Bone Fragility Syndrome: Comparison of Scintigraphy, Physical Examination, Scapular Ultrasound, and Serum Markers of Bone Turnover for Accuracy in Diagnosis

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Moderate to severe cases of bone fragility syndrome (BFS) are detectable by physical examination and scapular ultrasound. Scintigraphy was necessary to detect mild BFS and assess disease distribution. Serum markers of bone turnover were not clinically useful. Physical and scintigraphic severity indices will facilitate assessment of disease progression. Authors’ addresses: JD Wheat Veterinary Orthopedic Research Laboratory (Arens, Stover); Department of Surgical and Radiological Sciences (Puchalski and Whitcomb); Department of Medicine and Epidemiology (Gardner), School of Veterinary Medicine, University of California, 1 Shields Avenue, Davis, CA 95616; University Veterinary Center Camden, 410 Werombi Road, Camden, NSW Australia 2777 (Bell); e-mail: smstover@ucdavis.edu. *Corresponding author. © 2011 AAEP.

1. Introduction
Extensive and progressive bone resorption associated with bone fragility syndrome (BFS) results in skeletal deformations, pathologic fractures, and often, humane euthanasia. Prevention of bone resorption using antiosteoclastic therapies may improve lives of affected horses with early diagnosis. There is a need to assess the accuracy of diagnostic tests for BFS.

2. Materials and Methods
A prospective case control study used scintigraphy as the reference standard to which physical examination, scapular ultrasound, and serum biomarkers of bone formation (bone-specific alkaline phosphatase) and resorption (carboxyterminal telopeptide of collagen cross-links) were assessed for accuracy in disease diagnosis. Severity indices were created for scintigraphic and physical exam findings to capture the spectrum of disease.

3. Results
Scintigraphy was the most accurate diagnostic test for BFS, detecting BFS at early stages and providing information on disease severity and distribution. Physical examination and scapular ultrasound were
accurate for moderate to severe disease. The evaluated serum markers were not diagnostically useful. Severity indices for physical examination and scintigraphic features provide a framework within which affected horses can be assessed and monitored.

4. Discussion
Clearly defined criteria for interpretation of diagnostic tests aid in detection of BFS. Severity indices may be useful for assessing disease progression and response to treatment.