The Influence of a Rider with a Disability on the Equine Walk

Ellen Rankins

Therapists and instructors in Equine Assisted Activities and Therapies (EAAT) use the horse as a therapy tool or to provide an activity for riders that find it difficult to participate in other activities and sports. Due to the physical limitations of the participants in EAAT, horses used within this field are subjected to unique stresses that are not seen in other equine disciplines. It is possible that these stresses placed upon EAAT horses can affect their health and soundness and, therefore, their usefulness. The horse and rider system is a complex and integrated one and changes in one part of the system can easily produce consequences in the rest of the system. Based on this information, the following question arises: Does a rider with limitations (as seen in a therapeutic riding setting) affect the motion pattern of a horse at a walk as compared to the same horse ridden by a rider without limitations? To answer this question, three riders with similar riding experience, body weight, and build rode the same set of four horses on the same day. Two of the riders were able-bodied and the other rider had a physical limitation. Prior to the day of the video capture, riders participated in two riding lessons to familiarize themselves with the facilities and horses. The day of the filming, the horses were fitted with reflective markers on their hooves to facilitate tracking their movement in the videos. All filming utilized high speed video capture. Each of the four horses was filmed being ridden by each of the three riders and also while being led with no rider. Each rider rode the horse both while being led and while off lead or independently. Each condition (i.e. led with no rider or ridden) was filmed three times to ensure a more accurate measurement of the horse’s gait. Following filming, variables of stride length, step length, stance width, stance phase duration of each leg, swing phase duration of each leg, and stride duration were measured for each horse and condition pair. The videos are currently being analyzed with results forthcoming. The results of the study will provide a better understanding of the interaction that takes place between the horse and rider in

Figure, Rankins. This picture shows one of the horse and rider combinations during the data capture. The video camera in the foreground is recording the sagittal or side view of the horse and rider. There is a second video camera in front of the horse that cannot be seen from this angle recording the frontal view.
EAAT. This understanding will facilitate the creation of practices that protect the horses used in these programs and ensure their soundness and health resulting in a more effective interaction between horse and rider.

Statement of Research Advisor:
Biomechanics research with horses and riders has primarily focused on how skilled and experienced riders affect the horse’s movement. Very little has been done with inexperienced riders, let alone riders with disabilities, to examine how they may affect the horse’s movement. Though we have always assumed there is an influence, documenting and verifying the differences is the first step in quantifying the unique stressors experienced by horses used in EAAT.

- Elizabeth Wagner, Department of Animal Sciences

Validation of Canine TRAIL in Canine Tumor Cells

Paulina Platten and Maninder Sandey

Cancer in dogs shares several important characteristics with human cancers, including microscopic appearance, biological behavior, tumor genetics, inter-individual and intra-tumoral heterogeneity, and metastasis to relevant distant sites. Each year, approximately 4 million new cancer cases are diagnosed in the dog population. Thus, we not only need to design better therapeutics to treat canine cancers, but this vast pool of cancer patients can also be used to better understand the biology of cancer and to evaluate new drugs and approaches to treat cancer, be it canine or human. Gene therapy is a promising therapeutic approach that offers several advantages over traditional cancer therapies, including selective targeting of cancer cells and minimal other side effects. Tumor necrosis factor-related apoptosis-inducing ligand (TRAIL) is a type II transmembrane protein that interacts with cell surface receptors (DR4 and DR5) and induces cell death, or apoptosis, in a variety of tumor cells. Several studies have also shown that TRAIL does not induce apoptosis in normal cells, thus highlighting its potential as a cancer therapeutic. The goal of this study was to clone, express canine TRAIL, and to determine the tumor killing potential of canine TRAIL in a wide variety of canine tumor cells.

The extracellular domain of canine TRAIL was cloned and tagged at its amino terminus with the signal peptide from the canine immunoglobulin (Ig) kappa-chain. This peptide targets the protein for efficient secretion from the cell. The construct was cloned into a mammalian expression plasmid containing the cytomegalovirus (CMV) promoter for high-level constitutive expression. A reverse orientation clone was used as a negative control. The recombinant plasmids were transfected into human embryonic kidney (HEK 293) cells. Cell lysates and supernatants were isolated, resolved on SDS polyacrylamide gel electrophoresis, blotted onto a membrane, and the membrane was probed with Anti-Human TRAIL antibody in a Western blot. The recombinant plasmids were also transfected into CMT28 (canine mammary tumor), CML10 (canine melanoma), and NCF cells (Normal canine fibroblasts). After 72hrs, transfected cells were assayed with a cell proliferation assay (MTT) to determine the growth inhibitory effects of canine TRAIL.

The extracellular domain of the canine TRAIL was successfully cloned into the pDC311 plasmid. The orientation of TRAIL in the recombinant plasmids was confirmed by sequencing, restriction enzyme digestion, and agarose gel electrophoresis. Western blot analysis confirmed that canine TRAIL was expressed in cell lysates and also actively secreted into the culture supernatant, showing that the signal peptide was functional. We then transfected various canine normal and cancer cell types and performed proliferation assays to determine whether the cells were undergoing apoptosis.