



The
Modern

Equine Vet

www.modernequinevet.com

Vol 5 Issue 7 2015

MYSTERY WOUND

**Injecting the
navicular bursa**

**Ultrasonography &
palpation for colic**

BIOACTIVE PROTEINS and their role in horse health

By Carrie Hammer DVM, PhD

Optimal horse health and well-being are the goals of every veterinarian and owner whether the horse is a high performance athlete or a beloved companion. Providing good nutrition is the foundation for achieving this goal; however, there are times that supplements or other treatment options are needed to balance what the horse requires. Making decisions on which supplement or treatment to recommend can be daunting for even the most knowledgeable owners, as there are hundreds of oral supplements on the market advertised to support a variety of conditions.

Your advice is very important.

One new supplement released last year is marketed as an orally dosed serum protein product. Although administering oral serum to neonatal foals with failure of passive transfer or with the use of injected autologous conditioned serum (ACS or IRAP) may be familiar, the thought of orally dosing serum proteins to horses may seem foreign.

Traditionally, feeding of protein is talked about from a nutrition sense; i.e. the proteins incorporated in grasses and grains are ingested by the horse and broken down into

amino acids in the stomach and small intestine. These amino acids are then absorbed and re-assembled back into proteins that the body uses for various needs. However, in recent years, science has shown that after ingestion, some proteins can act within the body in ways that are different from the traditional nutrition pathway. These proteins have been named bioactive proteins and are defined differently among various scientific disciplines. Animal nutritionists define bioactive proteins as proteins that, when administered to the animal, improve animal performance and well-being beyond what can be explained solely by the understanding of basic nutrient digestion and absorption.

For animals, the main sources of bioactive proteins are products purified from dried serum or milk. Milk-based oral products for horses have been commercially available for approximately 10 years, while the first serum-based oral product was introduced in 2014. Although relatively new to the horse industry, the beneficial effects of serum-based bioactive proteins are well documented in humans and food animals and products have been available for over 30 years.

Serum is the fluid portion of blood remaining after the blood cells clot



©Shutterstock/Margo Harrison

and is rich in bioactive proteins, including immunoglobulins, transferins, cytokines and growth factors. Immunoglobulins are antibodies produced by the immune system and are responsible for protecting the body from infectious agents and toxins. Immunoglobulins act through a variety of complex mechanisms, ultimately rendering a disease unable to function.

Transferrins are proteins that bind iron, an element necessary for the growth and development of many bacteria. Thus, transferrins create a low-iron environment that affects bacterial survival. Finally, there are numerous cytokines and growth factors present in serum, including interleukin-1, platelet-derived growth factor, transforming growth factor and insulin-like growth factor. Cytokines and growth factors function in cell signaling, tissue growth and many various cellular activities.

One proposed mechanism-of-action of bioactive proteins is through modulation of the immune system, which is the body's defense against disease-causing pathogens—bacteria, viruses and toxins. Bioactive proteins reduce the ability of pathogens to attach and reproduce in the body, and also aid in tissue repair. These activities lead to beneficial support and maintenance of the immune system.

Overall, the beneficial effects of bioactive proteins are more pronounced in higher stress situations, as these situations are known to in-

crease the release of inflammatory cells. Animals can experience high stress as a result of illness and disease or other external factors, such as transportation, weaning and social or environmental changes.

Past research has shown that serum-based bioactive proteins help to manage symptoms and stress associated with illness. Increased survival and performance of pigs and calves suffering from respiratory and intestinal disease has been reported in numerous studies. In humans with irritable bowel syndrome, serum-based bioactive proteins reduced the number of symptomatic days. Although there are data supporting the use of bioactive proteins in farm animals and humans, the data in horses are limited. A recently reported study by Dr. **Josie Coverdale** from Texas A&M University demonstrated improved stride length at the walk and trot in regularly exercised Quarter Horse geldings that were given serum-based bioactive proteins for 14 days. As the science in this area is strong in other species, one would expect to see additional equine studies published in the near future.

The value of bioactive proteins in supporting health and reducing the effects of disease are well documented in animal agriculture and human research; however, the horse industry is only beginning to tap into these benefits. The future in this area is bright with the potential to set a new standard for horse health and performance. **MeV**

For more information:

Dr. Hammer is the director of the Equine Science program at North Dakota State University and also serves as the State Horse Extension Specialist.

Diffusion of mepivacaine from tendon sheaths

Injecting the digital flexor tendon sheath with mepivacaine at the standard dose results in sufficient concentration for analgesia only in the digital flexor tendon sheath.

There was no clinically relevant diffusion to adjacent synovial structures, according to a study by researchers from Ghent University in Belgium.

The researchers wanted to evaluate the extent of diffusion of mepivacaine to adjacent synovial structures following intrasynovial injection into the digital flexor tendon sheath.

Eight horses with no clinical or radiographic orthopedic abnormalities were included in the study. Under general anaesthesia in lateral recumbency, each horse had synoviocentesis of the digital flexor tendon sheath performed on the uppermost forelimb and hindlimb. At the same time, venous blood samples were obtained.

A standard dose of mepivacaine (1 mL/50 kg) was injected into the same limbs from which synovial fluid had been sampled. Samples of synovial fluid were then aspirated from the treated tendon sheaths as well as the metacarpophalangeal/metatarsophalangeal joint, proximal interphalangeal joint, distal interphalangeal joint and navicular bursa in the injected limbs and the contralateral metacarpophalangeal/metatarsophalangeal joint 15 minutes (forelimb) and 60 minutes (hindlimb) post-injection with blood samples at the same points. The protocol was repeated two weeks later except that the forelimb sites were sampled at 60 minutes and the hindlimb sites at 15 minutes.

All tendon sheath injections resulted in mepivacaine concentrations within synovial fluid well above those required for analgesia. Very low mepivacaine concentrations were found in all adjacent synovial structures sampled, and even the highest of these was well below a clinically relevant level. The concentrations in adjacent structures were all higher at 60 minutes post-injection than at 15 minutes, with the exception of the navicular bursa. There were no statistically significant differences between the concentrations in each adjacent synovial structure. Concentrations in blood were also below clinically significant concentrations at both time points.

A limitation to the study, the researchers said, was that it was performed in sound horses, so more studies are needed. **MeV**

For more information:

Jordana M, Martens A, Duchateau L, Haspelslagh M, et al. Diffusion of mepivacaine to adjacent synovial structures after intrasynovial analgesia of the digital flexor tendon sheath. *Equine Vet J.* 2015 Mar 31. doi: 10.1111/evj.12447. [Epub ahead of print]