Antwerp, Belgium

March 23-24, 2017

From Nutrition to Disease and Back

European Equine Health & Nutrition Congress

8th Edition

Can joint supplements help in preventing joint diseases?

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Introduction

As discussed in the previous paper, oral joint supplements (OJSs) are a common choice of clients, and have been perceived as a benign treatment for OA in horses.[1] The high prevalence of OA in combination with the lack of a definitive cure for OA has probably contributed to the popularity of OJSs among owners, veterinarians, and trainers. These supplements, according to recent market surveys, are the most popular type of nutritional supplements for horses and account for approximately 1/3 (34%) of all equine supplement sales, 1/2 of all pet supplements sold in the US for equine consumption and it is estimated that 49% of all horse owners purchase and administer some form of dietary supplement for their horses (http://www.packagedfacts.com/pet-supplements-market-c1641).

As also presented in the authors previous paper, the in vivo evidence for usefulness of OJSs has been in horses with clinical lameness/joint disease. However, there is no question that the OJSs are commonly fed to horses on a "prophylactic" basis. While, there is rationale for this (see below) there is a paucity of clinical/in vivo evidence for them preventing joint problems.

Rationale for joint supplements in preventing joint diseases

The critical components of articular cartilage are type II collagen fibrils (which provide a structural frame work) and extracellular matrix (ECM), which consists of aggrecan molecules and water (Figure 2, Appendix). The aggrecan molecule consists of aggregations of proteoglycan molecules on a hyaluronan (HA) backbone. The proteoglycan molecule, in turn, consists of a protein backbone with chondroitin sulfate and keratin sulfate side chains. These carry negative charges and due to repulsion of each other as well as attraction of water provide the compressive resistance to the articular cartilage.[2] Maintenance of these molecules is critical and some nutraceuticals provide potential building blocks for these molecules.

As previously discussed, the osteoarthritic process is associated with multiple deleterious mediators released from inflamed synovial membrane or induced by trauma that initiate a cascade of degradation in the articular cartilage. Interleukin 1 (IL-1) is considered a major cytokine initiating this cascade and this can influence other cells to cause increased release of metalloproteinases,

aggrecanase and prostaglandin E2 (PGE2). The question is could "maintenance" administration of OJSs inhibit the early stages of production of these deleterious mediators at lower levels. There is certainly in vitro evidence that has been presented in the previous paper where concurrent administration of IL-1 and certain OJSs in the media of cartilage explants will inhibit the degradative effects of IL-1. Again, whether this translates into the in vivo situation is difficult.

Extrapolation to preventative maintenance of conventional pharmaceuticals in equine joint disease

There has been increased used of intraarticular medication as "prophylactic" injections in some areas in the US. The author does not support this use of intraarticular medication and that would be the general consensus of most people in equine sports medicine. On the other hand, the use of systemic medications for joint disease on a prophylactic basis is common, particularly with intravenous (IV) hyaluronan (Legend™ in the US, Hyonate™ elsewhere) and intramuscular (IM) polysulfated glycosaminoglycan (PSGAG) (Adequan™).

Hyaluronan does not have a label claim to its IV use as a prophylactic. In a survey of American Association of Equine Practitioners using Legend™, 82% used the product IV with 60% of its usage aimed at preventative or prophylactic effects.[3] In a well-accepted model of equine OA, IV HA was shown to significantly improve clinical lameness and synovial membrane histology (specifically vascularity and cellular infiltration) and synovial fluid parameters such as lower PGE2 and total protein levels.[4] It is notable that these improvements were seen 45 days following the last of three treatments (40mg) that were given one week apart. The prophylactic properties of IV HA were also assessed in a 9-month study of racing Quarter Horses (n=140).[5] HA-treated horses tended to race longer before requiring the first joint injection, to have a better speed index, high average number of starts and more money earned compared with placebo treated horses. Thus, there was a level of evidence of benefit of IV HA used prophylactically.

The intramuscular (IM) administration of PSGAG became popular in the late 1980's and 1990's. However, IM PSGAG (500mg q4 days for 7 treatments) produced relatively insignificant effects in horses with sodium monoacetate-induced synovitis.[6] In a more recent study using the osteochondral fragment exercise model in which IM PSGAG was used a positive control (administered every fourth day for 28 days starting 14 days post-OA induction) decreased GAG levels in the serum 14 days post treatment was the only significant beneficial effect and in this study better improvement was seen in horses given extracorporeal shock wave therapy.[7]

Clinical use of OJSs as a prophylactic for equine OA

There have been no clinical studies looking at prophylactic use of OJSs compared to placebo. On the other hand, there are studies showing benefit in the

treatment of OA discussed in the previous paper and such studies should provide rationale for lowering the inflammatory cascade and deleterious mediator levels in the joints of horses in athletic training. Long-term studies in horses in training with half the group receiving an OJS and half the group receiving placebo would provide an excellent opportunity for validating the significant use of OJSs for this purpose.

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