

## A RETROSPECTIVE REVIEW OF 62 CASES OF SUSPENSORY LIGAMENT INJURY IN SPORT HORSES TREATED WITH ADIPOSE-DERIVED STEM AND REGENERATIVE CELL THERAPY

**INTRODUCTION:** There has been considerable interest in recent years in the therapeutic use of stem and regenerative cells in orthopedic injuries. The current multi-center retrospective study analyzes the efficacy of autologous adipose-derived stem and regenerative cell therapy in horses with suspensory desmitis and other ligament injuries. The specific technique for using adipose-derived cells has been investigated in a controlled, blinded study in a collagenase-induced tendonitis model of the superficial digital flexor tendon in the horse.<sup>1</sup> In this study, investigators reviewed the medical records, diagnostic images, and horse owner surveys for horses treated commercially in 11 equine practices in the United States during 2004 and 2005. Seventy-nine percent of these horses had chronic injuries and most had been treated with one or more modalities prior to use of adipose-derived stem and regenerative cell therapy.

**MATERIALS AND METHODS:** Participating clinics provided all case records for horses with suspensory ligament injuries that were treated with adipose-derived stem and regenerative cell therapy from 2004-2005. All cases that were more than one year from treatment with medical records and known outcomes were analyzed and are reported. The horses were treated intralesionally with a heterogeneous mixture of regenerative cells including mesenchymal stem cells, pericytes, endothelial progenitor cells, and preadipocytes isolated from a sample of their own adipose tissue. Tissue was submitted to the commercial laboratory of VetStem, Inc. (Poway, CA) and the cells isolated using a combination of enzymatic digestion, washing, and centrifugation adapted from Zuk et al.<sup>2</sup> Investigators reviewed medical records for soundness in conjunction with an owner survey to determine if the horse was back to full work and if he was up to the prior level of performance. Injuries were categorized as front or rear limb, proximal or body/branch, and acute or chronic (chronic > 3 months). In addition, notations were made for cases with complications such as bilateral disease or avulsion fractures.

**RESULTS:** The following table presents the number of horses that returned to full work after treatment. (percentage):

Veterinary Diagnosis	Full Work-Prior Level	Full Work-Lower Level	Non-responsive	Totals
Proximal - Fore	15 (83.3%)	2 (11.1%)	1 ( 5.6%)	<b>18</b>
Proximal – Rear	25 (73.5%)	7 (20.6%)	2 ( 5.9%)	<b>34</b>
Body/Branch – Fore	6 (85.7%)	0 ( 0.0%)	1 (14.3%)	<b>7</b>
Body/Branch – Rear	1 (33.3%)	1 (33.3%)	1 (33.3%)	<b>3</b>
<b>TOTALS</b>	<b>47 (75.8%)</b>	<b>10 (16.1%)</b>	<b>5 ( 8.1%)</b>	<b>62</b>

Overall, 75.8% (47/62) of horses treated returned to their prior level of performance and 16.1% (10/62) of treated horses returned to full work at a lower level of performance. Five horses, or 8.1%, did not respond to treatment. Ninety-two percent (12/13) of horses with acute injuries and 71.4% (35/49) of horses with chronic injuries returned to their prior level of performance after treatment. Nine horses sustained an unrelated injury during rehabilitation that precluded analysis of the outcome.

**DISCUSSION/CONCLUSION:** Regenerative cell therapy is being used in both human and veterinary medicine. This retrospective study focused on cases treated at 11 practices during 2004 and 2005. Seventy-nine percent (79%) of these horses had chronic injuries and most had been treated with one or more modalities prior to regenerative cell therapy. Although further investigation is warranted, this retrospective analysis supports the use of autologous adipose-derived stem and regenerative cell therapy for treatment of acute and chronic suspensory ligament injuries, with or without avulsions.

### REFERENCES:

- 1 Dahlgren LA. Use of adipose derived stem cells in tendon and ligament injuries. American College of Veterinary Surgeons Symposium Equine and Small Animal Proceedings, October 18, 2006.
- 2 Zuk PA, Zhu M, Ashjian P, De Ugarte DA, Huang JI, Mizuno H, Alfonso ZC, Fraser JK, Benhaim P, Hedrick MH. Human adipose tissue is a source of multipotent stem cells. Mol Biol Cell. 2002 Dec;13(12):4279-95

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