Effects of Mixing Pharmaceuticals With Equine Stem Cells for the Treatment of Orthopedic Injuries

Laurie Bohannon, DVM*; Naomi Walker, BA; Julie Burges, BS, MS; Larry Galuppo, DVM, Diplomate ACVS; Sean Owens, DVM, Diplomate ACVP; and Dori Borjesson, DVM, Diplomate ACVP

Equine bone marrow-derived mesenchymal stem cells (MSCs) tolerate coincubation with hyaluronic acid (HA). The practice of mixing MSCs with aminoglycoside antibiotics causes rapid cell death and is not recommended for clinical use. Authors' addresses: Surgical and Radiological Sciences, University of California, School of Veterinary Medicine, Davis, CA 95616 (Bohannon and Galuppo); Pathology, Microbiology, and Immunology, University of California, School of Veterinary Medicine, Davis, CA 95616 (Walker, Owens, and Borjesson); and Blood Bank, University of California, School of Veterinary Medicine, Davis, CA 95616 (Burges); e-mail: lkbohannon@ucdavis.edu. *Corresponding author. © 2011 AAEP.

1. Introduction
Mesenchymal stem cells (MSCs) are widely used to treat equine orthopedic injuries that are unresponsive to conventional therapies. We hypothesized that incubation of bone marrow (BM)-derived MSCs with therapeutic doses of gentamicin, amikacin, and HA would not alter MSC product pH or viability. The objective of this study was to evaluate the effects of ancillary products on MSC function.

2. Materials and Methods
Equine BM-MSCs from three adult horses were used. Five million MSCs from each donor were incubated with gentamicin (75 mg at 60 mg/ml), amikacin (125 mg at 125 mg/ml), HA (8.25 mg at 10 mg/ml), or 1% penicillin/streptomycin (control) under sterile conditions. MSC viability and product pH were serially measured.

3. Results
Serial flow cytometric analysis showed that the incubation of MSCs with gentamicin resulted in >95% MSC death after 45 min and 2 h, respectively. Rapid MSC death prohibited additional analyses with these additives. The incubation of MSCs with hyaluronic acid and penicillin/streptomycin for up to 6 h resulted in sustained MSC viability of 80%. All additives resulted in decreased product; pH, however, remained constant over time.

4. Discussion
In conclusion, MSCs are more tolerant with coincubation of HA, and its effects on MSC viability are minimal. Also, the practice of mixing MSCs with aminoglycoside antibiotics is toxic to equine BM-MSCs and not recommended for clinical practice.

Footnote