Stem Cells Acquired From Equine Sternum and Ilium: A Comparison of Cell Characteristics

Karla Penman, BA*; Laurie R. Goodrich, DVM, PhD, Diplomate ACVS; Jennifer N. Phillips, BA; John D. Kisiday, PhD; Audrey Ruple-Czerniak, DVM; and C. Wayne McIlwraith, BVSc, PhD, DSc, FRCVS, Diplomate ACVS

Bone marrow aspirates acquired from equine sternum and ilium yield mesenchymal stem cells of adequate multilineage propensities under in vitro conditions. Cells acquired from the sternum appear to have a higher propensity to become osteogenic than do cells from the ilium. Authors’ address: Equine Orthopaedic Research Center, Colorado State University, 300 W. Drake Road, Fort Collins, CO 80523-1678; e-mail: horsekrazykarla@yahoo.com. *Presenting author. © 2012 AAEP.

1. Introduction
Common marrow aspiration locations in the horse are the sternum and the ilium. Laboratory evaluation of cell growth characteristics has documented no difference in growth potential across aspiration between sternum and ilium. This study was performed to investigate whether mesenchymal stem cells (MSCs) from ilium or sternum have greater propensity to become tenogenic, chondrogenic, or osteogenic in vitro.

2. Materials and Methods
Sternum and ilium marrow aspirates were performed in horses. Cells were cultured and treated with appropriate differentiation media for tri-lineage evaluation. Flow cytometry was conducted on cells and evaluated CD11/18a, CD34, CD44, and CD90 surface markers. Further assays were performed to evaluate tenogenesis, chondrogenesis, and osteogenesis.

3. Results
Differentiation assays yielded MSCs with desired morphologic changes, confirming similar trilineage propensity between sternum and ilium. No significant differences were detected in cell surface markers between sternum and ilium. Osteogenic propensity quantified by alkaline phosphatase production had a trend to be higher in the sternum but this was not found to be statistically significant.

4. Discussion
The results of this study suggest that there were no differences in aspiration location and MSCs cell surface markers or tenogenic or osteogenic differentiation. While this study did not detect chondrogenic differences between aspiration location, another study reported moderately higher chondrogenesis for MSCs from the ilium1. While this study and others were performed in an in vitro system, future in vivo studies will determine if a biologic significance exists in chondrogenic, osteogenic or tenogenic healing potential of MSCs from different locations.

Reference
1. Kisiday JD, Goodrich LR, McIlwraith CW, Frisbie DD. Effects of equine bone marrow aspirate volume on the isolation, proliferation, and differentiation potential of mesenchymal stem cells. AJVR, 2013, in press.