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Supplementing for Joint Health

Tara Hembrooke, PhD, MS

Although joint disease develops for a variety of reasons in horses, a common cause is persistent inflammation. Under such conditions, uncontrolled free radical activity and dysregulation of local enzymes degrade critical components of cartilage, synovial fluid and the synovial membrane. The joint pain that arises as a result of these processes is a significant cause of lameness and "loss of use." To combat these problems, Platinum Performance™ has released Platinum Performance™ CJ, a comprehensive joint care formula that includes omega-3 fatty acids, glucosamine, methylsulfonylmethane, hyaluronic acid, avocado/soy unsaponifiables, cetyl-myristoleate, antioxidants and minerals. The effects of each of these components of Platinum Performance™ CJ will be discussed.

Fatty Acids

Omega-3 fatty acids and their metabolites generally have anti-inflammatory effects, which is in contrast to the pro-inflammatory effects of the metabolites of omega-6 fatty acids. In fact, the severity of articular cartilage lesions can be linked to the amount of omega-6 fatty acids in the cartilage.[1] Omega-3 fatty acids, on the other hand, have a protective role. For example, joint components treated with α-linolenic acid, an omega-3 fatty acid, produce less pro-inflammatory mediators such as interleukin-1 (IL-1), tumor necrosis factor-alpha (TNF-α), and prostaglandin E_2 (PGE_2).[2,3] Furthermore, the analgesic effects of omega-3 fatty acids suggest that they may be a safe alternative to non-steroidal anti-inflammatory drugs.[4]

Cetyl-myristoleate, an ester of an omega-5 fatty acid, has also demonstrated effectiveness in improving arthritic pain and mobility. Initial studies indicated injected cetyl-myristoleate blocks inflammation and protects rats and mice against experimentally-induced arthritis.[5,6] More recently, human dietary supplementation has significantly improved knee range of motion and functionality.[7]

Glucosamine

Glucosamine, an amino sugar, is a precursor to the compression-resistant components of cartilage called glycosaminoglycans, or GAGS. Glucosamine decreases the activities of collagen-degrading enzymes and increases cartilage protein synthesis.[8,9] Long-term supplementation studies in humans indicate that glucosamine slows the progression of osteoarthritis[10] and may also be as efficacious as ibuprofen in relieving

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arthritic pain.[11] The results of similar studies in animals indicate that glucosamine supplementation reduces the ill effects of osteoarthritis on cartilage and subchondral bone,[12,13] and treatment of equine cartilage explants with glucosamine reduces the destructive effects of interleukin 1-ß and synthesis of inflammatory mediators.[14,15]

Methylsulfonylmethane

Due to its analgesic and anti-inflammatory effects, methylsulfonylmethane (MSM), a sulfur-containing metabolite of dimethyl sulfoxide, is often advocated for joint pain. In human studies, dietary supplementation with MSM has successfully reduced joint pain, either alone or when consumed in combination with glucosamine.[16,17] Because the sulfur content of arthritic cartilage is approximately one-third that of healthy cartilage,[18] MSM often is advocated as a source of sulfur. Antioxidant properties of MSM have also recently been documented.[19]

Hyaluronic Acid

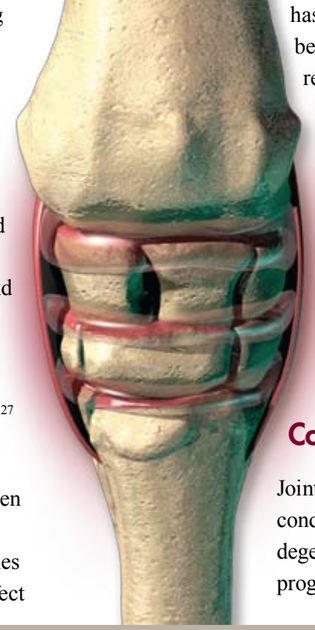
Hyaluronic acid is a key component of synovial fluid that nourishes, lubricates, and protects the joint. It is part of the building blocks for proteoglycans, such as aggrecan, stimulates the formation of cartilage components from equine stem cells,[20] and has anti-inflammatory actions in the synovial fluid by inhibiting PGE_2.[21] Although hyaluronic acid commonly is administered intra-articularly, orally administered hyaluronic acid has been shown to be bio-available[22] and effective in reducing post-operative joint inflammation in horses.[23]

Avocado/Soy Unsaponifiables

Avocado/Soy unsaponifiables (ASU) are comprised of oil fractions from avocado and soy. The results of *in vitro* studies with ASU demonstrate its ability to increase aggrecan synthesis, prevent IL-1-induced decreases in aggrecan production, and reduce expression or production of degradative enzymes and inflammatory proteins.[24,25] ASU supplementation of humans with osteoarthritis reduces the loss of joint space,[26] and horses consuming ASU have increased GAG synthesis and reduced breakdown of cartilage.[27]

Micronutrients

Recently, oxidative damage caused by reactive oxygen species has been implicated in the development of joint disorders in horses. These radical oxygen species promote the degradation of joint components, an effect


Unhealthy Joint

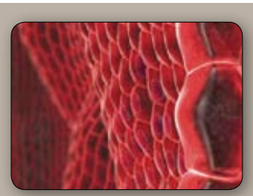
that can be counteracted by antioxidants such as vitamins C and E. For example, not only is vitamin C crucial for the development of cartilage, but its well-documented antioxidant effects may also protect against cartilage breakdown.[28] The fat-soluble antioxidant, vitamin E, has demonstrated analgesic and mobility-enhancing benefits in individuals with arthritis[29,30] and has been reported to protect against joint disorders in mice prone to osteoarthritis.[31] Of the other micronutrients in Platinum Performance™ CJ, silicon is important because it is required for normal formation of cartilage and bones. In fact, consumption of diets deficient in silicon by growing chicks results in abnormalities in articular cartilage formation, bone development, and growth of the comb[32] – a structure that is abundant in connective tissue and hyaluronic acid.

Conclusion

Joint disorders in horses are serious and debilitating conditions. The multiple possible causes of joint degeneration require a comprehensive nutritional program that addresses each contributing factor. Provision of omega-3 fatty acids, glucosamine, methylsulfonylmethane, hyaluronic acid, avocado/soy unsaponifiables, cetyl-myristoleate, antioxidants, and silicon modulates one or more of the major factors associated with joint disorders. Platinum Performance™ offers solutions for complete joint health with the new Platinum Performance™ CJ, Platinum Performance™ Equine, Ortho-Chon™ or Ortho-Chon™ HA.

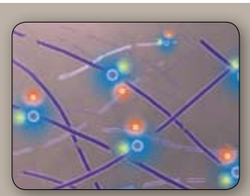
Putting it into Practice

- Reduce feeds with an imbalance of omega-3 and omega-6 fatty acids such as grains, corn oil and some commercial feeds.
- Encourage consumption of omega-3 fatty acids and antioxidants by increasing the horse's intake of forage and pasture grazing.
- Supplement with Platinum Performance™ Equine on a daily basis to protect the joint from inflammation and oxidative stress.
- For horses with existing joint problems or those prone to developing joint problems, supplement with Platinum Performance™ CJ.


Inflammation

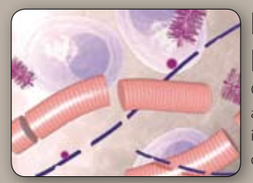
Chronic Inflammation

Omega-3 fatty acids, Glucosamine, Avocado/Soybean Unsaponifiables, Cetyl-Myristoleate, Antioxidants such as Vitamin C and Vitamin E, and botanical compounds such as Boswellia, decrease inflammatory responses.


Free Radical Damage

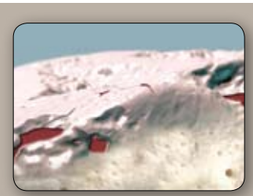
Free Radical Damage

Antioxidants and supplemental hyaluronic acid help protect the joint against degeneration caused by free radical damage and help maintain synovial fluid viscosity and normal joint function.


Enzymatic Activity

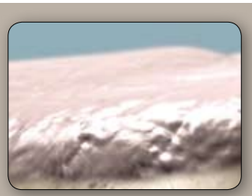
Degradative Enzyme Activity

Omega-3 fatty acids decrease the activity of aggrecanase enzymes in the joint and, therefore, reduce cartilage degradation.


Traumatic Injury or Overuse

Traumatic Injury or Overuse

Omega-3 fatty acids, antioxidants, silicon, MSM and ASU help slow degeneration and stimulate repair of cartilage. Silicon also supports bone density, cartilage synthesis and tendon and ligament strength.


Low-Grade Cartilage Damage

Natural Aging Process

Omega-3 fatty acids, antioxidants, and cartilage building nutrients protect against degeneration, which naturally occurs with age.

5 Major Contributors to Joint Disease