Comparative Health Sciences Faculty Interest Summaries 2022

Brianna Beechler

My research interests seek to understand the role of host physiology and immunology in disease transmission. I work with a variety of wildlife and domestic animal species including African buffalo, bighorn sheep, walrus, cattle and domestic cats.

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.

Cecily Bishop

Dr. Bishop’s research aims to investigate the incompletely understood molecular pathways associated with normal and pathologic ovarian and uterine angiogenesis.

Gerd Bobe

The focus of my research group is on dietary disease prevention using a “system biology” approach that integrates knowledge from nutrition & physiology, molecular & cellular biology, nutritional & molecular epidemiology, and biostatistics. (1) In ruminants, the focus of my research group is on optimal nutrition during periods of stress, in particular the time around calving and markers that predict risk of disease. Flaxseed, selenium, yeast fermentation product, and vitamin E are dietary compounds that we have looked at for improving health and performance of ruminants. (2) In humans, the focus of my research group is personalized disease prevention using dietary flavonols and dry beans. Combining “omics” techniques in parallel human and animal model studies provides the opportunity to improve risk assessment, allowing the development of new prevention and treatment options, and an individually tailored approach to prevention and treatment in humans.

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 camels. 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 endocrine control of reproduction, exploring the role of the molecular circadian clock in the brain’s timing of
reproduction in female mammals, investigating how circadian disruption may initiate breast and prostate cancers, and how the hormonal control of reproduction evolved from more ancient species such as corals.

**Gita Cherian**

The long-term goal of my research program is to better understand lipid metabolism in chicks so as to enhance their post-hatch growth and health along with producing wholesome foods for human consumption. Specifically, lipid modification strategies to: (1) investigate fatty acid metabolism during pre and early post-hatch in poultry, (2) investigate the role of maternal dietary lipids in modulating metabolic and cardiovascular disorders in progeny birds, and (3) develop value-added wholesome functional poultry foods were undertaken (or are in progress) through an OAES hatch project, the USDA-NRICGP, through the Agricultural Research Foundation or other private sources.

**Sandy Cleveland Phibbs**

Sandi supports the Oregon State University Center for Health Innovation’s purpose to connect Oregon State University faculty and students with external community, industry, and government partners, in order to create new and expanded opportunities to partner on innovative public health and human sciences workforce development, practice and research.

**Katie Curran**

Specializing in veterinary oncology, Dr. Curran appreciates providing owners with a comprehensive approach to diagnostic and therapeutic options. She studies ongoing advances in veterinary oncology.

**Lia Danelishvili**

Dr. Lia Danelishvili’s research is mainly focused on studying the mechanisms of *Mycobacterium tuberculosis* pathogenesis. Dr. Danelishvili’s research identifies and characterizes virulence genes and proteins that are required for the early events of macrophage infection, survival and cell-to-cell spread. She studies the molecular mechanisms of the pathogen-host interaction and the associated cellular processes, such as apoptosis, autophagy and necrosis. The multidisciplinary approaches employing bacterial genetics, high throughput screening libraries, gene knockout systems, cell biology, high-resolution microscopy, bioinformatics and mass-spectrometric sequencing are used in the laboratory.

**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”.

Theresa Filtz
Research in Dr. Filtz’ lab focuses on better understanding the means by which cells respond to signals that cause them to alter their activities or states. Cells receive message from the outside at receptors on the cell membrane and then a series of intracellular events converts those messages to changes in protein activities, often culminating in changes to transcription factors that function to alter gene transcription programs. Her lab advances the elucidation of new drug targets by trying to better understand the array of changes called post-translational modifications on transcription factors that may alter gene expression networks.

Elain Fu
The goal of the Fu Lab is to advance the engineering of novel microfluidic tools and devices for field use through improving our understanding of the devices' underlying physicochemical processes. Research in the lab consists of three areas of focus: the investigation of molecular interactions and fluid transport in microfluidic systems, the development of tools and methods for use in high-performance microfluidic assays, and the implementation of microfluidic assays for clinically relevant analytes. Global health application domains of interest include human disease diagnosis, veterinary medicine, environmental monitoring, and agriculture.

Jana Gordon
Dr. Gordon’s research interests are in endocrinology and infectious disease.

Elena Gorman
In addition to cytologic diagnosis of disease and advancing diagnostic accuracy, I have a strong dedication to student teaching, particularly in the areas of clinical chemistry, including acid base physiology, and cytology, subjects which are particularly challenging to students. I work closely with student groups, e.g. the pathology club, in order to generate interest in these subjects and to develop better teaching modalities in order to aid their ultimate grasp of these concepts.

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.

S. Marie Harvey

I am a public health researcher with 35 years of experience conducting research focused on the behavioral, contextual, and policy aspects of sexual and reproductive health (SRH) among diverse samples of young adults, including men, women, and couples. The overarching goal of my research program has been to reduce disparities in risky sexual behavior and increase well-being and access to sexual and reproductive health services. I have published widely in the area of prevention of unintended pregnancy and STIs and have been the recipient of numerous research grant awards. More recently, I have extended my research focus to examine the impact of new health policies and healthcare reforms on SRH. I served as PI on a six-year project funded by the Centers for Disease Control and Prevention to examine the impact of Medicaid expansion on the health of low-income women of reproductive age and infants in Oregon. In addition, I was PI on a study that investigated the impact of Oregon’s Medicaid reforms on abortion access and utilization. I am dedicated to the use of research findings to inform policies and practices that improve the health of women, men, and families.

Claudia Häse

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*). We are applying various modern molecular techniques to better-understand the virulence properties and environmental survival strategies of these pathogens. In addition, we are developing detection assays that can be used in aquaculture facilities to reduce the economic impact of vibriosis.

Adam Z. Higgins

Dr. Higgins’ research activities fit within the broad theme of medical bioprocessing, with a particular emphasis on technologies for long-term stabilization of cell-based products (e.g., cryopreservation, freeze drying) and microfluidic devices for chemical processing of blood. Current research projects focus on mathematical modeling and optimization of cryopreservation procedures, development of microfluidic cell washing methods to facilitate the use of frozen blood for transfusions and extracorporeal blood processing for treatment of sepsis.

Kenton Hokanson

All of the wonderful things our brains do, from visual perception, to coordinating our movements, to memorizing the lyrics of a new song, depend on the electrical activity of neurons. I study how these electrical signals are generated and transmitted, and how they drive communication between neurons connected by specialized structures called synapses.
To do this, I use a technique called electrophysiology, which involves placing tiny electrodes near or inside individual neurons to record their behavior with remarkable sensitivity. As the Director of the Electrophysiology Core Facility, I am working to bring this technique to the many other neuroscience laboratories at OSU.

Michael Huber

Research projects included surgical manipulation of endometrial cups in mares to manage infertility associated with pregnancy loss, and the impact of bone fragments on joint health. Focusing on some innovative ideas for limiting reproduction in BLM and Tribal horse and burro populations and development of an instrument to facilitate a surgical procedure.

Arup Indra

Our laboratory is investigating into the mechanisms of spatio-temporal development of skin (largest organ in the body) from stem cells and the role of lipids in skin barrier formation, suppression of inflammation and preventing the onset of inflammatory skin disease (e.g. eczema) using mouse genetics, biochemical, cellular and molecular approaches. My group pioneered a simple, non-invasive way to extract and profile skin lipids from rodents and humans using both “un-targeted” and “targeted” lipidomic approach that has opened up a new field of research in predicating onset of inflammatory skin diseases (e.g. AD or psoriasis).

We are also focusing on the mechanisms underlying the crosstalk between the various skin cells and immune cells, and the role of microenvironment in the promotion and progression of “melanoma”, the deadliest and the most aggressive of all skin cancer types. Over the past 16 years, our laboratory has generated multiple novel pre-clinical models of human diseases with skin barrier defects, hair loss, atopic dermatitis ((highlighted by the Office of the NIH Director), delayed wound healing, skin pigmentation disorder and for invasive metastatic melanomas.

In alignment with the drug discovery program of the College of Pharmacy, we are performing high throughput screening and evaluating anti-cancer properties of unique bioactive natural compounds and novel metabolites that are generated by collaborators Professors Taifo Mahmud and Fred stevens at OSU and external collaborators across the nation. We are establishing their role to regulate cancer cell metabolism and activate host-immune responses to pursue our goal to identify and characterize new molecules that could be effective for therapeutic interventions and control disease progression.

Jane Ishmael

Our research focuses on understanding the functional relationship between autophagy (“self-eating”) and cell death signaling in brain tumor cells. Glioblastoma multiforme is the most common malignant primary tumor of the central nervous system and remains very difficult to treat. These tumors arise from astrocytes and have many biological characteristics that allow them to evade cell death. We utilize a range of human cancer cell types and genetically modified mouse embryonic fibroblasts (MEFs) to determine how cells use autophagy as a survival response to stress. Our research interests are closely aligned with the drug discovery efforts in the College of Pharmacy and we study a number of unique compounds that have arisen in nature in diverse and unusual ecosystems. The main projects in the Ishmael
laboratory are currently centered around structures with anticancer potential that were discovered by Drs. Kerry McPhail and Taifo Mahmud at collection sites in Panama, South Africa, Indonesia and the Red Sea. By working at the interface of Medicinal Chemistry and Pharmacology we seek to understand the potential of these naturally occurring structures to modulate autophagy, inhibit cellular proliferation and induce apoptotic or alternate modes of cancer cell death. Our long-term goal is to characterize new chemical entities with the potential to inspire drug development for and identify new cellular targets for cancer chemotherapy.

Urszula Iwaniec

Current research foci include: 1) Neuroendocrine regulation of body weight and bone metabolism. 2) Nutrition as a factor in tumor metastasis to bone. 3) Regulation of stromal (stem) cell differentiation into bone cells and fat cells.

Ling Jin

My lab is interested in understanding of the mechanism of viral diseases and virus evolution. Latency of herpesviruses is the main focus of research in my laboratory. My lab uses several different herpesviruses to study the mechanism of herpes virus latency-reactivation cycles, the pathogenesis of herpes viruses, such as Herpes Simplex Virus 1 (HSV-1), Herpes Simplex Virus 2 (HSV-2), Laporid herpesvirus 4 (LHV-4), Koi herpesvirus (KHV) and other animal herpes viruses, and host- virus interaction in central nervous system. In addition, my lab in interested in anti-viral drug development, new emerging viral disease diagnosis, such as deer pox virus, deer adenovirus, goldfish tumor virus. Currently, we have research projects on HSV, LHV-4, KHV, Bovine Herpes Virus 1 (BHV-1), goldfish tumor virus, and deer adenovirus.

Jennifer Johns

Research in our lab focuses on several areas:

1) Translational research utilizing canine mesenchymal stem cells (MSCs) to assess how MSCs alter the bone marrow microenvironment/immune response in canine osteosarcoma (a common bone cancer of dogs) and the resulting impact on cancer progression; and how MSC-derived exosomes modulate the immune response in a potentially beneficial way for treating immune-mediated disorders.

2) Research on tick-borne rickettsial infections, including granulocytic anaplasmosis and related obligate intracellular bacterial infections.

3) Veterinary diagnostic testing with an emphasis on multiplex analysis, laboratory animal/wildlife species, and hematopoietic disorders.

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.

**Donald Jump**

My colleagues and I, in the Molecular Nutrition and Diabetes Research lab, investigate the molecular and metabolic basis of complications associated with obesity and diabetes. Our current focus is on the role diet plays in the onset and progression of nonalcoholic fatty liver disease (NAFLD), a major global health problem.

The central theme of our research is that dietary fat plays a central role in the control of transcriptional regulatory networks regulating carbohydrate, lipid and protein metabolism. Consumption of high fat diets or diets with insufficient polyunsaturated fats (omega 6 and omega 3 fats) contribute to the complications associated with obesity and type 2 diabetes. Such changes in dietary fat content disrupts regulatory networks controlling cell function. These events lead to complications of diabetes, such as hyperglycemia, dyslipidemia, cardiovascular disease and fatty liver disease.

**Michael Kent**

Dr. Kent’s research focuses on diseases of fishes and parasitology. Currently he is leading projects investigating diseases of importance to zebrafish in research facilities as this fish is now a very important model in biomedical research. Two groups of pathogens that he is studying are mycobacteria and microsporidia that infect zebrafish. He also is investigating diseases of importance in wild salmonid fishes, and presently is studying multiple pathogens associated with pre-spawning mortality in Chinook salmon.

**Molly Kile**

My major research interests are environmental, molecular epidemiology and global health. I am interested in understanding how exposure to chemicals in our environment influences maternal and child health. Specifically, I am interested in how chemical exposures in utero may alter epigenetic mechanisms that could contribute to chronic diseases later in life. I am also interested in how genetic and other individual factors such as nutritional factors may interact with chemical exposures to influences susceptibility to disease. I have a very strong background in exposure biology and developing cohorts for environmental epidemiological studies. I also have a very strong interest in international environmental health studies.

**Chrissa Kioussi**

The precision in formation of a developing embryo is the result of an intricate mechanism of morphogenetic events, which bring cell populations together for interactions to form three dimensional structures. Complex cascades of signal transduction pathways coupling with an overlapping array of transcription factors constitute the basis for interpreting the transient morphogenetic code. Chrissa Kioussi focuses on the molecular mechanisms by which transcription factors, such as the homeobox genes, mediate cardiovascular and muscle development. Using mouse model systems she searches for a better understanding of congenital heart diseases, muscular dystrophies and human syndromes.
Siva Kolluri

Our research efforts are directed toward discovering molecular targets that are selective for cancer, developing agents that are selectively toxic to cancer cells, and devising optimal combinations of therapeutic agents aimed at different molecular pathways for the prevention and treatment of cancer. We are currently focusing our efforts to (i) Develop small molecules to treat Bcl-2 overexpressing cancers and (ii) Therapeutic targeting of the Ah Receptor in cancer and autoimmune diseases.

Michelle Kutzler

Dr. Kutzler’s current areas of research include methods for non-surgical and alternative surgical sterilization, effects of gonadectomy on long-term health, and use of GnRH agonist treatment to improve long-term health of gonadectomized dogs.

Christopher Langdon

Research Areas: Aquaculture; nutrition of oysters and other bivalves; microencapsulation; polyculture of abalone; genetic selection of oysters.

Chris’s research is broadly interested in aquaculture of oysters and other bivalves, and of sea vegetables such as dulse. He also works with microencapsulation of nutrients to feed bivalves and other fishes in aquaculture operations. His work with the Molluscan Broodstock Program focuses on the genetic selection of oysters in order to improve all aspects of oyster production. Chris also studies ocean acidification and hypoxia and its effects on oyster production.

Mark Leid

The Leid laboratory is primarily focused on the in vivo role of the transcriptional regulatory protein known as Ctip2/Bcl11b. The laboratory discovered the protein and cloned the corresponding cDNA in 2000. The Leid group subsequently defined the molecular and cellular basis for the activity of this transcription factor, and demonstrated that the protein plays key roles in the development of several organ systems, including the immune system, teeth, craniofacial skeleton, and skin. We now work primarily on two projects, with the goals of which are: (1) determining the role of BCL11B in craniofacial development and craniosynostosis, and (2) defining the mechanisms by which post-translational modifications, such as phosphorylation, sumoylation, and ubiquitination, control the transcriptional regulatory activity of BCL11B in all cell types.

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.
Kathy Magnusson

Our human population is aging. The percentage of the population in this country that is over the age of 65 is projected to increase from 12.6% in 2005 to 20% by 2030. With this increase will come a rising financial burden to both families and society, unless we can prevent the declines that are currently associated with aging. Declines in brain functions during aging, including memory and cognitive flexibility, affect almost half of the human population over 65 years of age. This interferes with people’s quality of life as they get older. It also can become an economic burden, because they can no longer live independently. Pet animals can also experience these changes, which may limit their functional lifespan. These problems suggest that there is a decline in the optimal functioning of regions of the cerebral cortex and hippocampus. The N-methyl-D-aspartate receptor, a subtype of glutamate receptor, is highly expressed in these brain regions and plays a role in many of the functions that decline during aging. Our laboratory has found a selective vulnerability of the NMDA receptor to aging. This decline in NMDA receptors correlates with declines in memory function. We will be exploring the effects of drug or micronutrient intervention on these receptors during aging with the use of stereotaxic surgery, chronic drug administration, and/or behavioral testing using mice as our model system. We may also be examining the effects of interventions on receptor binding density, and subunit mRNA and protein expression with the use of receptor autoradiography, in situ hybridization and Western blots, respectively.

Erica McKenzie

Dr. Erica McKenzie is a specialist in large animal medicine and sports medicine and rehabilitation. Her research interests are largely related to exercise physiology and muscle function. Some of her projects have therefore included studying effective drugs for preventing muscle damage in horses, and the study of specific aspects of exercise physiology and disease in racing Alaskan sled dogs. As a large animal clinician, Dr. McKenzie occasionally performs research projects relevant to internal medicine in alpacas.

Jan Medlock

My primary research interests are in the epidemiology of infectious diseases. I also have broader interests in using quantitative and computational methods for questions in biological sciences. I am currently working on a variety of projects, including the epidemiology of foot-and-mouth disease virus in African buffalo and the ecology and epidemiology of pathogens in bighorn sheep. In the past, I have worked extensively on the epidemiology of HIV, influenza, dengue, and African sleeping sickness.

Kirk Miller

Dr. Kirk Miller is certified in Canine and Feline Practice through the American Board of Veterinary Practitioners. He was in private small animal general practice for more than 12 years before joining the faculty at OSU. Dr. Miller is a Clinical Instructor and teaches the Small Animal Primary Care rotation, which takes place at the Oregon Humane Society in Portland. His current research projects include looking at the natural incidence of dirofilaria immitis in dogs in the northern Willamette Valley and another project evaluating a novel spay technique in cats.
**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.

**Andriy Morgun**

Our lab is focusing on health problems in which an unbalanced interaction between immune, other host systems and different microbes leads to pathology. Those diseases range from immunodeficiency-associated enteropathy to cervical cancer and acute rejection of heart and renal transplants. We employ multiple large-scale quantitative approaches (also called “omics” [http://en.wikipedia.org/wiki/Omics](http://en.wikipedia.org/wiki/Omics)) to generate the data and use this data to make predictive statistical models and networks that allow us to address three major topics:

- Discover new or repurpose old drugs
- Generate diagnostic/predictive “omics” signatures for personalized medicine
- Validate experimental animal models for human research using “omics” approaches.

**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.

**Lauren Newsom**

Dr. Newsom is interested in research that focuses on practical applications of computed tomography and ultrasound, specifically as it relates to diagnosis and prognosis of oncologic, surgical, and medical illnesses in small animal patients.

**Fikru Nigussie**

My research interest is in adult hippocampal neurogenesis and its role in learning and memory, regulation of stress and circadian rhythm using animal and cell culture models.
Ana Pacheco

Dr. Pacheco’s research interest are in respiratory medicine, endocrinology and emergency and critical care.

Si Hong Park

My goal is developing a food safety program included genomics, metagenomics (microbiome and whole genome sequencing) and transcriptomics based on a next generation sequencing and bioinformatics. Research is focusing on the detection, identification and control of foodborne pathogens such as Salmonella, Listeria, Campylobacter and E. coli from farms to forks using various molecular techniques. Currently, I am working on microbiome sequencing in gastrointestinal tracts of humans, food animals (poultry and cattle), catfish and experimental animals to evaluate the microbial diversity in the presence of food and feed supplements (prebiotics, probiotics and antimicrobials) and/or foodborne pathogen challenge.

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
My lab's aim is to use the tools of computational systems biology to advance precision medicine. We integrate cellular, molecular, and population genetic information on a variety of scales within network models. By analyzing these network models, we aim to identify new disease mechanisms or therapeutic targets. We use machine learning to study the role of noncoding regulatory elements in pathogenesis. We use cross-species approaches, integrating canine and human datasets in the case of cancer and human and mouse datasets in the case of cardiovascular disease. In our newest project, we are using artificial intelligence methods to develop a "Wolfram Alpha"-like system for answering biomedical questions based on a huge database of structured biomedical prior knowledge.

Dan Rockey
Interactions between chlamydiae and the mammalian host. All species of chlamydiae are obligate intracellular bacteria that cause disease in a wide variety of animal species. In humans, Chlamydia trachomatis and C. pneumoniae cause a variety of diseases of the eye, genital tract and lung. These conditions affect millions of people worldwide and lead to billions of dollars in medical expenses yearly in the U.S. alone. Additionally, chlamydial infection is associated with certain types of arthritis and, most surprisingly, arterial sclerosis. Very little is known about how chlamydiae interact with the host to cause a particular chlamydial condition, and why some infected people have serious disease and others are asymptomatic.

Sarah Rothenberg
Dr. Rothenberg's research uses a multidisciplinary framework, including environmental monitoring, risk assessment, and epidemiologic studies, to fully understand the dynamics of mercury cycling and methylmercury exposure. She also investigates interactions with other trace metals, which co-occur with mercury in the environment.

Carl Ruby
My research interests include the assessment of tumor immunity in dogs with various types of cancer, including osteosarcoma and lymphoma. The involvement of immune cells in the natural history of these cancers can provide additional diagnostic information that complements existing readouts and guide therapeutic strategies. In addition, I am actively developing canine-specific cancer immune-based therapies that will provide clinicians and patient owners safe and effective options beyond the standard toxic chemotherapy regimens commonly available in the veterinary clinic.

Duncan Russell
My scholarly interests are applied clinical research, comparative pathology (particularly animal models of human disease and implant pathology), and educational science. I am especially interested in research questions that are directly applicable to clinical veterinary medicine. This has included histologic evaluation of surgical margins and descriptions of naturally occurring disease. My projects relating to educational science have evaluated the utility of alternative teaching strategies that enhance student learning and encourage metacognition.
Justin Sanders
My research is focused on host-parasite interactions and the impacts of ecological and evolutionary factors on these interactions. Current projects include: 1. Production of monoclonal antibodies that recognize a number of zebrafish cytokines and characterization of the zebrafish immune response, 2. Development and characterization of an elevated temperature zebrafish model, primarily for the study of the apicomplexan parasite, *Toxoplasma gondii*, 3. Improvement of diagnostic techniques for the detection of important veterinary parasites such as *Giardia intestinalis* and the liver fluke, *Fasciola hepatica*, 4. Identification and characterization of the transmission dynamics of aquatic pathogens. This work is being performed with salmonid fishes in the wild as well as with laboratory zebrafish in order to determine the factors involved in prespawn mortality of salmonids and to guide diagnostic efforts aimed at improving the health of zebrafish in laboratory fish colonies.

Mahfuzar 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.

Kate Schilke
Development of peptide-based bioactive surface modifications for biomedical devices, and applications of immobilized biomolecules in microreactors and lab-on-chip devices.

Carla Schubiger
I have a particular interest in bacterial infectious diseases of commercial aquatic species, currently working with oysters, shrimp, salmonids, and black cod. My group studies probiotics and their use as alternative treatment options against a variety of aquaculture pathogens, their influences on the innate immune response and the gut microbiome of the aquatic host, their efficacy in food safety, and the molecular mode of action of the probiotic. I am also curious about aspects of bacterial cell physiology and working with zebrafish.

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 camels.

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.

**Thomas Sharpton**

Dr. Thomas Sharpton’s research is broadly directed towards ascertaining how commensal microbiota and their genomic characteristics (i.e., the microbiome) relate to health. His laboratory specializes in the development and application of high-throughput computational and statistical tools that characterize microbiome biology, and investigates how microbiomes are distributed across space, time, and host physiology. The Sharpton lab aims to develop testable hypotheses about how hosts and their microbiome interact, and strives to understand the evolutionary and ecological processes that influence community assembly, maintenance, and function within a host. Ultimately, this knowledge will be used to discover disease mechanisms, identify predicative and diagnostic biomarkers of disease, and develop tools to treat disease through manipulation of the microbiome. All of the data resources and software that his lab develops are freely available.

**Neil Shay**

Neil Shay, Ph.D. is presently a Professor in OSU’s Department of Food Science and Technology. His research area is the study of bioactive compounds in fruits and vegetables, such as the antioxidant compound found in raspberries, watermelon, and grapes including resveratrol, quercetin, citrulline, and ellagic acid. His research most closely touched on the health problems of diabetes, hyperlipidemias, obesity, and chronic inflammation associated with metabolic diseases. Trained in nutrition-related aspects of biochemistry and molecular biology, Dr. Shay’s research has included molecular biology studies, animal models, and clinical studies.

**Natalia Shulzhenko**

My laboratory studies interactions between the immune system, metabolism and gut commensal microorganisms (microbiota) in mouse models and human diseases. Microbial cells exceed ten times the number of our own body cells and contribute to several physiological processes. With the advent of new genomic technologies, the role of microbiota in health and disease is a rapidly evolving field of research. We apply novel systems biology approaches such as network reconstruction to analyze host and microbiota simultaneously. Our recent work on chronic enteropathy in immune-deficient hosts revealed a crosstalk between the immune system, the microbiota, and the epithelial cells affecting both intestinal and systemic lipid metabolism. Using metagenomic sequencing, we plan to reveal the microbial players contributing to this disorder and to test them in a mouse model of this disease. In another project, we are studying adverse effects of antibiotics on the intestinal immune system and on
microbiota and how this disruption contributes to metabolic syndrome and type 2 diabetes.

Aleksandra Sikora

The emergence and increasing occurrence of bacterial strains that are resistant to all classes of available antibiotics is a global problem. Current antimicrobials target a relatively small number of essential gene functions including: inhibition of cell wall biosynthesis, and synthesis of macromolecules (proteins, DNA and RNA). Treatment of infections caused by antibiotic resistant bacteria requires new approaches and agents with novel modes of action. The bacterial extracellular proteome (cell envelope, membrane vesicles and secreted proteins) plays a fundamental role in establishing infection by enabling the microbes to adhere to and invade host cells, facilitating nutrient acquisition, host tissue destruction, and suppression of host immune responses. Hence the components of the extracellular proteome are promising targets for drugs/vaccines aimed at preventing bacterial infections. The long-term goal of our research is to enhance our understanding of the phenotypic plasticity of the bacterial extracellular proteome and utilize this information to identify attractive targets for development of new therapeutic interventions. Currently, our research focuses on the role of bacterial extracellular proteomes in colonization and circumvention or exploitation of host immune response using two model organisms Vibrio cholerae and Neisseria gonorrhoeae. We examine these issues using comprehensive proteomic studies, chemical genomics, and state of the art genetic, molecular and biochemical methods.

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. Currently I have a focus in cats with lung disease, dogs and New World camelids with gastrointestinal and cardiac disease. In addition, I have a strong interest in understanding if additional techniques such as three-dimensional CT can improve the accuracy reading CT studies in evaluators less experienced reading CT studies. Furthermore, I am also interested in establishing new techniques such as elastography to evaluate patients with musculoskeletal disease. Elastography is a relative new technique used in human patients with injuries of the soft tissues and has in human patients so far predominantly been used to evaluate patients with suspected breast cancer. Current ongoing funded projects include CT of the gastrointestinal tract of dogs and New World Camelids with enteropathy, cardiac-gated CT of New World camelids with complex cardiac abnormalities, evaluation of the healthy and diseased supraspinatus tendon in dogs using ultrasound and MRI. In addition, I am involved in a dental study performing tooth root ablations of the tooth bud of the last maxillary molars (wisdom teeth in humans) using pigs as a model for future studies in human patients.

Stacie Summers

Dr. Stacie Summers is board-certified in small animal internal medicine and has a special interest in feline medicine and urinary tract disease. Her PhD research evaluated novel causes of chronic kidney disease in cats with a focus on the fecal microbiome and role of microbial
metabolites in the disease. Dr. Summers has expanded her research to dogs and cats with both intestinal and systemic disease. She evaluates therapies that have the potential to change the microbiome and its function to help treat dogs and cats with disease. She also has interest in the biological variation of biomarkers and investigation into novel biomarkers of disease diagnosis, treatment efficacy, and prognosis. She has collaborated on other projects relative to small animal internal medicine including infectious disease, nutrition, and primary gastrointestinal disease.

Sue Tornquist

My areas of research include hematology, metabolic disease and infectious diseases of camelids and use of immunocytochemistry in diagnosis and prognosis of neoplasia.

Katy Townsend

My research focus involves studying how tumors spread throughout the body, specifically to lymph nodes. Accurately determining whether cancer has spread is important to assess prognosis, what further treatment is necessary and what surgery we recommend. We cannot determine based on anatomy alone if cancer has already spread to lymph nodes, so we are looking into emerging imaging and intraoperative modalities to determine this. My collaborators and I are assessing individualized staging for dogs and cats with wide varieties of cancer, to give our pets individualized treatments based on their individual disease process. Our research efforts ultimately will result in individualized patient care by allowing us to determine whether each dog or cats cancer has spread. This will help us determine what further treatment we should perform.

Richard Van Breemen

Aligned with the Linus Pauling Institute, research in the van Breemen laboratory concerns the discovery and development of natural products as chemoprevention agents and the investigation of mechanisms of action and safety of botanical dietary supplements. The goal is to identify micronutrients and natural products that may be used to maintain optimal health and prevent cancer and neurological degenerative diseases. This research integrates the analytical tool of mass spectrometry into all aspects of the drug discovery and development from screening of botanical extracts for the identification of active natural products, to studies of drug metabolism and disposition, and to quantitative analyses of the bioavailability and pharmacokinetics of pharmacologically active compounds. These translational studies extend from basic science to clinical trials.

Joy Waite-Cusic

Dr. Waite-Cusic’s lab conducts applied research in four main themes: (1) pre-harvest food safety, (2) process validation, (3) prevalence of pathogens in food systems, and (4) microbiological quality indicators and spoilage.

Jennifer Warnock

Dr. Warnock is a Small Animal Surgeon with a practice focus on orthopedic surgery. Her 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. Her 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, her 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. Her clinical research focuses on minimally invasive surgery and validation of surgical techniques. She has a long-term goal of bringing discoveries made in her laboratory (following efficacy and safety analysis) to the hospital to benefit of her patients.

Katja Zellmer

I am interested in pathophysiology, diagnosis and treatment of musculoskeletal diseases in equines, specifically in osteoarthritis and tendonitis. Currently, we are investigating the effects of botulinum toxin on osteoarthritic joints, as well as signaling changes that may be responsible for the development of osteochondrosis (a developmental joint disease) in foals. We are also interested in rehabilitative methodologies for musculoskeletal diseases/injuries in horses, such as therapeutic laser. We are also investigating the effects of therapeutic exercises on muscle activation in horses and hope that this research will improve our rehabilitation of equine athletes from injuries, and possibly allow us to prevent injuries in the future.