Longitudinal tendon healing assessed with multi-modality advanced imaging and tissue analysis

Johnson et al. (2024), in *Animals*

Products
Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and Ultrasonography (US) for longitudinal assessment of superficial digital flexor tendon (SDFT) healing.

Hospital / Authors
Sherry A. Johnson, Alejandro Valdés-Martínez, Philip J. Turk, Cyril Wayne McIlwraith, Myra F. Barrett, Kirk C. McGilvray, David D. Frisbie
Colorado State University, Orthopaedic Research Center, Veterinary Imaging Consultants, Atrium Health.

Clinical Background
SDFT injuries present challenges due to high re-injury rates and biomechanical deficits. Multi-modality imaging provides advanced diagnostic capabilities, aiding in rehabilitation and performance optimization.

Aim of Study
To compare CT, MRI, and US in assessing tendon healing, correlating imaging findings with histologic, biochemical, and biomechanical parameters using an equine surgical model.

Cohort Study
Surgically induced tendon lesions in eight horses, imaged using CT, MRI, and US over 12 months. Imaging findings correlated with histologic and biomechanical data to evaluate tissue changes during healing.

Link to paper

Results

- **CT imaging identified the largest lesions** and precisely detected scar tissue changes, with isoattenuation correlating to aggrecan deposition, indicating suboptimal healing.
- **MRI T2-weighted hyperintensity revealed hypercellular remodeling** even in chronic stages, while PD-FS hyperintensity indicated reduced cellular density and chronic tissue changes.
- **US consistently underestimated lesion size**, highlighting its limitations compared to CT and MRI in advanced tendon imaging.
- **Lesion size decreased over time across all modalities**, with CT showing the largest lesion-to-tendon ratios, followed by MRI and US.

Summary

- **CT imaging** provided the **most precise assessment** of tendon lesion size and healing dynamics, identifying **scar tissue formation** through **isoattenuation**.
- **MRI sequences** revealed **chronic tissue remodeling**, offering **valuable insights** into **cellular-level changes** during healing.
- **US**, while **practical and accessible**, should be interpreted **cautiously** due to its **underestimation** of lesion size.
- **Advanced imaging modalities** are **critical** for refining **diagnostic accuracy** and **rehabilitation strategies**, ensuring **optimal outcomes** for equine athletes.

Source: Johnson, S. A., Valdés-Martínez, A., Turk, P. J., et al. (2024). DOI: 10.1111/ evj.13478, in *Animals*.