Pharmacokinetics of orally administered phenylbutazone in African and Asian elephants (Loxodonta africana and Elephas maximus)

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Abstract

The pharmacokinetic parameters of phenylbutazone were determined in 18 elephants (Loxodonta africana and Elephas maximus) after single-dose oral administration of 2, 3, and 4 mg/kg phenylbutazone, as well as multiple-dose administrations with a 4-wk washout period between trials. After administration of 2 mg/kg phenylbutazone, mean serum concentrations peaked in approximately 7.5 hr at 4.3 ± 2.02 µg/ml and 9.7 hr at 7.1 ± 2.36 µg/ml for African and Asian elephants, respectively, while 3 mg/kg dosages resulted in peak serum concentrations of 7.2 ± 4.06 µg/ml in 8.4 hr and 12.1 ± 3.13 µg/ml in 14 hr. The harmonic mean half-life was long, ranging between 13 and 15 hr and 39 and 45 hr for African and Asian elephants, respectively. There was evidence of enterohepatic cycling of phenylbutazone in Asian elephants. Significant differences (P < 0.0001) in pharmacokinetic values occurred between African and Asian elephants for clearance (27.9 and 7.6 ml/hr/kg, respectively), terminal half-life (15.0 and 38.7 hr, respectively), and mean residence time (22.5 and 55.5 hr, respectively) using 2-mg/kg dosages as an example. This suggests that different treatment regimens for Asian and African elephants should be used. There were no apparent gender differences in these parameters for either elephant species.