

## 2018 Summer Research Studentships

Students interested in working on a particular summer research studentship project should contact the faculty member directly in advance of the competition closing date of February 14, 2018 to discuss possible involvement with the project.

Faculty will select the student based on the following criteria:

Academic record (i.e., transcripts provided by the student)

General interest in research and the summer research project

Adherence to the terms and conditions of the Studentships particularly the commitment to being present for a maximum of 35 hours per week during the entire 14.4 week period of the research project. As students will receive 4% vacation pay on their hourly rate, it is expected that they will work full-time (35hrs/week) for the entire 14.4 weeks.

Restrictions as stated in the award.

Faculty will inform the Associate Dean Research and Innovation at [ovcsumre@uoguelph.ca](mailto:ovcsumre@uoguelph.ca) of the name of the student chosen for the summer research student assistantship by February 14, 2018

Below is a list of the 2018 summer research studentship project titles. It is followed by a list of project descriptions that include names and departments of faculty contacts.

<b>James and Marjorie Pinkney Award Summer Research Studentship – Animal Welfare (Restricted to DVM students)</b>
The effect of long distance transport on the welfare and productivity of weaned piglets
<b>Boehringer Ingelheim Veterinary Scholars Program (Restricted to DVM students)</b>
Equine Herpesvirus-1 (EHV-1) prevalence investigation and relative risk of abortion in Ontario horse farms.
Correlating clinical and pathological findings in inflammatory CNS diseases in dogs
<b>PetSmart Charities Summer Research Studentship (shelter medicine or human-animal bond, for phase 2 student)</b>
Understanding the etiology of diarrhea in shelter cats and responsiveness to diet and stress management
<b>Andrea Leger Dunbar Summer Research Studentships (No Restrictions)</b>

Mental health of veterinarians: A literature review of mental health in healthcare professionals and support programs
Adapting the high immune response technology to improve the health and productivity of beef cattle POSITION FILLED
Cardiac self-repair and regeneration in the leopard gecko
Characterization of extracellular vesicles released by primary and metastatic canine osteosarcoma
Pilot safety assessment of a novel DNA-based dual vector/pathogen vaccine in cattle and goats
Cytologic profile of bronchoalveolar lavage fluid in Ontario horses diagnosed with mild asthma in association with air pollution: a prospective study
Premedication and anesthesia in ball pythons ( <i>Python regius</i> )
Assessing the Impact of Sex Hormones on the Efficacy of Oncolytic Viruses
The effect of direct examiner supervision versus video recording on stress and skills performance during objective structured assessment of technical skills (OSATS)
Stimulation of innate immune responses for prevention of bovine respiratory disease
Reducing osmotic stress during cryopreservation of equine embryos
Liver enzyme as potential prognostic parameter in dogs with acquired cardiac disease
Teaching of critical RCT appraisal for DVM students and veterinarians
Characterizing immune phenomena in experimental osteoarthritis in sheep
Assessing the potential exposure of birds and mammals to raccoon roundworm in the environment
Understanding the link between hock & neck injuries and lameness in dairy cows
In vivo tracking of equine stem cells following intravenous injection
Comparison of methods to achieve one-lung ventilation for minimally invasive thoracic surgery in dogs
Spatial epidemiological investigation of well-water contamination and testing practices in Wellington County, Dufferin County, and the City of Guelph
Evaluation of the prevalence of <i>Echinococcus multilocularis</i> in dogs, and risk factors for infection, in southern Ontario
Determination of important causes of morbidity and mortality in small flocks in Ontario
A retrospective evaluation of the utility of thromboelastography as a diagnostic tool in dogs
Gene copy number variation and cancer susceptibility in horses
<b>OVC Summer Research Studentship (No restrictions)</b>
Nutritional myopathy of seahorses
Molecular epidemiology of resistance to cephalosporins in farm animals

A study of veterinarian-client-patient interactions
Evaluation of the repeated use of allogeneic umbilical cord blood mesenchymal cells in the clinical cases of equine superficial digital flexor tendinitis
Olfactory-derived mesenchymal stromal cells as neurogenic precursors in dogs

**James and Marjorie Pinkney Award Summer Research Assistantship – Animal Welfare (Restricted to DVM Students) (one project)**

**Project Title:** The effect of long distance transport on the welfare and productivity of weaned piglets

**Faculty Contact:** Dr. Terri O’Sullivan (Population Medicine) [tosulliva@uoguelph.ca](mailto:tosulliva@uoguelph.ca)

**Project Description:** Within Canada 65% of newly weaned piglets are transported to nursery barns for rearing. These journeys take place in seasonal temperature extremes and can of variable duration. There is very limited data on how the newly weaned piglet cope with such transport conditions. In 2017 CFIA proposed changes to the Health of Animals Regulations XII concerning the transportation of live animals. For weaned piglets, it is clear that there are several areas requiring further research in order to provide science-based legislative changes. The objective of the proposed project is to determine the effect of transport duration in summer on the welfare and productivity of newly weaned piglets. The objectives will be achieved through working with one producer who transports newly weaned piglets for both short and long durations to nursery barns. To retrieve measures from pigs experiencing long durations of transport, a producer in Saskatchewan who ships piglets to Ontario for a total transport time of 36 hours will be selected. Data collection will be performed by two teams of researchers. The Western team led by Dr. Yolande Seddon, Western College of Veterinary Medicine will perform data collection on piglets prior to loading, and the Eastern team led by Dr. Terri O'Sullivan, Ontario Veterinary College will perform data collection once the pigs arrive at the destination barn in Ontario. In brief, data collection will be divided as follows: Western Team: Assessment of the pigs prior to loading including collection of group weights, fitting specific trailer compartments with temperature and humidity data loggers and video cameras, drawing blood and fitting heart rate monitors to a sub-sample of focal piglets. Weights from the focal pigs will be collected. Upon arrival, the Eastern team will assess and reweigh piglets upon arrival at the nursery barn, retrieve data loggers and cameras from the trailer and heart rate monitors from the pigs. Perform repeat blood draws from the focal pigs. Cameras will be secured within the nursery barn over a sub-sample of pens containing the focal pigs and the behaviour of pigs recorded for 48 hours following arrival. The Eastern team will reenter the nursery barn again following 48 hours post arrival to reweigh the focal pigs. The total morbidity and mortality and nursery exit weight of the piglets will be retrieved from the nursery barn. Video footage during transport will be viewed to assess pig comfort, coping strategies, and aggression during the journey and speed of recovery post arrival. A minimum of four transport loads travelling from Saskatchewan to Ontario will be assessed over summer 2018. An Ontario based summer student working on this project will be required to assist with data collection In

Ontario, and to help with communicating with swine producers, visiting farms, blood analysis, and watching and assessment of behavior videos.

## **Boehringer Ingelheim Veterinary Scholars Program (Restricted to DVM students) (two projects)**

**Project Title:** Equine Herpesvirus-1 (EHV-1) prevalence investigation and relative risk of abortion in Ontario horse farms

**Faculty Contact:** Dr. Brandon Lillie (Pathobiology) blillie@uoguelph.ca

**Project Description:** The proposed research project will provide an excellent opportunity for a veterinary student to get exposed to both molecular based lab work as well as diagnostic anatomic pathology. The research project involves surveying Ontario horse operations for EHV as well as studying immune responses to EHV. The student will work in a multi-PI lab and be involved in all aspects of the project. Samples (blood, nasal and vaginal swabs) will be/have been collected at various times during the equine gestational cycle. The student will be heavily involved in DNA isolation and processing of blood samples as well as analyzing data from droplet digital PCR and serology testing. They will also gain exposure to a variety of molecular techniques including, NGS, RT-qPCR, and gel electrophoresis that are also utilized in Dr Lillie's lab and learn how these techniques are applicable to disease diagnosis.

In addition to the lab work, a substantial part of this position involves experiential learning and assisting in post-mortem examinations of domestic animals. Exposure and involvement in activities in an academic post-mortem facility provides an excellent & unique experiential learning opportunity, particularly to see how diagnostic pathology translates into disease research at OVC. The student will get exposed to a wide range of important veterinary diseases, including infectious diseases affecting horses and other livestock. As part of their PM activities, the student will collect tissues from the respiratory and reproductive tract of EHV-affected horses as well as from other infectious disease cases in horses & other livestock, helping build an infectious disease tissue-bank being developed.

The applicant must be a DVM student and completion of phase II of the DVM program is preferred. Proof of a immunity to rabies (a protective titre) is required. Students will be encouraged to participate in the Summer CORE program as well as other activities in the Department of Pathobiology, such as research seminars and Gross and Histopathology Rounds

**Project Title:** Correlating clinical and pathological findings in inflammatory CNS diseases in dogs

**Faculty Contact:** Dr. Stefan Keller (Pathobiology) smkeller@uoguelph.ca

**Project Description:** Inflammatory central nervous system (CNS) diseases in dogs can be challenging to diagnose because different diseases present with similar clinical signs. Definite diagnosis requires histopathological evaluation of tissue samples after the patient has deceased. As a result, there are currently no evidence-based guidelines for choosing a treatment regiment and predicting outcome. The long-term goal of this project is to develop a

diagnostic test that can diagnose inflammatory CNS diseases ante mortem more precisely and reliably than current methods. Our strategy is based on the assumption that different diseases trigger different adaptive immune responses that are characteristic for a given disease. This summer project will focus on characterizing a case series of canine inflammatory CNS diseases that will subsequently be used for immune profiling studies. The student will retrieve pertinent clinical data, compile key histopathological features and generate a basic assessment of the immune cell composition of the samples. The project will utilize the following methodologies: database search, review of medical records, DNA extraction and quantification, PCR and capillary electrophoresis. This study is funded by Pet Trust and the summer student will work in close collaboration with the graduate student on the project.

In addition, A substantial component of this position involves experiential learning and assisting in post-mortem examinations of domestic animal species in the post-mortem suite of Pathobiology. Therefore, completion of phase II of the DVM program is preferred, and proof of immunity to rabies (a protective titre) is required.

The student will also be encouraged to participate in the Career Opportunities and Research Exploration (CORE) program at the OVC.

### **PetSmart Charities Summer Research Studentship (shelter medicine or human-animal bond, phase 2 student) (one project)**

**Project Title:** Understanding the etiology of diarrhea in shelter cats and responsiveness to diet and stress management

**Faculty Contact:** Dr. Shane Bateman (Clinical Studies) [sbateman@uoguelph.ca](mailto:sbateman@uoguelph.ca)

**Project Description:** Diarrhea is among the most common ailments of cats in shelters. The etiology of the problem can be multifactorial and related to infectious agents, stress, or diet changes. In some cases, the problem can be refractory and lead to longer length of stay in shelter or reduced adoption potential. The use of antimicrobial and antiparasitic treatments is common but the responsiveness to these therapies is unknown. This project would examine and describe the factors associated with affected cats in a local animal shelter (Guelph Humane Society). In addition, the study will explore the responsiveness of the problem to various treatments. Finally, if time permits, the study will explore the responsiveness of non-infectious diarrhea to stress and dietary management strategies.

### **Andrea Leger Dunbar Summer Research Studentships (No restrictions) (twenty-three projects)**

**Project Title:** Mental health of veterinarians: A literature review of mental health in healthcare professionals and support programs

**Faculty Contact:** Dr. Colleen Best (Population Medicine) [cbest@uoguelph.ca](mailto:cbest@uoguelph.ca) and Dr. Andria Jones-Bitton (Population Medicine)

**Project Description:** This project will work towards filling an important knowledge gap facing veterinary profession. Recent work at the OVC supports international findings that veterinarians experience higher levels of stress, psychological distress, and suicide than other occupations. Unfortunately, there is a serious gap in knowledge regarding the mental health supports available to the veterinary profession, including through veterinary college curricula.

The student in this position will work on the crucial task of reviewing the existing peer-reviewed, grey, and online literature, as well as communicate with mental health and veterinary organizations, to identify and describe the support programs currently in place in Ontario, other Canadian provinces, and in some instances, internationally. This will help fill an important knowledge gap, and is crucial to inform a larger project on mental health literacy and support for Canadian veterinarians that the research team is currently working on.

The student may also assist with conducting a field study investigating the impacts of veterinarian wellness on outcomes of care. Further, they may be involved with the development of online and in-person resources for veterinarians and veterinary students. Previous experience with website and app design an asset.

**Project Title:** Adapting the high immune response technology to improve the health and productive of beef cattle POSITION FILLED

**Faculty Contact:** Dr. Bonnie Mallard (Pathobiology) [bmallard@uoguelph.ca](mailto:bmallard@uoguelph.ca)

**Project Description:** Selective breeding to improve the productivity of livestock has led in recent decades to continuous increases in yields of milk and meat. Selective breeding for disease resistance, however, has received little attention until recently. Research in the laboratory of Dr Mallard of the University of Guelph has resulted in a patented High Immune Response (HIR) technology that can be used to identify individual animals with superior genetics for immune responses and disease resistance. This technology has been licenced to the Semex Alliance, and semen from dairy sires with superior genetics for immune responses is marketed as Immunity+. Research is in progress to extend and adapt the HIR technology for use in beef cattle. Selective breeding for improved immune function can contribute to reduced disease in neonatal calves (eg. diarrhea, pneumonia, septicemia, joint ill, navel ill) and also in weaned feedlot calves (especially bovine respiratory disease [BRD]), thus improving animal health and welfare, and importantly reducing the need for antibiotics.

Immune responses of beef cows at the Elora Beef Research Centre, and their calves born in 2016 and 2017, have been tested using a modified HIR method, and associations with disease events are being analyzed. In an extension of the project this summer, blood samples will be collected from calves under a week of age, for assessment of passive (colostral) transfer of maternal immunoglobulin G (IgG) in the context of high, average or low immune responders. Neonatal health data and serum IgG data will be analyzed in combination with data from the previous 2 years to assess dam and sire effects. A student working on this project will develop hands-on skills working with beef cattle collecting blood samples, develop laboratory skills performing radial immunodiffusion assays for IgG, extracting DNA from leukocyte preparations, and in optimizing polymerase chain reactions (PCR) to detect single nucleotide polymorphisms

(SNPs) in genes relevant in transfer of IgG from dam to newborn (see Laegreid et al., 2002, Mamm Genome 13:704-710; Clawson et al., 2004, Mamm Genome 15:227-236). The student will be involved in statistical analyses and may assist as needed in related research into immune responses of dairy cattle, swine or horses as opportunities arise.

**Project Title:** Cardiac self-repair and regeneration in the leopard gecko (*Eublepharis macularius*)

**Faculty Contact:** Dr. Matt Vickaryous (Biomedical Sciences) mvickary@uoguelph.ca

**Project Description:** In mammals, injury to heart tissue typically results in scar formation and diminished cardiovascular function. In contrast, many species of teleost fish are able to replace damaged heart tissues with fully functional regenerated tissues. Although less is known about the regenerative abilities of other non-mammalian species, emerging evidence indicates that some reptiles may also be capable of cardiac self-repair. Previous work in our lab has identified several features of the leopard gecko heart that are similar to the heart of teleost fish, including a trabeculated myocardium and populations of constitutively proliferating cardiomyocytes. We are currently investigating how the leopard gecko heart heals following a ventricular puncture injury (cardiocentesis). The objective of this summer project is to histologically characterize the tissue-level events that occur in the leopard gecko heart following the cardiac puncture. Heart tissues will be collected at multiple time points following the puncture, and then (using serial histology) immunostained for a panel of protein markers (e.g., motor proteins, cell proliferation and apoptotic markers). This investigation seeks to expand the comparative framework of cardiac regeneration in a novel reptilian model. The long-term goal of this research is to contribute to our overall understanding of endogenous mechanisms of heart repair. This project will involve performing serial histology and immunohistochemistry, and possibly generating three-dimensional reconstructions from micro-computed tomography (CT) data sets. Additional responsibilities will include assisting with the maintenance of our gecko colony.

**Project Title:** Characterization of extracellular vesicles released by primary and metastatic canine osteosarcoma

**Faculty Contact:** Dr. Alicia Vilorio-Petit (Biomedical Sciences) aviloria@uoguelph.ca

**Description:** Bone tumours (osteosarcomas) are common and highly lethal cancers in dogs. Standard treatment consists of limb amputation followed by chemotherapy, but expected survival times are still only a year on average. Currently, there are no reliable predictors of how well dogs with bone cancer will fare after treatment. Microscopy of biopsy specimens has been used to determine how badly a tumour is likely to behave, but this method does not work for bone cancer. There is also no way to reliably measure “disease burden” (how much cancerous tissue is in the patient and whether it is growing) until bone cancer spreads and is large enough to be detected by x-rays, usually in the lungs. This leaves owners and veterinarians in the difficult position of deciding the best course of action for dogs with bone cancer, and no way to monitor the success of therapy. A new concept in the cancer field is the use of routine, non-invasive blood sampling as a “liquid biopsy” for diagnosis and prediction of therapy response. Recent studies in human cancers have shown that microscopic bubble-like vesicles released by tumour cells into blood circulation behave as tumour “fingerprints”. They are usually produced in larger quantities by tumour cells as compared to normal cells, and are loaded with molecules

enriched or exclusive to their tumour of origin. Thus, these easily accessible circulating vesicles may provide key information about disease burden and the likelihood that the tumour will be effectively treated by a specific type of therapy. This project will assess the general features and protein cargo of extracellular vesicles produced by primary canine osteosarcoma tumours and their metastases. For this purpose, live tissue from the aforementioned tumour sites will be cultured ex-vivo by a method already optimized at our laboratory. The vesicles released by the tissue will be purified from the culture media and characterized using standard methods in the field. By doing so, we expect to find out whether or not extracellular vesicles are likely to provide new and valuable information that could justify moving forward to their assessment in patient's blood. Findings from this study could improve and extend the life of dogs with osteosarcoma.

**Project Title:** Pilot safety assessment of a novel DNA-based dual vector/pathogen vaccine in cattle and goats

**Faculty Contact:** Luis Arroyo (Clinical Studies) larroyo@uoguelph.ca

**Description:** The proposed research project will look at the safety of a novel vaccine approach designed to vaccinate against both pathogen and vector (in this case a tick). As climate changes occur and natural habitats for certain pathogen vectors change, we are seeing a shift in the prevalence of certain livestock and companion animal disease (for example Lyme disease increasing in prevalence in Ontario and the tick vector of bovine theileriosis recently being found as far north as New Jersey). As part of a large CIHR funded research project looking at animal models and vaccination strategies to control Crimean-Congo Hemorrhagic Fever Virus, another vector-borne viral disease, this pilot vaccine study will vaccinate calves and adult goats, two species commonly infected by the virus, with a novel DNA-based dual vector/virus vaccine. Animals will then be monitored and routinely sampled to assess health and immune status. Some of the animals will then be shipped to the National Lab in Winnipeg for challenge studies, while the remainder will be challenged at OVC with a BSL-1 viral protein to investigate immune parameters. The OVC summer student will work with the DVSc student on the project and be involved in all aspects of the project that occur during the summer. This includes, but is not limited to, animal health monitoring/records/physical exams and sample collection (e.g. blood collection), as well as data analysis.

The applicant must have proof of a protective rabies titre and being a DVM student would be desirable though is not mandatory. A driver's license would also be considered an asset. The student will be encouraged to participate in the Summer CORE program

**Project Title:** Cytologic profile of bronchoalveolar lavage fluid in Ontario horses diagnosed with mild asthma in association with air pollution: a prospective study

**Faculty Contact:** Janet Beeler-Marfisi (Pathobiology) jbeelerm@uoguelph.ca

**Description:** The student will assess bronchoalveolar lavage fluid (BALF) from horses presented to the OVC HSC, and to participating referral veterinarians to determine whether the horse has mild asthma. The student will subcategorize the type of mild asthma based on the predominant cell type noted in the differential cell count (e.g., neutrophils, eosinophils, mast cells, etc.).

These findings will be compared to historical records of air quality pollutant data available from the Ontario government ([http://www.airqualityontario.com/science/data\\_sets.php](http://www.airqualityontario.com/science/data_sets.php)) to determine if any associations between predominant cell type and degree of pollution exist. The student will also participate in the Career Opportunities and Research Experience program, undertake scientific presentations to peers at the OVC, and will participate in the writing of a scientific journal article based on the research findings. Through this project the student will learn about lung disease in horses, as well as how to analyse equine bronchoalveolar lavage fluid, manage data, perform statistical analyses, and how to approach scientific writing. Background: Inflammatory Airway Disease is similar to mild-to-moderate forms of persistent human asthma. Typically noted in young performance horses, IAD is characterised by coughing in association with exercise and decreased athletic performance. Because of this, it is a disease of economic importance to both the racing and the sport horse industries in Ontario. Finally, increased air pollution is associated with increased numbers of asthma attacks in children and adults, but whether air pollution is also associated with IAD in Ontario horses has not been investigated.

**Project Title:** Premedication and anesthesia in ball pythons

**Faculty Contact:** Dr. Dorothee Bienzle (Pathobiology) [dbienzle@uoguelph.ca](mailto:dbienzle@uoguelph.ca)

**Description:** Snakes are popular as companion animals and in zoological institutions. Despite increasing knowledge of reptilian medicine and surgery, some of the most common anesthetic drugs such as isoflurane, nitrous oxide, and midazolam are not well characterized for use in snakes. The goals of this research project are: 1. Determine the minimum anesthetic concentration (MAC) of isoflurane; 2. Quantify how much less isoflurane can be used if midazolam and nitrous oxide are used concurrent with isoflurane; 3. Measure how midazolam is metabolized in snakes.

The research will include 9 to 12 ball pythons in a randomized crossover trial of anesthesia with isoflurane alone, isoflurane with nitrous oxide, and isoflurane with midazolam.

The successful student for this project will have experience and interest in working with snakes. The project will involve blood sampling, placement of catheters, induction of anesthesia, monitoring of anesthetic depth and recovery. The student is expected to participate in all aspects of research, including data collection and data analysis. Participation in the summer leadership program at the Ontario Veterinary College is encouraged, and will be facilitated in addition to hands-on research.

**Project Title:** Assessing the impact of sex hormones on the efficacy of oncolytic viruses

**Faculty Contact:** Dr. Byram Bridle (Pathobiology) [bbridle@uoguelph.ca](mailto:bbridle@uoguelph.ca)

**Project Description:** Oncolytic viruses (OVs) preferentially replicate in and kill tumour cells and represent a paradigm-changing approach to the treatment of cancers. The vast majority of in vitro testing of OVs is conducted under synthetic laboratory conditions that fail to recapitulate aspects of real tumour microenvironments. The aim of this project is to determine whether sex hormones have any impact on the oncolytic potential of viruses. To evaluate this, a variety of cancer cell lines, with or without exposure to estrogen or testosterone or selective

estrogen/androgen receptor modulators, will be treated with a panel of OV's. Specifically, human cervical and human and murine breast and prostate cancer cell lines will be used. Cell culture using aseptic technique will be a core method. A high-throughput resazurin dye-based metabolic assay that correlates with viability will be used for initial testing. Flow cytometry and/or western blotting will be used to explore mechanisms of action. The ideal candidate would have biohazard training, experience with laboratory methods and a genuine interest in cancer biotherapy research. Highly motivated, hard-working and collaborative individuals are encouraged to apply. The successful candidate will participate in weekly lab meetings, enrol in the Ontario Veterinary College Summer Career Opportunities and Research Experience Program and will have opportunities to contribute to other research projects that are ongoing.

**Project Title:** The effect of direct examiner supervision versus video recording on stress and skills performance during objective structured assessment of technical skills (OSATS)

**Faculty Contact:** Dr. Brigitte Brisson (Clinical Studies) [bbrisson@uoguelph.ca](mailto:bbrisson@uoguelph.ca)

**Description:** Basic and more advanced surgical skills are essential to graduating veterinary students and are taught in our program. Stress can affect performance and may have an impact when students are asked to perform a surgical task in a teaching laboratory session or in an examination situation. Examination of skills by objective structured assessment of technical skills (OSATS aka OSCE) is a well-recognized method of assessing skills but it has the potential to be stressful and could therefore affect student performance. Video recording of basic surgical skills has been shown to provide reliable data for rating using a standardized rubric with adequate inter-rater agreement (Williamson & Brisson, in press). The objective of this study is to assess and compare the performance and stress level during evaluation of surgical +/- laparoscopic skills in novice surgeons using direct (skilled examiner) and indirect (video recording to be later assessed by a skilled examiner) skills evaluation. Surgical skills tested will include basic suturing skills using a surgical model and basic laparoscopic skills using a laparoscopic trainer. Stress will be measured using a wrist heart rate monitor, a blood pressure cuff and salivary cortisol levels comparing heart rate, blood pressure and cortisol levels during or following the skill testing vs baseline and with a questionnaire administered prior to and following the skills testing. Performance will be measured and compared using previously published scoring rubrics. Additionally, a separate study will compare the in-person assessment to the blinded assessment of a video recording to ensure reliability at our institution. A convenience sample of students from all phases enrolled in the veterinary program will be recruited for this study. This study is performed in collaboration with Dr. Andria Jones Bitton (Pop med). Ethics approval REB#17-08-012 and funding (University Learning Enhancement Fund) are already in place. The student hired for this project will be in charge of recruiting students, coordinating and administering examinations in collaboration with their supervisor. The student will manage data entry and will help with analysis, writing and publication. If interested, the student is encouraged to participate in the CORE program.

**Project Title:** Stimulation of innate responses for prevention of bovine respiratory disease

**Faculty Contact:** Dr. Jeff Caswell (Pathobiology) [jcaswell@uoguelph.ca](mailto:jcaswell@uoguelph.ca)

**Description:** Bovine respiratory disease is the most common disease of beef cattle, costs the North American beef industry in excess of \$1 billion annually, is a welfare issue from animal

suffering, and is a main reason for preventive use of antibiotics in beef production. The disease most commonly occurs when calves are weaned, transported long distances, and mingled with calves from other sources. Thus, stress and viral infection are major risk factors that lead to development of bacterial pneumonia in cattle. The objective of this research is to develop an intervention to prevent this suppression of the respiratory immune system. Such an intervention would be of value in preventing respiratory disease in beef cattle in feedlots, and may reduce the need for preventative use of antibiotics in beef production. Specifically, the project involves in vitro and in vivo studies that investigate a novel method to stimulate innate immune responses in the respiratory tract of calves. We will test the effect of this immunostimulation on development of bacterial infection in 1-month-old calves. The studies will also characterize the nature of the induced innate immune response using thoracic ultrasound, quantitative RT-PCR for innate immune proteins and inflammatory cytokines, flow cytometry analysis of leukocytes, cytology of bronchoalveolar lavage fluid, histologic examination of respiratory tissues, and bactericidal activity of neutrophils and pulmonary alveolar macrophages.

**Project Title:** Reducing osmotic stress during cryopreservation of equine embryos

**Faculty Contact:** Dr. Tracey Chenier (Population Medicine) tchenier@uoguelph.ca

**Description:** Embryo transfer in horses is currently expensive and inefficient. Current limitations mean that most embryos are transferred fresh upon flushing, and large recipient herds must be kept to meet this need. Freezing horse embryos has met with limited success, with pregnancy rates near zero for frozen-thawed day 7-8 embryos. Recent studies in our lab have shown that horse embryos exposed to concentrated sugar solutions lose significant amounts of water, suggesting this method could be successfully applied to embryo freezing protocols. However, the high concentration of freezing compounds and sugar solutions used in fast-freezing (vitrification) methods induce significant osmotic shock upon the embryo.

Recent developments in nanotechnology and microfluidic methods are ideal for application to embryo handling and processing. To date, such microfluidic chambers have been described for human, bovine and murine oocytes and embryos. These chambers allow precise addition of highly concentrated media to the embryo over time. The shrinkage rate of the embryo can be precisely controlled, significantly reducing osmotic stress. The large size of the horse embryo presents unique challenges in the development of microfluidic methods. In this study, the collaborative efforts of an equine reproduction specialist and a bio-nanotechnology engineering specialist will together develop a new microfluidic chamber for freezing of horse embryos. The objectives of this initial development stage of the research are to test and evaluate the prototype microfluidic device's ability to rapidly, accurately and automatically separate, trap, and release embryos, first in mixed buffer solutions, and subsequently in various cryoprotectant solutions. The summer research student will utilize bovine in-vitro produced embryos and previously frozen-stored embryos to assist in the early development of the microfluidic chamber. The summer research student will learn bovine and equine embryo handling skills, laboratory preparation of cryoprotectant media, and mare breeding management procedures.

Note: This project is a collaborative effort between Dr. Tracey Chenier in Theriogenology, and Dr. Suresh Neethirajan in Engineering, with funding pending from the AQHA, and initial work funded through a General Trust Fund (Chenier) and NSERC (Neethirajan).

**Project Title:** Liver enzyme as potential prognostic parameter in dogs with acquired cardiac disease

**Faculty Contact:** Dr. Sonja Fonfara (Clinical Studies) sfonfara@uoguelph.ca

**Description:** Elevated liver enzymes have been associated with worse outcome in people with acute heart failure. Increased alanine transaminase (ALT),  $\gamma$ -glutamyltransferase (GGT), alkaline phosphatase (AP), and total bilirubin and a lower aspartate transaminase (AST)/ALT ratio were further reported as predictors for non-liver related morbidity and mortality. Whether liver parameters might serve as predictors for outcome in dogs with cardiac diseases is not known. Blood samples from 23 dogs with degenerative valvular disease (DVD) and 13 dogs with dilated cardiomyopathy (DCM) in cardiac disease stages B (n=19) and C (n=17) have been collected for a previous study. Routine complete blood count and biochemistry was measured at initial presentation, after 1 and 3 months. The dogs were followed for one year, owners and/or veterinarians were contacted after 6 and 12 months and survival times for the dogs were recorded. The objective of the study is to compare concentrations of liver parameters (ALT, AP, AST, GGT, total bilirubin, albumin) between dogs with DVD and DCM, and stage B and C disease, and associate these results with survival times of the dogs. The aim is to investigate whether liver parameters might be associated with the severity of the cardiac disease and whether they might be useful as predictors for mortality in dogs.

**Project Title:** Teaching of critical RCT appraisal for DVM students and veterinarians

**Faculty Contact:** Dr. Brad Hanna (Biomedical Sciences) bhanna@uoguelph.ca

**Project Description:** Assessments of the quality of published RCTs over the past 30 years have consistently shown that a large majority contain flaws that can render the conclusions misleading (1). It is also widely recognized that MD and DVM programs provide limited education on how to evaluate clinical trials (2), partly due to the perception that it would be too time-consuming for a busy student or clinician to learn to do so.

The objective of this project is to develop user-friendly web modules for the teaching and learning of selected aspects of clinical trial assessment, not at the level of a trial expert, but at a much more sophisticated level than is currently the case for many practitioners, using the Consolidated Standards of Reporting Trials (CONSORT Statement) and CIHR Trials Network recommendations as a basis. Beginning with a small number of key items (e.g. Participant Flow; Numbers Analyzed), modules will be developed with a focus on: (a) simplicity and clarity of the content (common errors and how to recognize them), (b) sufficient visual appeal to make learning a potentially dry subject easier and more enjoyable, and (c) efficiency; the aim is to engage busy practitioners so these must not be overly time consuming.

Applicants should have good organizational skills. Artistic ability would be an asset.

(1) Chen et al. (2017) Int J Radiation Oncol Biol Phys 98:170-176

(2) Govani & Higgins (2012) Gastroenterol Hepatol 8:241-248

**Project Title:** Characterizing immune phenomena in experimental osteoarthritis in sheep

**Faculty Contact:** Dr. Mark Hurtig (Clinical Studies) mhurtig@uoguelph.ca

**Project Description:** This project will require the student to become familiar with clinical aspects of anesthesia, surgery and large animal handling. During sedation sheep will undergo synovial fluid and synovial biopsy collection. These will be used to determine the number of activated macrophages participating in inflammatory and immunomodulatory roles. We will use autogenous stem cells generated from umbilical cord to determine if these cells control inflammation and catabolic metabolism in the synovial environment. Students will learn several laboratory methods including flow cytometry, immunofluorescence on live cells, traditional immunostaining on frozen sections and traditional histology using paraffin embedded tissues. This is an excellent opportunity for a student who sees themselves progressing to take further training to be a clinician-scientist.

**Project Title:** Assessing the potential exposure of birds and mammals to raccoon roundworm in the environment

**Faculty Contact:** Dr. Claire Jardine (Pathobiology) cjardi01@uoguelph.ca

**Project Description:** We are currently investigating the ecology of *Baylisascaris procyonis*, the raccoon roundworm in Ontario. Raccoons (*Procyon lotor*) are the definitive host for *B. procyonis*, an emerging parasite, that has the ability to infect and cause severe neurological disease in a large range of paratenic and aberrant hosts, including humans. Given our limited understanding regarding the role of these paratenic hosts in supporting the parasite in the environment, we are investigating the potential exposure of birds and mammals to *B. procyonis* eggs in the environment. Through the use of motion sensitive trail cameras, we will monitor multiple (10-12) established raccoon latrines in the Guelph area. We will assess the images produced by the cameras and identify the species present as well as specific behaviours of interest, such as foraging. Species identification and behaviour at the latrine sites will be assessed in an effort to better understand which species are at greatest risk of exposure to *B. procyonis*. In conjunction with other ongoing research, this study will help guide wildlife management protocols in a one health framework to improve human and environmental health. The student selected for this project will be involved in designing the project, setting up and monitoring camera sites, organizing and assessing the images obtained from the cameras, and analyzing the data. Dependent on student interest, opportunities exist to assist with other ongoing *B. procyonis* research in our lab

**Project Title:** Understanding the link between hock and neck injuries and lameness in dairy cows

**Faculty Contact:** Dr. David Kelton (Population Medicine) dkelton@uoguelph.ca

**Project Description:** Given that the Dairy Farmers of Canada proAction Animal Care component is being rolled out across Ontario, and will be fully implemented by September 2018, dairy farms are having animal care assessments completed. Producers will be required to document and implement a corrective action plan for any animal based measures that fall into the unacceptable category, and will be expected to demonstrate improvement at the time of the next assessment. In order to establish the level of improvement that will be required from producers, it is important to understand the relationships between injury and lameness, and what is realistically achievable in terms of timelines to resolve these issues. As part of a multi-faceted research program, work is being carried out at the Livestock and Research Innovation Centre - Dairy in Elora to better understand the roles that both leg injuries and hoof lesions play in the lameness of dairy cattle. Each of these components has been investigated separately, but there is a need to understand the entire dynamic. The student research associate will be working with our graduate student investigators to score cows and heifers on a weekly basis for injuries and lameness, and will work with the hoof trimmer each month to document all hoof lesions. Results of this work will give clarity to the relationships among injury, hoof lesions and lameness, including the time it takes for these issues to develop and to resolve.

**Project Title:** In vivo tracking of equine stem cells following intravenous injection

**Faculty Contact:** Dr. Thomas Koch (Biomedical Sciences) tkoch@uoguelph.ca

**Project Description:** Exercised induced pulmonary hemorrhage (EIPH) is a common condition in racehorses and a significant equine welfare issue (OMAFRA priority). The etiology of EIPH is poorly understood but pulmonary inflammation is a downstream consequence of frequent bleeding. Attenuation of pulmonary inflammation from bleeding following intravenous MSC injection has been shown in vivo in humans and non-equine species. Work in the Koch lab has demonstrated that equine umbilical cord blood-derived (CB) MSC are more immunomodulatory than the more commonly used MSCs derived in vitro from adipose tissue or bone marrow aspirates. THE HYPOTHESIS OF THIS EQUINE GUELPH FUNDED PROJECT IS THAT ALLOGENEIC EQUINE CB-MSC WILL ATTENUATE EIPH-ASSOCIATED PULMONARY INFLAMMATION IN STANDARD BRED RACEHORSES WITH ACTIVE EIPH.

The main experiment of the project is to evaluate the effect on lung bleeding within Standardbred horses suffering from EIPH following injection of allogeneic CB-MSC intravenously. However, insights into the functional mechanism of such stem cell therapy are sought in a separate study conducted on research horses. It is this later study we are seeking summer student support for.

**Project Title:** Comparison of methods to achieve one-lung ventilation for minimally invasive thoracic surgery in dogs

**Faculty Contact:** Dr. Ameet Singh (Clinical Studies) amsingh@uoguelph.ca

**Project Description:** Minimally invasive surgery (MIS) is commonly performed in companion animal practice. With the growing surgical oncology caseload worldwide, MIS options are being sought to reduce post-operative pain and shorten hospital stay in these often geriatric patients. Minimally invasive surgery of the thoracic cavity or thoracoscopy is commonly performed at the OVCHSC. Visualization within the thorax can be challenging with the movement of the lungs, therefore, for advanced thoracoscopic procedures, one-lung ventilation (OLV) is commonly

performed. The purpose of OLV is to remove ventilation to the side of the lungs where the surgeon is working to improve "working space." There are several methods to achieve OLV, with endobronchial blockade most frequently used. A novel endobronchial blocker, E-Z blocker, has recently become available to veterinarians and has been used at the OVCHSC for the last 12 months with good success. A clinical study is underway, however, further evaluation of the E-Z blocker and traditional endobronchial blocker is required in a live animal study.

The purpose of our study will be to evaluate two methods for OLV in purpose-bred research dogs using computed tomography (CT). Each dog will be anesthetized, and OLV will be performed using both tubes. Pulmonary volume and location of the tube within the trachea/bronchi will be visualized using CT. Comparative statistical analysis will be performed. The dogs will be recovered from anesthesia and then returned to the research colony. The USRA will be in charge of organizing the experimental details of this study and will gain experience in clinical research, dog handling, blood taking, and canine anesthesia. In addition the student will have the opportunity to join additional research projects depending on time and interest.

**Project Title:** Spatial epidemiological investigation of well-water contamination and testing practices in Wellington County, Dufferin County, and City of Guelph

**Faculty Contact:** Drs. David Pearl and L. Trotz-Williams (Pathobiology) [dpearl@uoguelph.ca](mailto:dpearl@uoguelph.ca)

**Project Description:** Well-water contamination with coliform bacteria remains a public health concern in Ontario. Contaminated well water can result in illness from a variety of pathogens including Salmonella, E. coli O157:H7, and Campylobacter. Identifying high risk areas and factors associated with contamination (e.g., microbial testing frequency, well design, proximity to agricultural production systems) is important for informing public health education and disease prevention programs. Using well-water testing data collected by Wellington-Dufferin-Guelph Public Health, geographic information system (GIS) software and spatial statistics will be used to identify high risk areas in the region for well contamination with coliform bacteria as well high risk areas for sub-optimal frequency of microbiological testing of known wells. In addition, the summer research assistant will assist in the design and delivery of a survey tool being developed by Wellington-Dufferin-Guelph Public Health to collect more specific information concerning well designs, locations, testing practices, and attitudes that influence water testing, and the preliminary analysis of survey data collected over the summer.

**Project Title:** Evaluation of the prevalence of Echinococcus multilocularis in dogs, and risk factors for infection, in southern Ontario

**Faculty Contact:** Dr. Andrew Peregrine (Pathobiology) [aperegri@uoguelph.ca](mailto:aperegri@uoguelph.ca)

**Project Description:** Echinococcus multilocularis is a small tapeworm that occurs in the small intestine of wild and domestic canids following ingestion of infected rodents. The parasite poses a significant risk to humans and dogs as ingestion of eggs can lead to alveolar echinococcosis, a potentially fatal disease. Prior to 2012, E. multilocularis had not been diagnosed in Ontario. However, between 2012 and 2016, five cases of alveolar echinococcosis were diagnosed in dogs in the Golden Horseshoe region of southern Ontario; four of the dogs had not left this region and likely became infected as a result of ingesting large numbers of eggs

in their environment (most likely by ingestion of coyote/fox feces). As a result, a study was recently carried out to determine the prevalence of *E. multilocularis* in wild canids across southern Ontario; the project demonstrated an overall prevalence of infection of 23.3%; highest prevalences of 24-46% were observed in ten public health units, largely located in the Golden Horseshoe area. In light of the health risks associated with *E. multilocularis*, and because a substantial proportion of Ontario's human population resides in the high-risk Golden Horseshoe area, there is a critical need to determine the prevalence of *E. multilocularis* in domestic dogs in this area; dogs are considered to be the primary source of infection for people. The objectives for this study are therefore to (i) determine the prevalence of intestinal shedding of *E. multilocularis* in off-leash dogs within the Golden Horseshoe area, and (ii) identify risk factors for intestinal *E. multilocularis* infections in dogs in the Golden Horseshoe area. The prevalence of all other intestinal parasites in the same dogs will also be determined. To this end, fecal samples will be collected from 500 dogs visiting a random sample of off-leash dog parks within the aforementioned public health units with the highest prevalence of *E. multilocularis* in wild canids. Dog owners who contribute to the study will be administered a brief survey to collect information on their dog's physical and behavioural characteristics, as well as medical history. All fecal samples will be analyzed using (i) a sensitive PCR method for *E. multilocularis* DNA, (ii) a sucrose double-centrifugation method for other intestinal parasites, and (iii) a *Giardia* fecal antigen ELISA test (SNAP *Giardia* Test, Idexx Laboratories). Regression analyses will be used to evaluate the association of potential risk factors for individual parasite infections. The student will work with a Masters student and will be involved in all field and laboratory aspects of this project.

**Project Title:** Determination of important causes of morbidity in small flocks in Ontario

**Faculty Contact:** Dr. Leo Susta (Pathobiology) lsusta@uoguelph.ca

**Project Description:** The specific aim of this study is to perform an exhaustive review of pathological diagnoses (postmortem) of poultry species derived from small flocks (non-quota / non-commercial) submitted to the Ontario Veterinary College (OVC) and Animal Health Laboratory (AHL), with the overarching goal to assess disease prevalence and identify risk factors (e.g., age, sex, history). These data will ultimately help to formulate practical recommendations for diagnosticians and clinicians engaged in poultry medicine, such as production of accurate lists of differential diagnoses and implementation of diagnostic algorithms. This application builds on the initial groundwork laid over the past two years within the frame of an OMAFRA project, which resulted in the preliminary organization and formatting of a large database containing the pathological diagnoses of poultry species from Ontario small flocks submitted to the OVC and AHL from 1995 to 2015.

The summer student will be working in close collaboration with a DVSc student, as outlined in the following Objectives: 1) Consolidate the existing database, through harmonization of the etiological coding system and production of searchable coding categories that capture the types of lesions and history of the flocks; 2) Hierarchically identify, for each species, the frequency of affected organ systems, and for each system the frequency of etiological categories; 3) Identify and retrieve cases that necessitate review (i.e., final diagnosis was not reached) or additional testing (e.g., PCR for suspected infectious diseases); 4) Modify the current database into a

binary format, to be inputted into statistical software for regression analysis. Proposed timeline: Objective #1, week 1-5; Objective #2, week 6-8; Objective #3, week 8-11; Objective #4, week 6-16 (this objective can overlap with others).

At the completion of this assistantship, the student will have become familiar with the most common poultry diseases, and different aspects of veterinary diagnostics and epidemiology. These skills will be very valuable for coursework and training within the DVM curriculum, as well as his or her future career.

**Project Title:** A retrospective evaluation of the utility of thromboelastography as a diagnostic tool in dogs

**Faculty Contact:** Dr. Darren Wood (Pathobiology) woodr@uoguelph.ca

**Project Description:**

Thromboelastography (TEG) is diagnostic test for global assessment of hemostasis, which provides information related to blood clot initiation, rate of development and degradation in a patient. Over the last 5 years, >300 canine patients have had a TEG performed by the OVC Comparative Hemostasis Lab as part of the diagnostic workup. There is a myriad of potentially useful data that, to date, has largely not been investigated. Although it has been used for clinical cases for many years at several institutions and referral practices, and numerous publications have appeared related to the assay, there are still unanswered questions about the usefulness of TEG as a diagnostic tool. The aim of the summer project would be to, 1) from the TEG software, create a case database that captures relevant clinical, laboratory, and outcome data for dogs that had a TEG performed, 2) partition cases based on diagnosis and evaluate for trends in TEG results (which will better guide interpretation in the future), and 3) critically assess the impact of known variables on TEG including hematocrit, platelet count and fibrinogen concentration. The expected deliverables of the project are to learn better how the test is used at OVC, and how it relates to patient outcomes in a large cohort of cases. The student will work out of the hemostasis lab in Clinical Studies, but would be affiliated with Pathobiology. The student will be trained to use the hospital's medical record system (Stringsoft) and the Animal Health Lab's information management system (Labvantage). The project would be ideal for someone with an interest in clinical pathology and/or small animal internal medicine. There will also be opportunity to assist with various hemostasis lab procedures during the summer period, to attend rounds, and to assist with other projects.

**Project Title:** Gene copy number variation and cancer susceptibility in horses

**Faculty Contact:** Dr. Geoff Wood (Pathobiology) gewood@uoguelph.ca

**Project Description:** Although most genes exist as single copies (2 alleles) in mammals, a significant proportion of genes are sometimes present in more than one copy. The differences in gene copy number between individuals is referred to as copy number variation, and is linked to phenotypic traits such as hair colour and height, as well as to disease susceptibility. Our recent findings indicate that horses have high copy number variation in the MAL2 gene. This gene is a known tumour suppressor gene and loss of expression of MAL2 contributes to cancer formation in humans. Whether this occurs commonly in horses is not known, but our preliminary data show that loss of MAL2 occurs in equine melanoma. The goals of this project

are to isolate DNA from normal tissue and tumours in horses, and conduct copy number analysis of MAL2 by digital droplet PCR. We expect that horses with less copies of MAL2 will be more susceptible to cancer in general and that horse tumour cells will lose copies of MAL2 as they become more malignant. This research may help to better determine prognosis in equine cancers and could prove useful for prediction of overall cancer susceptibility in horses. In the future, understanding the molecular pathways by which MAL2 suppresses tumour formation may also reveal novel targets for treating equine cancer.

## **OVC Summer Research Studentship (No restrictions) (five projects)**

**Project Title:** Nutritional myopathy of seahorses

**Faculty Contact:** Dr. John Lumsden (Pathobiology) [jsl@uoguelph.ca](mailto:jsl@uoguelph.ca)

**Project Description:** Seahorses are iconic and many species are at risk. Seahorses are maintained by aquariums for display and conservation however their nutritional requirements are poorly understood. Drs. Lumsden and LePage (who is the Ripley's Aquarium veterinarian and who will directly participate in this project) published the description of a myopathy in seahorses that was suspected to be due to a nutritional deficiency (Vitamin E). The larger research project will address this hypothesis and the summer studentship will play a critical role in allowing the research to take place. The trial will involve two species of seahorses (*Hippocampus kuda* and *H. erectus*) fed two diets, replete and deficient, and with all treatments in duplicate tanks (8 tanks total, each with ~30 fish per tank). Ripley's Aquarium is collaborating on a NSERC Engage grant to support this research and have already donated 20 seahorses for this purpose. These fish are presently housed in the Hagen Aqualab on campus in Lumsden's research room. They are maintained by a team of volunteers who feed and observe the fish twice daily seven days a week.

The summer student will be responsible for breeding, feeding - three times daily (along with our existing volunteers) and maintenance of the the seahorses tanks. The summer student will also grow the live food that is needed to feed the juvenile seahorses. (There are several other personnel who maintain the larger recirculation systems that house the seahorse tanks). The student will actively interact with graduate students, post-docs, Dr. LePage and myself. All of the knowledge for the project is in-house and will be transferred to the student. The student will participate in analysis of tissue and diets and in the histopathology of affected seahorses. The student will also be taught key aspects of marine recirculation systems and will also be involved to some extent in our marine research including corals. The student will also be expected to participate in the OVC CORE program.

**Project Title:** Molecular epidemiology of resistance to cephalosporins in farm animals

**Faculty Contact:** Dr. Patrick Boerlin (Pathobiology) [pboerlin@uoguelph.ca](mailto:pboerlin@uoguelph.ca)

**Project Description:** Extended-spectrum cephalosporins (ESCs) are considered critically important antibiotics by both the WHO and the OIE. However resistance to these antibiotics is widespread in bacteria from farm animals and new ESC resistance genes (*bla*CTX-M) have emerged in Canada in the past decade. This project will make use of molecular methods (PCR, plasmid characterization, genome sequencing ) to study the epidemiology and dynamics of ESC

resistance genes in *E. coli* and other Enterobacteriaceae from farm animals in Canada. The student will participate to the molecular characterization of an existing collection of ESC-resistant Enterobacteriaceae carrying blaCTX-M genes, as well as to in vivo experiments on the dynamics of ESC-resistant bacteria and transfer of ESC resistance plasmids in the gut of chicken. The work will be conducted with the support and of a graduate student and a technician and is part of a collaboration with researchers at the National Microbiology Laboratory in Winnipeg and researchers in the United Kingdom. The student will acquire a deeper understanding of the epidemiology of antimicrobial resistance and of the most recent molecular approaches to the study of molecular epidemiology of bacteria.

**Project Title:** A study of veterinarian-client-patient interactions

**Faculty Contact:** Dr. Jason Coe (Population Medicine) [jcoe@uoguelph.ca](mailto:jcoe@uoguelph.ca)

**Project Description:** Veterinarians play an important role in the decision-making process of their clients, influencing the relationship between people and their companion animals. The clarity and content of veterinary communication can assist clients in making informed decisions about their pet's health and in supporting a client's and patient's human-animal bond. The proposed research project will examine video-recorded veterinarian-client interactions in small animal practices and the extent to which veterinarians engage their clients in conversations on a variety of topics (e.g., preventive pet behaviour counseling, pet behaviour modification, spay-neuter). These broader results of this research project will be used to inform enhancements to the veterinary-client relationship in order to improve the human-animal bond. The student will be involved in the collection and management of a large observational study looking at the veterinarian-client-patient interactions in small animal practice. The study intends to capture through audio-video recordings, approximately 1000 companion animal veterinarian-client-patient interactions by recruiting approximately 60 companion animal veterinarians practicing within a 2-hour drive of Guelph. At the time of these visits, the student will be responsible for onsite data collection including audio-video record veterinary appointments, and follow-up each appointment with a survey. The student will also be actively involved in data cleaning and preparation, including the development of a catalogue of conversations taking place between the veterinarian and client (e.g., preventive pet behaviour counseling, pet behaviour modification, spay-neuter, etc) for more indepth future analysis. Future research projects will use this data collection and catalogue to examine a variety of conversations between veterinarians and clients in companion animal practice which will be used to develop evidence-based best practices on a variety of topics in order to continue to enhance the veterinarian-client relationship and support the human-animal bond, benefiting veterinarians, clients and veterinary patients.

**Project Title:** Evaluation of the repeated use of allogenic umbilical cord blood mesenchymal cells in clinical cases of equine superficial digital flexor tendinitis

**Faculty Contact:** Dr. Judith Koenig (Clinical Studies) [jkoenig@uoguelph.ca](mailto:jkoenig@uoguelph.ca)

**Project Description:** The primary objective of this study is to confirm that use of allogeneic CB-MSD for treatment by way of repeated (or multiple) injections is well tolerated by the horse

irrespective of intralesional or arterial administration. The second objective is to document the quality of healing and duration of time to return to full function in 10 horses with naturally occurring tendonitis. 10 client owned horses diagnosed by the referring veterinarian with either front limb superficial digital flexor tendinitis requiring stem cell treatment will be enrolled. During each presentation to OVC or the race track, a subjective brief lameness examination using the AAEP grading scale will be performed and a video of the exam recorded for blinded evaluation by board certified surgeon at a later time. Further, a semi-quantitative lameness evaluation using a computer-based system (Lameness Locator [<http://equinosis.com/>]) and ultrasonographic imaging will be performed at each examination point. Detailed exercise and rehabilitation instructions for the next 4 to 8 weeks will be supplied to the client based on examination findings following a standard rehabilitation protocol.

Examinations as described above will be performed prior to stem cell administration (week 0, first stem cell injection) and then at weeks 4 (2nd stem cell injection), 8 (3rd stem cell injection), 16, 24, 32, 40 and 48. Total duration until return to full exercise, and total time to return to competition will be obtained. Outcome data will be recorded and compared to historical published data for each time point/value as previously described

**Project Title:** Olfactory-derived mesenchymal stromal cells as neurogenic precursors in dogs

**Faculty Contact:** Dr. Jonathan LaMarre (Biomedical Sciences) [jlamarre@uoguelph.ca](mailto:jlamarre@uoguelph.ca)

**Project Description:** Diseases affecting the neurological system of dogs are increasingly recognized in general and specialty veterinary practice. Despite their high prevalence, medical treatment options are limited and often aim to ameliorate clinical signs rather than modify the disease itself or its underlying causes. One potentially useful approach to understanding neurologic diseases in dogs at a basic level (in order to develop more effective diagnostic and treatment methods) is to obtain neurons and model the diseases in vitro using Mesenchymal Stromal Cells (MSCs) from different sources.

In this project, we postulate that MSCs isolated from olfactory mucosa give rise to a greater proportion of neurons than MSC isolated from adipose tissue in dogs. The proposed summer assistant will help address this hypothesis experimentally as follows:

1) MSCs from canine olfactory and adipose tissue will be isolated using established techniques in the laboratory. The proliferation rate of different MSCs will be compared using population doubling time and Ki67 labelling. Proliferation rate should reflect the potential for each population to provide sufficient numbers of cells for experimental manipulation and analysis in subsequent studies.

2) To evaluate the neurogenic potential of both populations, the expression of neural stem cell markers Nestin and CD15, which have been shown to correlate with the number of neurons obtained after differentiation, will be assessed both at the messenger RNA level with qRT-PCR and at the protein level using immunocytochemistry using specific PCR primers and antibodies respectively. This will allow us to determine which source of MSC is the most suitable to obtain neuronal progenitor cells, which will ultimately be critical for both mechanistic studies on neurologic diseases and cell-based therapies where large numbers of cells are required. In the course of these studies the student will acquire and/or improve their skills in cell culture, immunohistochemistry, molecular biology techniques and statistical analysis appropriate for in

vitro analysis. They will also substantially improve their understanding of canine neurology and neurologic diseases.