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Milky plasma, diabetes, and severe hyponatremia

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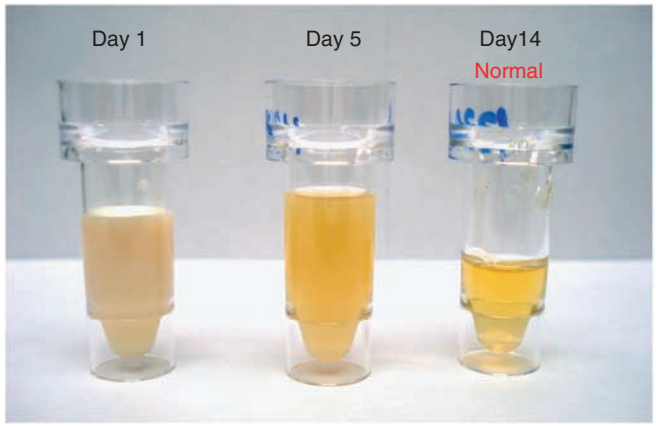

Figure 1 | Milky plasma with pseudohyponatremia (121 mmol/l) due to severe secondary hyperlipidemia (triglyceride 11,284 mg per 100 ml, cholesterol 674 mg per 100 ml on day 1) improved to a normal appearance with intensive insulin therapy and fenofibrate therapy.

A 66-year-old woman, with a 15-year history of type II diabetes and hypertension, was admitted for suspected coronary artery disease. She was clinically euvolemic without a history of diuretic use. Severe asymptomatic hyponatremia (121 mmol/l) with mild prerenal azotemia (blood urea nitrogen 34 mg per 100 ml and serum creatinine 1.4 mg per 100 ml) and hyperglycemia (350–475 mg per 100 ml) were noted. Her hemoglobin A1C was 11%. Her plasma was grossly milky (Figure 1) with severe hypertriglyceridemia (11,284 mg per 100 ml) and hypercholesterolemia (674 mg per 100 ml). Her plasma osmolality was normal (298 mosM/kg). There was no family history of hyperlipoproteinemia. The diagnosis of pseudohyponatremia due to severe secondary hyperlipidemia was made. Intensive insulin therapy and fenofibrate 200 mg twice daily were given, resulting in better control of hyperglycemia (200–275 mg per 100 ml) and hyperlipidemia (total cholesterol 319 mg per 100 ml and triglyceridemia 910 mg per 100 ml) after 4 days. The hyponatremia and prerenal azotemia also markedly improved (sodium 135 mmol/l, blood urea nitrogen 27 mg per 100 ml, and serum creatinine 1.2 mg per 100 ml), whereas the plasma osmolality remained unchanged (295 mosM/kg). Two weeks later, with continuing control of hyperglycemia, her hyponatremia and hyperlipidemia were completely resolved with normal appearance of the plasma. Fenofibrate was discontinued thereafter.

Uncontrolled diabetes, especially when of gradual onset, may be accompanied by severe hypertriglyceridemia, which may result in pseudohyponatremia. This is due to the displacement of the plasma water by lipid so that the water content of a given volume of plasma is depressed below its normal value of 94.5%. Using indirect ion-selective electrode method, the electrolyte content of a measured volume of plasma is determined irrespective of its water content. Therefore, in the presence of high concentrations of a displacing substance that reduces water content of plasma to $<93\%$, there will be an artificial reduction of plasma sodium content. Measurement of osmolality by depression of freezing point is not influenced by the presence of displacing substances and reflects the concentration of solutes in the plasma water.