

Research Grant 2/2012:

A comparison of equine Adipose Derived Stem Cells (ADSC), Bone Marrow Stem Cells (BMSC) and Peripheral Blood Stem Cells (pBSC) for the treatment of lameness conditions in horses.

Amy Redmond Hubbard and Dr Lee Morris,
EquiBreed NZ Ltd.
www.equibreed.co.nz
13 September, 2012

The high rate of lameness in horses during training is a major concern within the racing and performance industries. Tendon injuries are a common occurrence and result in the formation of scar tissue. This weaker tissue makes re-injury more likely once the horse goes back into training. An Australian study on wastage in two year old racehorses showed that 66% of lost training days were due to limb injury or lameness. A study in the UK of 400 horses with tendon or ligament injuries showed a re-injury rate of 53% after the horses went back into training. A treatment which can reduce recovery time and get the animal back into work with a lower risk of re-injury would be of great benefit to owners, trainers and horses alike.

The use of mesenchymal stem cells (MSC) can potentially help with reducing the time it takes for an injured horse to get back into work or training. Also, MSC treatments have shown a lower rate of re-injury after the horse has returned to work. Equine bone marrow, fat tissue and blood can all provide stem cells. This project will test all three sources to see which area of the body provides the best source of MSCs. Ideally the source will be easy to collect from and provide a high number of stem cells. There have been a number of previous studies on MSCs from bone marrow for tendon injuries and how they respond to treatment with MSCs. In many cases the injured tendons showed improved healing rates with a higher number of treated horses returning to work than untreated horses. MSCs from fat tissue and blood have also shown improved healing of tendon injuries. Blood as a stem cell source is of particular interest as it is less invasive to collect from the horse than bone marrow or fat tissue, both of which involve minor surgical procedures.

Current MSC treatments take the cells from the injured horse, rather than a donor horse, and inject the cells back into the injured horse. If cells are injected from a donor horse an immune response is stimulated and this results in the cells being rejected. Studies have shown that freezing MSCs can lower the activation of the immune response to the injected cells and reduce rejection rates. All three sources of cells will be frozen to investigate the effect freezing has on the amount of antigen released.

This project provides the opportunity to determine which is the best source of MSCs as well as looking at the effect freezing has on the cells. The ultimate aim is to produce a supply of storable MSC treatments from a group of donor horses which can then be injected into the injury sites of different horses as required. This type of treatment would provide benefits to the equine industry by enhancing the welfare of horses and reducing costs associated with injury and rehabilitation for owners and trainers.