

May Webinar

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- There are 205 bones in the horse's skeleton.
- Twenty of these bones are in each foreleg and 20 in each hind limb, for a grand total of 80 bones in the four equine legs.



Synovial Joints

- These are the movable joints and the ones most apt to sustain injury or be afflicted with disease. An example of a synovial joint is the carpus (knee), which actually contains three joints and multiple bones. In a manner of speaking, the synovial joints are the horse's ball bearings. A synovial joint consists of two bone ends that are both covered by articular cartilage. The cartilage within the joint is smooth and resilient, allowing for frictionless movement. Each joint capsule also contains an inner lining called the synovial membrane, which secretes synovial fluid to lubricate the joints.



Cartilaginous joints

- These joints are slightly movable or immovable, depending on the bones involved. Cartilaginous joints are united by fibrocartilage (composed of collagen fibers), hyaline cartilage (translucent bluish white), or both. An example is the connective tissue between vertebrae.

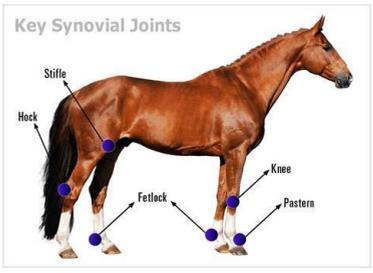


Fibrous joints

- These are immovable joints where the bones are bound by fibrous tissue that ossifies (hardens into bone) as the horse matures. An example would be joints within the equine skull.



Synovial Joints

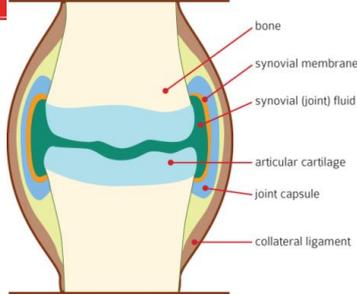


Synovial Joints

- **Several components:**
- **Collateral ligaments** – Prevent lateral movements of the bones
- **Synovial fluid** – Fills the space between the bones and provides lubrication and nourishment to the cartilage
- **Joint capsule** – Stabilizes the joint
- **Synovial membrane** – Regulates the joint fluid
- **Articular cartilage** – The soft structural tissue that covers and cushions the ends of the bones



Synovial Joints



Synovial Joints

- The joint structure is designed to absorb concussion and permit leg movement. The two bone ends are encased in a fibrous capsule that helps provide stability. Collateral ligaments, comprised of very tough fibers, attach to the sides of each of the bones within the capsule, and this plays a major stabilizing role. Other ligaments, such as the cruciate ligaments, also help stabilize some joints, including the stifle. Other ligaments outside the joint cavity also lend support. A prime example would be the distal sesamoidean ligaments and suspensory ligaments that, together with the sesamoid bones, make up the apparatus that holds the fetlock in proper position.



Synovial Joints

- The outer part of the joint capsule is the fibrous layer and the inner part is synovial membrane that lines the sides of the joint capsule. The joint is lubricated by synovial fluid, which is secreted by the synovial membrane. The ends of each of the bones within the fibrous capsule are covered with cartilage, which primarily is hyaline cartilage—a substance that is flexible and somewhat elastic. Beneath the cartilage in each bone end is subchondral bone.



Synovial Joints

- synovial membrane secretes lubricating fluid that allows a healthy joint to have frictionless movement. In addition to being a lubricant, synovial fluid also supplies nutrients and removes waste from hyaline articular cartilage. Synovial fluid is described as having the consistency of raw egg white.



Synovial Joints

- An important component in the makeup of synovial fluid is hyaluronic acid, also known as sodium hyaluronate or hyaluronan. It is primarily responsible for giving the synovial fluid its lubricating capability. When disease strikes a joint, there often is a depletion of hyaluronic acid. When that happens, the joint's ability to function properly—for movement and as a concussion absorber—is compromised.



Synovial Joints

- There is a second method for lubricating cartilage in a joint. Fluid is stored within the cartilage and when weight bearing occurs, it is squeezed out of the cartilage onto the surface. When weight bearing ceases, the fluid is reabsorbed by the cartilage.



Capsulitis

- Joint damage can be categorized into distinct stages:
- Synovitis
- Capsulitis
- Degenerative joint disease
- Osteoarthritis



Synovitis

Inflammation of the synovial membrane. The primary cause of synovitis is overstretching of the synovial membrane during demanding exercise. Swelling due to an increase in joint fluid production is the most obvious sign. This accumulation of fluid is called joint effusion, common in racing thoroughbreds and other horses worked strenuously. Synovitis can usually be calmed with a layoff from strenuous exercise.



Capsulitis

- Inflammation of the fibrous joint capsule. This condition usually is present when synovitis occurs and vice versa.



Degenerative joint disease

- can occur if synovitis goes untreated, causing damage to the cartilage surface to develop. This deterioration of the cartilage is the next stage of articular breakdown. DJD is characterized by chronic, progressive degeneration of the joint cartilage and is found most frequently in the fetlock and knee, but is also diagnosed regularly in the pastern and hock. Two primary processes lead to DJD:
- Repeated bouts of synovitis causing the quality of joint fluid to decrease until it is watery and ineffective in protecting the cartilage
- Recurring and excessive compression of the cartilage such as that associated with speed, landing after a jump and quick stops. The cartilage becomes rough and flattened, losing all ability to withstand compression

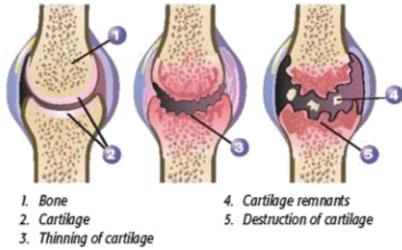


Osteoarthritis

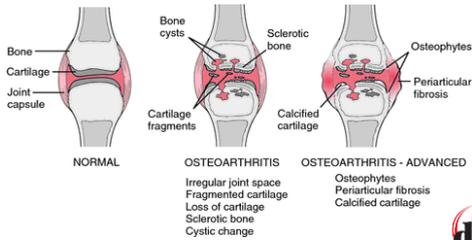
- distinguished from DJD by changes in the bone that comprise the joint. These changes severely impede mobility and soundness. The inflammation process goes largely unnoticed unless significant swelling is present.
- There are several different types of arthritis in horses, but the most commonly reported are:
 - Osteoarthritis
 - Infectious arthritis
 - Traumatic arthritis



Osteoarthritis



Osteoarthritis

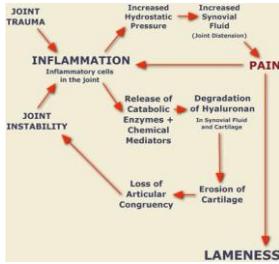


Common Causes of Arthritis

- Arthritis is caused by the slow wearing of cartilage. Over time, compression and stress wear away the protective cartilage. Causes of arthritis include:
- Repetitive and excessive force on a joint may wear down the supporting tissue of the joints
- Physical injury triggers inflammation
- Poor conformation may cause abnormal forces, placing addition strain on joints
- Bacterial infection (septic arthritis) will stimulate an inflammatory response
- Dislocation and fractures in the joint will result in some degree of arthritis
- Excessive weight, which causes severe trauma and wear on the joints
- Hoof deformities and problems with trimming or shoeing can be contributing factors



Common Causes of Arthritis



Diagnosing Arthritis

It is best to look for and discover the disease early since treatment is much more effective in the early stage. Arthritis onset may not be obvious as signs may be absent or there may only be a little joint swelling which is easy to miss.

- Indications arthritis is developing include:
- Slight puffiness in lower leg joints
- Stiff and awkward gait at the start of exercise, improving as the horse warms up
- A reluctance to perform movements that used to be done with ease
- Grating sound when the joint is used
- Bumps and swellings on joint extremities
- Stiffness after sleeping or prolonged standing



etect swelling, heat and tenderness. Comparing the affected limb to a similar
 determining which joint is affected as subtle lameness often becomes move
 flexed for a minute, then trot the horse on a firm surface)



Managing Arthritis

- It is important to be proactive to minimize joint damage and prevent DJD. Activities that can assist in the management of arthritis include:
- Use nutritional supplements, principally hyaluronic acid which can restore the quality and viscosity of the synovial fluid and improve nutrition of the cartilage
- Regular exercise helps if it is tailored to the horse's condition. This increases circulation, tones the muscles and a fit horse has thicker and healthier cartilage covering the joints



Managing Arthritis

- Remove the horse from a stall. The movement of walking helps the joint fluid circulate as the joint cartilage is compressed and released
- Altering the diet may help if the horse is overweight
- Do stretching exercises along with an extensive warm up before exercise. This increases blood flow and warms up and softens muscles and ligaments

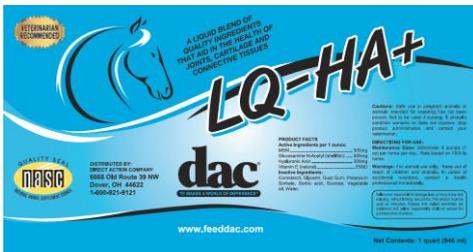


Treatments for Arthritis

- Nutritional supplements – Glucosamine chondroitin and MSM are frequently used. However, there is conflicting data surrounding their use. Hyaluronic acid, which is the most important component of joint fluid, may improve the quality and viscosity of the joint fluid and assist in preventing the advancement of degenerative joint disease



dac® LQ-HA+



dac® LQ-HA+



- Liquid
 - 1 quart or 1 gallon size
 - 1oz feeding rate
- Glucosamine N-Acetyl
 - N-acetyl glucosamine occurs naturally in the outer shells of certain insects and shellfish
- Increase Hyaluronic Acid to 200mg
 - Synovial Fluid contains 3-4mg/ml of hyaluronic acid
 - Synovial fluid serves as the viscous fluid lubricant allowing joints to freely move.
- **NO** Chondroitin therefore can be fed to other livestock
- Vitamin E 250 IU/oz
- MSM



dac® LQ-HA+



Kilborne, A.H., H. Hussein, A.L. Bertone. 2017. Effects of hyaluronan alone or in combination with N-acetyl-d-glucosamine on lipopolysaccharide challenge-exposed equine fibroblast-like synovial cells. American Journal of Veterinary Research. 78(5):579-588.

- Synovial cell cultures (those that line the joints and produce joint fluid) had significantly better survivability and lower concentrations of inflammatory mediators and degradative enzymes when treated with HA or a combination of HA-NAG
- Used prior to an inflammatory event, both HA and the HA-NAG combination had a protective effect on the cells
- HA-NAG had a greater anti-inflammatory effect than HA alone



Glucosamine

- **4-18 g/day^{1-3*}**
- Supports cartilage production. Improves joint comfort. Inhibits inflammatory mediators (these contribute to cartilage breakdown and joint pain).
- *Equine Research: Yes*



Chondroitin sulfate

- **1-6 g/day^{1-3*}**
- Supports production and slows breakdown of cartilage. Improves joint comfort. Inhibits inflammatory mediators. Glucosamine and chondroitin sulfate have been shown in published equine cell research to work better together than either alone.⁴ Absorption of chondroitin sulfate especially can vary, so it is important to choose one that has been shown to be absorbable in horses.⁵
- *Equine Research: Yes*



HA (hyaluronic acid)

- **100 mg/day used in OCD study⁹; wide range of manufacturer-recommended doses: 20-300 mg/day***
- One study found less joint effusion (swelling), compared to horses not taking HA, after arthroscopic removal of an OCD lesion.⁹
- *Equine Research: Yes*



MSM (methylsulfonylmethane)

- **Equine study 8 g/day recommended for joint health benefits***
- Proposed anti-inflammatory activity in the joint, though exactly how is not known. A study in exercised horses given MSM reported anti-inflammatory and antioxidant benefits in the bloodstream.¹²
- *Equine Research: Yes*



Dac options

Optimum Flex Plus	Blend of Chondroitin, Glucosamine, HA MSM and vitamin C to support joint health and alleviate inflammation
LQ-HA+	Liquid HA to increase joint synovial fluid
Herbal Respond	Concentrated levels of yucca schidigera extract along with Devils Claw which have anti-inflammatory properties. Elevated levels of vitamin C.



QUESTIONS?

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