Effect of Hyaluronic Acid and Betamethasone on Interleukin-1–Treated Chondrocyte Pellets

Elysia Schaefer, DVM; Allison A. Stewart, DVM, MS; and Matthew C. Stewart, BVSc, PhD

Authors’ address: University of Illinois, College of Veterinary Medicine, Large Animal Clinic, 1008 West Hazelwood Drive, Urbana, Illinois 61802; e-mail: ecschae@uiuc.edu. © 2009 AAEP.

1. Introduction
A previously published study performed on equine chondrocyte pellet cultures treated with interleukin-1 (IL-1) showed that the addition of a high molecular weight hyaluronic acid (HA) combined with triamcinolone had protective effects on IL-1–induced proteoglycan (PG) matrix catabolism. Our hypothesis was that administration of HA at a molecular weight of 3 million Daltons, alone or in combination with betamethasone, could equally mitigate effects of IL-1–induced chondrocyte PG matrix catabolism.

2. Materials and Methods
Normal chondrocyte pellets were isolated from seven horses. Chondrocyte pellet cultures from each horse were treated with fresh control media, IL-1 media, or IL-1 media containing HA, betamethasone, or betamethasone and HA. New PG synthesis and release was determined by $^{35}$SO$_4$ incorporation into the pellet or release into the media, respectively. Total glycosaminoglycan (GAG) content in the pellets and media was determined using a dimethylmethylene blue binding assay. Statistical significance was determined using repeated measures analysis of variance on statistical software with a p value of <0.05 considered to be significant.

3. Results
The use of 2.0 mg/ml HA caused a significant increase in PG synthesis of IL-1–treated pellets compared with the IL-1 treatment group, whereas the use of 0.006 mg/ml betamethasone caused a significant decrease in PG synthesis compared with the 0 mg/ml betamethasone treatment group. Total pellet GAG content had a significant increase when treated with 2.0 mg/ml HA, whereas treatment with betamethasone had no significant effect compared with the IL-1 treatment group.

4. Discussion
In this study, HA had beneficial effects on pellet PG matrix metabolism induced by IL-1, whereas a single-tested dose of betamethasone showed some possible detrimental effects. In contrast to the previously published study using triamcinolone, betamethasone showed no protective effects on PG metabolism in IL-1–stimulated chondrocytes. In addition, no synergistic effects were seen when HA and betamethasone were combined.

Footnotes
bCelestone Soluspan, Schering, Kenilworth, NJ 07033.
cSigmaStat software, Aspire Software International, Ashburn, VA 20147.