

## CONTINUING MEDICAL EDUCATION ΣΥΝΕΧΙΖΟΜΕΝΗ ΙΑΤΡΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

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### Acid-Base Balance-Electrolyte Quiz – Case 16

A 72-year-old man was admitted to the hospital with symptoms of congestive heart failure: Arterial pH 7.62, PO<sub>2</sub> 48 mmHg, PCO<sub>2</sub> 25 mmHg, HCO<sub>3</sub><sup>-</sup> 21 mEq/L, Na<sup>+</sup> 128 mEq/L, Cl<sup>-</sup> 78 mEq/L.

Which are the acid-base disorders of the patient?

- a. Respiratory alkalosis
- b. Respiratory alkalosis and metabolic alkalosis
- c. Respiratory alkalosis and metabolic acidosis
- d. Metabolic alkalosis and respiratory acidosis
- e. Respiratory alkalosis and metabolic acidosis, as well as metabolic alkalosis

#### Comment

*Hypoxemia-induced respiratory alkalosis is the dominant acid-base disorder (alkalemia due to decreased PCO<sub>2</sub>). In this case the expected HCO<sub>3</sub><sup>-</sup> concentration is between 18 mEq/L and 21 mEq/L (a 2–4 mEq/L decrease of serum HCO<sub>3</sub><sup>-</sup> levels for each decrease of PCO<sub>2</sub> by 10 mEq/L). Thus, there is no obvious superimposed*

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*metabolic disorder. However, the serum anion gap is elevated (29 mEq/L), suggesting the presence of a coexisting wide gap metabolic acidosis (possibly due to lactic acidosis). Even though other causes of an elevated anion gap should be carefully excluded, a very wide anion gap virtually establishes the presence of an increased anion gap metabolic acidosis. In an increased anion metabolic acidosis the decrease in HCO<sub>3</sub><sup>-</sup> is equal to the increase in the anion gap. However, in the present case the decrease of serum HCO<sub>3</sub><sup>-</sup> concentration (3 mEq/L) was substantially lower than the increase in serum anion gap (29–10=19 mEq/L), a finding that implied the presence of an additional acid-base disorder (metabolic alkalosis) due to the previous furosemide administration.*

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