

## CONTINUING MEDICAL EDUCATION ΣΥΝΕΧΙΖΟΜΕΝΗ ΙΑΤΡΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

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### Acid-Base Balance-Electrolyte Quiz – Case 43

A 22-year-old woman with psychological problems was admitted to the emergency room in a comatose state. Laboratory investigation showed: glucose 90 mg/dL, urea 35 mg/dL, creatinine 1.3 mg/dL, sodium 144 mEq/L, potassium 4 mEq/L, chloride 106 mEq/L, arterial pH 7.24,  $PCO_2$  24 mmHg and  $HCO_3^-$  10 mEq/L.  $Posm$  (measured by an osmometer) was 360 mosmol/kg. Urine examination was unremarkable.

Which is the likely cause of metabolic acidosis?

- a. Alcoholic ketoacidosis
- b. L-lactic acidosis
- c. D-lactic acidosis
- d. Ingestion of toxins
- e. Renal tubular acidosis

#### Comment

The patient had a high anion gap [ $serum\ anion\ gap = Na^+ - (Cl^- + HCO_3^-) = 18\ mEq/L$ ] metabolic acidosis (acidemia associated with a decrease in serum  $HCO_3^-$  levels). The most common causes of a high anion gap metabolic acidosis include diabetic or alcoholic

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*ketoacidosis (which can be excluded by the absence of hyperglycemia and ketonuria), lactic acidosis [which can be excluded by the absence of any apparent cause of lactic acidosis; moreover, lactic acid levels were within normal limits (2 mmol/L)], renal failure (which is not the cause in our patient), and finally ingestions of certain toxins. The possibility of toxin-induced metabolic acidosis is further supported by the patient's history and by an increased serum osmolar gap [difference between measured  $Posm$  and calculated  $Posm$  from the equation:  $Posm = 2 \times serum\ Na^+ (mEq/L) + glucose (mg/dL)/18 + urea (mg/dL)/6$ ]. Under normal conditions, the osmolar gap is  $<10\ mosmol/kg\ H_2O$ . In this patient, the osmolar gap was  $360 - 299 = 61\ mosmol/kg$ , a value which signifies the potential ingestion of toxins, such as methanol or ethylene glycol. A careful examination of the urine can help in the diagnosis of ethylene glycol poisoning, since the presence of calcium oxalate crystals can support this diagnosis. However, measurement of methanol or ethylene glycol in the serum or urine can confirm the diagnosis.*

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