Stem cells have 3 general properties that differentiate them from other cell types in the body. They can divide and renew themselves for long periods of time, they do not perform any function, unspecialized and they can become specialized. They can become a cell that is able to perform a function; they can become specialized.

Embryonic stem cells are derived from embryos. They are capable of forming a new organism. This is the controversial branch of stem cell research and is not used in veterinary medicine. Adult stem cells, or somatic stem cells, are found among differentiated cells in tissues/organs in the living organism. Their role in the body is to repair the tissue in which they are found. These are the stem cells used in veterinary medicine and are most often collected from adipose tissue or bone marrow.

Adipose derived/bone marrow stem cells can differentiate into tendon, ligament, bone, cartilage, cardiac, nerve, muscle, blood vessels, fat and liver tissue. They are readily accessible and adipose derived specifically contain a mixture of regenerative cells.

The adipose tissue or bone marrow is processed to isolate and concentrate the stem cells and can then be delivered to a patient either into the site of concern or intravenously. When stem cell therapy was first studied, it was thought that differentiation was the primary mechanism of action, but there are many ways that stem cells can be therapeutic that are just as important if not more important.

It seems that stem cells can read the environment and modify that specific situation. Dr. Arnold Caplan, stem cell researcher from Case Western summed this up nicely when he said “Stem cells are injury-specific, perfectly choreographed pharmaceutical factories.”

Anti-inflammatory/immunomodulatory- Studies have shown that stem cells inhibit inflammation and promote noninflammatory pathways through suppression of T-cell proliferation, the inhibition of monocyte maturation and myeloid dendritic cells.

Trophic support- Studies have also shown that stem cells secrete growth factors and cytokines that promote new blood vessel formation, stimulate local tissue repair and protect cells from apoptosis. In direct stem cell to chondrocyte contact, these trophic factors have been observed to influence chondrogenic differentiation and cartilage matrix formation.

Stem cells have the ability to home, or migrate to the site of concern via chemotaxis allowing it to be used intravenously when direct implantation into the site of concern is not possible. For example, stem cells have been studied in stroke models by intravenous injection since it is not
appropriate to implant into the brain. Labeled stem cells have been shown to migrate to the site of infarction after intravenous injection and not to unaffected areas in the brain.

Research in stem cell therapy for the canine/equine osteoarthritis and/or tendon/ligament model is available in double-blind, placebo controlled studies, case studies, and retrospective studies. More research is needed but research does support the use of stem cells.

Although, not scientific data, Vet Stem Biopharma has compiled large case numbers since their formation in 2002. As far as safety of the procedure, after treating over 3,500 dogs and 4,000 horses they have not had a systemic adverse event reported and have less than 0.5% local tissue reaction.

Canine owners have indicated quality of life improved in over 80% of dogs and roughly 1/3 of dogs were able to discontinue pain medications and roughly another 1/3 were able to reduce medications. Horses were able to return to their prior level of work in about 75% of the cases for suspensory ligament and tendon injuries and about 60% of the cases for joint disease.

References available upon request.