

Stem cell therapy

Stemming the tide on tendon injuries

From much-loved ponies to million-pound racehorses, is this the best solution for a tendon injury?

It is well recognised that horses are predisposed to tendon and ligament injury as a result of stresses and strains endured in training and competition. The superficial digital flexor tendon (SDFT) is most commonly injured and results in the characteristic 'bowed tendon' appearance.

SDFT injury has traditionally been associated with racehorses, event horses and hunters, but it can occur in any type of horse or pony of any breed and age. Many people think that such an injury will be the end of the horse's athletic career as there is a high rate of re-injury with traditional treatments. However, in recent years stem cells have provided an alternative treatment, resulting in a more normalised tendon.

It has now been proven that stem cell therapy halves the rate of re-injury when compared with traditional treatments. Many horses in a variety of disciplines are competing successfully after VetCell's StemRegen stem cell therapy – including a number of high profile elite athletes in racing, eventing and dressage.

International eventer Oingy Boingy won a silver medal at the Young Rider Europeans in 2007 (his first season back after stem cell therapy in 2005 for a tendon injury). He is still going strong and had a

double clear at Burghley in 2010. Owner and rider Nicola Wilson says: "I am so pleased that we went ahead with the treatment. His recovery has been incredible and his performance feels as good as ever. I would definitely use stem cell therapy again."

Riding club all-rounder and novice eventer Zoe suffered a 30 per cent tear to her deep digital flexor tendon while messing about in the field. Her owner Gail takes up the story: "We were given several options of treatment but the vet felt as it was such a new injury and so large a tear that stem cell therapy would be the best way to treat her. It would give her a good chance of returning to full work and staying sound. After stem cell implantation and the year-long rehabilitation she came back to full fitness and won her first two-day-event. Her scan results showed that the tendon had healed and there was no sign of damage."

And it's not just horses that gallop and jump that can benefit from stem cell therapy. International Grand Prix dressage rider and former Team GB member Wayne Channon has used stem cell therapy for tendon and ligament injuries. He firmly believes in the technology. Wayne says: "A tendon injury for a dressage horse used to be the end of the road, now we are getting elastic repairs that mean most horses can return to full competition work. It is a life saver." ●

Below right: Stem Cell treatment success story Oingy Boingy in action

THE CAUSE OF INJURY

Tendon and ligament injury can occur due to a repetitive strain injury (RSI) or from direct trauma. When you see the extent to which a tendon stretches during galloping or during take-off and landing over a fence you can understand how an RSI type problem can occur. Under normal circumstances the horse's fetlock joints, both front and hind, will virtually touch the ground at the point of take off over a fence, as the horse pushes down with the front end, lifts its shoulders and transfers its weight onto the hind end to push off the ground. The same is true on landing as the forelimbs take the strain.

This force on the tendon has been measured at one tonne per square centimetre of tendon, both when jumping and also when at a full gallop (bear in mind that the SDFT is actually only one square centimetre in cross-sectional area!). It has also been shown, under lab conditions, that the SDFT breaks when one tonne of stretching force is applied to it. This means that the tendon is close to breaking point whenever the horse is galloping or jumping.

TRADITIONAL TREATMENTS

In the past, many people would simply put their horse in the field for a year to heal after a tendon injury. This allows the formation of scar tissue in the lesion, but scar tissue is not stretchy like normal tendon. It is hard and fibrous and will mean that the areas above and below the scar tissue are put under increased strain as they have to stretch even more than normal to compensate. As the horse's exercise

But how does a tendon injury occur? What exactly is stem cell therapy? And why is it so effective?

level is not controlled the horse can put too much strain on the tendon before it is strong enough, often resulting in further damage.

Firing was a traditional tendon treatment but it is highly controversial and somewhat frowned upon today due to welfare implications. This treatment is now rarely used as stem cell therapy has been proven to be more effective and far less invasive.

Recent research into stem cell therapy (by Smith and his colleagues at the Royal Veterinary College) has shown that using stem cells reduces the rate of re-injury by a half (re-injury rate 27 per cent) when compared with the results of Dr Sue Dyson's 2004 research of more conventional treatments (re-injury rate 56 per cent). These two studies used similar populations of horses and analysed them in the same way. So what is it about stem cell therapy that makes it so much more effective at returning the tendon to a more normal state and reducing the risk of re-injury?

THE STEM CELL

Mesenchymal stem cells are considered an ideal source of cells for regenerative medicine because it can be demonstrated, in horses as in other species, that they are capable of differentiating into different cell types and forming new structures very close to normal. These stem cells are thought to be present in small numbers in



most types of tissue, but for the purposes of stem cell therapy they are harvested from the bone marrow because of ease of recovery and minimal donor site complications.

In addition, because the bone marrow can be harvested from adult tissue you can use the horse's own (autologous) stem cells to heal its tendon, which avoids the need for donor animals or for venturing into the controversial territory of using embryonic stem cells.

It has also been proven that bone marrow derived mesenchymal stem cells tend to out-perform stem cells taken from other areas (such as fat tissue) when comparing their ability to differentiate into new tissue.

Right: Bone marrow is harvested from the horse's sternum or tubercula (hip bone) using a specialised needle



THE STEM CELL THERAPY PROCESS

So how do the stem cells get from the horse's bone marrow and into its tendon to begin the repair work?

Bone marrow is harvested from the horse's sternum or tuber coxa (hip bone) under standing sedation and with a local anaesthetic, using a specially designed needle. This usually needs to happen within one month of the horse sustaining the injury. The bone marrow is then sent to a laboratory. At the lab, the stem cells are cultured over a period of two-three weeks until they have grown in sufficient numbers to be implanted into the horse's tendon (usually about 10 million). They

are then re-suspended in bone marrow supernatant and returned to the vet. The vet uses an ultrasound scanner to guide the needle while stem cells are injected into the tendon lesion, again under standing sedation and with a local anaesthetic (there is no need for a general anaesthetic at any point in the stem cell therapy process).

A bandage is placed on the limb and the horse then undergoes a few days of box rest before beginning a year of a

custom-designed controlled exercise programme to rehabilitate to full fitness. The aim of this is to encourage the stem cells to grow into tendon cells by subjecting them to the stresses that a tendon would normally be exposed to.

Regular ultrasound examinations are used to monitor progress and to evaluate when the horse's workload can be increased. A final scan is also recommended before the horse returns to competition or racing.

What does it all cost?

Stem cell therapy costs around £1,500-£2,000 and is covered by most insurance policies. Following Professor Smith's latest research, VetCell are also now offering the VetCell Plus Promise – a money-back guarantee to show their confidence in their StemRegen stem cell therapy (visit www.vetcell.com for details).

If your horse is ever unfortunate enough to sustain a tendon injury then it is certainly worth remembering to discuss the option of stem cell therapy with your vet. VetCell offers training for any vet wishing to learn the procedures involved in treating horses with stem cell therapy, either via a one-day course or on a one-to-one basis to help with a particular equine patient.

Regenerative medicine is proving to be the way forward for so many injuries and illnesses, and stem cells, with their remarkable ability to differentiate, are at the heart of it.

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