Pharmacokinetics of Metronidazole in Foals

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Neonatal foals have reduced clearance of metronidazole compared to adults, with a prolonged elimination half-life. Based on the results of this study, dosage recommendation for foals includes 10–15 mg/kg IV or orally, q 12 h. Authors’ addresses: William R. Pritchard Veterinary Medical Teaching Hospital (Swain); Department of Internal Medicine and Epidemiology (Magdesian, Edman); and Kenneth L. Maddy Equine Analytical Chemistry Laboratory (Knych), School of Veterinary Medicine, University of California, Davis, CA 95616; e-mail: elsbethswaindvm@gmail.com. *Corresponding and presenting author. © 2014 AAEP.

1. Introduction
Neonatal foals have different pharmacokinetics compared to adults, which may lead to accumulation of drugs and adverse effects when adult dosage regimens are used. The purpose of this study was to determine the pharmacokinetics of metronidazole in healthy foals when administered as a single intravenous (IV) and intragastric (IG) dose.

2. Materials and Methods
Twelve healthy foals at 1 to 2.5 days of age were randomized into two groups and received metronidazole (15 mg/kg) IV or IG. Foals in the IV group were studied again at 10 to 12 days of age to evaluate for maturational differences. Plasma metronidazole concentrations were measured using liquid chromatography mass-spectrometry. Pharmacokinetics were described using a noncompartmental model and were compared between age groups.

3. Results
For IV administration in foals 1 to 2.5 days of age, the maximum plasma concentration ($C_0$ after infusion) was 18.79 ± 1.46 µg/ml, elimination half-life was 11.79 ± 1.77 h, clearance was 0.84 ± 0.13 ml/min/kg, and the volume of distribution was 0.87 ± 0.07 L/kg. Oral bioavailability was 100%. Elimination half-life was significantly longer, and clearance was significantly lower, in 1–2.5 day-old foals compared to 10–12 day-old foals. Elimination half-life at 10 to 12 days of age was 9.07 ± 2.84 h.

4. Discussion
The reduced clearance and longer elimination half-life of metronidazole in foals compared to adults warrants altered dosing recommendations in foals.

Acknowledgments
Conflict of Interest
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