigail Williams** Periodic hiPSC-NSC-EVs treatment reduces prefrontal cortex neuroinflammation in an early-onset Alzheimer's model **Mentor:** Drs. Leelavathi Nara Madhu, Ashok Shetty
10:15 am	**BREAK**
	Session 2, Moderator: Dr. Tracy Vemulapalli
10:30 am	**Rachel Dishongh** Developing a blood-based test for the detection of colorectal cancer in rhesus macaques (Macaca mulatta) **Mentor:** Dr. Carolyn Hodo
10:45 am	**Claire Webb** Avian Bornavirus and wild hosts: prevalence, genetic variance, and implications for captive populations **Mentor:** Dr. Sarah Hamer
11:00 am	**Thomas Gee** Determination of the causative amyloid protein in Bracchi Italiani with renal amyloidosis **Mentor:** Drs. Mary Nabity, Jessica Hokamp

11:15 am	**Miyu Sakaguchi** Protective Efficacy of a Protein Subunit Vaccine Against Psittacine Avian Bornavirus 4 in Cockatiels **Mentor:** Drs. Caitlin Mencio, Sarah Hamer
11:30 am	**Ari Moth** Feline Kidney Metallothionein Expression and Its Relationship to Cadmium and Chronic Kidney Disease **Mentor:** Dr. Laura Bryan
11:45 am	**Olivia K. Jones** 8-Isoprostane levels correlate to severity of ischemic acute kidney injury after aortic balloon occlusion **Mentor:** Dr. Elaheh Rahbar
12:00 pm	**Kourtney Mayfield** Managing cattle waste in lagoons does not promote horizontal transfer of antimicrobial resistance genes **Mentor:** Drs. Paul Morley, Lee Pinnell
12:15 pm	**LUNCH**
Session 3, Moderator: Dr. Chuck Long	
1:00 pm	**Kaitlyn Morales *** Multispectral imaging characterizes tissue changes in open wounds of canine patients over time **Mentor:** Dr. Alex J. Walsh
1:15 pm	**Marty Kacsh** Novel predictors of fatigue in Thoroughbred racehorses **Mentor:** Dr. Sarah White-Springer
1:30 pm	**Alexandra Aucoin** Trajectory of anti-rhodococcal IgA differs from IgG subisotypes in BAL fluid but not serum of neonatal foals **Mentor:** Dr. Noah Cohen
1:45 pm	**Charles Lee *** Flow rate and particle size of corticosteroids differ based on equine nebulizer device configurations **Mentor:** Dr. Rebecca Legere
2:00 pm	**Lauren Parker** Activities of fecal total IgA, Rhodococcus equi-specific IgA, and C3 in enterally immunized foals **Mentor:** Dr. Angela Bordin
2:15 pm	**Paul Klett** Adaptive Sampling: a powerful tool to enrich Mannheimia haemolytica DNA in bovine respiratory tract samples **Mentor:** Dr. Robert Valeris-Chacin
2:30 pm	**Reagan Stephens #** Systematic in vitro testing for the effect of equine nebulizer design on aerosol drug delivery **Mentor:** Dr. Rebecca Legere

*** *Texas Veterinary Medical Foundation Research Fellow* | **#** *Morris Animal Foundation Research Fellow*

SynthoPlate decreases clot formation time in canine thrombocytopenic blood

Annabelle Newton[1], Grantham Peltier[2], Kennedy Shalloup[1], Sylvain Cardin[2], Thomas Edwards[1,2]

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Thrombocytopenia is a common disease that can result in life threatening bleeding. In companion animals, currently available therapy often includes platelet replacement, which comes with several drawbacks: risk of infection, transmission reactions, shortages of product, and specific storage requirements. SynthoPlate is a shelf-stable synthetic platelet-like particle designed to augment platelet function. Our goal was to determine if SynthoPlate binds to canine platelets and to assess canine platelet function in thrombocytopenic (TCP) blood with and without SynthoPlate. Blood collected from 17 clinically normal dogs was separated by centrifugation into platelet rich plasma (PRP), platelet poor plasma (PPP), and packed red blood cells (pRBC). PRP from 6 dogs was diluted to a concentration of 250,000 platelets/uL and spiked with SynthoPlate for flow cytometry. TCP blood was reconstructed by combining PPP and pRBC from 17 dogs, which was then inoculated with SynthoPlate at platelet to SynthoPlate ratios of 1:50 and 1:100. Platelet function was then assessed with VCM Vet™. Data was analyzed with one way ANOVA and Tukey's (flow cytometry) or Holm-Sidak's (VCM) multiple comparisons test. Based on flow cytometry, there was significantly more binding of SynthoPlate to canine platelets at a SynthoPlate concentration of 21.9 ug/mL compared to 10.2ug/mL (P=0.0299). Clot Formation Time of TCP blood with a platelet to SynthoPlate ratio of 1:100 decreased significantly compared to TCP blood alone (P=0.0262). These results suggest that SynthoPlate interacts with canine platelets and modestly decreases clot formation time. More research is needed to understand the clinical significance of SynthoPlate in canine thrombocytopenia.

Student Support: NIH T35 OD010991; Texas A&M College of Vet Medicine & Biomedical Sciences

Research Support: US Army Institute of Surgical Research

Evaluation of serum 25-hydroxyvitamin D and acute phase proteins in dogs with *Heterobilharzia americana*

Deborah Ha, Geoffrey Fosgate, Lea Poellmann, Gui Verocai , Kathleen Aicher

Gastrointestinal Laboratory, Dept of Small Animal Clinical Sciences (Ha, Poellmann, Aicher) and Dept of Veterinary Pathobiology (Verocai), Texas A&M University, College Station, TX; Dept of Veterinary Clinical Sciences, Lewyt College of Veterinary Medicine, Long Island University, Brooklyn, NY (Fosgate)

Heterobilharzia americana (HA) is a trematode parasite of dogs and is the cause of canine schistosomiasis, capable of causing significant morbidity and mortality. Parasite eggs cause marked granulomatous inflammation in affected organs. Measurement of 25-hydroxyvitamin D (25-(OH)D) and acute phase proteins (APP) such as C-reactive protein (CRP), haptoglobin (HG) and ceruloplasmin (CP) are used as a biomarker in other diseases to assess disease severity and therapeutic response, but their association with HA has not been investigated. The objective was to determine if measurements of blood APP and 25-(OH)D differed between healthy dogs (HC) and dogs infected with HA, as well as between dogs with asymptomatic (ASY) and symptomatic (SYM) HA infection. We hypothesized that measurements of CRP, HG, and CP would be higher, and 25-(OH)D would be lower in dogs with HA compared to HC. In this prospective cohort study, 10 HC dogs and 20 dogs with newly diagnosed HA were recruited. HA dogs were further separated into ASY or SYM groups. Blood was collected from each dog and underwent measurement of 25-(OH)D, CRP, HG, and CP. Dogs with HA (CRP: median, interquartile range [IQR};4.4 mg/L,4.8; CP: 4.6mg/dL, 0.65) had higher serum CRP and CP than HC (CRP: 2.35 mg/L, 1.5; p=.004; CP: 3.9 mg/dL, 0.7; p=.015). Dogs with HA (median, IQR; 182 nmol/L, 98.5) had significantly lower 25-(OH)D than HC (293.5 nmol/L, 96.25; p=.003). SYM dogs (328 mg/dL, 440.75) had significantly higher HG than HC (65 mg/dL, 85.5; p=.043). Measurement of CRP, HG, and 25-(OH)D may have clinical value in dogs with HA infection.

Student Support: NIH T35 OD010991, Texas A&M College of Veterinary Medicine and Biomedical Sciences

Research Support: AKC Canine Health Foundation grant #03235, Texas A&M University Gastrointestinal Laboratory

Seasonal prevalence of *Angiostrongylus cantonensis* in rodents from a zoological facility in southeast Texas

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Angiostrongylus cantonensis, the rat lungworm, is the leading cause of eosinophilic meningoencephalitis in humans worldwide. In addition to humans, it causes potentially fatal neurologic disease in several accidental hosts, including non-human primates. *Angiostrongylus cantonensis* has been reported from across the Gulf Coast in the United States. An AZA-accredited zoological establishment with over 6,000 animals including various endangered species in Houston, Texas, partnered in an investigation of *A. cantonensis* prevalence in the zoo rat population. We necropsied and examined 155 rodents including 150 black rats (Rattus rattus) and 5 brown rats (*Rattus norvegicus*). Adult nematodes were collected from the lungs, sexed, and enumerated. Overall prevalence was 34.19% (53/155), and only black rats were infected. Seasonal prevalences in spring, summer, fall, and winter of 2024 were 14.75% (9/61), 41.03% (16/39), 57.14% (4/7), and 50% (24/48), respectively. Statistical analysis was performed on data from the black rats. There was a significant relationship between tibia length (age) and infection status ($p = .0017$) and prevalence and season ($p < .001$) indicating that older rats are more likely to be infected and the number of infected rats is related to the season. No significance was found between host sex and infection status ($p = 1.000$) or tibia length and infection intensity ($p = .36$). *Angiostrongylus cantonensis* is well-established in the studied rat population, and it is prevalent year-round. Understanding the seasonality and epidemiology of *A. cantonensis* is paramount for developing preventive measures to support conservation of endangered species in zoological facilities in endemic areas across the country.

Student Support: Boehringer Ingelheim VSP; Texas A&M University College of Veterinary Medicine and Biomedical Sciences

Research Support: Texas A&M University College of Veterinary Medicine and Biomedical Sciences

Summarizing Antimicrobial Susceptibility in Uropathogens Isolated from Small Animal Patients

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Understanding antimicrobial resistance in bacteria cultured from the lower urinary tract allows clinicians to optimize antimicrobial therapy for patients, while reducing selection for resistance, and allows for informed empiric decisions when urine culture is not possible. We compared data from patients presented to primary care and referral practice to evaluate the antimicrobial susceptibility of uropathogens. We assigned patients to categories based on the clinical service to which they presented. To control for repeat visits, patient information, culture results, and antimicrobial susceptibility data were evaluated based on the first presentation only. We hypothesize that bacteria isolated from patients who presented through a specialty service will demonstrate higher resistance patterns than bacteria isolated from primary care patients. Evaluating data from 2,261 unique small animal patients and 3,092 unique patient cultures from calendar years 2021 to 2024, 33% of cultures yielded growth with a total of 1,404 organisms. Enterobacterales made up 43% of the organisms cultured, of which 11.7% were ESBLs and less than 1% were CREs. Staphylococcus species represented 13% of the bacteria cultured, with 51% beta-lactamase positive and 38% mecA positive. No ESBL, CRE, or mecA positive organisms were isolated from patients who initially presented through primary care (90 cultures yielding 33 organisms). These data confirm bacterial prevalence patterns identified in previous literature, as well as provide a baseline for local susceptibility patterns that can be used for future monitoring of trends in antimicrobial resistance.

Student Support: NIH T35 OD010991; Texas A&M College of Vet Medicine and Biomedical Sciences

Research Support: Texas A&M College of Vet Medicine and Biomedical Sciences

Hemodynamic shock alters platelet mitochondrial respiration in dogs

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Mitochondria generate cellular energy in the form of adenosine triphosphate (ATP) via oxidative phosphorylation, a process that relies on oxygen availability. During hemodynamic shock, impaired tissue perfusion and decreased oxygen delivery lead to cellular hypoxia, which may alter mitochondrial function. The purpose of this study is to expand our understanding of mitochondrial function during shock, using easily accessible platelet mitochondria. Platelets were isolated from whole blood samples taken from healthy dogs and dogs in shock, then resuspended in running media containing glucose, pyruvate, and glutamine. Oxygen flux was determined in a high-resolution respirometer during three respiratory states: Routine (R), Leak (L), and maximally uncoupled (ETS). Three flux control ratios (R/E, L/E, and (R-L)/E) were calculated. Comparisons were made using a one-way ANOVA followed by Sidak's adjustment. A total of 18 healthy dogs and 5 dogs in shock were included in this study. The average R/L ratio was significantly higher in the control group (51 ± 8%) compared to the shock group (40 ± 9%, p=0.03). Additionally, the mean (R-L)/E ratio of the control group (47 ± 7%) was significantly higher than the shock group (35 ± 7%, p=0.02). No other comparisons were statistically significant. Our findings suggest that shock is associated with altered canine platelet mitochondrial function reflected by a decrease in the proportion of total oxygen consumption capacity dedicated to energy production at rest. This may reflect a diminished capacity of platelet mitochondria to meet resting cellular energy requirements during shock. Further research is needed to explore the underlying mechanisms of mitochondrial dysfunction during shock.

Student Support: Boehringer Ingelheim VSP; Texas A&M College of Vet Medicine and Biomedical Sciences; Defense Health Agency

Research Support: US Army Institute of Surgical Research

Periodic hiPSC-NSC-EVs treatment reduces prefrontal cortex neuroinflammation in an early-onset Alzheimer's model.

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Alzheimer's disease (AD) is typified by progressive cognitive and memory decline associated with inflammation, plaques, and tangles in the brain. Intranasal (IN) administration of extracellular vesicles (EVs) from human induced pluripotent stem cell-derived neural stem cells (hiPSC-NSCs) has shown promise to slow down AD pathogenesis in an animal model of AD. Here, we determined whether periodic hiPSC-NSC-EVs treatment would restrain microglia-mediated chronic neuroinflammation for extended periods in the medial prefrontal cortex, a brain region vital for working memory. Three-month-old male and female 5xFAD mice, a model of early-onset AD, received IN administrations of ~30 billion hiPSC-NSC-EVs or the vehicle once monthly for 5 months. Brain tissue analysis at 9 months of age revealed that vehicle-treated male and female AD mice displayed increased numbers of microglial clusters, enhanced expression of disease-associated microglia genes APOE, CST7, and CTSD, and elevated levels of proinflammatory cytokines interleukin-1 beta (IL-1b) and IL-18, the end products of inflammasome activation. Intermittent hiPSC-NSC-EVs treatment decreased the number of microglial clusters in males, the expression of APOE, CST7, CTSD in males and APOE and CST7 in females, and the concentration of IL-1b and IL-18 in both sexes. Male AD mice receiving EVs also exhibited decreased amyloid plaques. The anti-inflammatory effects of EVs also led to improved cognitive function in male and female AD mice. Thus, intermittent intranasal hiPSC-NSC-EVs treatment in AD has promise to maintain better brain function for extended periods by a sustained regulation of neuroinflammatory signaling.

Student Support: NIH T35 OD010991, Texas A&M College of Veterinary Medicine and Biomedical Sciences

Research Support: NIH National Institute on Aging 1RF1AG074256-01A1

Developing a blood-based test for the detection of colorectal cancer in rhesus macaques (*Macaca mulatta*)

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Poor compliance with colonoscopy screening hinders early diagnosis of colorectal cancer (CRC). CRC in rhesus macaques closely resembles microsatellite-instable CRC in humans. A subset of the macaque colony at the KCCMR develop spontaneous or inherited CRC, making them an invaluable model for the study of this disease and development of an early-diagnostic test. Several biomarkers, such as miRNAs and cancer antigens (CA), have shown promise in humans and other veterinary species but a validated blood-based method for diagnosing CRC in macaques does not yet exist. Serum and plasma samples from macaques with CRC, chronic colitis, or without apparent GI disease were collected opportunistically. To evaluate the utility of miRNAs as a biomarker for CRC, whole-miRNA sequencing was performed on plasma and analyzed for patterns of differential expression. Three CRC-associated tumor markers were also analyzed in serum and plasma across the diagnosis groups using a magnetic bead-based assay. We expect to identify candidate miRNAs for further validation as biomarkers of CRC development. Differences in expression of Cas among the diagnosis groups did not reach statistical significance, but observed trends indicate the potential for at least CEACAM5 to serve as a screening biomarker. Trends in longitudinal samples from individuals with CRC also suggest that CA125, CEACAM5, and CA19-9 may have value when monitoring an individual over time. Further investigation with larger sample sizes is warranted to validate these observations. The validation of a blood-based biomarker for CRC in the macaque would allow greater utilization of the animal model in investigation of potential treatments and prognostic markers.

Student Support: NIH T35 OD010991, Texas A&M College of Vet Medicine and Biomedical Sciences

Research Support: Cattlemen for Cancer research grant

Avian Bornavirus and wild hosts: prevalence, genetic variance, and implications for captive populations

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Avian Bornavirus (ABV) is a neurotropic virus and etiological agent of proventricular dilation disease (PDD), an often-fatal condition for which no effective vaccine or treatment is available. PDD manifests clinically as neurological and gastrointestinal dysfunction. Prior studies have found that 1-2% of wild birds serve as natural ABV reservoirs; however, these studies are biased toward aquatic species, leaving ABV's true prevalence poorly defined. Broadening species surveillance is essential to accurately assess transmission risk, uncover novel viral genotypes, and understand variation in ABV disease across host populations. Utilizing an opportunistic pipeline through the Lights Out, Texas initiative, we collected brain samples from birds that fatally struck windows. This allowed us to examine the accuracy of current ABV prevalence data and identify potential novel viral genotypes via RT-PCR, PCR, and genomic sequencing. We hypothesized that if wild birds act as natural reservoirs for ABV and contribute to viral variation, expanding the sampled population would increase observed viral prevalence and reveal novel genotypes. Across 368 wild birds tested, ABV prevalence was 1.6% (six positive cases), including a Barred Owl (Strix varia), Cooper's Hawk (*Accipiter cooperii*), Black-chinned Hummingbird (*Archilochus alexandri*), White-throated Sparrow (*Zonotrichia albicollis*), and two Lincoln's Sparrows (*Melospiza lincolnii*). Positive samples are under evaluation for geographic, seasonal, or host-specific risk factors, and viral sequencing is underway to determine genotype identity. Understanding ABV prevalence and genetic variation in wild birds may provide critical information for protecting both wild and captive bird health.

Student Support: Boehringer Ingelheim VSP, Texas A&M College of Veterinary Medicine and Biomedical Sciences

Research Support: Pat Palmer Foundation, Schubot Center for Avian Health, Innovation[X]

Determination of the causative amyloid protein in Bracchi Italiani with renal amyloidosis

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Renal amyloidosis is present in ~12% of proteinuric dogs biopsied for suspected glomerular disease, and dogs with this condition have a poor prognosis. Multiple proteins capable of misfolding into amyloid have been identified in humans, allowing for targeted therapeutics, better prognostication, and improved knowledge of conditions predisposing to renal amyloidosis. Several dog breeds are predisposed to developing renal amyloidosis (e.g., Chinese Shar-Pei, Bracchi Italiani (BI)), but the amyloid precursor protein has only been identified in the Chinese Shar-Pei. This study aimed to 1) optimize a protocol for amyloid protein identification via liquid chromatography mass spectrometry (LC-MS/MS) using formalin-fixed paraffin-embedded kidney tissue, and 2) determine the likely causative amyloid precursor in BIs with confirmed renal amyloidosis. Kidney tissue from 3 BIs with amyloidosis was used in addition to 1 BI with glomerulosclerosis and 2 non-BIs (1 with glomerulonephritis; 1 normal) as negative controls. Tissue sections were deparaffinized, rehydrated, and air-dried, followed by sonication and protein denaturation. After measuring protein concentration, trypsin (S-Trap) digestion and LC-MS/MS analysis (Orbitrap Fusion MS) were performed. Serum amyloid A (SAA) was identified only in the 3 BIs with amyloidosis, with an average of 10.6 peptide spectrum matches, while other amyloid precursor proteins were identified in both BIs and controls. This supports SAA as the causative misfolded protein involved in renal amyloidosis in BIs. Further work is needed to determine if BIs are predisposed to overproduction of SAA or if SAA has high misfolding rates that lead to renal amyloidosis in the breed.

Student Support: NIH T35 OD010991; Texas A&M College of Vet Medicine & Biomed. Sciences

Research Support: International Veterinary Renal Pathology Service

Protective Efficacy of a Protein Subunit Vaccine Against Psittacine Avian Bornavirus 4 in Cockatiels

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Avian bornavirus (ABV) is the causative agent of Proventricular Dilatation Disease (PDD), also referred to as avian ganglioneuritis (AG), a progressive and often fatal neurological and gastrointestinal condition affecting psittacine birds. Despite its impact on pet ownership, aviculture, and conservation, no effective treatment or vaccine against ABV infection or PDD/AG currently exists. To address this gap, we have explored vaccine strategies. Our earlier research showed that a subunit vaccine containing ABV viral proteins induced antibody production in cockatiels (Nymphicus hollandicus). This study evaluated the efficacy of this candidate vaccine following an experimental challenge of psittacine avian bornavirus 4 (PaBV-4). We hypothesized that vaccination would protect cockatiels against ABV, resulting in vaccine-induced antibodies, reduced viral RNA levels, and fewer PDD/AG clinical signs. In the preliminary analysis, among 13 birds challenged with the virus, one of five unvaccinated birds tested positive for ABV RNA via cloacal swab PCR (as expected given intermittent shedding), while all eight vaccinated birds tested negative. Four of five unvaccinated birds showed elevated antibody titers at least once, indicating possible ABV infection. Seven vaccinated birds exhibited elevated titers post-vaccination that declined over time, with sporadic increases observed later potentially reflecting infection or vaccine-induced memory responses. No differences in body condition scores or weight were observed between groups. We are currently evaluating viral presence and tissue pathology in necropsy-collected tissues from all 13 birds via PCR and histopathology to confirm infection status and assess the vaccine's efficacy.

Student Support: Boehringer Ingelheim VSP; Texas A&M College of Vet Medicine and Biomedical Sciences

Research Support: Pat Palmer Foundation and the Schubot Center for Avian Health

Feline Kidney Metallothionein Expression and Its Relationship to Cadmium and Chronic Kidney Disease

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Many feline companions are diagnosed with chronic kidney disease (CKD) at some point in their lifetime. Heavy metals such as cadmium are known to accumulate in the renal tissue of other species and have been associated with CKD. Metallothionein is a protein that binds and neutralizes heavy metals, such as cadmium, and is then later filtered by the kidneys. This study investigated the relationship between cadmium levels in feline renal tissue and metallothionein through measuring the expression of metallothionein-producing gene (MT). We hypothesized that MT expression will be elevated in renal tissues with higher cadmium levels, suggesting an attempted compensatory mechanism for heavy metal detoxification before the CKD-causing cadmium threshold was breached. MT expression was high within the corticomedullary junction of the feline renal tissues, with some expression also found within the cortex. Cats with lower levels of quantified cadmium in their renal tissues had higher levels of MT within their corticomedullary junction. This data suggests that there may be an important association between reduced metallothionein gene expression and increased cadmium burden. It also identifies a potential inverse relationship between cadmium detoxification capacity and the onset of renal damage. These findings suggest that metallothionein may serve as an early biomarker in the fight to help diagnose and stop CKD from appearing in feline patients.

Student Support: NIH T35 OD010991, Texas A&M College of Veterinary Medicine & Biomedical Sciences

Research Support: Texas A&M College of Veterinary Medicine & Biomedical Sciences

8-Isoprostane levels correlate to severity of ischemic acute kidney injury after aortic balloon occlusion

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Trauma related injuries account for ~214,000 American deaths per year, with 30-40% of deaths occurring from hemorrhagic shock within 6-24 hours of initial injury. Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) has been adopted to mitigate hemorrhagic shock fatalities by temporarily occluding the aorta to restrict blood flow to the point of hemorrhage. However, REBOA's use is limited due to ischemia-reperfusion injuries. The kidneys are particularly sensitive to REBOA use and present with ischemic acute kidney injury (AKI) or renal failure. Therefore, being able to titrate REBOA via the use of kidney injury biomarkers could potentially improve REBOA. Plasma, urine and renal samples from pigs (n=3/group) subjected to 10% and 30% hemorrhage were used to assess kidney injury molecule 1 (KIM-1), 8-isoprostane, and renal artery pathology post-full REBOA and no REBOA use. We hypothesized that both 8-isoprostane and KIM-1 would be highest in pigs exposed to 30% hemorrhage and full REBOA. Two-way ANOVA was used to assess differences in biomarkers between hemorrhage and REBOA groups, significance set at $p<0.05$. We observed significantly increased plasma 8-isoprostane levels in the 30% hemorrhage with full REBOA group, as opposed to the 10% hemorrhage without REBOA group (255.92 pg/mL vs. 110.75 pg/mL). This correlated with slight ischemic tissue damage based on renal artery histology results. However, KIM-1 was undetectable in both plasma and urine samples regardless of hemorrhage and occlusion levels, suggesting KIM-1 is an unreliable biomarker in porcine models. This data supports 8-isoprostane as a potential biomarker for monitoring ischemic AKI or ischemia-reperfusion injury either during or post-REBOA use.

Student Support: NIH T35 OD010991; Texas A&M College of Veterinary Medicine & Biomedical Sciences

Research Support: NIH R01-HL162633

Managing cattle waste in lagoons does not promote horizontal transfer of antimicrobial resistance genes

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Concerns about antimicrobial resistance (AMR) are rising globally, especially related to food animal production. Managing animal waste effectively is considered crucial in controlling the spread of AMR. The integron integrase 1 gene (intI1) has been suggested as a marker to evaluate how environmental stressors influence the horizontal gene transfer (HGT) of AMR genes. A recent study indicates that aquatic environments may increase intI1 expression, raising worries about whether lagoon systems used for feedlot waste management could facilitate HGT and AMR gene expression. This study examined the presence and activity of the intI1 gene in fecal and wastewater samples from five feedlots in the Texas Panhandle, comparing these to 16S rRNA gene counts as an estimate of the total microbial load. RNA and DNA were isolated, and RNA was reverse-transcribed into cDNA for quantification of transcribed copy numbers by qPCR. DNA copy numbers for the 16S gene were about 1.6 times higher in feces than in lagoon water ($P<0.001$), but transcribed copy numbers (cDNA) were not measurably different between sample types ($P=0.34$). Conversely, lagoon water had about 70 times higher intI1 DNA copy numbers than fecal samples ($P<0.001$), yet transcribed gene counts were again similar between the two sample types ($P=0.68$). These findings suggest that lagoon-based feedlot waste management does not promote HGT when using intI1 as a marker, as evidenced by the lack of increased gene expression.

Student Support: Boehringer Ingelheim VSP; Texas A&M College of Vet Medicine and Biomedical Sciences

Research Support: National Cattlemen's Beef Association, a contractor to the Beef Checkoff; Texas A&M College of Vet Medicine and Biomedical Sciences

Multispectral imaging characterizes tissue changes in open wounds of canine patients over time

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Predicting if open wounds are going to heal properly is challenging despite advances in visualization and diagnostic tools. Multispectral and hyperspectral optical imaging techniques have previously been used for surgery and oncology applications and have the potential to detect tissue biomarkers that indicate wound chronicity. Yet, correlating the spectral data to clinical outcomes of wound treatment is a challenge due to the large volume of data acquired. The goal for our multispectral imaging study is to detect biomolecular changes in the wound bed and margin over time in canine second-intention wounds being treated at the Texas A&M Small Animal Teaching Hospital. It is hypothesized that the absorbance intensity at visible and near-infrared (NIR) wavelengths changes over the course of wound healing and differs from healthy tissue of the same patient, as well as wounds healing by primary intention. From January to July 2025, 6 wound patients and 6 patients with abdominal surgery incisions were recruited for this study. Across the patients, there was low variability in the mean absorbance values over time for the healthy tissue and skin adjacent to the wound. Analysis of one open wound patient indicated an overall decrease in absorbance from the 450 to 600 nanometers wavelength range, specifically in the wound margin and center of the wound bed. The wound margin also had more absorption variability for the NIR wavelengths compared to the visible spectrum. This preliminary data, which demonstrated differences in absorbance over time and across wound regions, highlights the possibility of utilizing multispectral imaging to estimate the stage of a wound and guide clinical treatment plans.

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Novel predictors of fatigue in Thoroughbred racehorses

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Musculoskeletal injuries, which may be caused by exercise-induced fatigue, remain a leading cause of morbidity and mortality in Thoroughbred racehorses. This has serious implications for both equine welfare and economic burden within the industry. Through the evaluation of mitochondrial function, calcium handling, and inflammatory responses in training Thoroughbred horses, predictive biomarkers can be identified to assess fatigue risk before clinical signs appear. Gluteus medius samples from 12 Thoroughbred geldings (n=12; mean ± SD 8 ± 2 yr; 510 ± 35kg) were collected on d0, 2, and 4 prior to exercise-to-fatigue tests (SETs) on d1, 3, and 5 before (wk 0) and after (wk 9) 8 wk of moderate-intensity exercise training. During the study, 2 horses were excluded due to lameness. Mitochondrial capacities, including production of ATP and H_2O_2 were assessed using high-resolution fluororespirometry. Proteins involved in calcium handling (STIM1, ORAI1, SERCA1, calsequestrin, RYR1) and mitophagy (PINK1, Parkin, BNIP3, NXC1) were quantified using Western immunoblotting. To account for intermembrane variability in gels, only samples from d0 and 4 were included. On d4, prior to horses demonstrating a decreased run time to fatigue on d5, ATP production was altered and H_2O_2 production increased, suggesting impaired mitochondrial function. Discovery of the differences in proteins involved in calcium regulation, which may impact both mitochondrial health and skeletal muscle contraction, paired with indicators of mitochondrial breakdown (mitophagy) may reveal insights into fatigue susceptibility, which may guide individualized feeding, training, and management regimens and ultimately reduce the risk of fatigue-induced-injury in racehorses.

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Trajectory of anti-rhodococcal IgA differs from IgG subisotypes in BAL fluid but not serum of neonatal foals

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Pneumonia caused by *Rhodococcus equi* is a common cause of disease and death of foals worldwide. Virulent *R. equi* express the virulence-associated protein A (**VapA**) and are widespread in the environment of foals. Younger foals are highly susceptible to *R. equi*, but the correlates of protective immunity are ill-defined. Systemic immunoglobulin (Ig) activity against VapA is associated with protection against rhodoccococal pneumonia, but little is known about intrapulmonary Igs targeting *R. equi*. Thus, we examined the activities of VapA-specific IgG1, IgG3/5, IgG4/7, and IgA at ages 4, 14, 28, and 56 days in bronchoalveolar lavage fluid (BALF) and serum of 19 healthy foals naturally exposed to virulent *R. equi*. We hypothesized that *R. equi*-specific IgG1, IgG3/5, IgG4/7, and IgA in foals would increase during the first 56 days of age from inhalation of virulent *R. equi* from the environment. Serum and BALF samples were analyzed for antibody activity relative to positive control by enzyme-linked immunosorbent assays (ELISAs); BALF ELISA results were corrected for dilution using BALF microprotein concentrations. ELISA data were analyzed using linear mixed-effects modeling. Serum activities of VapA-specific IgG1, IgG3/5, IgG4/7, and IgA did not differ significantly during the first 28 days of age but increased exponentially by age 56 days. In contrast, BALF activity of VapA-specific IgA but not IgG subisotypes increased progressively with age. The differential increase of IgA relative to IgG subisotypes in BALF suggests intrapulmonary expression of VapA-specific IgA. The role of anti-rhodococcal IgA in protection against *R. equi* pneumonia merits further study.

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Flow rate and particle size of corticosteroids differ based on equine nebulizer device configurations

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Nebulized corticosteroids are commonly used to treat equine asthma as an alternative to systemic therapy to deliver drug directly to the lungs and reduce adverse effects. Dexamethasone is frequently prescribed due to low cost and availability in general practice, but clinical response can be inconsistent, equine nebulizers are poorly validated, and some formulations can be inefficient to nebulize. The leading equine nebulizer Flexineb E3 has 2 nebulizer mesh cup styles and 3 power settings resulting in 6 unique configurations, each potentially influencing drug delivery. Nebulizer testing is reported for aerosols directly exiting the nebulizer cup, but a spacer is used between the cup and patient as a reservoir that refines inhaled particle size profiles. Here, we tested 6 Flexineb setups with and without the spacer, nebulizing saline and 2 formulations of dexamethasone for aerosol droplet distribution, flow rate, and drug concentration following aerosolization. Each drug x device setup was tested in triplicate. Particle size distribution was measured by laser diffraction with inhalation cell. Flow rate was measured by changes in drug volume in the device over time. Drug concentration was measured in stock drug and aerosolized drug by high performance liquid chromatography (HPLC). Data were compared by multivariate analysis. Preliminary analysis demonstrated significant differences between nebulizer setups, particularly for PEG-formulated dexamethasone. These results highlight the value of standardized, clinically relevant testing for equine nebulizers, the importance of consistent nebulizing protocols in practice, and the need to investigate efficiently nebulized corticosteroids for managing equine asthma.

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Activities of fecal total IgA, *Rhodococcus equi*-specific IgA, and C3 in enterally immunized foals

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Rhodococcus equi pneumonia is a major cause of disease and death in foals at horse breeding farms. Enteral administration of live virulent *R. equi* soon after birth protects foals against intrabronchial infection with *R. equi* through a gut-lung axis, but the protective mechanisms remain unknown. To evaluate local immune responses in the gut, our goal was to examine whether fecal total IgA (TIgA) concentration, *R. equi*-specific IgA (REIgA) activity, and complement component 3 (C3) concentration were associated with enteral immunization status, age, and pneumonia status. Healthy foals were randomly assigned to enteral immunization with live virulent *R. equi* (2×10^9 colony forming units [CFU]; n=8), live avirulent *R. equi* (2×10^9 CFU; n=8), or saline (n=8) at ages 2 and 4 days. Foals were infected intrabronchially with *R. equi* (2×10^6 CFU) at age 28 days and monitored for development of clinical pneumonia. Fecal swabs were collected at ages 2 (before immunization) and 28 days (before intrabronchial infection) and tested by ELISA for TIgA, REIgA, and C3 activities. Data were analyzed using linear mixed-effects modeling. IgA concentrations significantly decreased ($p<0.05$) with age in foals of all immunization groups. No significant differences among groups were found for C3 and REIgA. TIgA and REIgA decreased significantly with age for healthy and pneumonic foals; however, the decrease in REIgA was significantly greater in pneumonic than healthy foals. Although further validation is needed, these results suggest that fecal REIgA may contribute to protective immunity against *R. equi* through a gut-lung axis in foals.

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Adaptive Sampling: a powerful tool to enrich *Mannheimia haemolytica* DNA in bovine respiratory tract samples

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Bovine respiratory disease (BRD) remains a major health challenge to the beef cattle industry in the United States, contributing to significant morbidity and mortality rates and resulting in immense economic loss. Previous research indicates an underestimation of strain diversity associated with *Mannheimia haemolytica*, a major bacterium in acute BRD. Therefore, this study aimed to determine the efficacy of a molecular enrichment procedure, Adaptive Sampling, in recovering *M. haemolytica* DNA and the effect of sequencing time on the detection of *M. haemolytica* from bovine respiratory tract samples. DNA extracted from nasopharyngeal swabs (n=24) previously identified with high levels of *M. haemolytica* via digital qPCR, was randomly assigned to three DNA library pools (n=8 per pool). Each pool was prepared with the Nanopore native barcode kit v14 and sequenced using Adaptive Sampling on a PromethION device. The genomes of three *M. haemolytica* strains representing serotypes A1, A2, and A6 were used as reference. At 72 hours, the median total read count was 1,750 reads (IQR: 1,652 reads). Most sequencing reads aligned to *M. haemolytica* reference genomes (median: 97.2%, IQR: 2.6%), but a wide heterogeneity in read counts was observed between samples within each sequencing pool. On average, both the total reads and *M. haemolytica*-mapped reads steadily increased, approaching a plateau at 60 hours of sequencing time. Consequently, the total and mapped new reads decreased almost linearly over sequencing time. These results highlight the ability of Adaptive Sampling to enrich targeted sequences selectively. The application of this technique will enhance the understanding of within- and between-host dynamics of *M. haemolytica* in BRD.

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Systematic in vitro testing for the effect of equine nebulizer design on aerosol drug delivery

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Nebulizers are commonly used to deliver inhaled medications to horses for treating respiratory diseases, including asthma and pneumonia. Different human nebulizer designs result in clinically relevant variations in aerosol drug profiles and device efficiency; this can further vary between individual drugs within each device. There is no standardized validation for equine nebulizers, and current protocols are largely based on speed of nebulizing, trial-and-error, and empirical recommendations from nebulizer manufacturers instead of evidence. Here, we interrogated 6 commercially available equine nebulizers and 10 commonly nebulized drug solutions for drug flow rate and clinically relevant particle size distribution parameters correlated with extent of intrapulmonary drug delivery. Three vibrating mesh and three jet nebulizers were connected to an inhalation cell with particle size analysis via laser diffraction. Tested drugs included 3 antimicrobials, 3 corticosteroids, 2 bronchodilators, and 2 mucolytic solutions. Each drug x device pairing was tested in triplicate. Flow rate was measured by changes in drug volume in device over time. Particle size distribution parameters were calculated by laser diffraction software. Data were compared by multivariate analysis. Preliminary analysis demonstrated significant differences between devices for each drug, and between drugs used in the same device. Together, these data illustrate the value of testing of nebulizing devices under consistent conditions replicating equine clinical scenarios. Further investigation is warranted to correlate results with in vivo drug delivery, towards our long-term goal of generating evidence-based treatment protocols for nebulizing horses.

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