Significant Osteolysis in the Equine Distal Phalanx Associated With the Development and Progression of Laminitis

Julie B. Engiles, VMD*; Hannah Galantino-Homer, VMD, PhD; Raymond C. Boston, PhD, MSc; Diane McDonald, VMD; Michael Dishowitz, PhD; and Kurt D. Hankenson, DVM, PhD

Progressive distal phalangeal osteolysis is associated with equine laminitis and may affect sensitive lamellar pathology, disease progression, or response to therapeutic management. Authors’ addresses: Department of Pathobiology (Engiles); Laminitis Institute, Department of Clinical Studies (Galantino-Homer, Boston, McDonald, Hankenson); School of Veterinary Medicine, University of Pennsylvania, 382 West Street Road, Kennett Square, PA 19348; Department of Bioengineering, School of Engineering and Applied Sciences (Dishowitz); Department of Orthopaedic Surgery (Hankenson), Perelman School of Medicine, University of Pennsylvania, 3900 Spruce Street, Philadelphia, PA 19104; e-mail: engiles@vet.upenn.edu. *Corresponding and presenting author. © 2013 AAEP.

1. Introduction
Laminitis-associated pathology of the equine distal phalanx (DP) has not been well characterized. The objective of this study was to identify, characterize, and quantify progressive DP osteopathology associated with equine laminitis through the use of micro-computed tomography (microCT).

2. Materials and Methods
Thirty-six feet from 15 horses with and without clinical history or signs of laminitis were evaluated for lamellar pathology using a novel, multi-modal pathological grading schematic and for quantitative bone loss through the use of microCT. Semi-quantitative pathology grades incorporating radiologic, gross, histopathologic, and temporal factors were correlated with DP microCT volumetrical and morphometric data.

3. Results
MicroCT measurements show significant decreases in bone volume within DP trabecular, compact bone, and total bone compartments as well as bone density and trabecular structural configurations that correlate with severity and progression of lamellar pathology. These bony changes are observed in performance and non-performance animals as well as in acute to subacute or mild/subclinical stages of disease.

4. Discussion
A detailed semi-quantitative pathological grading scheme and a novel method to evaluate and quantify
osteopathology of the equine DP through the use of microCT were developed. Progressive DP osteolysis correlated with severity and temporal progression of laminitis, which has the potential through shared blood supply and close anatomic approximation to influence lamellar pathology and disease progression.