Normal Potassium in the Presence of Gross Hemolysis

Mary M. Barrett and Y. Victoria Zhang*  

CASE DESCRIPTION
A 15-year-old boy presented to the emergency department with acute development of fever and chills. Physical exam revealed a blood pressure of 86/61, jaundice with scleral icterus, and dark urine. Laboratory tests (increased free hemoglobin, increased lactate dehydrogenase, and decreased haptoglobin) revealed a direct antiglobulin test (DAT)-negative hemolytic anemia. Sequential serum potassium measurements remained normal to low (reference interval, 3.6–5.2 mmol/L) through the majority of his disease course (Fig. 1).

Fig. 1. Potassium concentrations over the course of the hospital stay. The solid line indicates potassium concentrations, and the dashed lines indicate the potassium reference interval.

QUESTIONS FOR DISCUSSION
1. How would you expect gross hemolysis to affect the serum potassium concentration?
2. What caused the normal serum potassium in the setting of hemolysis?
3. What medical conditions can cause DAT-negative hemolytic anemia?

The answers are on the next page.
Hemolysis releases intracellular potassium. For hemolysis occurring after the sample is drawn, the serum potassium would appear artificially high (1, 2). However, when hemolysis occurs in vivo (e.g., a hemolytic anemia), the patient’s potassium-regulating systems will quickly normalize the serum potassium to prevent hyperkalemia (3). Some possible causes of DAT-negative hemolysis include thrombotic thrombocytopenic purpura/hemolytic uremic syndrome, disseminated intravascular coagulation, infection (e.g., malaria), drug- or toxin-induced hemolysis, hypersplenism, and Wilson disease (4).

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References