

CONTINUING MEDICAL EDUCATION ΣΥΝΕΧΙΖΟΜΕΝΗ ΙΑΤΡΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

Acid-Base Balance-Electrolyte Quiz – Case 55

Which is the approximate increase of serum sodium concentration in a 60 kg woman with acute symptomatic hyponatremia (serum sodium 120 mEq/L) given a 2 mL/kg body weight of hypertonic 3% NaCl solution ($\text{Na}^+=513$ mEq/L):

- 1 mEq/L
- 2 mEq/L
- 4 mEq/L
- 6 mEq/L.

Tonicity balance studies can be used to calculate the change in serum sodium levels. The estimate total body water is 50% of total weight (30 L). The patients total cation content can be calculated from the equation:

$$\text{Serum sodium} = \frac{\text{Total cation content}}{\text{Total body water}} \rightarrow \text{total cation content} \\ = \text{serum sodium} \times \text{total body water} = 30 \text{ L} \times 120 \text{ mEq/L} = 3,600$$

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mEq. The total cation content will be increased by the administration of the hypertonic saline solution by 62 mEq (2 mL/kg=120 mL [0.12 L] × 513 mEq/L=62 mEq), while the total body water will be increased by only 0.12 L. Thus, the new sodium concentration is:

$$\text{serum sodium} = \frac{\text{Total cation content}}{\text{Total body water}} = \\ = \frac{3,600 + 62}{30.12} = 121.6 \text{ mEq/L}$$

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