Microstructural Alterations Associated With Severe Navicular Degeneration

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Severe navicular bone degeneration is associated with microstructural alterations of trabecular and cortical bone tissues throughout the medullary cavity and articular and flexor cortices. Authors' address: School of Veterinary Medicine, University of California, Davis, CA 95616; e-mail: saarsvold@ucdavis.edu. *Corresponding author. © 2011 AAEP.

1. Introduction
Navicular bone pathology is an important component of foot lameness in horses. Enlarged synovial invaginations, bone fragmentation, enthesophyosis, flexor cortical lysis, and medullary sclerosis are typical clinical radiographic findings. However, the pathogenesis and interrelationships of these changes remain poorly understood. The primary objective of this study was to more fully characterize alterations in microstructure of severely diseased navicular bones.

2. Materials and Methods
Unilateral forelimb navicular bones from 13 diseased and 7 control horses were imaged using microcomputed tomography. Trabecular morphology, porosity, mineral density, and cortical thickness were quantified and compared between diseased and control bones using t tests with $p \leq 0.05$ considered significant.

3. Results
Diseased bones had more and denser compact bone, fewer, thicker, and less-organized trabeculae, and thicker articular (dorsal) and flexor cortices than control bones. Mid-sagittal flexor cortical lucencies were present in diseased and control bones, but only diseased bones had flexor cortical surface disruption.

4. Discussion
Microstructural alterations consistent with bone modeling and pathology were observed throughout the compact and trabecular tissues of these severely diseased bones. These findings are consistent with an altered biomechanical environment of the entire bone as well as pathological changes in the flexor cortex and medullary cavity. This study helps to clarify radiographic abnormalities identified in horses with navicular degeneration.