

CONTINUING MEDICAL EDUCATION ΣΥΝΕΧΙΖΟΜΕΝΗ ΙΑΤΡΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

Acid-Base Balance-Electrolyte Quiz – Case 59

Which is the effect of the rapid administration of 1 L of hypertonic saline solution (3%) on serum osmolality but also on extra- and intravascular volume in a patient with Posm 300 mosmoL/g and body weight 80 kg?

Answer:

The initial number of total body osmoles is total body water (60% of body weight=48 L) \times Posm=14,400. An increase of total body water by 1 L and an increase of total number of osmoles by 1,034 osmoles are observed with the administration of 1 L of hypertonic (3%) saline solution. Thus, the new total body water is 49 L and the new total number of osmoles is 14,400+1,034=15,434. Accordingly, the new Posm is 15,434/49=315 mosmoL/kg (therefore, an increase in Posm and subsequently in serum sodium is

expected). The new total number of osmoles in the extracellular volume (baseline value 48 L/3=16 L) is $16 \times 300 + 1,034 = 5,834$. Hence, the new extracellular volume is new osmoles/new Posm= $5,834/315 = 18.5$ L (an increase by 2.5 L), while a decrease in intravascular volume by 0.5 L will be ensued.

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