Computed Tomography for Verification of Patient Position and Gross Tumor Volume

Principal Investigator
Dr. Lisa Forrest, Department of Surgical Sciences

Abstract
Current state-of-the-art radiation therapy utilizes mulileaf collimators to dynamically modulate the radiation beam meticulously to fit the tumor volume while avoiding normal surrounding tissues. To accurately plan radiation therapy, static computed tomography (CT) images are acquired. Theoretically, this allows delivery of radiation therapy with submillimeter accuracy. However, current CT technology cannot account for respiratory or organ motion. This means that, despite the best technology available, margins for motion error must be incorporated into every radiation plan. The movement of the tumor or organs during treatment results in significant radiation delivery to normal tissue and occasionally inadequate treatment of the tumor. This study will compare traditional CT to real time MRI and respiratory or motion gated 4-dimensional CT, two newly emerging technologies in human radiation treatment planning. We aim to determine if these technologies are likely to improve safety of radiation delivery to both human and animal patients.

Determinants of Canine Health in “Village Dogs” in Rural Uganda

Principal Investigator
Dr. Tony Goldberg, Department of Pathobiological Sciences

Abstract
Dogs in the developing world suffer miserably from preventable diseases. However, previous studies of canine health in developing countries have largely focused on dogs as sources of human diseases and as carriers of diseases that can harm livestock or wildlife. This study will focus on the health of village dogs living in communities surrounding a bio-diverse national park in Uganda. By following a group of dogs for a full
year, the study will identify the major infectious diseases that contribute to ill health in this population of dogs. The long-term goal of the study is to use the information generated to design meaningful veterinary public health interventions to improve canine health and welfare in Uganda and similar regions around the world. The project will form the basis of a new program in global companion animal health at UW-Madison.

Chinchilla Pain Management: Safety and Efficacy Evaluation of Different Formulations and Routes of Administration of Buprenorphine

Principal Investigator
Dr. Christoph Mans, Department of Medical Sciences

Abstract
Chinchillas are popular, robust, and relatively long-lived pet rodents. Unfortunately, there are no published research studies on pain management in chinchillas, and analgesic drug dosages used in chinchillas are extrapolated from other mammals. The goal of our study is to evaluate the analgesic efficacy and safety of buprenorphine, an opioid medication, by comparing two routes of administration (oral/transmucosal and intramuscular), and two buprenorphine formulations (standard and long-acting). The oral route has the potential to eliminate the need for stressful injections and allow owners to easily provide pain relief at home after discharge from the hospital. A novel, long-acting form of buprenorphine has the potential to eliminate the need for repeated dosing and handling. This study will be the first to systematically evaluate pain medications in chinchillas, which will help clinical veterinarians provide effective and safe pain relief to their chinchilla patients.

The Effect of Regional Perfusion of the Distal Limb with Amikacin Sulfate on Wounds Healing by Second Intention and Validation of a Wound Infection Model in Adult Horses

Principal Investigator
Dr. Samantha Morello, Department of Surgical Sciences

Abstract
Healing of distal limb wounds in horses can present a significant challenge to veterinarians and owners. Through the combination of an inherently poor inflammatory response and proximity to a dirty environment, limb wounds often develop infections and may suffer from delayed healing. High tissue levels of antimicrobial can be achieved through regional perfusion of the limb to help prevent or treat wound infection. While effective, this technique establishes high-pressure gradients between tissues and blood vessels that may alter the local wound environment during healing. This study will
determine the effects, if any, of regional perfusion on healing of clean wounds in horses. Additionally, we will use this opportunity to perform a pilot study to create a model for bacterial wound infection in horses. Development of a successful model will be beneficial for future studies evaluating different methods of treatment for infected wounds in horses.

**Normal MRI Anatomy and MRI Arthrography of the Canine Coxofemoral Joint**

**Principal Investigator**
Dr. Susan L. Schaefer, Department of Surgical Sciences

**Abstract**
Musculoskeletal conditions in and around the hip joint are common causes of pain and lameness in dogs. While conditions like hip dysplasia, avascular necrosis, and hip luxation can be readily diagnosed by standard radiography, sporting injuries (joint capsule tears, iliopsoas muscle tears) and issues secondary to osteoarthritis (free osteochondral fragments or sciatic nerve impingement) are much more difficult to diagnose. Magnetic resonance imaging (MRI) is widely utilized to diagnose musculoskeletal disease in humans. Superior soft tissue image resolution along with the ability to image in multiple planes has made MR imaging the diagnostic modality of choice for numerous joint pathologies. As MRI availability increases and cost decreases, this diagnostic tool has become more commonplace in veterinary medicine. As with any new imaging tool, gaining an understanding of normal anatomy is essential before it can be applied to clinical patients. The first objective of this study is to perform a detailed comparative study of normal gross anatomic sections and MRI sections of the canine hip joint, focusing on associated soft tissue structures. The second objective is to describe the normal hip joint anatomy as seen with MRI arthrography. The goal is to develop an MRI atlas of the normal anatomy of the canine hip joint and associated soft tissues (muscles and tendons). The results of this study will serve as a foundation for evaluating the role of MRI in diagnosis of musculoskeletal disorders of the canine hip.

**Evaluation of a New Noninvasive Fracture Repair Technique for Mandibular Fractures in Dogs and the Impact of Tooth Preservation on Fixation Strength**

**Principal Investigator**
Christopher Snyder, Department of Surgical Sciences

**Abstract**
This project will investigate a new technique for treatment of fractures of the lower jaw of dogs. Traditional orthopedic repair techniques that entail drilling holes for plates and screws often result in damage to tooth roots. Jaw fractures are frequently repaired using techniques in which teeth are wired together and plastic splints are placed. These
techniques can be time intensive and cumbersome. This study will determine whether the use of special screws designed to be connected by wire results in a stronger repair and a time-saving alternative to wiring teeth. A second component of this study will evaluate an important feature of jaw fractures, specifically the effects of involvement of tooth roots in fractures. Fractures frequently involve tooth roots, and teeth associated with the fracture are typically removed. This study will evaluate whether preserving teeth in the fracture will increase the strength of the fracture repair.

Evaluating the Impact of Surgery and Radiation Therapy on Circulating Cytokine Levels in Dogs with Osteosarcoma

Principal Investigator
Timothy Stein, Department of Medical Sciences

Co-principal Investigators
Cecilia Robat and Robert Hardie, Department of Medical Sciences; Lisa Forrest, Department of Surgical Sciences

Abstract
Osteosarcoma, a highly aggressive bone cancer in dogs and children, has a poor survival rate due to its highly metastatic nature. The use of therapy that stimulates the immune system of patients with osteosarcoma has improved outcomes of treatment. Radiation therapy (RT) is not routinely used for definitive treatment of OSA; however, recent studies have found local RT can stimulate the immune system to generate systemic anti-cancer responses, which is called an abscopal effect. The anti-tumor effects of RT, as well as modifications to the tumor microenvironment, may result in different blood-borne signals (immunocytokines) that enhance the capacity of the immune system to recognize cancerous cells. This pilot study will determine whether RT is more effective than surgery at stimulating an anti-tumor immunocytokine response. Results have the potential to be developed into larger, more detailed studies that may shift the current treatment paradigm for OSA and improve outcomes of treatment of this devastating disease.

Hypocobalaminemia and Cobalamin Deficiency in Cats with Hyperthyroidism

Principal Investigator
Katrina Viviano, Department of Medical Sciences

Abstract
Cobalamin (vitamin B12) is an essential vitamin, and significant disorders can develop if cobalamin is depleted. Functional cobalamin deficiency is defined as low cobalamin associated with increased methylmalonic acid (MMA). In humans and cats, low
cobalamin has been associated with hyperthyroidism, a common endocrine disorder characterized by high circulating thyroid hormone levels. Only recently has hyperthyroidism been linked to low cobalamin in cats, and whether this is a functional cobalamin deficiency is unknown. The purpose of this study is to determine if a functional cobalamin deficiency exists in hyperthyroid cats, assess whether weight loss associated with feline hyperthyroidism correlates with cobalamin status, and evaluate if cobalamin and MMA levels (if abnormal) return to normal following radioiodine therapy of hyperthyroidism. The results will determine whether cobalamin should be evaluated in hyperthyroid cats and may suggest a population of cats that would benefit from cobalamin supplementation.