College of Veterinary Medicine Faculty Interest Summaries 2024

Luiz E. Bermudez
Mycobacterial pathogenesis and new therapies to mycobacterial infection. *Mycobacterium tuberculosis*, *Mycobacterium avium*, *Mycobacterium abscessus* and *Mycobacterium avium* subsp *paratuberculosis*. Infection of the human and animal host interaction with mucosal surface, survival mechanism in the host, biofilm and its role in disease. Macrophages, Natural Killer cells and T lymphocyte participation in host defense against mycobacterial infection.

Brianna Beechler
I work on One Health related research topics, especially relating to wildlife disease and physiology. This summer I am looking for students who want to participate in the one-health program for undergraduates and veterinary students. This project asks how antimicrobial resistance and zoonotic waterborne disease, such as leptospirosis and giardia, change along a land use gradient from undisturbed forest, through agriculture land and into cities along the Mary's River locally.

Chris Cebra
Dr. Chris Cebra main lines of inquiry involve energy metabolism and gastrointestinal disorders. Regarding energy metabolism, he has primarily investigated the diabetes-like characteristics of llamas and alpacas, but has completed projects on cattle and horses as well. Regarding gastrointestinal diseases, he has concentrated on causes of colic, parasitic disorders, and other enteritides of camelids. He has also initiated or collaborated on projects in a number of other areas relevant to large animal internal medicine including equine and camelid peritoneal fluid analysis, diagnostic imaging, infectious diseases, and immunology.

Patrick Chappell
Work in my lab broadly focuses on basic mechanisms underlying the neuroendocrine control of reproduction, exploring how sex steroids interact with the molecular circadian clock in regulating the brain's timing of reproduction in female mammals. Separate projects involve investigating how circadian disruption may initiate hormone-dependent cancers, and how steroid exposure contributes to polycystic ovarian syndrome (PCOS). Current projects include neuronal proteomics to determine neurosecretory factors required for bone remodeling and metabolism, and cellular and molecular mechanisms underlying estrogen positive and negative feedback required for fertility, using mouse immortalized neuronal lines. Recently, we have generated immortalized neurons and pituitary lactotrophs from sheep, and are using these to probe mechanisms of the seasonal control of reproductive function.

Lia Danelishvili
I study the pathogenesis mechanisms of both non-tuberculous and tuberculosis causing mycobacterial pathogens. The non-tuberculous mycobacterial organisms (NTMs) that my group investigates are *Mycobacterium abscessus* and *Mycobacterium avium* (prevalent pathogens in HIV patients and in individuals both with immunosuppression and chronic lung pathologies) and *M. avium* subsp. *paratuberculosis* (etiological agent of Johne's disease in ruminant animals). We investigate bacterial virulence mechanisms and host-pathogen interactions. I also have ongoing drug discovery projects to identify novel compounds that target a) virulence factors uniquely expressed by intracellular bacteria and b) host factors influencing the pathogen's survival, and c) the biofilm formation. In addition, we characterize mycobacteriophages a) to overcome bacterial drug resistance and b) to understand phage-mediated innate immune responses by macrophages. The multidisciplinary approaches employing microbiology and cell biology techniques, bacterial genetics, high throughput screening libraries, gene knockout systems, the high-resolution microscopy, bioinformatics and mass- spectrometric sequencing are used in the laboratory to understand many basic questions that will help in the development of new therapeutic strategies.

Helio De Morais
My focus is on vector-borne and emerging infectious disease of dogs and cats.

Brian Dolan

Research in my lab is focused on two main areas. The first is the biology of antigen presentation, the process by which the cells of the body alert the adaptive immune system to the presence of intracellular pathogens, such as viruses, or oncogenic transformation. We are trying to determine which cellular pathways are necessary to successfully present the foreign peptide on major histocompatibility complex class I (MHC I) proteins at the cell surface, which serve to flag down disease specific cytotoxic T cells. We are also interested in studying immune responses in wild animal populations as it relates to disease spread.

Charles Estill
Dr. Estill is a Theriogenologist in the Department of Clinical Sciences. Research areas of interest include corpus luteum physiology and control, nutritional influences on reproduction, and ontogeny of sexual development. Current projects include collaboration on studies of “A ram model of neuroendocrine determinants of sexual orientation” and “Role of Peroxisome Proliferator-Activated Receptor gamma on prevention/cure of Mastitis”.

Jean Hall
My research is concerned with how nutrition affects immunity. I am interested in nutrigenomic technology, or the study of how nutraceuticals affect the expression of genes involved in the immune response. My projects involve sheep and cows supplemented with selenium and its effects on immune responses, animal health, and animal production. In particular, we are interested in using selenium as a fertilizer to enhance forages fed to ruminants. I am also interested in the health benefits of dietary n-3 fatty acids and antioxidants in geriatric dog and cat foods. We are currently investigating these supplements in renoprotective foods used to slow the progression of chronic kidney disease in dogs and cats. In conjunction, we are assessing novel renal biomarkers used for monitoring disease progression and therapeutic interventions.

Claudia Hase
The genus *Vibrio* consists of a group of Gram-negative bacteria that naturally inhabitant aquatic environments worldwide. Among this diverse group of microorganisms are a few human pathogens, namely *Vibrio cholerae* and *Vibrio parahaemolyticus*. In addition, our lab studies some Vibrio species that cause disease in aquaculture (*Vibrio tubiashii*) and corals (*Vibrio coralliilyticus*). To survive and efficiently replicate in the host, bacterial pathogens must adapt their metabolism to the conditions at the infection site. Infection by the human pathogen *Vibrio cholerae* involves multiple adaptation processes that ultimately lead to virulence factor production in the human small intestine. We are currently investigating the link between virulence gene regulation and cellular metabolism via the central metabolite acetyl-CoA in *V. cholerae.*
In addition to the world of *Vibrio*, we are interested in virulence attenuation in *Yersinia pestis*, the causative agent of plague. Antibiotic resistance is a growing problem in the treatment of many bacterial infections, including *Yersinia pestis*. Certain membrane proteins that transport ions could provide new targets for the development of innovative intervention strategies. We previously investigated the roles of the primary and two main secondary sodium pumps in *Y. pestis* virulence and found that the loss of two secondary pumps completely abolishes *Y. pestis* virulence. Currently, we are analyzing the key components that integrate calcium, sodium, and potassium homeostasis in *Y. pestis* to gain a better understanding of how this multifaceted cation transport system governs viability in this pathogen.

Ling Jin
My lab is interested in understanding of the mechanism of viral diseases and virus evolution. Understanding the mechanism of herpesvirus latency and reactivation is the main focus of research in my laboratory. My lab uses different herpesviruses to study the mechanism of herpes virus latency-reactivation cycles, the pathogenesis of herpesviruses, such as Herpes Simplex Virus 1 (HSV-1), Koi herpesvirus (KHV) and other animal herpes viruses. Currently, we have research projects on investigation of chromatin modification inhibitors as drugs against herpesvirus reactivation from latency.

Anna Jolles
Dr. Anna Jolles is a disease ecologist and epidemiologist at Oregon State University, where she has appointments in the College of Veterinary Medicine and the Department of Zoology. The Jolles lab studies the ecology and eco-immunology of infectious diseases in wild mammals. Current study systems include infectious diseases of African buffalo, feline immunodeficiency virus in African lions and Hanta virus in small mammals in

Oregon. We collaborate with Dolan's group on comparative immunology across a broad range of mammal species, and with Clint Epps (OSU Fisheries & Wildlife) on pneumonia in desert bighorn sheep.

Christiane Löhr
My research focuses on the molecular pathology as it applies to a wide range of diseases especially carcinogenesis, cancer prevention and treatment and infectious diseases. As a board certified anatomic veterinary pathologist with an appointment in the Veterinary Diagnostic Laboratory I encounter new or poorly understood disease conditions with regularity. Such cases provide excellent opportunities to identify specific, potentially novel, causes and mechanisms of disease processes. Much of my research is conducted in collaboration with colleagues in the College, on campus and outside the University. I find it very rewarding to provide critical input and data to large projects and to contribute to the training of researchers at all levels.

Jan Medlock
My research interests are in infectious diseases and ecology, using my background as an applied mathematician. I am currently working on a variety of subjects, from more theoretical work on dispersal of organisms to more practical projects on influenza, dengue, and African sleeping sickness. I am also interested in the application of mathematics and statistics to biology in general: I have recently begun working with Dr. Shay Bracha to analyze large amounts of genomics and proteomics data on canine cancers.

Tim Miller-Morgan
Dr. Tim Miller-Morgan is an extension veterinarian focusing on aquatic species and the ornamental fish industry. He leads the Oregon Sea Grant Aquatic Animal Health Program, which provides the ornamental fish industry, aquatic research laboratories, and public aquaria with cutting-edge, scientifically based, conservation minded disease management techniques, consultation and training. Our research focus is on applied research aimed at current and emerging animal health issues generally associated with the management of wild-caught ornamental fish species and the management of disease throughout the chain of custody from the collector/farmer to the end consumer the ornamental fish hobbyists.

Hong Moulton
Morpholino oligomers are a class of steric-blocking antisense molecules that have been widely used to knock down gene expression, modify pre-mRNA splicing or inhibit miRNA maturation and activity. Injection of Morpholinos into single-celled embryos of many creatures results in specific knockdown of targeted genes with little toxicity. Morpholino oligomers have revolutionary potential for treatment of a broad range of human diseases, including viral, bacterial, age-related and genetic diseases, but they suffer from poor delivery into cells. My long term research interest has been in inventing and improving methods for enhancing *in vivo* delivery of Morpholinos in a tissue-specific manner for a given disease by chemically modifying and/or formulating Morpholinos. My current research is 1) to develop and validate a high throughput *in vivo* model to assess the efficacy and toxicity of intracellular delivery methods for steric-blocking antisense oligos, and 2) to investigate how host factors affect influenza viral infection using the Morpholino-mediated gene knockdown approach.

Manoj Pastey
Dr. Pastey's laboratory is conducting research work on the pathogenesis of influenza, HIV, and respiratory syncytial virus (RSV) and developing a new diagnostic method to detect Dengue virus, Bovine Herpes virus, and sexually transmitted infections in clinical samples.

HIV Research Study: Our laboratory is testing a poly herbal vaginal microbicide named "BASANT" that has been shown to inhibit a wide range of sexually transmitted pathogens including HIV. Preliminary studies have also shown safety and acceptability in Phase I (acceptability and toxicity study) human trials in India. Therefore, the next step is to verify the effectiveness of the BASANT in preventing HIV transmission *in vivo*. We are also working on a novel HIV protein that is required for replication in T cells. HIV sequestration in the CNS and the failure of antiretroviral drugs to penetrate through blood-brain barrier to eliminate latent CNS reservoir continues to be a major road block in AIDS therapy. Therefore, we are developing Nanotechnology based delivery systems to target the virus within different tissue compartments.

RSV Research Study: Respiratory Syncytial Virus (RSV) is a leading cause of bronchopneumonia in infants and the elderly. There are no vaccines or effective treatment available. Knowledge of viral and host

protein interactions is important for better understanding of the viral pathogenesis and may lead to development of novel therapeutic drugs. In our lab, we have shown that Respiratory Syncytial Virus Matrix (M) protein interacts with cellular adaptor protein complex (AP)-3 and its medium (μ) subunit. We are also looking into the role played by Myeloid cell leukemia-1 (MCL-1), an anti-apoptotic member of the B-cell lymphoma-2 (Bcl-2) family, in Respiratory Syncytial virus pathogenesis.

New Diagnostic method: We are developing a new rapid diagnostic method to detect dengue virus, bovine herpes virus, and sexually transmitted infections at Point-of-Care within 30 mins at room temperature using recombinase polymerase amplification (RPA) technology without the need for sophisticated equipment.

Stephen Ramsey

Our lab uses the tools of bioinformatics, machine-learning, artificial intelligence, and systems biology to better understand the molecular basis of diseases and to advance precision medicine. Currently, we are working on projects in the areas of (1) cancer, (2) therapeutic drug monitoring, and (3) drug repositioning.

Dan Rockey

The Rockey laboratory focuses on chlamydial pathogens of humans and animals. The importance of these agents stretches from human sexually transmitted infections and trachoma, through serious diseases of sheep, birds, and koala bears. Many aspects of basic biology are similar among these different chlamydial pathogens, and therefore, our work with one infection is generally relevant to other diseases as well. Our research approach exploits cell culture-based and genomics-based analyses and we work to keep our investigations in line with clinically important issues faces by medical doctors, veterinarians, and their patients. We currently have room for early-stage students with active interest in research careers, who will focus on the testing of polymerase-chain-reaction primers on DNA collected from clinical samples.

Mahufzur Sarker

The long-term goal of my research program is to develop strategies to inactivate *Clostridium* spores and to control *Clostridium*-mediated diseases. We mainly focus our work on spores of *C. perfringens* (*Cp*) causing *Cp* food poisoning, which currently ranks as the third most commonly reported food-borne disease in the USA. *Cp* also causes non-food-borne gastrointestinal (GI) diseases in humans and GI diseases in domestic animals. Specifically, we investigate the molecular mechanisms of *Cp*: i) spore heat resistance; ii) spore germination; iii) spore-host interactions; and iv) spore inactivation.

Katherine Scollan

My research in the field of veterinary cardiology is focused on three-dimensional imaging of the heart including 3D echocardiography and computed tomography (CT). I am investigating the use of these imaging modalities to assess size and function of the cardiac chambers in normal and diseased hearts. In addition, I perform research in pharmacokinetics and efficacy of antiarrhythmic medications used in dogs and have an interest in the congenital cardiac diseases of camelids.

Stacy Semevelos

Her research focuses on comparative orthopaedics, particularly postnatal cartilage development and osteochondrosis in horses. She has discovered molecular expression changes in osteochondrosis and has explored the quantitative and spatial alterations of matrix molecules, growth factors, and cell-to-cell signaling in this important disease. In addition, she has discovered age-related changes in gene and protein expression patterns of matrix molecules, growth factors and paracrine factors in articular cartilage of normal growing horses throughout postnatal development. She has also investigated musculoskeletal disorders of llamas and alpacas, using molecular, biochemical, and histological techniques to evaluate suspensory apparatus breakdown in these species.

Natalia Shulzhenko

The Shulzenko lab is interested in understanding how cells of the immune system communicate with other host systems and the resident microorganisms (microbiota) in complex organisms in health and disease. This co-existence is beneficial for both sides but has to be tightly regulated in order to prevent disease development. In order to disclose the mechanisms of these physiological and associated pathological processes, the lab uses a

systems approach and analyzes host and microbiota simultaneously. This is done through host transcriptome profiling and global microbiome analysis by next generation sequencing to identify the key regulators of the process. These findings are further validated by directed perturbations of host and microbiota using gnotobiotic mice, i.e. those colonized with defined microbiota. Lab's recent work in chronic enteropathy of immunodeficient hosts (human and mouse) and in type 2 diabetes focuses on finding microbiota members that can be harmful or beneficial for these diseases.

Susanne Stieger-Vanegas
My research interests focus broadly in computed tomography and ultrasound of gastrointestinal, complex cardiac and musculoskeletal disease in dogs and New World Camelids. My interest not only includes the CT imaging of clinical patients, but establishing new imaging protocols to improve imaging of diseased veterinary patients using CT. Furthermore, my research focuses on 3D modeling and printing of complex disease processes in small, large and exotic species with the goal to better understand complex disease processes, provide tools for enhanced student learning and improve patient outcomes by providing 3D models for individualized treatment planning and care.

Sue Tornquist
I don't have current research projects but have worked primarily in infectious diseases and immune response, and metabolic disease. My interests are in hematology and cytology.

Jennifer Warnock
I am a Small Animal Surgeon with a practice focus on orthopaedic surgery. My major area of basic science research is on *in vitro* meniscal tissue engineering, using waste tissue obtained during clinical arthroscopy. Meniscal injury and deficiency is a major cause of pain, disability and irreversible osteoarthritis in dogs and humans. As the menisci have minimal to absent healing responses, creating autologous fibrocartilages *in vitro* through tissue engineering may be a viable strategy for addressing the meniscal deficient stifle or knee. My current work has focused on creating fibrocartilage-like tissue from synovial and meniscal cells cultured from clinical patients in need of engineered stifle tissues. Specifically, my lab has synthesized autologous, scaffold free, tensioned neotissues, to avoid the complications seen with use of synthetic, allogenous, and xenogenic scaffolds in meniscal tissue engineering applications. My clinical research focuses on minimally invasive surgery and validation of surgical techniques. I have a long-term goal of bringing discoveries made in my laboratory (following efficacy and safety analysis) to the hospital to benefit my patients.

Katja Zellmer
My general research area is the pathophysiology, diagnosis, treatment and prevention of musculoskeletal diseases in horses. In recent years, we have started to evaluate rehabilitative musculoskeletal therapies in horses using kinesiologic myography. We are interested in defining which muscles are actually activated during specific therapeutic exercises in horses. This will improve veterinarians' and owners' ability to rehabilitate horses from certain musculoskeletal conditions, as well as to improve their performance. In the long term, we are interested in developing protocols or systems that are predictive for musculoskeletal injury or disease occurrence in horses, followed by the development of specific treatment or training plans to decrease the risk of these musculoskeletal injuries or diseases.
This summer, we are hoping to finalize and verify protocols to utilize surface electromyography in combination with inertial sensors as a means of measuring muscle activation patterns for different gaits in horses.