DEPARTMENT OF VETERINARY PATHOBIOLOGY

The purpose of the contract is to provide NIAID with a broad and flexible range of in vitro assay capabilities for human infectious diseases of human importance caused by infectious agents. The broad scope will allow NIAID to respond to changing priorities as scientific and public health needs shift, including rapid responses to public health emergencies. The scope of work encompasses any type of in vitro assay work needed for infectious disease research, to include routine screening of products and development of new in vitro assays and database management of work. The services provided under this and other similar contracts will assist NIAID in accomplishing its goal of developing medical products to counter emerging, re-emerging and other infectious diseases, as well as agents of bioterrorism. Co-investigators are Christina Bourne, Ph.D., Phil Bourne, Ph.D., and Ken Clinkenbeard, Ph.D., D.V.M.

PI/PD: William W. Barrow, Ph.D., Professor and Sitington Chair in Infectious Diseases.

The CVHS is currently using in vitro assays to screen test substances for activity against emerging infectious agents and agents of bioterrorism. Work involves screening of compounds for antimicrobial activity against several biodefense-related bacterial pathogens and drug resistant strains in Categories A, B, and C. Testing materials are submitted through NIAID. Work also includes screening of a 10,000 compound diversity library for leads on new drugs as well as a natural product marine library. The work performed under this IDIQ contract is part of the NIAID Biodefense Research Resources Program and supports research being conducted by scientists working in this area. Co-investigators are Christina Bourne, Ph.D., Phil Bourne, Ph.D., and Ken Clinkenbeard, Ph.D., D.V.M.

PI/PD: William W. Barrow, Ph.D., Professor and Sitlington Chair in Infectious Diseases.

Broad-spectrum Antifolates for Treatment of Drug Resistant Bacillus anthracis – Research Grant
This is a multidisciplinary partnership grant involving the Departments of Veterinary Pathobiology (CVHS-VP) and Chemistry at OSU, Sapient Discovery (San Diego, CA), and Lovelace Respiratory Research Institute (LBERI) (Albuquerque, NM). Co-Investigators are Christina Bourne, Ph.D. and Phil Bourne, Ph.D. (CVHS-VP), Darrell Berlin, Ph.D. and Richard Bunce, Ph.D. (Chemistry/OSU), Kal Ramnarayan, Ph.D. (Sapient), and Michelle Valderas, Ph.D. (LBERI). The goal is to develop a new assemblage of antimicrobials for the treatment of inhalation anthrax. The iterative process will involve a combination of traditional drug design methods, including crystallography, molecular biology and medicinal chemistry as well as in silico discovery tools and animal models.

PI/PD: William W. Barrow, Ph.D., Professor and Sitlington Chair in Infectious Diseases.

Commercial Assay for Prion Disease Detection
The goal of the research is to develop a cervid (white-tailed deer, mule deer, or elk) cell culture model
system for prion conversion that can be used for detection of prions. To accomplish this, a library of transformed cervid cell lines was established from primary cultures of brain, spleen, lymph node and bone marrow. Exposure of these transformed cell lines to brain from elk with chronic wasting disease (CWD) demonstrated conversion normal prion protein to mis-folded disease associated prion protein. The cervid cell lines previously selected will be developed and optimized as a commercial assay for antemortem and environmental detection of CWD prions. Following optimization, the assay will be validated, accuracy and sensitivity determined and compared with currently available assays.

**Sponsors:** Oklahoma Center for the Advancement of Science and Technology Oklahoma Applied Research Support Program

**PI/PDs:** Ken Clinkenbeard

DNA Solutions, Inc: Brandt Cassidy

**Bovine Respiratory Disease: Risk Factors, Pathogens, Diagnosis, and Management**

The project determines changing patterns, geographical differences, risk factors, and management practices related to bovine respiratory disease. The influence of various bacteria and viruses is studied. In addition, the pharmacokinetics and efficacy of newer therapies and new-generation vaccines are evaluated. The host-pathogen relationships are characterized at the molecular level.

**Sponsor:** Oklahoma Agricultural Experiment Station

**PI/PDs:** A. W. Confer, R. W. Fulton, S. Ayalew

**M. haemolytica Chimeric Protein Vaccine for Delivery of Multiple Outer Membrane Protein and Leukotoxin Antigens**

Using immunoproteomic approach, outer membrane protein antigens that are important in stimulating immunity to *M. haemolytica* were identified and sequenced. The genes were then cloned and expressed for functional studies of antibodies to these important antigens. Studies will incorporate new epitopes into chimeric vaccines to stimulate immunity against the bacterium.

**Sponsors:** U.S. Department of Agriculture CSREES, National Research Initiative Competitive Grant

**PI/PDs:** A. W. Confer, S. Ayalew

**Comparison of Mannheimia haemolytica Isolates from Cattle in Australia with U.S. Isolates**

*Mannheimia haemolytica* is the most common bacterial agent of bovine respiratory disease. This study is examining *M. haemolytica* isolates from across the United States to isolates obtained from Australia, with the goal of determining whether vaccine products licensed for use in the US may be expected to be effective in other geographic regions. Genotyping techniques as well as antigenic comparisons will be made to determine diversity and effectiveness of immune response to the vaccine at neutralizing the isolates.

**Sponsor:** Pfizer Animal Health

**PI/PDs:** A. W. Confer, J. D. Taylor

**Prevalence of Brucella canis Infection in a Fighting Pit Bull Population**

*Brucella canis*, the causative agent of canine brucellosis, is a zoonotic disease that causes abortion and infertility in dogs and flu-like illness, lymphadenopathy and recurrent fevers in humans. This study proposes to determine the prevalence of *B. canis* infection, using serology and polymerase chain reaction, among a population of >400 fighting pit bulls and associated breeding animals. This could assist in determining the public health risk of dogfighting operations and unregulated dog breeding operations.

**PI:** Tamara Gull
Characterization of Tick Genes Involved in the Tick Developmental Cycle and Transmission of the Cattle Pathogen, *Anaplasma marginale*

The vectorial capacity of ticks for *Anaplasma marginale* is most likely dependent upon both tick cell and pathogen interactions that involve pathogen adhesion proteins, tick cell receptors and a series of tick cell proteins that mediate the trafficking of the pathogen throughout ticks. In this research we will identify and characterize genes differentially expressed in tick cells in response to infection with *A. marginale*. These key genes will then be tested as vaccine antigens aimed at reducing the vectorial capacity of ticks for transmission of *A. marginale*.

**Sponsor:** Oklahoma Agricultural Experiment Station  
**PI/PDs:** OSU Center for Veterinary Health Sciences, Katherine M. Kocan, José de la Fuente, Edmour F. Blouin

Functional Genomic and Proteomic Analysis of Differential Gene Expression in Tick Cells in Response to Infection with the Cattle Pathogen *Anaplasma marginale*

Control of ticks and tick-borne pathogens by vaccination will avoid the use of acaricides that result in selection of drug-resistant ticks and environmental pollution. We have demonstrated the feasibility of developing vaccines targeted at the reduction of tick infestations and interruption of pathogen transmission. In this research we will identify genes expressed by tick cells in response to *A. marginale* infection that may prove to be useful in vaccine development.

**Sponsor:** Oklahoma Agriculture Experiment Station, Animal Health Funds  
**PI/PDs:** Center for Veterinary Health Sciences, Jose de la Fuente J, Katherine M. Kocan, Edmour F. Blouin

Tick Gene Expression and Developmental Cycle of *Anaplasma phagocytophilum*

*Anaplasma phagocytophilum* is a tick-borne pathogen that causes emerging disease in humans, human granulocytic anaplasmosis. In this research we will describe the development cycle of *Anaplasma phagocytophilum* in its tick vector, *Ixodes scapularis*. We will then determine the impact of silencing selected differentially-expressed genes identified previously by RNA interference on the pathogen and transmission.

**Sponsor:** OSU Center for Veterinary Health Sciences, Research Advisory Committee  
**PI/PDs:** Katherine M. Kocan, José de la Fuente, Edmour F. Blouin.

Walter R. Sitlington Endowed Chair in Food Animal Research

Funds generated by this endowed chair support the overall Tick and Tick-borne Pathogen Vaccine Development Laboratory for the conduct of the various research projects.

**Sponsor:** Center for Veterinary Health Sciences  
**PI/PD:** Katherine M. Kocan

Baboon Research Resource Program

Baboons are an important animal species used in biomedical research. This program will develop a breeding colony of baboons in Oklahoma and supports research aimed at improving the breeding efficiency of baboons in captivity, defining viruses that naturally infect baboons, and improving the basic well-being and behavior of captive-bred baboons.

**Sponsors:** National Institutes of Health, National Center for Research Resources  
**PI/PDs:** Richard Eberle, J.M. d’Offay, Mason Reichard, Dianne McFarlane; OUHSC: Gary White

Development of an SPF Baboon Colony

Indigenous viruses can have a major adverse effect on the results of biomedical research studies using animals, particularly where immunosuppression is involved. This program supports derivation of a
A colony of baboons that are free of all known herpesviruses and most retroviruses.

**Sponsors:** National Institutes of Health, National Center for Research Resources
**PI/PD:** Richard Eberle; OUHSC: Gary White

**Bovine Viral Diarrhea Disease Virus (BVDV) Vaccines: Antibody Response to Heterologous BVDV Strains**
The study will determine the range of heterologous immunity in calves receiving modified live virus (MLV) or killed BVDV vaccines. Currently there are two recognized antigenic types and several subgenotypes of BVDV: BVDV1a,2a,1b, and 2b. The study will determine if these vaccines induce antibodies to these four BVDV subtypes.

**Sponsors:** Novartis Animal Health, Pfizer Animal Health, Fort Dodge Animal Health
**PI/PDs:** Robert W. Fulton, Anthony W. Confer

**Bovine Viral Diarrhea Virus: Diversity of BVDV Strains and Impact on Diagnosis, Vaccinations, and Control Programs**
Bovine viral diarrhea viruses (BVDV) isolates from persistently infected (PI) cattle will be obtained from feedlot cattle. The isolates will be subtyped by sequencing a region of the 5’-UTR. Subgenotypes to be detected will include those of worldwide ePI/PD epidemiology. The BVDV subgenotypes expected in North America are: BVDV1a, 1b, 2a, and 2b. Molecular diagnostic tests including reverse transcriptase PCR and real time PCR will be evaluated to detect these diverse BVDV subgenotypes in peripheral blood, sera, and ear notch samples of infected animals. Cytopathic BVDV 1b strains as potential vaccine strains will be sequenced to permit detection by genomic tests allowing differentiation of vaccine strains from field strains in vaccinated animals. The prevalence of PI/PD animals in Oklahoma beef herds will be determined using immunohistochemistry and antigen capture ELISA (ACE) on ear notches. The PI/PD strains will be subtyped. Vaccination records will be obtained to determine use of BVDV vaccines or lack thereof in herds with PI/PD animals. Potentially new subtypes may warrant additional subtypes in the vaccines.

**Sponsor:** Oklahoma Agricultural Experiment Station
**PI/PDs:** Robert W. Fulton, A. W. Confer, D.L. Step

**Antibiotic Administration and Vaccination with Live Bacterial Vaccine in Calves**
This study will determine if an antibiotic given calves that have been administered avirulent *Mannheimia haemolytica* and *Pasteurella multocida* vaccine will decrease the immune responses to the immunogens. Calves will receive Micotil antibiotic and Once PMH *Mannheimia haemolytica* and *P. multocida* vaccine. The calves’ sera will be tested for *M. haemolytica* and *P. multocida* antibodies.

**Sponsor:** ELANCO Animal Health, Division of Eli Lilly and Company
**PI/PDs:** Robert W. Fulton, Anthony W. Confer

**Evaluation of Viral Vaccine Containing Infectious Bovine Rhinotracheitis Virus (IBRV), Bovine Viral Diarrhea Virus 1 and 2 (BVDV), Parainfluenza -3V (PI/PD-3V), and Bovine Respiratory Syncytial Virus (BRSV) in Preventing Infection and Respiratory Disease in Cattle**
The purpose of the study will be to determine if pre-weaning vaccination of ranch calves with viral vaccine: (1) reduces respiratory disease; and (2) reduces transmission of viruses in calves moved from auction markets and commingled with the fresh calves under feedlot conditions.

**Sponsors:** Fort Dodge Animal Health, Schering Plough Animal Health, BI Animal Health
**PI/PDs:** Robert W. Fulton, A.W. Confer
Rapid Diagnosis of Viruses Involved in Bovine Respiratory Diseases
The purpose of the study will be to determine if use of reverse transcriptase PCR testing aids in the
diagnosis of viruses involved in bovine respiratory disease. Samples including nasal swabs, serums, and
lung samples collected at necropsy will be tested for viruses using the PCR tests for bovine viral diarrhea
viruses, bovine herpesvirus 1, bovine respiratory syncytial virus, and bovine coronavirus. The tests
results will be compared to use of standard tests including cell culture isolation for viruses. Genomic
tests have advantages as cell culture tests are not often rewarding for viral identification. A higher
recovery rate for these viruses is expected by PCR.
Sponsors: Oklahoma Agricultural Experiment Station, 1433 Animal Health Research
PI/PD: Robert W. Fulton

Efficacy of an Experimental IBR-BVD-PI/PD3-BRSV-VLS Vaccine in Protecting Pregnant Heifers and
Fetuses Against a Bovine Viral Diarrhea Virus Type 1b Challenge
This objective of this study is to demonstrate efficacy of an IBR, BVDV, PI/PD3V, BRSV, Campylobacter
fetus, and leptospiral bacterin prebreeding vaccine in protecting pregnant heifers and their fetuses
against challenge exposure to seeder calves persistently infected with BVDV 1b at approximately 75
days of gestation.
Sponsor: Pfizer Veterinary Medicine Research and Development
PI/PDs: Robert W. Fulton, Bill J. Johnson, DL Step, Clint Krehbiel

Bovine Coronavirus: Role in Respiratory Disease
Bovine respiratory diseases (BRD) also referred to as “Shipping Fever” represents significant losses to
cattlemen. There are several viruses contributing to the BRD which has a polymicrobial etiology. These
include bovine herpesvirus, parainfluenza -3 virus, bovine respiratory syncytial virus, and bovine viral
diarrhea viruses along with Mannheimia haemolytica, Pasteurella multocida, Histophilus somni, and
Mycoplasma spp. The bovine coronavirus (BCV) has emerged as another virus which contributes to BRD.
Measuring the BCV role in BRD has been hampered by lack of tools for the study of this virus both in
vitro and in animal studies. The purpose of this study will be to develop means of propagating the BCV in
cell cultures, developing and validating a serologic test for BCV antibodies to demonstrate active
infections, developing an immunohistochemistry assay to detect BCV in infected cells and tissues, and a
challenge model to demonstrate the disease induced by BCV. An attempt will be made to develop live
and inactivated BCV vaccines for cattle.
Sponsors: Oklahoma Agriculture Experiment Station, U.S. Department of Agriculture Section 1433
Animal Health Research Funds
PI/PDs: Robert W. Fulton, A.W. Confer, R. Eberle, D.L. Step

Bovine Coronavirus in Respiratory Disease: Methods of Study, Pathogenesis, and Development of
Challenge Model for Efficacy Studies
Bovine coronavirus (BCV) represents an infectious agent contributing to bovine respiratory disease
(BRD) in cattle. This study will investigate the role of BCV in clinical cases of BRD by viral isolations from
clinically ill cattle, and the use of serology to detect active infections in commingled cattle under feedlot
conditions. Serologic tests will include ELISA and viral neutralization tests to detect BCV antibodies. BCV
isolated from affected cattle will be characterized as BCV and propagated with viral quantification. A
challenge model will be developed to measure infectivity and pathology caused by BCV in susceptible
cattle. This challenge model will be used to measure resistance to BCV in cattle immune and susceptible
to BCV.
Sponsor: Pfizer Veterinary Medicine Research and Development
Bovine Herpesvirus-1: Molecular Characterization of Vaccine, Reference, and Field Strains

Bovine herpesvirus-1 (BHV-1) represents significant virus infections in cattle with significant losses due to respiratory, fetal (abortions), and genital tract diseases. Vaccines are available, with the MLV type the most commonly used for control programs. Often BHV-1 is recovered from clinically ill cattle shortly after vaccination. Tests are needed to differentiate the MLV vaccine strains from field strains. This project will use molecular procedures including viral sequencing and PCR to characterize BHV-1. The entire genome of 15 BHV-1 strains including: reference strains, vaccine strains, and selected field isolates will be sequenced. The viral genomes will be evaluated with selected regions used for PCR and sequencing will be performed on the respective regions derived from the PCR product. The entire viral genome results will be compared to the published viral genome for the BHV-1 Cooper reference strain. Variable regions will be identified for the selection of the PCR primers.

**Sponsor:** Novartis Animal Health

**PI/PDs:** Robert W. Fulton, J.M. d’Offay, Richard Eberle

Veterinary Medical Diagnostic Program

The Veterinary Medical Diagnostic Program at the Oklahoma Animal Disease Diagnostic Laboratory (OADDL) serves to: 1) investigate and document the types of injuries sustained by horses involved in horse racing and in race training related activities on racetracks that fall under the jurisdiction of the Oklahoma Horse Racing Commission (OHRC); 2) monitor this population of migrating horses for the presence of any epizootic disease(s) that may pose a threat to the Oklahoma horse industry; and 3) evaluate the overall effects of all other aspects (including diet and stress) of racing and race training on the health and well being of Oklahoma’s racehorses. This program is the result of an alliance formed between the OHRC and OADDL.

**Sponsors:** Oklahoma Horse Racing Commission, Oklahoma Bred Program.

**PIs:** Bill J. Johnson, Grant B. Rezabek

Epidemiology of American Canine Hepatozoonosis: The Susceptibility of Selected Prey of Carnivores to Infection with *Hepatozoon americanum* and the Role of Vertical Transmission

*Amblyomma maculatum* has been identified as the definitive host and vector of *Hepatozoon americanum* in dogs throughout the southern U.S. Transmission to dogs, an obligate intermediate host, occurs through ingestion of the infected tick. However, dogs are rarely infested with any of the 3 feeding stages of the tick. Immature ticks, stages that acquire the parasite, feed preferentially on smaller mammals and ground-dwelling birds; therefore, dogs are an unlikely source of infection for the tick definitive host. A naturally reservoir for the parasite has not been identified. However, cystozoites, a quiescent, infectious stage of the parasite, develops in the tissues of experimentally exposed laboratory rodents, making canine exposure through predation of infected prey (potential paratenic or facultative intermediate hosts of *H. americanum*) a possible mode of transmission. The primary goals of this research are: 1) to determine the natural vertebrate reservoirs for *Hepatozoon americanum*, 2) to determine the susceptibility of select vertebrate species known to be preferred hosts of immature *Amblyomma maculatum* to infection with *H. americanum*, 3) to determine the susceptibility of common prey of canids to infection with *H. americanum*, 4) to determine if vertical transmission from canine dam to offspring occurs and 5) to test the efficacy of the coccidiostat, decoquinate, as a preventive for infection of *A. maculatum* and transport hosts. Experimental transmission trials to laboratory raised rodents, birds and lagomorphs will be conducted. Comparisons of *Hepatozooon* isolates from wild-caught vertebrates to canine isolates will be made through morphology, histopathology and DNA sequencing. Vertical transmission will be investigated through the natural birth of puppies from a chronically infected carrier dog and monitoring of the offspring by weekly DNA analysis of the puppies’ blood.
Identifying the natural reservoirs of the parasite and methods of transmission will help implement preventative measures for susceptible dogs to a non-curable, potential fatal parasitic disease.

**Sponsor:** OSU Center of Veterinary Health Sciences, Research Advisory Committee  
**PI/PDs:** Eileen M. Johnson, Kelly E. Allen, Roger J. Panciera, Susan E. Little, Sidney A. Ewing

**Canine Schistosomiasis: An Emerging Disease in Oklahoma**

Canine schistosomiasis, caused by *Heterobilharzia americana*, is a debilitating and often fatal disease of dogs in southern states bordering the Gulf of Mexico. Recent reports indicate that the natural range for this fluke is expanding due to the migration or translocation of infected raccoons, a natural host and reservoir for the parasite. Reports of infections in dogs or wildlife in Oklahoma have not been published. Recently the infection has been diagnosed by local veterinarians in dogs (2) from a Tulsa neighborhood. Collaborative field investigation of the Tulsa neighborhood for infected dogs and for the snail intermediate host in a retention pond frequented by animals in the neighborhood have been ongoing. Eight dogs have been diagnosed and suitable pulmonate snails have been collected from the retention pond. Schistosome cercariae released from snails collected from the retention pond are being tested for *H. americana* DNA. Examination of raccoons collected from the surrounding area should help verify introduction and establishment of this trematode infection in Northeastern Oklahoma.

**PI/PDs:** Todd Yeagley, Eileen Johnson, Mason Reichard, Matt Bolic and Sharon Snowden

**Effects of Temperature Changes, Contaminants, and Collection Methods on Culture and PCR Identification of *Tritrichomonas foetus* from Naturally Infected Bulls**

With recent changes in regulations for the testing of bulls for *T. foetus* before sale or movement has identified diagnostic complications related to collection methods, handling of commercial culture pouches (TF InPouch®) and testing methods used by veterinary diagnostic laboratories nationwide. A study was conducted to investigate the effects of Oklahoma temperature extremes, contaminants and collection methods on recovery and growth of the protozoan organism in the commercial media, and the stability of the organism’s DNA under adverse conditions. Time interval between prepucial collections and 2 collection methods were also evaluated using a naturally infected bull to determine impact on recovery, culture, and PCR detection of the organism. Hot and cold temperature extremes were detrimental to survival of the protozoan in the culture pouches after 4 hours. Detection of the parasite through PCR amplification of DNA in culture media held at environmental temperature extremes was successful, indicating that the DNA remained stable under these conditions. Fecal bacteria interfered with growth of the parasite in the culture media. Less than a two week rest interval between prepucial collections reduce disolation of the parasite.

**Sponsor:** OSU Center of Veterinary Health Sciences, Research Advisory Committee  
**PI/PDs:** Brenda Love, Stacy Blaylock, Emily Cooper, Eileen Johnson, Grant Rezabek, Emily Cooper, Bill Johnson and John Gilliam

**Timing of Transmission of Tick-borne Disease Agents**

This project examines the transmission dynamics at play as tick borne disease agents move between vertebrate hosts and vector ticks.

**Sponsor:** Bayer Animal Health.  
**PI/PD:** Susan E. Little

**Infection and Exposure Rates for Rickettsial Agents in Dogs**

Rickettsial agents, including *Rickettsia* spp. and *Ehrlichia* spp., commonly infect dogs in areas of the US where lone star ticks predominate. This project seeks to document the extent to which dogs become infection with rickettsial agents following natural infestations in endemic areas with an ultimate goal of
developing strategies to interrupt those infections.  
**Sponsor:** Bayer Animal Health  
**PI/PD:** Susan E. Little

**Assembly of Human Respiratory Syncytial Virus (HRSV)**
HRSV infects virtually every person on the planet and presents a serious, worldwide, disease burden. Available therapies are not adequate, and a better understanding is needed of the virus life cycle. In this project, the molecular mechanisms of virus assembly are investigated, and the role of the viral matrix and transmembrane glycoproteins therein determined. With an improved understanding of virus assembly, the project aims to: 1) control the virion assembly process such that the quality of anti-HRSV vaccine preparations can be improved, and 2) create new concepts for antiviral therapies.  
**Sponsor:** Oklahoma Center for the Advancement of Science and Technology (OCAST)  
**PI/PD:** Tom Oomens

**Diversity of Bacterial Isolates from the Nares of Healthy and Sick Calves**
The project will determine the genetic diversity of bacteria isolated from nasal passages of both healthy calves and those suffering from bovine respiratory disease (BRD). The goal is to determine whether a single clone typically dominates or if a variety of strains of a given species can be expected. If most or all isolates represent a single clone, culture of nasal swabs may be used in both diagnostic and research efforts of BRD. If a variety of strains are frequently present, nasal swabs would have limited usefulness, as it is not practical to examine all strains present in each calf.  
**Sponsor:** Oklahoma State University Center for Veterinary Health Sciences  
**PI/PDs:** J. D. Taylor, A. W. Confer, D. L. Step

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**DEPARTMENT OF PHYSIOLOGICAL SCIENCES**

**Mechanisms and Functions of Human Sulfotransferases**
The major goals of this project are to elucidate human sulfotransferase (SULT) chemical and kinetic mechanisms, to understand physiologic functions of SULTs, and to investigate their relevance to human health in physiologic and pathologic conditions. Research focus on: (1) mechanisms of enzyme catalysis, substrate inhibition, and product activation of human SULTs. (2) effect of clinical widely used drugs on human sulfotransferase catalytic activities. (3) oxidative regulation mechanisms of human SULTs.  
**Sponsor:** National Institutes of Health  
**PI/PD:** Guangping Chen

**Stress Regulation of Sulfotransferases**
The aims of this research project are to investigate how sulfotransferase (SULT) expression and activity are regulated by various stressors including oxidative stress, physical stress, and chemical stress. The relationships between the changes of SULT expressions and the changes of various biosignaling molecule levels as well as nuclear receptor expression levels will be investigated to understand the mechanisms.  
**Sponsor:** National Institutes of Health  
**PI/PD:** Guangping Chen

**Cancer Drugs Induction of Human Sulfotransferases**
Studies in this project focus on sulfotransferase (SULT) induction by cancer drugs. Rats, human hepatic carcinoma cell line, Hep G2, and human intestinal carcinoma cell line, Caco-2, are used for these studies.
Enzyme activity assay, Western blot, RT-PCR, site directed mutagenesis, plasmid transfection, small interfering RNA (siRNA) gene silencing, promoter gene deletion, DNA footprinting, and electrophoretic mobility shift assay are used to determine the SULT gene regulation and nuclear receptor mediated SULT induction mechanisms.

**Sponsor:** American Cancer Society  
**PI/PD:** Guangping Chen

*Effect of Selected Nutritional Components on Immunity to Haemonchus in Small Ruminants*
Internal parasitism causes a significant loss in the small ruminant industry of Oklahoma and other regions of the USA and worldwide. The proposed project will address this problem through characterizing the mechanisms of immune responses and attempting to manipulate specific cytokine expression to enhance resistance to parasites in small ruminants. The outcome of this research will lead to a better understanding of the interrelationship between immunity and parasitism and a precise immunity-enhancing strategy for parasite control in ruminants.

**Sponsor:** U. S. Department of Agriculture  
**PI/PDs:** Guangping Chen, Zaisen Wang (Langston University)

*Capacity for Respiratory-based Thermoregulation in Brachycephalic Breeds*
Brachycephalic dogs are believed to be less capable of thermoregulation due to the conformation of their upper airways, leading many airlines to prohibit shipping of these dogs. This study will objectively characterize the thermoregulatory capacity of these dogs relative to dogs with longer noses to determine more precisely the appropriate guidelines for shipping.

**Source:** American Kennel Club Canine Health Foundation  
**PI/PD:** Michael Davis

*Muscle Adaptations Permitting Fatigue-resistant Exercise*
Exercise capacity is limited by either the ability to supply muscle with substrates for the production of energy, or the ability of the body to eliminate the waste products of energy production. In the case of endurance exercise, the availability of macromolecules for oxidation is typically the limiting factor in a thermoneutral environment. This study will determine the mechanisms by which availability of macromolecular substrates can be increased to facilitate improved exercise endurance.

**Source:** Army Research Office Division of Life Sciences, Department of Defense  
**PI/PDs:** Michael Davis, Guangping Chen  
Peter Hoyt, Department of Biochemistry  
Ray Geor, Michigan State University  
Kenneth W. Hinchcliff, University of Melbourne  
Arend Bonen, University of Guelph  
Ken Bartels, Department of Veterinary Clinical Sciences

*Combinatorial Drug Screening to Identify Strategies to Enhance Ground Troop Readiness at High Altitude*
Acute exposure to high altitude confers a disadvantage to individuals needing to perform physical tasks, when compared to individuals who have acclimatized to high altitude. The goal of this study is to develop novel compounds that will accelerate the acclimatization process to low ambient oxygen levels, with subsequent improvement in exercise performance.

**Source:** DARPA-DSO (Subcontract through University of Colorado)  
**PI/PDs:** Michael Davis, Lara K. Maxwell  
Jerry Ritchey, Veterinary Pathobiology
Physiology and Pathophysiology of Equine Athletic Performance
Superior athletic performance in horses requires optimal physiological adaptation in the musculoskeletal and cardiopulmonary systems, and improvements in these systems often lead to improved performance. Conversely, disease in these systems will invariably cause decreased performance, and in some cases the exercise itself is the cause of the disease. The goals of this program are to investigate the mechanisms underlying the physiological adaptation to exercise in horses, identify methods that will improve the horse's adaptation to exercise, and determine strategies that can prevent exercise-induced disease. (2729)
Sponsors: Oklahoma Agricultural Experiment Station, Oxley Chair in Equine Sports Medicine
PI/PD: Michael Davis

IDD 2.0: Building a Better Canine Warfighter
Dogs are increasingly being used as warfighters tasked with assignments ranging from attack/patrol to explosive detection. Deployment places a considerable amount of physiological stress on the dogs, and there is currently minimal information as to the magnitude of this stress and how to adapt the dogs to this stress successfully. This study will develop conditioning and monitoring programs to prepare canine warfighters for the stress of deployment, including the proper type of athletic conditioning, heat tolerance, and dietary support. It will also develop field-implementable protocols for monitoring the successful adaptation of the dogs to deployment stress. 
Source: Office of Naval Research, Department of Defense
PI/PD: Michael Davis

The Role of P2X7R-Mediated Purinergic Signaling in Alveolar Epithelial Cell Death.
The goal of this predoctoral fellowship is to study functional roles of P2X7R in alveolar epithelial cells. 
Sponsor: American Heart Association, South Central Affiliate, predoctoral fellowship #09PRE2300211
PI/PD: Yujie Guo (Mentor: Lin Liu)

Activation of Wnt/beta-catenin Signaling Inhibits Inflammation During Acute Lung Injury
The goal of this student seed grant is to investigate the role of Wnt signaling in lung inflammation during ALI.
Sponsor: Center of Veterinary Health Sciences, Oklahoma State University
PI/PD: Yujie Guo (Mentor: Lin Liu)

Genetic Modifiers of Organ Dysfunction in PKD
This proposal’s focus is on the role that proteoglycans and inflammation have on renal and liver dysfunction in polycystic kidney disease. These experiments utilize available multiple mouse models from collaborators in combination with mutant mice we’ve made to examine lesion severity. 
Sponsor: Oklahoma Center for Advancement of Science and Technology
PI/PD: Myron Hinsdale

Extracellular Determinants of Polycystic Kidney Disease Severity
The focus of this grant is to study the role that proteoglycan levels have in lesion severity in PKD and specifically autosomal recessive polycystic kidney disease.
Sponsor: National Institutes of Health
PI/PD: Myron Hinsdale
Adult Stem Cell Proteoglycans and Emphysema
The focus of this grant is to study the role that stem cell extracellular matrix proteoglycans have in the healing process of lung disease.

**Sponsor:** Oklahoma Center for Adult Stem Cell Research  
**PI/PD:** Myron Hinsdale

Mechanisms of Alveolar Fluid Transport
The goal of this project is to investigate the roles of chloride channels of alveolar epithelial type I and type II cells in fluid secretion of fetal lungs, and in maintaining fluid homeostasis of adult and injured lungs.

**Sponsor:** National Institutes of Health R01 HL083188  
**PI/PD:** Lin Liu

Role of MicroRNAs in Bronchopulmonary Dysplasia
The major goal of this project is to identify microRNAs involved in bronchopulmonary dysplasia using microRNA microarray and examine their functions.

**Sponsor:** National Institutes of Health R21HL087884  
**PI/PD:** Lin Liu

MicroRNA Expression Profiling in Idiopathic Pulmonary Fibrosis
The goal of this project is to identify and characterize microRNAs changed in idiopathic pulmonary fibrosis using the IPF patient lung samples from the Lung Tissue Research Consortium.

**Sponsor:** National Institutes of Health R03HL095383  
**PI/PD:** Lin Liu

MicroRNAs and Bovine Respiratory Disease
The major goal of this project is to investigate the functions of microRNA in bovine respiratory disease.

**Sponsor:** U.S. Department of Agriculture 2009-035505-05855  
**PI/PD:** Lin Liu

Reprogramming of Adult Lung Cells for Cell-based Therapy
The goal of this grant is to convert adult lung cells into stem cells and use them for treating COPD.

**Sponsor:** Oklahoma Center for Adult Stem Cell Research  
**PI/PD:** Lin Liu

Purchase of Shared Equipment for Testing Efficacy of Adult Stem Cell Therapy
The goal of this project is to purchase the flexivent system to test how animals respond to adult stem cell therapy.

**Sponsor:** Oklahoma Center for Adult Stem Cell Research  
**PI/PD:** Lin Liu

Regulation of VAMP-2 in Alveolar Type II Cells by MicroRNA-206
The goal of this project is to investigate the regulation of lung surfactant secretion by microRNA-206.

**Sponsor:** American Heart Association, South Central Affiliate  
**PI/PD:** Lin Liu
Regulation of Placenta Growth Factor by Hemodynamics and Reactive Oxygen Species
The goal of this research project is to investigate fundamental mechanisms regulating a key arteriogenic growth factor called placenta growth factor (PLGF) as a basis for developing new, noninvasive treatments for ischemic cardiovascular disease. A variety of in vitro and in vivo model systems are being used to identify key regulatory mechanisms controlling PLGF expression in health and disease.
Sponsors: National Institutes of Health
PI/PD: Pamela G. Lloyd

Endothelial Progenitor Cell Survival and Function in Emphysema: Role of VEGF-A/PLGF Signaling
The goal of this project is to determine whether altered VEGF-A/PLGF ratios contribute to EPC homing, migration, and/or survival in lungs of mice with experimental emphysema.
Sponsor: Oklahoma Center for Adult Stem Cell Research (OCASCR)
PI/PD: Pamela G. Lloyd

Nuclear Receptor Gene Expression in the Bovine Preimplantation Embryo Produced in Vetro
The central hypothesis of this work is that specific patterns of early gene expression in the cumulus-oocyte complex during the maturation phase affects subsequent developmental capacity; these patterns are subject to influences of the local environment and can be characterized by examining the stimulatory effect of certain nutrient, including vitamin A (9-cis Retinoic Acid (RA). It follows that identification of the positive effects of 9-cis RA will provide a view of a transcript profile having positive influence on subsequent embryo development. The effect of 9-cis RA stimulation on maternal transcriptional activity and transcript profile, and the impact on the oocyte transcript profile will be separated by analysis of the cumulus cells alone, the oocyte alone, versus the cumulus-oocyte complex as a whole, using subtractive hybridization. These results are expected to yield a better understanding of the early transcriptional profile and those genes critical to developmental potential. Benefits may include targets for testing developmental potential of preimplantation embryos and better production methods. (2277)
Sponsor: Oklahoma Agricultural Experiment Station
PI/PD: Jerry Malayer

Pathogenesis, Diagnosis, Treatment, Prevention and Control of Livestock Diseases
This project covers agricultural and biomedical research funded by sources other than USDA that contributes to total research capacity of the OSU Center for Veterinary Health Sciences (CVHS). We are developing strategic alliances with partner institutions and the private sector and growing the supporting infrastructure. Consequently, publications are presented as evidence of progress and productivity. Expenditures for these non-USDA projects came from Federal, State and private funding sources, including biological and pharmaceutical corporations. (2061)
Sponsor: Oklahoma Agricultural Experiment Station
PI/PD: Jerry Malayer

Initiating Factors of Neurodegeneration
Parkinson’s Disease and age are both characterized by a loss of functional dopamine-producing neurons. Several aging factors have been implicated in the development of dopaminergic neuronal loss including misfolding of a nerve protein known as alpha-synuclein (a-syn). The long-term goal of our research program is to understanding how aging results in the accumulation of misfolded a-syn and a loss of functional neurons and why the process is accelerated in those individuals with Parkinson’s Disease using two novel animal models; spontaneous neurodegeneration in aged baboons and a highly prevalent neurodegenerative disease of aged horses.
The Effect of Season, Latitude and Breed on Equine Pituitary Function
Seasonal variation in pituitary activity, resulting in increased production of pars intermedia (PI) hormones in the fall, occurs in many species including the horse, presumably to prepare them metabolically and physically for winter. It is unknown what triggers seasonal PI activation, and when in the year it begins. We hypothesize that hormone release from the healthy equine pituitary pars intermedia is regulated by seasonal change in day length. Therefore, we expect plasma concentrations of PI hormones to increase starting in July, when day length begins to shorten. We also expect that horses residing in latitudes further from the equator, where the seasonal change is more extreme, to have a more pronounced seasonal hormone increase compared to those residing closer to the equator. Finally, we expect thrifty breeds (ponies, Morgan horses) to have a more robust seasonal increase in PI hormone concentration compared to light breeds and horses with PPID to have no seasonal hormone variation.

Sponsor: American College of Veterinary Internal Medicine Foundation
PI/PD: Dianne McFarlane

Season Variation in Immune Function in Captive Baboons
Seasonal variation in immune response in young baboons housed outside will be compared to that of baboons housed indoors, with a consistent exposure to 12 hours of artificial light daily. This project is part of the Baboon Research Resource Program.

Sponsor: National Institutes of Health-National Center for Research Resources P40 RR12317
PI/PDs: Dianne McFarlane; OUHSC: Gary White

Presynaptic Modulation of Anticholinesterase Toxicity
The project evaluates the role of endocannabinoid signaling in differential toxicity of organophosphorus insecticides.

Sponsor: National Institute of Environmental Health Sciences
PIs: Carey Pope, Jing Liu Pope

Chemical Forensics for Toxic Chemicals and Explosives
This project develops approaches for detecting toxic chemicals on synthetic surfaces.

Sponsor: Department of Defense
PIs: Carey Pope, Jing Liu Pope

Counteracting Acute and Persistent Effects of Organophosphate Intoxication
This project evaluates long-term neurobehavioral deficits following acute diisopropylfluorophosphate intoxication and their modulation by drugs which enhance endocannabinoid signaling.

Sponsor: National Institute of Neurological Disorders and Stroke
PIs: Carey Pope, Jing Pope

Role of miR-150 and its Target Glycoprotein NMB on the Pathogenesis of Bronchopulmonary Dysplasia.
The goal of this postdoc seed grant is to investigate the functional role of miR-150 in the BPD.

Sponsor: Center of Veterinary Health Sciences, Oklahoma State University
PI/PD: Dhananjay Shukla (Mentor: Lin Liu)
MiR-124a Regulates Fetal Alveolar Epithelial Maturation.
The goal of this student seed grant is to study how miR-124a regulates fetal lung development.
**Sponsor:** Center of Veterinary Health Sciences, Oklahoma State University
**PI/PD:** Yang Wang (Mentor: Lin Liu)

The Functions of miRNAs in the Regulation of EMT
The goal of this student seed grant is to identify miRNAs that are involved in EMT.
**Sponsor:** Center of Veterinary Health Sciences, Oklahoma State University
**PI/PD:** Xiao Xiao (Mentor: Lin Liu)

MicroRNA Profiling in Bovine Alveolar Macrophage
The goal of this student seed grant is to identify microRNA changed during LPS-stimulation in bovine alveolar macrophages.
**Sponsor:** Center of Veterinary Health Sciences, Oklahoma State University
**PI/PD:** Li Zhang (Mentor: Lin Liu)

DEPARTMENT OF VETERINARY CLINICAL SCIENCES
Veterinary Medicine Biomedical Laser Laboratory
Since the establishment of the Biomedical Laser Laboratory within the OSU Center for Veterinary Health Sciences, research to establish protocols for clinical applications in veterinary medicine has been a primary objective. In addition, the use of laboratory models has resulted in transfer of technology to both industry and human medicine. Work will continue concentrating on the clinical applications of biomedical lasers coupled with collaborative research protocols involving basic scientists (engineers, physicists) and clinicians.
**Sponsors:** McCasland Foundation, Kerr Foundation
**PI/PD:** Kenneth E. Bartels

Transrectal Near-infrared Optical Tomography for Prostate Imaging
This project is a collaboration between OSU colleges (School of Electrical and Computer Engineering and the Center for Veterinary Health Sciences), and the University of Oklahoma Health Sciences Center. It involves development of trans-rectal ultrasound probe using an animal model to image and differentiate malignant tumors in the prostate.
**Sponsors:** U.S. Army Prostate Cancer Research Program, Tomo Wave Laboratories, Kerr Foundation
**PI/PDs:** Kenneth E. Bartels, Reed W. Holyoak, Jerry W. Ritchey

Assessment of *Bdellovibrio bacteriovorus* Strain 109J as an Alternative Treatment for Infectious Bovine Keratoconjunctivitis
Pinkeye or infectious bovine keratoconjunctivitis (IBK) is associated with significant economic loss in the cattle industry. Although antibiotic therapy is the treatment of choice for IBK, treatment failures are common and current vaccines are not optimally effective. As a result, our laboratory has been actively investigating the therapeutic potential of *Bdellovibrio bacteriovorus* 109J (*B. bacteriovorus*), as a new treatment for IBK. The goal of this study is to evaluate the killing efficiency of *B. bacteriovorus* on various strains of *Moraxella bovis* and *Moraxella bovoculi* isolated from cattle with clinical signs of IBK in the state of Oklahoma.
A Comparison of Propofol and Propofol-Ketamine Anesthesia for Evaluation of Laryngeal Function in Healthy Dogs

Laryngeal paralysis is a common cause of upper airway obstruction in dogs. The disease is diagnosed via direct visualization of the arytenoid cartilages and their failure to abduct during inspiration. Multiple anesthetic protocols have been used to evaluate laryngeal function but the ideal protocol has yet to be identified. The purpose of the current study is to compare propofol to a combination of ketamine and propofol while observing laryngeal function in lightly anesthetized normal dogs. Forty-eight healthy dogs presented for elective sterilization will be randomly assigned to one of two possible anesthetic protocols and undergo laryngoscopy prior to intubation. Scoring for each dog will be based on ease of laryngeal visualization and assessment of laryngeal function.

Sponsors: OSU Center for Veterinary Health Sciences, Research Advisory Committee
PI/PDs: Marjorie Gross, Kelci McKeirnan, Mark Rochat

Effect of Ampicillin/Sulbactam and Enrofloxacin on the Arterial Blood Pressure of Healthy Anesthetized Dogs

Antibiotics are commonly administered medications during surgical procedures. In general, these medications have few side effects. The two antibiotics used in this study are ampicillin/sulbactam, and enrofloxacin. Ampicillin/sulbactam contains sulbactam sodium, a beta-lactamase inhibitor that is added to ampicillin sodium to extend its spectrum to include a wider range of gram-positive, gram-negative, and some anaerobic bacteria. Side effects of penicillins include hypersensitivity reactions, tachypnea, dyspnea, edema, and tachycardia. The second antibiotic to be used in this study, enrofloxacin, is one of the most common fluoroquinolones used in veterinary medicine. Side effects of fluoroquinolones that have been reported include CNS (seizures, possible with NSAID administration), gastrointestinal (vomiting, anorexia, diarrhea), chondrotoxicity (young growing dogs), cardiovascular (hypotension, bradycardia), and nephropathies (Takayama 1995). The goal of this experiment is
to determine the effect of these commonly administered antibiotics on the blood pressure in anesthetized healthy dogs.

**Sponsor:** Cohn Family Chair for Small Animals

**PI/PDs:** Mark Rochat, Jeremiah Moorer, Meg Gross, Heather Towle

**Statistics:** Mark Payton

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**Evaluating the Feasibility of a Dual-modality Optical Sensing Approach in Assessing Hepatic Steatosis in a Rat Model for Fatty Liver**

This research aims to develop and evaluate a technology for rapidly assessing the intensity of steatosis (fatty liver), and reliably discriminating the macro-steatosis (single large lipid droplet in a hepatocyte) from the micro-steatosis (numerous small lipid droplets in a hepatocyte). Such technologies are urgently needed for liver transplantation but do not exist clinically. Liver transplantation programs increasingly use livers of “marginal” quality such as fatty livers. Steatosis, specifically macro-steatosis, in the donor organ represents a major risk to organ recipients. Micro-steatosis, on the other hand, is not associated with an increased risk of dysfunction. This research develops a photonic-needle sensing approach that integrates an optical spectroscopy technology and a depth-resolved optical imaging technology for the aim of quantifying the content and size-distribution of lipid droplets in liver tissue. Such a device may enable hepatic surgeons to determine if an available organ is within a safe steatosis range.

**Sponsor:** Oklahoma Center for the Advancement of Science & Technology Medical Research

**PI/PDs:** Kenneth E. Bartels, Reed W. Holyoak, Jerry W. Ritchey

**Electrical and Computer Engineering:** Daqing Piao

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**Comparison of Three Anticoagulants to Obtain Hematologic Values in Captive Bull Sharks (Carcharhinus leucas)**

To date, there is no published data available for blood values in bull sharks. Since bull sharks have specific physiologic adaptation systems enabling them to inhabit marine, estuarine and fresh water systems, their blood data will not be comparable with other strict marine fish species. Blood was collected multiple times from five captive bullsharks. Samples were collected in three different anticoagulants, and compared with each other to evaluate the influence of the different anticoagulants on the blood cell morphology and differentiation.

**Sponsor:** Department of Veterinary Clinical Sciences

**PI/PDs:** C.J. Ketz-Riley, T.A. MacNab

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**Regular Blood Collection from Captive Bull Sharks (Carcharhinus leucas) to Establish Hematological and Biochemical Normal Values for this Species Under Controlled Conditions**

Only few reports exist on normal ranges of blood values in cartilaginous fish, also called elasmobranchs. To date, there is no published data available for blood values in bull sharks. Since bull sharks have specific physiologic adaptation systems enabling them to inhabit marine, estuarine and fresh water systems, their blood data will not be comparable with other strict marine elasmobranch species. Blood was collected multiple times from five captive bullsharks. The samples were collected in liquid Sodium Heparine. The values obtained were used to establish normal values for bull sharks.

**Sponsor:** Department of Veterinary Clinical Sciences

**PI/PDs:** C.J. Ketz-Riley, T.A. MacNab

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**Comparison of Three Anticoagulants in Hemolysis and Plasma Biochemical Values in Captive Southern Stingray (Dasyatis americana) Blood**

Only few reports exist on normal ranges of blood values in stingrays. Most of the values have been obtained opportunistically from single rays in aquariums or from wild rays under less controlled
conditions. Blood was collected from 11 Southern stingrays (*Dasyatis americana*) kept in an Aquarium in the Mid Western US. Sample collection occurred under controlled conditions. Three different anticoagulation protocols were compared for their influence on hematologic and serum biochemistry values. The values obtained were used to establish normal values for Southern stingrays.

**Sponsor:** Department of Veterinary Clinical Sciences  
**PI/PDs:** C.J. Ketz-Riley, A. Hahn

### Computerized Tracking of Mustangs in Nevada

The overall scope of our proposal is to demonstrate the efficacy of remote release global positioning collars to locate and define movement patterns of feral horses (mustangs) in Nevada. This technology has already been used for tracking wild animals. It has been utilized in Australia to study movement of feral horses. We hope to facilitate location of horses and pattern seasonal movement so that BLM officials can more easily validate horse populations and substantiate the need for relocation of horses or adjusting appropriate management levels (AMLs) in various herd management areas (HMAs) of Nevada. Another key management issue is the efficacy of contraceptive drugs that can only be accurately determined by identification and location of individually treated animals. The specific goals of the project are to design and deploy a collar suitable for feral horses with a satellite uplink so that data can be collected and analyzed from remote locations and then locate and pattern specific herds during various times of the year. Efficacy of contraceptive drugs can be determined without the use of aircraft to locate individual collared and treated horses. Another key aspect of this project is that collars can be removed with a remote release mechanism (cell phone) when sufficient data has been collected on an individual horse. All data will be subjected to statistical analysis using the methodology described in the proposal.

**Sponsor:** Bureau of Land Management  
**PI/PD:** Henry W. Jann

### The Effects of Low Level Laser Therapy on Distal Limb Full-thickness Skin Wounds in Horses

Cutaneous wound healing in the distal limbs of horses is an aspect of veterinary medicine that has made few advances in spite of our expanding knowledge and technological progress. In fact, treating cutaneous distal leg wounds (DLWs) and the ensuing exuberant granulation tissue remains one the most frustrating clinical challenges. There have been countless topical preparations and medications that have been applied to DLWs over the millennia and even in recent times; but few have actually been scientifically shown to possess significant clinical efficacy. The goals of treating cutaneous DLWs include minimizing exuberant granulation tissue and facilitating wound contraction and epithelialization. Minimizing scar tissue and adhesion of underlying deep structures are also important considerations. Low level laser therapy (LLLT) has been shown to be beneficial in facilitating healing of slow or non-healing wounds in humans and research data has demonstrated beneficial effects in laboratory animals. This experiment will document the effects of LLLT on surgically created identical and symmetrical DLWs in a controlled environment.

**Sponsor:** Erchonia  
**PI/PDs:** Henry W. Jann, Kenneth E. Bartels, T. Stashak, S. Swaim

### The Effects of Low Level Laser Therapy on Equine Tendon Healing

Although many treatments for overstrain injury of the equine superficial digital flexor tendon have been anecdotally shown to be effective, actual scientific data is lacking. It is also difficult to compare existing studies because experimental injury models differ. Currently the commonly used forms of therapy include stem cell, shock wave, platelet rich plasma (PRP), and immunoreactive antagonistic protein (IRAP). Experimental efficacy data are few and inconsistent for all these modalities. At present no one therapy is universally accepted as being effective. Low-level laser therapy (LLLT) has been shown to have positive
effects on tendon and ligament healing in laboratory animals and humans. The purpose of this experiment is to evaluate the therapeutic efficacy of LLLT to augment tendon healing in equine superficial digital flexor window tenectomies.

**Sponsor:** Erchonia  
**PI/PDs:** Henry W. Jann, Kenneth E. Bartels, T. Stashak, S. Swaim

### OKLAHOMA ANIMAL DISEASE DIAGNOSTICS LABORATORY

The Oklahoma Animal Disease Diagnostic Laboratory provides accessible and accountable diagnostic service for Oklahoma veterinarians and animal owners in all 77 counties. Early detection of diseases provides the starting point for reducing their incidence and threat. The Laboratory also acts as a frontline sentinel for new and emerging diseases. OADDL promotes and protects the health and economic welfare of Oklahomans, supports the teaching and research missions of the OSU College of Veterinary Medicine, and conducts self-supported research aimed at developing more precise test procedures for commonly encountered, as well as emerging and foreign animal diseases, that may produce catastrophic losses (e.g., bovine viral diarrhea, malignant catarrhal fever, parvovirus disease, avian influenza, equine viral arteritis and encephalitis, and toxicoses related to oilfield wastes and agricultural chemicals). OADDL is a member of the National Animal Health Laboratory Network and does surveillance testing for Avian Influenza, novel H1N1, exotic Newcastle Disease and Classical Swine Fever in Oklahoma livestock and birds. The Laboratory maintains full accreditation by the American Association of Veterinary Laboratory Diagnosticians.  
**PI/PDs:** Bill J. Johnson and Staff