Projects funded in 2009

**Effects of selected topical ophthalmic medications on IOP, Anterior Segment anatomy and aqueous humor dynamics in normal and glaucomatous cats.**
Dr. Ellison Bentley, Department of Surgical Sciences

Glaucma, a disease that is associated with increased intraocular pressure (IOP), is an important cause of blindness in humans and domestic animals. In cats, glaucoma is often secondary to other disease processes, including inflammation and tumors. Medical therapies are vital in preventing or slowing progressive loss of vision and reducing discomfort in affected patients. Unfortunately, the prognosis for long-term maintenance of vision in cats with glaucoma is poor because glaucoma in cats often goes unrecognized until late in the disease process. Coupled with this, there is currently a lack of published studies that address the usefulness of conventional medical therapies in glaucomatous cats. We have established a colony of cats with inherited glaucoma. This feline model will enable us to determine the efficacy in lowering IOP, mechanisms of action, and potential adverse effects of several commonly used ophthalmic drugs in glaucomatous cats. The results of our investigations will provide a strong foundation of species-specific clinical data, enabling veterinary clinicians to formulate appropriate and effective treatment strategies for feline glaucoma patients.

**Cystoscopic, magnetic resonance imaging and histopathologic evaluation of submucosally injected polyethylene glycol-based hydrogel and bovine cross-linked collagen in the porcine urethra.**
Dr. Robert Hardie, Department of Surgical Sciences

Urinary incontinence due to sphincter mechanism incompetence (SMI) is a common problem that affects 20% of all female dogs following ovariohysterectomy. Cystoscopic injection of bovine collagen (BC) as urethral bulking agent is a widely used treatment for SMI. However, clinical results using BC vary significantly with only 53% of dogs becoming continent after one treatment and the median duration of effect limited to 3 months. Reasons why BC does not provide a more lasting effect are unknown; however, potential explanations include rapid degradation or deformation of BC within the urethra. Polyethylene glycol hydrogel (PEGH) is a biocompatible compound that can be formulated with variable viscosity and biodegradability. Its unique properties offer tremendous potential as a bulking agent that may eliminate many of the limitations seen with BC. Our hypothesis is that PEGH will generate less tissue response and maintain a more consistent shape within the urethra compared to BC, making it a superior bulking agent. The objectives of this study are to evaluate and compare the tissue response and degree of degradation and deformation of BC and PEGH in the urethra of 8 dogs. Standardized submucosal injections of BC and PEGH will be made at two separate locations in the urethra. The injection sites will be evaluated with cystoscopy, MRI, and histopathology at 30 and 120 days. Data from this study will be used to support a clinical trial using PEGH as a bulking agent for the treatment of SMI in dogs.
**Canine computer tomographic cardiovascular angiography**
Dr. Rebecca Johnson, Department of Surgical Sciences

Computed tomographic angiography (CTA) of the heart in human patients is used in emergency and scheduled appointment practice to diagnose many heart disorders such as narrowing of the arteries, abnormalities in the structure of the heart and changes that occur with heart attacks. In addition, CTA is the best way to detect blood clots caught within blood vessels of the lung. The technique is a fast and noninvasive procedure with superior image clarity compared to the imaging techniques currently used. However, CTA requires slow, steady heart rates and breathing patterns to obtain high-quality images, conditions which are not always present in anesthetized companion animal patients. As such, the aim of this project is to establish a short-term anesthetic protocol using drugs to controllably slow the heart rate which will enable advanced imaging of the canine heart and lungs with CTA. With this, the imaging protocol for canine heart and lung CTA will be established and described. Our novel data will provide the basis for future investigations into the usefulness of CTA in the noninvasive diagnosis of heart abnormalities present from birth, acquired heart diseases, and diseases involving the lungs and blood vessels of companion animals.

**Construction and evaluation of a mucosal vaccine for canine influenza.**
Dr. Jorge Osorio, Department of Pathobiological Sciences

**The effects of S-Adenosylmethionine on erythrocyte and hepatic glutathione concentrations of clinically normal horses.**
Dr. Simon Peek, Department of Medical Sciences

S-adenosyl-L-methionine (SAMe) is a chemical present in cells throughout the body. Studies in people, dogs, rats, mice and rabbits have found that when SAMe is administered in amounts exceeding those that are normally present in the body to individuals with liver disease there is a beneficial antioxidant effect. Furthermore SAMe has been shown to be safe in all species in which it has been tested. Liver disease is relatively common in horses but there are currently few proven therapeutic options. Many of the liver diseases that SAMe is used to treat in people, dogs and cats have striking similarities to the common liver diseases of horses. Given this, SAMe shows potential as an adjunctive therapy to treat liver disease in horses. We propose a study to establish whether these same beneficial anti-oxidant effects can be achieved in red blood cells and liver tissue of normal horses when SAMe is administered orally. Our study would then establish a therapeutic, safe dose for adult horses and thereby improve therapeutic options for horses with liver disease.

**Articular cartilage in normal canine cadaveric elbows: Comparison of CT arthrography with MRI and MR arthrography.**
Dr. Susan Schaefer, Department of Surgical Sciences

The elbow is a common site for the development bone and cartilage lesions, often referred to as elbow dysplasia in young growing dogs. Articular cartilage erosions, fissures or fragmentation are often found
at the time of arthroscopic surgery in dogs with elbow dysplasia and are believed to negatively affect long-term outcome. It would be helpful if these lesions could be identified without the need for arthroscopic surgery. Radiography, Committed Tomography (CT), and Magnetic Resonance Imaging (MRI) are diagnostic tools that can evaluate bony lesions and secondary degenerative changes, but fail to allow visualization of the articular cartilage. Arthrography, the use of a contrast medium in a joint, in combination with radiography, CT or MRI, is required for the accurate evaluate the articular cartilage. CT and MR arthrography are utilized in the diagnosis of cartilage lesions of the human elbow but no previous work has validated these imaging modalities in the canine elbow. The purpose of this investigation is to establish the optimum technical parameters for CT arthrograms of the canine elbow and to determine which imaging modality, CT or MRI, is most accurate in the measurement of articular cartilage thickness. Canine cadaver elbows will be used for this study. Confirmation of a reliable technique for cartilage evaluation in the dog will significantly enhance our ability to identify abnormalities and prevent needless surgeries in our patients.

**The prevalence of acute lung injury in small animal patients receiving transfusions.**

Dr. Elizabeth Thomovsky, Department of Medical Sciences

Transfusion-related acute lung injury (TRALI) is a syndrome that occurs in humans after receipt of a blood or plasma transfusion. The transfusion induces inflammation in the lungs that leads to infiltrates which cause a variety of clinical signs ranging from none (sub-clinical cases) to an inability to breath, increased heart and respiratory rates, and even death. TRALI is a subset of acute lung injury (ALI) in humans. In the veterinary world, ALI has been described in dogs and dogs are regularly given blood and plasma transfusions. Dogs receiving transfusions do suffer from a variety of complications related in time to the transfusion, some of which are likely attributable to TRALI. However, TRALI has not been proved to exist in dogs. The goal of our study is to determine if ALI induced by transfusion does exist in dogs (ie, TRALI). We will study this by taking chest radiographs (X-rays) before and after transfusions in dogs to look for evidence of infiltrates in the lungs. At the same time, the patients will have an arterial blood gas analysis conducted which will provide information on the patients’ ability to oxygenate before and after the transfusion. Our goal is to determine if ALI is induced by transfusion in dogs; if so, it will lend credence to the idea that TRALI exists in dogs.

**Is oxidative stress a risk factor for adverse reactions to the anti-thyroid drug methimazole.**

Dr. Lauren Trepanier, Department of Medical Sciences

Hyperthyroidism (an overactive thyroid) is a common disease in middle aged to older cats. Methimazole (also called Tapazole®) is the most commonly used drug for this condition, particularly when radioiodine is not available or not affordable. However, methimazole leads to unpredictable adverse drug reactions, including low platelet and white blood cell counts, facial scratching, or liver toxicity, in 2-7% of cats. This study will determine whether antioxidant deficiencies are a risk factor for these drug reactions in cats. The results of this study may provide a rationale for antioxidant supplementation in cats with hyperthyroidism, with the goal of preventing adverse reactions to the otherwise very effective drug, methimazole.
Pilot study: evaluation of CD19 as a potential immunotherapeutic target for the treatment of canine and feline lymphoma.

Dr. David Vail, Department of Medical Sciences

In the past twenty years, no improvement in cures have been made in the treatment of dogs and cats with lymphoma, the most common form of white blood cell cancer. Approximately 90% of our companions continue to die from this disease. Despite newer forms of chemotherapy, improvements in curing lymphoma in people did not occur until the development of antibodies (a form of immunotherapy) that attack the cancerous white blood cell were developed about 10 years ago. Unfortunately, the antibody that recognizes and helps kill human cancerous white blood cells does not recognize the dog and cat cancer cell. This study will seek to identify and test a new set of antibodies that will be designed to recognize the cancerous white blood cells found in dogs and cats. It is hoped that, as it has for people, this new immune therapy will be successful in increasing the cure rate for lymphoma in our companion animals.