

Diabetes of 1st type – example

Education



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Chapter 2 Case Study Summary 1: 21-year old woman that has had type 1 diabetes for the past 8 years, was brought to the hospital in a coma. She was prescribed to take 92 units of insulin a day to maintain her sugar levels within normal limits and prevent excess sugar in her urine. Upon admission she was hypotensive, tachycardic and hyperventilating.

Her labs show she is acidotic, arterial blood carbon dioxide levels were low, blood oxygen tension is normal, bicarbonate levels are really low indicating metabolic acidosis, low sodium levels, slightly high level of potassium, Chloride level is on the low end of normal, very high levels of blood urea and nitrogen, total carbon dioxide levels are really low, extremely high sugar levels and high creatinine levels. She tested positive for ketones. She received 8 units of regular insulin through an IV and 8 units per hour by IV infusion pump.

Her blood sugar levels began to drop at about 100 mg/dL each hour. After seven hours her breathing and pH went back to normal, following an injection of intravenous sodium bicarbonate to raise her pH and vigorous IV fluids and electrolyte replacement. 1. It seems her type 1 diabetes is uncontrolled. As her body could not use the sugar and there is not enough insulin, fat was used for fuel instead. During fat breakdown, byproducts called ketones are developed. Ketone bodies are acidic and dangerous when they build up in the body causing all her symptoms upon admission. . Yes, her pH levels became normal. Meaning her bicarbonate levels increased to compensate for the increased hydrogen proton levels in her blood. 3. When the body uses fat for energy instead of sugar, the body creates a byproduct called ketones. Since this is a byproduct, it flows through the renal system

waiting to be expelled from the body. Normally, the existence of ketone bodies are detected through a urine sample. 4. The potassium results were high which can indicate some problem with her kidneys. 5.

The low sodium results are based on the fact that sodium's job in the body is to keep proper acid-base equilibrium (homeostasis). Sodium has alkaline properties so if the levels are low the acid levels will be higher. 6. Diabetes can affect normal control of BP and can cause damage to the nerves supplying the blood vessels. When the blood pressure lowers the glomerular filtration rate decreases. 7. Anion gap measures of anions in the arterial blood. Anion gap equals chloride plus bicarbonate minus sodium $\text{Na}-(\text{Cl} + \text{HCO}_3^-)$.

The patient has an anion gap of 30. Normal levels are 7 to 16. 8. Osmolality measures the concentration of all chemical particles found in the fluid part of blood. Normal values range from 275 to 295. The patient has an osmolality of 351. 1 Summary 2: 14 year old boy that was never vaccinated against poliomyelitis got the disease late summer. He was hospitalized and needed a respirator during the severity of the illness. Once he began to recover, they took him off the respirator with no apparent effects. Days later a blood analysis revealed the following. pH level is slightly acidic, carbon dioxide levels are high and indicate some respiratory acidosis, blood oxygen level is low, bicarbonate level is high, sodium levels are normal, potassium is normal, chloride level is slightly low, and total carbon dioxide levels are high. 1. It seems the patient has respiratory acidosis. Production of carbon dioxide occurs fast and the failure of proper ventilation increases the CO_2 in the blood.

2. Buffers are normal compensatory mechanisms to respond to the acidosis.
- 3.

Yes, the HCO_3^- (bicarbonate) test is elevated and bicarbonate is a buffer. 4. Acute respiratory acidosis is when a abrupt failure of ventilation occurs. Chronic respiratory acidosis may be secondary to many disorders. 5. Total CO_2 measures the serum bicarbonate and available forms of carbon dioxide. Bicarbonate takes up about 95% of the total. They take the bicarbonate measurements by the sample of the venous blood and arterial blood gas analysis. 6. Chloride levels are slightly lower due to respiratory muscle weakness.