Lameness Diagnosis, Condylar Disease and Stress Fractures

Read any textbook or article about lameness in horses nowadays and it will mention nuclear scintigraphy (bone scan). It is a relatively recent advance in diagnostic imaging pioneered in Europe in the late 70’s. Bone scan is a way to look inside the horse’s bones to extract clinically relevant information and to help prevent more serious injury. It helps answer questions that we couldn't answer before. Lameness is still the biggest cause of wastage in racehorses and these losses can be minimised by early diagnosis and treatment with bone scan.

Indications for Bone Scintigraphy

Nuclear Scintigraphic Imaging is now an established diagnostic tool that provides the examining vet with physiological information regarding the horse’s anatomy and pathologic changes (disease). Scintigraphy is used for:

- Lameness
- Negative radiographs
- Upper limb or pelvic lameness
- Sore back
- Multiple lesions/ multi-factorial lameness’s
- Lesion localization and extent
- To evaluate healing
- Assess muscle injury
- Fractious horses unsuitable for nerve block examination

As a tool, Scintigraphy works alongside the more familiar mainstream diagnostic imaging methods such as x-ray, ultrasound and regional nerve blocks. Scintigraphy however is much more sensitive and gives us the opportunity to image multiple sites or sites that are otherwise difficult to image like the back, pelvis and shoulders.

How does it work?

Diphosphonate salt is labelled with Technicium 99m to produce a radiopharmaceutical that is injected into the horse. Diphosphonate salts are used as they selectively localise into bone. Its uptake is therefore relative to the bone cell (osteoblastic) activity or metabolism of the bone and the blood flow to the bone in a specific area.

What does it tell us?

**Soft tissue attachment uptake** - several patterns of Increased Radiopharmaceutical Uptake (IRU) appear to be associated with the attachment of soft tissue structures to bone. The most classic example is injury to the origin of the suspensory ligament (OSL), but includes other conditions such as early osteoarthritis, collateral ligament damage, strain to the insertion of the deep digital flexor tendon and avulsion of the muscles of the third trochanter of the femur.
Stress Fracture/ Bone Remodeling - this category is undoubtedly the reason that scintigraphy originally became so popular as an imaging modality for horses. The classic example would be a stress fracture in the long bone of a racehorse. Such a lesion may be difficult to detect in the average case, especially when few clinical signs are present after a race. It is not uncommon that a trainer has noticed just a few bad steps after a race or poor performance and presents the horse for examination solely for that reason. Detection with scintigraphy will often lead to appropriate rest or surgery prior to catastrophic fracture, thus saving the horse’s career and possibly its life.

Other examples of bone remodeling lesions that are most easily detected with scintigraphy are subchondral bone lesions in the fetlocks of racehorses, navicular bone remodeling, and sclerosis of the third tarsal bone (hock spavin).

Because of its sensitivity it also allows monitoring of the healing process so that horses may be returned to training at the correct time.

Subchondral bone disease
This syndrome deserves special mention as it plays a significant role in osteoarthritis in horses (and humans). Racehorses undergo tremendous changes in the subchondral bone of their carpal (knee) and metacarpophalangeal (fetlock) joints during training. Diseases in these joints can range in severity from simple fragmentation to complete fracture. In addition, intense subchondral bone sclerosis (modelling) and subsequent joint damage (osteoarthritis) are common. In fact these injuries account for the majority of wastage and poor performance in athletic horses.

Recent studies using scintigraphy and clinical and pathological findings support the concept of a continuum of adaptive and non-adaptive responses of bone in these horses. It is believed what happens in the joint is that the underlying bone becomes stiff due to the high loads experienced during training and as a result the overlying cartilage collapses.

These types of lesions are progressive and inoperable and result in significant osteoarthritis, despite supportive therapy. The challenge is in detecting these injuries at an early stage to allow their correct management and scintigraphy is essential in achieving this. These changes are occurring well before we can see lesions on radiographs and if the horse continues to exercise the problem exacerbates until a chronic untreatable lameness results in early retirement of the horse.

Stress Fractures
Stress fractures again are a common cause of lameness and wastage in racehorses and human athletes. Stress fractures appear as a localised crack within the bone as a response to the loads being applied to it during training. Basically the bone can’t strengthen quickly enough to adapt to the increased loads put on it during galloping or fast exercise. The major problem is that these stress fractures have the potential to
enlarge and become a complete fracture if exercise continues. Many complete fractures that result from stress fracture propagation are not repairable and require the humane destruction of the horse. Diagnosing these bony changes before it is too late is next to impossible without performing a bone scan.

Horses will often exhibit intermittent signs of lameness, and with rest the lameness resolves rapidly. **This does not mean, however, that the stress fracture has healed.**

Stress fractures are seen in a variety of sites including the canon bone, humerus, tibia, scapula, pelvis and spinal vertebrae.

The gold standard diagnostic method for stress fractures is Scintigraphy. Scintigraphy is an extremely sensitive imaging modality for identifying stress fractures and is able to show up stress fractures that radiographs cannot demonstrate.

Stress fractures are typically treated by resting the affected horse. This will consist of a graduated schedule starting with box rest and progressing to a yard and then paddock rest. A 12-16 weeks rest period is typically advised. Bone heals well at most stress fracture sites but the key is knowing what you are dealing with to institute the correct treatment programme, rest period, and to know when to safely get the horse back into training.

Scintigraphy makes it possible to make an accurate diagnosis and give effective treatment for a variety of lameness injuries in horses. The challenge for vets is proving to owners and trainers the benefits of these diagnostic tools to equine welfare, minimising lost training days and those associated costs, and minimising the wastage and poor performance of potentially great athletes.

Unfortunately wherever there is a problem with a horse there is a wandering quack with a bottle of snake oil to fix it. So there is the need for a greater understanding and awareness of the problems faced by our equine athletes and a willingness to properly diagnose and treat injuries by employing good science rather than guesswork and witchcraft.