

## Regenerative therapy



Lameness is a pain-avoidance strategy adopted by horses, and is a common cause of poor athletic performance and compromised welfare. Whatever the precise cause of pain (e.g. osteoarthritis, tendon injury), that pain is caused by inflammation.

Inflammation is the cascade of chemical and cellular events that occurs following any type of tissue damage. By causing pain it alerts the animal to rest the damaged area, thereby preventing further injury. Inflammation also acts as the initial stimulant of the healing or repair process, hence it is extremely important. However ongoing, uncontrolled inflammation causes chronic pain and can actually exacerbate the tissue damage. This is where veterinary intervention becomes necessary.

Conventional therapies aim to stop the inflammatory process, and these remain a vital, cost-effective component of orthopaedic disease treatment. However, they do not influence the repair of tissue and can occasionally delay this important process.

'Regenerative therapies' aim to optimise the repair of a structure by replacing damaged tissue with tissue of the same cell type and hope to minimise the formation of non-functional scar tissue, hence maintaining the original biomechanical properties of the structure. This increases the probability of return to previous athletic ability, and reduces the likelihood of ongoing lameness and/or reinjury.

Research and clinical trials of regenerative therapies have been ongoing since 2003, but there are now several exciting options that have been scientifically proven to modify inflammation and reduce pain in clinical trials, all of which are available at Oakhill.



### **Stem cells are**

a type of cell which have the potential to develop into a variety of more specialist cell types dependant on the environmental signalling that they are subject to. An embryo begins as a ball of stem cells that go on to develop into every type of cell required to make a mature being! Stem cells continue to be present within the body after birth in reduced quantities.

It is not fully understood how stem cells behave when they are used as a medical treatment - whether they differentiate into the same cell type as the tissue they are introduced to, or if they modulate the inflammatory process. Either way, they have been found to decrease or eliminate lameness when used to treat joint disease, and have the potential to reduce the reinjury rate when used to treat tendon injuries!

Autologous stem cells are collected from the individual horse that requires treatment. Bone marrow is collected (most commonly from the sternum) under sedation and sent away for complex processing to provide a product containing millions of stem cells.

These cells are injected into core (central) lesions within tendons and ligaments.

Allogenic stem cells are produced from the blood of donor horses (treated to prevent reaction when introduced into the horse requiring treatment). These are purified to get rid of other blood cells and then cultured to increase the number of cells into the millions. They are specifically stimulated to give the ability to differentiate into chondrocytes - the cell type present in cartilage.

Commercially this product is available as Arti-Cell. This has proven highly successful at reducing lameness in horses with degenerative joint disease.



**Interleukin-1 Receptor Antagonist Protein**, more commonly referred to as **IRAP**, is a protein synthesised by a variety of cells. It prevents the actions of Interleukin-1 - a substance which has an important role in the induction and maintenance of inflammation within diseased joints. Studies in humans and horses have proved that intra articular IRAP injections reduce synovial (joint lining) inflammation and lameness.

IRAP is produced by collection of blood (from the horse to be treated) in a special syringe. This is then incubated overnight before filtration to produce concentrated and purified IRAP. This can be frozen to allow storage of the product until an appropriate time for medication of a joint. This product can be of benefit where steroid medication is not appropriate (e.g. competition horses where steroid medication is prohibited, horses at risk of laminitis) or where joint pain no longer responds to steroid medication. There is also some evidence that the effects of IRAP last for up to two years!

**Platelet Rich Plasma**, or **PRP** is simply defined as plasma (the non-cellular component of blood) which has been processed to have a high concentration of platelets. It is rich in growth factors - substances which stimulate cell multiplication and tissue repair, therefore it promotes a favourable environment for healing. Like IRAP, it is produced by the specialist collection and processing of blood (from the horse to be treated). This can be done immediately prior to injection of the PRP into the area of damage.

PRP is most commonly used in the treatment of ligament injuries that are not healing as well as anticipated. It is also occasionally used in the treatment of joint disease that has not responded to steroid medication or IRAP.

**Polyacrylamide** hydrogel (marketed for use in horses as Aquamid) is unlike other regenerative therapies in that it is a synthetic compound. It is the same material used as a cosmetic filler in humans! When injected into joints, it becomes integrated into the synovial membrane (joint capsule) which decreases joint effusion (overproduction of poor quality joint fluid) and stiffness.

Clinical trials have indicated a high success rate with this treatment, whether used as a primary treatment or in joints that have failed to respond to other treatments.

Overall, this is an exciting time for the treatment of equine lameness. If you wish to discuss the potential benefits of regenerative therapy for your horse, we would be happy to do so.