

# capsules

## THE CURRENT LITERATURE IN BRIEF

### Furosemide—CRI vs Bolus

Diuretics are considered the most effective treatment for congestive heart failure, for initial treatment of pulmonary edema, and for acute respiratory distress syndrome. Typically administered IV as an intermittent bolus every 4 to 6 hours, the diuretic effect of furosemide lasts only 1 to 2 hours, resulting in rebound sodium and water retention because neurohormonal activity can resume between doses. Continuous-rate infusion (CRI) in humans has been shown to result in more diuresis with less variation in serum and renal tube drug concentrations and risk for toxicity. In one random crossover study with a 2-week washout period between treatments, clinical use of furosemide was simulated in 6 healthy greyhounds. Intermittent bolus and CRI in the absence of fluid replacement were compared. For the intermittent bolus test, dogs received 3 mg/kg furosemide at 0 and 4 hours. For the CRI test, dogs received a 0.66-mg/kg loading dose of furosemide followed by 0.66 mg/kg/hr over 8 hours in a diluted, pH-adjusted, IV solution. In another study, veterinary furosemide (50 mg/ml) was diluted without pH adjustment to 10 mg/ml using 5% dextrose in water, 0.9% saline, lactated Ringer's solution, or sterile water without gross or microscopic precipitation for 8 hours. Such dilution facilitated administration as a CRI by enabling flow rates that maintain catheter patency.

Urine production and water intake were greater ( $P = 0.05$ ) for CRI than with intermittent bolus, as were sodium and calcium losses ( $P = 0.05$ ). However, potassium loss was less ( $P = 0.03$ ). There was no difference between urine magnesium and chloride losses, or other blood markers, which is similar to results of most studies in humans. No serious side effects for CRI were noted.

Further evaluation of CRI furosemide is warranted in normal dogs of other breeds and in patients with congestive heart failure. Diluted veterinary formulations without pH adjustment probably can be safely administered to dogs and cats, but clinical study will be necessary to confirm this assumption.

**COMMENTARY:** The first study demonstrates the merit of CRI of furosemide versus bolus injection. The second study suggests that simple dilution of veterinary furosemide may be safe for CRI, which could be valuable for treatment of congestive heart failure as well as acute respiratory distress syndrome.—*R. Michael Thomas, DVM*

*Intermittent bolus injection versus continuous infusion of furosemide in normal adult greyhound dogs. Adin DB, Taylor AW, Hill RC, Scott KC, Martin FG. J VET INTERN MED 17:632-636, 2003.*

*Short-term compatibility of furosemide with crystalloid solution. Adin DB, Hill RC, Scott KC. J VET INTERN MED 17:724-726, 2003..*