Pharmacokinetics and toxic effects of lithium chloride after intravenous adminstration in conscious horses

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Objective: To determine the pharmacokinetics and toxic effects associated with IV administration of lithium chloride (LiCl) to conscious healthy horses.

Animals: 6 healthy Standardbred horses.

Procedure: Twenty 3-mmol boluses of LiCl (0.15 mmol/L) were injected IV at 3-minute intervals (total dose, 60 mmol) during a 1-hour period. Blood samples for measurement of serum lithium concentrations were collected before injection and up to 24 hours after injection. Behavioral and systemic toxic effects of LiCl were also assessed.

Results: Lithium elimination could best be described by a 3-compartment model for 5 of the 6 horses. Mean peak serum concentration was 0.561 mmol/L (range, 0.529 to 0.613 mmol/L), with actual measured mean serum value of 0.575 mmol/L (range, 0.52 to 0.67 mmol/L) at 2.5 minutes after administration of the last bolus. Half-life was 43.5 hours (range, 32 to 84 hours), and after 24 hours, mean serum lithium concentration was 0.13+/-0.05 mmol/L (range, 0.07 to 0.21 mmol/L). The 60-mmol dose of LiCl did not produce significant differences in any measured hematologic or biochemical variables, gastrointestinal motility, or ECG variables evaluated during the study period.

Conclusions and clinical relevance: Distribution of lithium best fit a 3-compartment model, and clearance of the electrolyte was slow. Healthy horses remained unaffected by LiCl at doses that exceeded those required for determination of cardiac output. Peak serum concentrations were less than steady-state serum concentrations that reportedly cause toxic effects in other species.