Projects funded in 2010

Iron status, red blood cell indices, and reticulocyte indices in dogs enrolled in a canine blood donor program
Dr. Jonathan Bach, Department of Medical Sciences

Current standards for human blood donors permit people weighing more than 50 kg (110 lbs) to donate blood every 56 days, with each donation being ~400-450 ml. Canine blood donor programs typically require dogs to weigh more than 23 kg (50 lbs), but despite lower canine weight standards, donations remain in the range of 400-450 ml. Initial studies suggested that dogs tolerate donations every 28 days without developing anemia. However, recent studies have shown evidence of iron deficiency, without overt anemia, in people donating blood only four times annually. Iron status has not been critically evaluated in canine blood donors. The objective of this study is to evaluate iron status and incidence of iron deficiency in dogs enrolled in the University of Wisconsin Veterinary Medical Teaching Hospital’s blood donor program. The results could lead to early intervention protocols or donation recommendations to prevent iron deficiencies in donor dogs.

Dr. Ian Duncan

This research project will investigate the genetic basis of a neurologic disease in Weimaraners, with the long-term goal of producing a bench test that will help the breed selectively eliminate the disease, based on their ability to identify dogs that carry the abnormal gene. The disease presents in the early neonatal period with affected pups developing a severe tremor at 10-12 days of age. This tremor dissipates with time and is lost when the dog is 4-5 months. Although not life-threatening, the tremor causes considerable stress to the owner and prevents dogs being placed in homes at the usual age. It is found across America and in Europe. Using DNA from two Weimaraner families we will use an approach known as a genome wide association study to map the gene and then fine map the gene and the mutation. This will allow the development of a DNA test to identify carriers of the mutation, thus allowing future selective breeding.

Pharmacokinetics and pharmacodynamics of pimobendan in hispaniolan amazon parrots (Amazona ventralis)
David Sanchez-Migallon Guzman

Congestive heart failure is the most commonly diagnosed cardiac disease in parrots and its treatment has historically been difficult. Pimobendan is a newer inotropic drug that has become the drug of choice in the treatment of congestive heart failure in dogs. We aim to find a clinically practical oral dosage of pimobendan that shows cardiovascular effects that are beneficial for the treatment of congestive heart failure in Amazon parrots. We would also like to characterize the cardiovascular properties of pimobendan in Amazon parrots. First we will study the pharmacokinetic profile of a single oral and intravenous dose of pimobendan in Hispaniolan Amazon parrots (Amazona ventralis). In order to
correlate the cardiovascular effects of pimobendan with its plasma concentrations, we will assess the cardiovascular effects of a single intravenous dose.

**Translaryngeal Percutaneous Arytenoid Lateralization (TPAL) as a New Minimally Invasive Technique for Treatment of Laryngeal Paralysis in Dogs**

Robert J. Hardie, DVM, Dipl. ACVS  
Clinical Associate Professor Small Animal General Surgery

Laryngeal paralysis is a relatively common problem in large breed dogs that results in obstruction of the airway due to failure of the vocal cords to open properly during respiration. Problems resulting from laryngeal paralysis include coughing, gagging, or aspirating while eating, exercise intolerance, respiratory stridor and difficulty oxygenating, and potentially severe respiratory distress and collapse. Dogs that develop respiratory distress can be challenging to treat and often require emergency intubation to relieve the airway obstruction and break the cycle of respiratory distress that leads to further collapse of the vocal cords. Emergency intubation is effective for most dogs; however, some fail to stabilize due to persistent swelling of the vocal cords, aspiration pneumonia, or other concurrent conditions and require additional treatment prior to definitive surgery to open the paralyzed vocal cords. Currently, the only option for relieving the persistent airway obstruction in these dogs is a tracheostomy tube that requires intense management and has been associated with increased mortality when used in dogs with laryngeal paralysis. The objective of this study is to investigate a new, less-invasive technique called translaryngeal percutaneous arytenoid lateralization (TPAL) which is designed to temporarily hold open the vocal cords and maintain a patent airway so that dogs can be better stabilized prior to definitive surgery for laryngeal paralysis. The procedure is performed through the mouth and involves placing a suture around one of the vocal cords and tying the suture on the outside of the neck so that the vocal cord is temporarily fixed in an open position thus maintaining a patent airway while the dog is further stabilized. If successful, this technique has the potential to dramatically improve the way in which dogs with laryngeal paralysis are treated and reduce the morbidity currently associated with the use of tracheostomy tubes in dogs.

**Comparison of pelvic flexure enterotomies closed with a TA-90 stapling device v. hand sewn closure**

Dr. Michael Livesey, Department of Surgical Sciences

Up to 7% of calls made by equine veterinarians are to treat horses suffering from colic. While most respond to medical treatment, <1% have an intestinal accident, requiring abdominal surgery. This is performed with the horse restrained on its back under general anesthesia. An incision is made through the abdominal wall to expose the intestines. Manipulation of the bowel is difficult if it is distended, while pressure exerted on the diaphragm will make it difficult for the horse to breath. Speed and efficiency are therefore of importance.

During surgery, the large bowel is exposed, and if distended, is emptied through an incision made in the wall, a hosepipe inserted and water pumped in to soften and flush out the contents. The incision is closed with two overlapping layers of sutures, providing a water and gas tight seal. A secure closure that
decreased the surgical time would help reduce complications related to the horse lying on its back for an extended period. Stapled closure of the colonic incision may offer these benefits, provided our study confirms the closure has a similar mechanical strength.

**Spinal Anesthesia and Analgesia in Red-Eared Slider Turtles**

Christoph Mans, med. Vet; Paulo Steagall, MV, MSc, PhD; Stephen M. Johnson, MD, PhD; Kurt K. Sladky, MS, DVM, Dipl. ACZM

Turtles and tortoises commonly present to veterinarians for surgical conditions such as egg binding or penile/cloacal prolapse. Unfortunately, these animals are frequently physiologically compromised due to a delay in care, which can significantly increase anesthetic risk and lead to a poor recovery. Spinally administered anesthesia/analgesia may help alleviate these negative consequences. Therefore, we propose to develop and validate a novel, spinal anesthesia/analgesia technique in red-eared slider turtles. The benefits of spinal anesthesia/analgesia would include a reduction in systemically administered anesthetics and analgesics, minimal cardiorespiratory depression, and improved post-surgical recovery, particularly in compromised patients. This study will be the first of its kind to investigate spinal anesthesia in any reptile species.

**Identification of a genetic susceptibility in canine cruciate rupture.**

Dr. Peter Muir, Department of Surgical Sciences

Cruciate rupture is the most common cause of lameness in dogs. Ruptures usually occur during normal activity and are not associated with accidental injury. Traditionally, knee arthritis was thought to be a consequence of joint instability after rupture of the cruciate ligament. However, recent work suggests this paradigm is incorrect and that development of cruciate rupture is actually a consequence of inflammatory knee arthritis. Consequently, it has been proposed that cruciate rupture develops because of an inflammatory arthritis and chronic inflammation of the joint lining. The health of the cruciate ligament tissue is closely related to the joint environment, as the ligament is surrounded by joint fluid and covered by the joint lining. Although inflammation of the joint lining is typically found in affected dogs, it is unclear whether the immune responses that develop within knee joints with cruciate rupture are abnormal. In human beings, inflammatory arthritis is often associated with an immunogenetic susceptibility. This study will determine whether there is an association between major histocompatibility complex genotype and development of cruciate rupture. Identification of a genetic risk factor for cruciate rupture will confirm that joint immune responses are abnormal, allow early detection of at-risk dogs and facilitate development of selective breeding strategies.

**Tramadol, but not Carprofen, provides effective alleviation of post-operative pain after canine enucleation**

Principal Investigator: Lesley J. Smith DVM, DACVA
Co-Investigator: Ellison Bentley DVM, DACVO

Our collaborative research group has successfully employed the canine model of eye removal for studies of analgesics in dogs that present to the UW VMTH for medical conditions requiring this procedure. To date, we have used this model to publish studies on specific local anesthetic blocks. Many veterinary
practitioners, however, are not comfortable with the competency required to perform these techniques. A popular non-steroidal anti-inflammatory oral analgesic used for canine post-operative pain is the drug carprofen, which is similar to the drug ibuprofen. Carprofen has potential side effects, including damage to the renal and gastrointestinal systems. A second oral analgesic that is gaining popularity in veterinary medicine is tramadol. Tramadol has mechanisms of action that make it a potentially superior analgesic with fewer side effects, but studies of its efficacy in clinical models of canine pain are lacking. Specifically, tramadol acts as a morphine-like drug, but also provides analgesia by inhibiting specific neurotransmitter reuptake in the spinal cord, so its mechanisms of action are more diverse and “multimodal” than the non-steroidal anti-inflammatory drug carprofen. The goal of the study proposed here is to compare analgesia in dogs, requiring eye removal, that have received either carprofen or tramadol orally prior to surgery. The hypothesis of this study is that tramadol will provide more effective analgesia than carprofen in the post-operative period and that fewer dogs receiving tramadol will require additional analgesia. Results of this study would provide valuable information to veterinarians about the comparative analgesic benefits of these drugs.

**Comparison of image quality of the dog maxilla obtained by cone beam computed tomography or medical grade computed tomography**

JASON W. SOUKUP, DVM, DAVDC
RANDI DREES, Dr. med. vet., DACVR, DECVDI
CHRISTOPHER SNYDER, DVM, DAVDC
LISA J. KOENIG, B.CH.D., D.D.S., M.S.

Successful surgical planning of maxillofacial pathology in companion animals requires high-resolution, three-dimensional pre-operative imaging. A new imaging modality, cone beam computed tomography (CBCT), has been shown to provide high-detail, high-resolution two- and three-dimensional images in humans. Given the steady movement toward the use of CBCT as the primary imaging modality of the orofacial region in humans, validation of CBCT in companion animals is needed. The primary objective of our research is to determine the feasibility and potential benefits of CBCT imaging of the canine maxilla, when compared to traditional imaging modalities. Our future goals are to evaluate the capacity of CBCT to: quantify bone loss from periodontal disease; facilitate diagnosis and treatment success of endodontic disease; support planning of surgical and non-surgical treatment of orthodontic disease; and improve diagnosis and treatment planning of invasive oral pathology and maxillofacial trauma.

**Bacteriologic and clinical cure rates of short duration trimethoprim-sulfamethoxazole therapy versus long duration β-lactam therapy in female dogs with uncomplicated bacterial cystitis**

Principal Investigator: Katrina R. Viviano PhD, DVM, DACVIM
Co-Investigators: Sharon Clare PhD, DVM and Faye A. Hartmann, M.S., MT (ASCP)

Urinary tract infections are a common clinical problem in women and female dogs. In women, research supports short duration trimethoprim-sulfonamides (TMS) versus long duration β-lactams. Short duration TMS is used in women without clinically significant drug hypersensitivity reactions, a rare adverse reaction of sulfonamide antibiotics. In contrast, long-duration β-lactams are routinely used in dogs. A cure rate of 45% was recently reported in dogs treated with cephalixin for 14 days, suggesting
β-lactams may not be ideal therapy in dogs. The goals of this study are to compare the response to treatment with short-term TMS to long-term β-lactam therapy in female dogs with urinary tract infections and determine the frequency of clinically significant sulfonamide hypersensitivity reactions in dogs treated for 3 days. We hypothesize that short-term TMS therapy will be safe and effective in the treatment of urinary tract infections in female dogs while minimizing cost, antibiotic exposure, and bacterial resistance.

**Apoptosis - not just for nucleated cells**
Karen Young, Clinical Professor, Department of Pathobiological Sciences

Red blood cells (RBCs) circulate in the blood stream and provide oxygen to all tissues of the body. The lifespan of circulating RBCs is tightly regulated, and an "old" cell undergoes alterations that result in its removal, whereas replacement RBCs are made in the bone marrow. In healthy animals, the exact nature of the alterations in RBCs and the mechanisms used to recognize and remove them are areas of active investigation. In immune-mediated hemolytic anemia (IMHA), RBCs are destroyed or removed from the blood stream early and in excess of what the bone marrow can produce; thus, the animal's ability to deliver oxygen to the tissues is compromised. This disease can be severe and is often life-threatening in dogs with a reported mortality rate of 40%. Efforts to improve diagnosis and management of IMHA have long focused on the immunologic components of the disease. Recent data suggest that a closer look at changes in RBCs themselves is warranted. We will systematically evaluate changes in RBC membranes and signaling events hypothesized to contribute to their increased interaction with the immune system and removal from circulation. This has the potential to identify alterations in the RBCs that may serve as diagnostic aids or therapeutic targets in the future.