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By James Meyer, BSc (PV) DVM

Equine Osteoarthritis

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Lameness is one of the top three areas of equine veterinary medicine, along with colic and reproduction. Joint disease is the most common cause of lameness and results from pain during movement. The pain can be sudden or long-term, and may result in an obvious lameness or the horse 'just not being right'. Osteoarthritis, commonly shortened to arthritis, can result from a range of factors, but all result in joint inflammation and degradation. We'll take a look at how this happens and what we can do about it.

Let's get technical, technical!

Who doesn't love a good Olivia Newton-John reference but, seriously, before we can look at diagnosing and treating arthritis, we must understand how if forms.

Thorough knowledge of joint anatomy and function will allow us to know exactly where our treatments are being focussed. The purpose of joints is to join skeletal structures, and allow for movement and shock absorption. They consist of three main structures: a joint capsule, bone ends (subchondral bone) covered with articular cartilage and synovial (joint) fluid. Articular cartilage is by far the most important structure in arthritis.

Normal articular cartilage

Articular cartilage has no nerves or blood vessels, but receives its nutrients from both the bone it sits on and the fluid around it. It is made up of specialised cells (chondrocytes), collagen fibres and groups of proteoglycans (protein molecules).

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Our group is made up of Equine Dental Veterinarians from across the globe and we have over 300 members right here in Australia. Most of our members provide afterhours and emergency care for all equine health issues and using our dedicated search on our website you can find the Equine Dental Vets nearest you at the touch of a button. This is particularly useful if you are away from home, for example when travelling to shows and competitions.

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> Osteoarthritis, commonly shortened to arthritis, can result from a range of factors, but all results in joint inflammation and degradation.
>
> It is the most common cause of lameness.

It is important to note that only the protein molecules can be reproduced once damaged; the cells and collagen are almost never replaced.

Now, hold onto your horses, there's some big words in the next bit, but they will revolutionise your understanding of arthritis treatment. Let's focus on the proteoglycans.

Long strands of non-polysulfated glycosaminoglycan (hyaluron) acts as a core, which has many smaller polysulfated glycosaminoglycans (i.e. chondroitin sulfate) attached to it in a bottlebrush-like structure. This structure holds onto water and provides the major cushioning force during movement. Hyaluron? Glucosamine? Polysulfated glycans? Sounding familiar? That's because they make up the majority of our arthritis treatments.

Normal joint fluid

The other component of joint health to consider is the fluid. Synovial fluid comes from plasma in the blood and is supplemented with proteoglycans produced by the cells in the joint. Hyaluronate and glycoprotein in the fluid, along with hydration of the articular cartilage, form the lubrication system for the joint. It is important for it to be a thick, viscous fluid for this system.

The purpose of joints is to join skeletal structures (bones), and allow for movement and shock absorption.

A joint consists of three main structures:

- Joint capsule,
- Bone ends (subchondral bone) covered with...
- ...Articular cartilage

The joint capsule is filled with synovial (joint) fluid

Articular cartilage is by far the most important structure in arthritis.

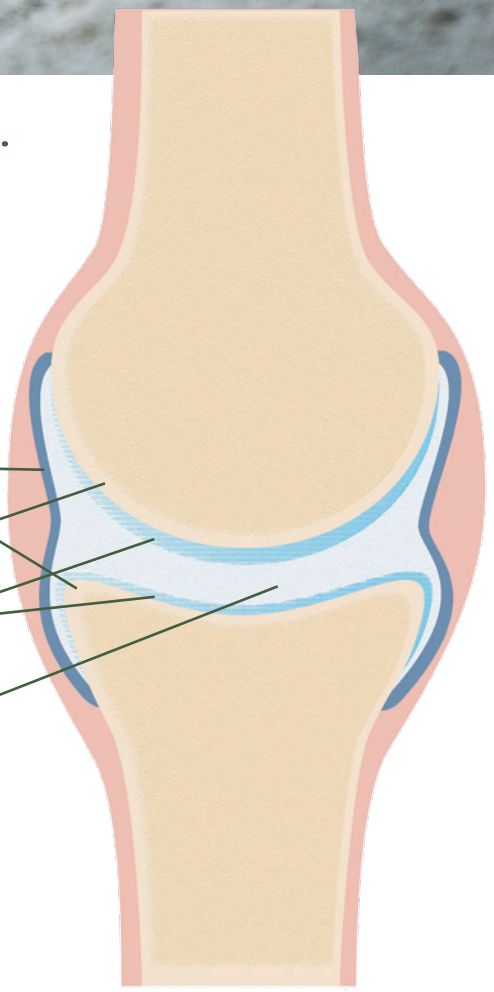


Image courtesy of HyGain Pty Ltd

Arthritis Risk Factors

Conditions and factors that can result in joint damage

Such stress and/or disease leads to death of the specialised cells in the cartilage. As they die, they cause inflammation in the joint fluid, and enzymes start to breakdown the proteoglycans and collagen present. Injury to the cartilage can be partial or full thickness. Partial thickness cartilage erosion neither heals, nor progresses, very quickly. However, once the bone is exposed, the body rapidly works to fill the defect with fibrocartilage. As there are no nerves present in the articular cartilage, partial thickness defects tend not to be painful, but inflammation and bone exposure will result in pain, which we see as lameness.

Diagnosis

Right, we have a lameness, what do we do with it? Treat it! Wait, hang on… You've locked in the wrong answer. How can we treat it if we don't know what is causing it?

The first question that should spring to mind is: "Where is it?" A very good question you might say, but how do we find that out? Your local veterinarian has been trained and likely spent years honing their skills in lameness examination and diagnosis, and they should be your first port of call. Once we know where the problem is, we can treat it and/or refer the management on to other professionals as required.

Back to Olivia Newton-John, it's now time to get physical. As many of you will have experienced, a thorough lameness examination can be quite in-depth and take many methods, such as joint flexion, local anaesthetic blocks and lunging, to narrow down the source of the issue. The aim is to methodically stress individual joints and assess the degree of lameness exhibited to determine which one is the most affected. Local blocks can then be used to block out the pain and hopefully see an improvement in the lameness.

Once the affected joint(s) have been located, we then need to try to determine what is affecting them. To do this, we will often need to use something to see 'inside' the joint. The most common imaging technique is radiographs or 'x-rays'. X-rays show us the bony structures within the joint and might provide insight into bony reactions, bone chips, fractures, and much more. Ultrasound may also be utilised to image the soft tissue structures, such as ligaments and joint capsules. If you are lucky enough to live near a large hospital (and have a healthy wallet), you may also get the chance to use Magnetic Resonance Imaging (MRI) or scintigraphy. These advanced imaging methods are superb at showing different types of skeletal and soft tissue injury, and can be invaluable in looking at difficult to reach areas.

Disease Process

Joint damage results from the disruption of tissue due to mechanical stress. This stress exceeds the body's normal absorptive mechanisms discussed in the article, and can result from a range of problems, including:

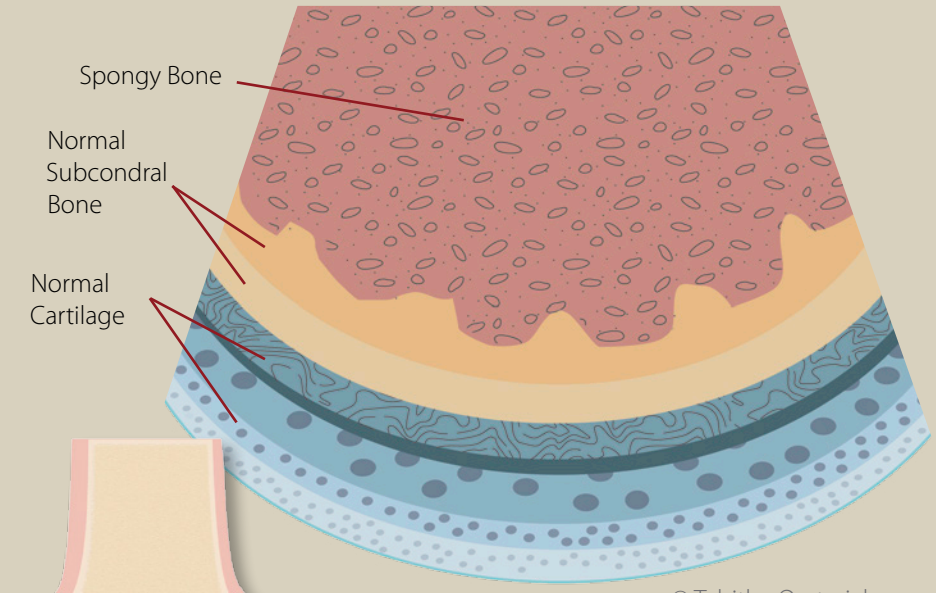
- Trauma (i.e. fracture, bone chips)
- Ligament/joint capsule tears
- Repetitive loading (i.e. racing, jumping)
- Poor conformation
- Congenital abnormalities (i.e. angular limb deformities, subchondral bone cysts)
- Lameness
- Excessive body condition

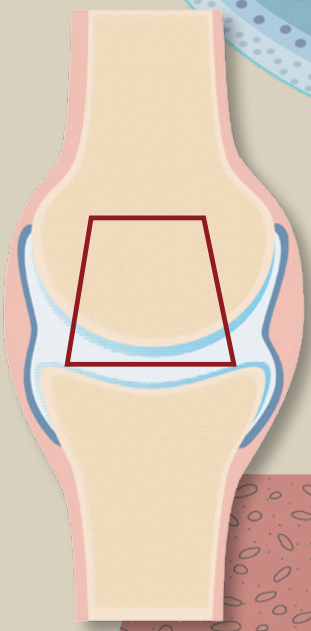
Damage can also occur under normal stress when there is pre-existing damage to the cartilage, such as:

- Joint inflammation
- Osteochondrosis
- Ageing
- Joint infection

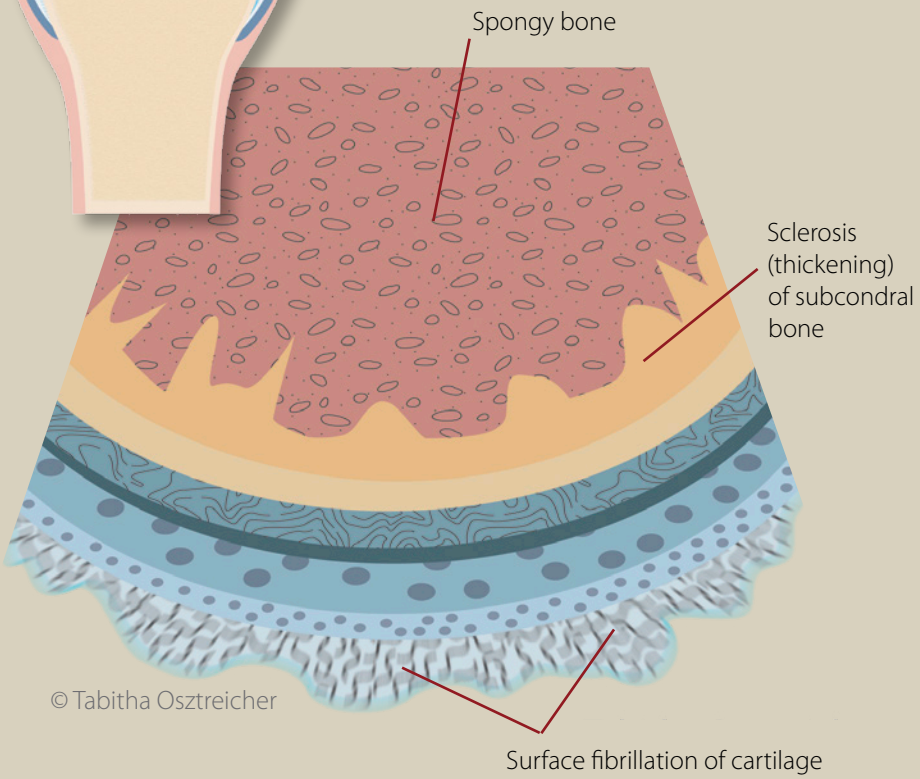
Stages of Joint Disease

1) Normal joint and articular surface





2) Early degenerative changes



Treatment

Now in to the fun stuff! We all love to DO something, so let's get treating. First cab off the rank is surgery...

Surgery

There's something about surgery that just gets veterinarians going and, thankfully, it can be quite useful in arthritis. An arthroscope can be used to look inside the joint while your horse is under general anaesthetic and can assess the degree of cartilage damage. Once there, damaged cartilage can be removed to promote production of that fibrocartilage mentioned earlier. Bone fragments and excessive soft tissue can also be removed during surgery. Arthrodesis - or joint fusion - can also be performed and is quite useful in 'low-motion' joints. By fusing two levels of joint and removing the friction, there is no longer the pain, and hence lameness, associated with the bone-on-bone movement.

Systemic non-steroidal anti-inflammatories (NSAIDs)

Bute! Yes, you finally get to crack out that tub of bute that's been sitting at the back of the feed shed. Phenylbutazone, more commonly referred to as 'bute', is a frequently used NSAID to reduce the pain and inflammation associated with arthritis. It works by blocking the enzyme pathways in inflammation, but unfortunately these are important for normal body function as well. Long-term use can potentially result in gastrointestinal damage and must be managed carefully. Other members of the NSAID group, such as meloxicam, may potentially have less detrimental effects than bute and may be a viable option for long-term pain relief.

Joint injections

You might ask: "It's only one joint that's affected, why am I treating the whole body?"

Thankfully, you have asked the right question and there are ways we can treat specific joints alone. Joint injections are frequently performed and often contain glucocorticoids (steroids) and/or hyaluronic acid. Steroids are powerful anti-inflammatory agents, and act to decrease the pain and inflammation in the joint.

Hyaluronic acid brings us back to our list of big words at the beginning; it is the building block of the proteoglycan structure that gives articular cartilage its absorbency and keeps joint fluid healthy. It has been shown that, by injecting hyaluron into the joint, you not only supplement the levels in the joint fluid, but can potentially stimulate increased production by the joint cells. These injections can be extremely useful in management of arthritis and may last up to six months or more before needing to be re-administered.

There are a number of treatments also available that derive their activity from the horse itself. The most common are interleukin 1 receptor antagonist protein (IRAP), platelet rich plasma (PRP) and stem cells. The ideology behind them is to separate the body's natural healing products, concentrate them and place them where they are needed. Originally designed for humans, their use varies regionally and upon veterinarians' preferred techniques. Stem cells also potentially give us the ability to replace the chondrocytes that don't normally grow back.

> "Once located and the extent of the damage determined, there are a range of treatment options available.

Injectable supplements

If you're dealing with a mild case of arthritis or you've got a horse with more busted joints than good, you might want to consider systemic injectable supplements. These can be given either into the muscle or vein, and act to promote widespread joint health without the complications of NSAID use. These supplements commonly consist of polysulfated glycosaminoglycans, which you will remember forms the bottlebrush-like structure with hyaluronic acid. The most common of these is pentosan polysulfate, a plant derived product that many people have seen great success with. It works on multiple fronts by inhibiting inflammation, stimulating chondrocytes and fibrocartilage, and improving joint fluid. Not all of these products are equal though, so consult your veterinarian.

Oral supplements

Right, for those of you that love adding a pinch of this and a spoon of that, here's the section for you. There are as many oral joint supplements on the market as there are kids cereals and it can be difficult to sort the forest from the trees. My rule of thumb is if it doesn't have a listed active ingredient then don't buy it! What that means is if it doesn't have a listed active ingredient then they don't actually know what, if any, works. While this doesn't guarantee the product will work, it does mean someone has sat down and tried to determine what is effective and what is actually safe to give.

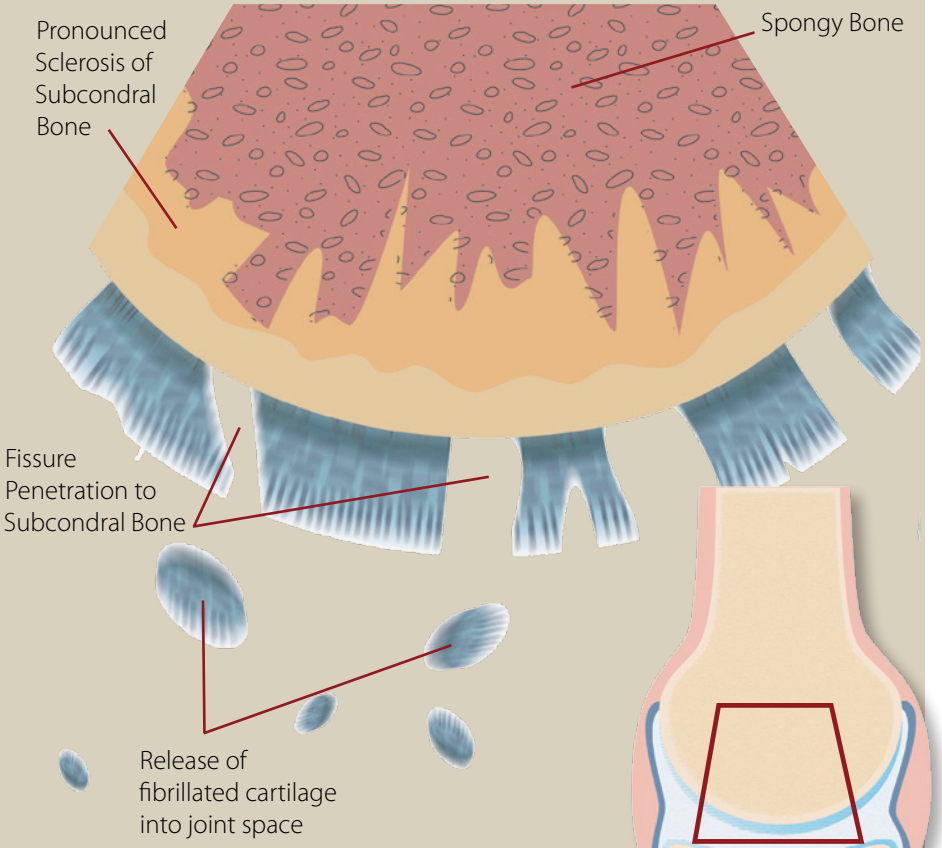
Along that line, the most common (and safe) supplement is glycosamine. The 'glycosamin' part of 'glycosaminoglycan' should point to the relative importance of this compound in joint health. It can be bought in a range of forms that have been safely distilled, so you know what you're buying and how much you need to give. Keep in mind that there are limited studies of efficacy on even these products and the amounts you actually need to give your horse can be quite expensive. However, these products can be useful in individual cases and may benefit other treatments such as pentosan or joint injections. If the label says 'a cup' though, it's probably more due to convenience to the guy packaging it, than it is to how much your horse actually needs.

Exercise and rest

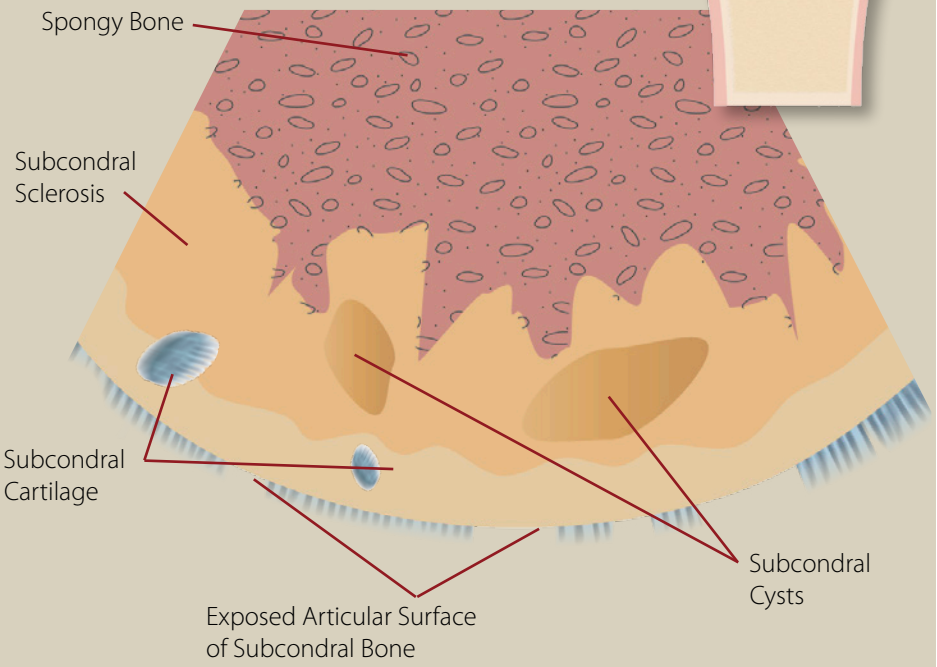
We discussed partial versus full thickness articular cartilage damage and full thickness loss is replaced with fibrocartilage. This process can be hastened by exercise or prolonged passive motion. Once this diagnosis has been made, you can work with your veterinarian, physiotherapist and/or chiropractor to develop suitable rehabilitation programs. Other factors, such as suitable warm-up and cool-down periods while riding, can help mitigate the impact arthritis has on your horse's comfort. Finally, you can never beat good ol' rest periods to give the body time to heal.

Stages of Joint Disease

3) Advanced degenerative changes



4) End-stage degenative changes



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X-rays show us the bony structures within the joint and may provide insight into bony reactions, bone chips, fractures, and much more.

Normal radiograph of pastern and hoof. Image courtesy of Dr James Meyer.

Advanced pastern arthritis (ringbone) subsequent to an old fracture. There is loss of joint space between the long and short pastern, bony growth resulting in bone fragments and swelling of surrounding soft tissues. Image courtesy of Dr James Meyer.

Treatment Options Summary:

Surgery

- Good for visualising joint damage
- Commonly used for removal of damaged cartilage and bone fragments
- Arthrodesis (surgical immobilisation of a joint) may be beneficial in low-motion joints

NSAIDs (non steroidal anti-inflammatory drugs)

- Very effective at reducing the pain and inflammation of arthritis
- Cheap and easy to administer
- Potential for side effects, especially with prolonged use

Joint injections

- Useful when few joints are affected
- Very good at reducing inflammation and promoting joint fluid health
- Often re-administered every 3-6 months

Injectable supplements

- Great for horses with multiple joints affected or early stages of arthritis

Conclusion

Arthritis leading to lameness is one of the most common conditions affecting our equine companions and can result in significant pain during movement. Once located and the extent of the damage determined, there are a range of treatment options available. Ranging from specific joint medications to systemic anti-inflammatories, there are options suitable for the lawnmower to the elite athlete.

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This month's contributor to the health feature from
Equine Dental Vets

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Dr James Meyer completed his veterinary degree in the Inaugural Class at the University of Adelaide, South Australia. He began riding horses at the age of three and worked his way through hacking, dressage and eventing. James currently works at Adelaide Plains Equine Clinic, South Australia, and is an active member of both the Pony Club Association of SA and Equine Veterinarians Australia. His main interests in equine practice are in surgery, as well as preventative medicine in pleasure horses. Visit: **www.adelaideplainsequine.com.**