Key Points:

- Mesenchymal stem cell therapy for soft tissue disorders including tendonitis, desmitis, and meniscal injuries is favorable.
- Early diagnosis and intervention improves the regenerative response.
- Administration of allogeneic stem cells and regional limb perfusion of stem cells are promising new treatment modalities.
- Rehabilitation programs and controlled clinical trials are necessities.

Regenerative medicine techniques have been used in equine practice for over 10 years. More recently stromal vascular fraction obtained from adipose tissue and mesenchymal stem cells (MSCs) derived from bone marrow and fat have been used to treat soft tissue orthopedic disorders. Although clinical reports are limited, anecdotal reports from many areas of the world as well as a recent review article are positive regarding improved outcomes for many tendon, ligament and joint injuries.

The main soft tissue disorders that have been treated with stem cell therapy are tendonitis of the deep and superficial digital flexor tendons, desmitis of the suspensory apparatus (suspensory and distal sesamoidean ligaments) and collateral ligaments, and various articular disorders including those with meniscal damage.

Early diagnosis and intervention as well as multiple treatments will likely improve the potential to achieve the greatest regenerative response. Experimental data from development of a tendonitis model has shown migration of fibroblast into the area of injury within 2-3 weeks. Intervening during the early inflammatory stage of healing should have the greatest potential to optimize a regenerative response for soft tissue injuries. In addition, for many disorders, only one administration of stem cells has been utilized. Correlating the stages of healing (inflammatory, reparative and remodeling), with specific treatment times and dosages supports using multiple stem cell applications to achieve an optimal healing response.

Using allogeneic MSCs as a source for cellular therapy has the potential to promote early therapy with larger treatment doses. With current methods for culture and expansion of autologous MSCs, it requires at least 2 weeks of culture time and often can take up to 4 weeks to obtain stem cell numbers greater than 10 million.

Administration of MSCs by regional perfusion has the potential to deliver large number of cells to soft tissue injuries in a minimally invasive manner. This alternative route of administration may be particularly useful when treating injuries without severe fiber disruption and core formation because intralesional administration of MSCs may cause damage to the surrounding uninjured tendon or ligament tissue.

Stem cell therapy is only one part of the puzzle to enhance healing. Appropriate rehabilitation programs optimize the chance for overall treatment success.

Although most reports regarding regenerative medicine therapy for soft tissue injuries are favorable, overall numbers are limited to obtain relevant outcome data for specific disorders. Although it will still be important to document case outcomes retrospectively, instituting
controlled clinical trials will be necessary in order to fully realize the effectiveness of stem cell therapy.

5. 1st International Meeting of the Veterinary Stem Cell Consortium, Leipzig Germany, 2009:S1-S33
6. 1st North American Veterinary Regenerative Medicine Conference, Santa Ynez Valley, March 5-6, 2010