Total body water and ECFV measured using bioelectrical impedance analysis and indicator dilution in horses

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The purposes of this study were 1) to determine the compartmentation of body water in horses by using indicator dilution techniques and 2) to simultaneously measure bioelectrical impedance to current flow at impulse current frequencies of 5 and 200 kHz to formulate predictive equations that could be used to estimate total body water (TBW), extracellular fluid volume (ECFV), and intracellular fluid volume (ICFV).

Eight horses and ponies weighing from 214 to 636 kg had catheters placed into the left and right jugular veins. Deuterium oxide, sodium thiocyanate, and Evans blue were infused for the measurement of TBW, ECFV, and plasma volume (PV), respectively. Bioelectrical impedance was measured by using a tetrapolar electrode configuration, with electrode pairs secured above the knee and hock. Measured TBW, ECFV, and PV were 0.677 ± 0.022, 0.253 ± 0.006, and 0.040 ± 0.002 l/kg body mass, respectively.

Strong linear correlations were determined among measured variables that allowed for the prediction of TBW, ECFV, ICFV, and PV from measures of horse length or height and impedance.

It is concluded that bioelectrical impedance analysis (BIA) can be used to improve the predictive accuracy of non-invasive estimates of ECFV and PV in euhydrated horses at rest.