Effect of background serum lithium concentrations on the accuracy of lithium dilution cardiac output determination in dogs

Objectives: To assess the effect of increasing serum lithium concentrations on lithium dilution cardiac output (LiDCO) determination and to determine the ability to predict the serum lithium concentration from the cumulative lithium chloride dosage.

Animals: 10 dogs (7 males, 3 females).

Procedure: Cardiac output (CO) was determined in anesthetized dogs by measuring LiDCO and thermodilution cardiac output (TDCO). The effect of the serum lithium concentration on LiDCO was assessed by observing the agreement between TDCO and LiDCO at various serum lithium concentrations. Also, cumulative lithium chloride dosage was compared with the corresponding serum lithium concentrations.

Results: 44 paired observations were used. The linear regression analysis for the effect of the serum lithium concentration on the agreement between TDCO and LiDCO revealed a slope of -1.530 (95% confidence interval [CI], -2.388 to -0.671) and a y-intercept of 0.011 (r^2 = 0.235). The linear regression analysis for the effect of the cumulative lithium chloride dosage on the serum lithium concentration revealed a slope of 2.291 (95% CI, 2.153 to 2.429) and a y-intercept of 0.008 (r^2 = 0.969).

Conclusions and clinical relevance: The LiDCO measurement increased slightly as the serum lithium concentration increased. This error was not clinically relevant and was minimal at a serum lithium concentration of 0.1 mmol/L and modest at a concentration of 0.4 mmol/L. The serum lithium concentration can be reliably predicted from the cumulative lithium dosage if lithium chloride is administered often within a short period.