Tendon Injuries Could Be Explained By New Research Results

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Two novel discoveries about how different types of tendons age and "refresh" themselves made by researchers from University College London in the United Kingdom help explain why aging horses are atrisk for tendon injury.

Tendons play key roles in locomotion as they are the link between muscles and bones. Tendons such as the equine superficial digital flexor tendon (SDFT) are energy-storing tendons that stretch and recoil to increase the efficiency of locomotion, whereas other tendons such as the common digital extensor tendon (CDET) are primarily positional tendons that assist in limb placement.

"The energy storing tendons are subjected to much higher stresses and strains than positional tendons, which is why tendons like the SDFT are more prone to injury and micro-damage," said lead researcher Helen Birch, BSc, BSc (Ost.), PhD, senior lecturer at the Institute of Orthopaedics and Musculoskeletal Science at University College London.

Birch and colleagues previously hypothesized that the matrix of the energy storing tendons would be turned over or “refreshed” more quickly than positional tendons to maintain a healthy anatomic structure and ultimately decrease injury.

"Unexpectedly, we found that the matrix of the SDFT was turned over more slowly than the CDET in horses," explained Birch.

To confirm these surprising findings using more sophisticated technology, Birch and coworkers measured the "age" of the molecules in the SDFT and CDET in young and older horses and the rate of collagen turnover.

Their key findings?

- Average half-life of collagen in the tendons was almost six times longer in the SDFT than the CDET (197.53 and 34.03, respectively);
- The collagen half-life was significantly longer in older horses; and
- Collagen degradation products in the SDFT increased significantly with age.

Birch noted, "We speculate that the slower rate of turnover in the SDFT could actually protect horses because too high a rate of turnover would compromise the strength and stiffness of the tendon, making it more prone to injury than it already is."

She continued, "In addition, it seems that the increased susceptibility of older horses to tendon injury results from an inability to remove partially degraded collagen from the tendon matrix, resulting in a reduction of mechanical competence."

According to the scientists on the study, not only does this research confirm the group’s earlier findings and provide additional information regarding the development of tendon injuries, it also points researchers in a new direction for developing better tools for treating tendon injuries.

"In future work we will determine whether a reduced rate of collagen turnover in older horses is due to a decline in tendon cell activity or due to increased resistance of the matrix to degradation," relayed Birch.

The study, "Aspartic acid racemization and collagen degradation markers reveal an accumulation of damage in tendon collagen that is enhanced with aging," was published in the May 21, 2010, edition of *The Journal of*

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