Measuring Iron–Dextran in Serum: Is It Important?

Severe anemia, which commonly occurs in patients with chronic renal failure, usually results from deficient production of erythropoietin. Other causative factors, i.e., iron deficiency, frequently contribute to the anemia, especially in patients on chronic hemodialysis. This has led to the almost routine use of intravenous iron–dextran. Recently, recombinant erythropoietin has been used in the treatment of anemia in cases of chronic renal failure. Because iron deficiency may hinder adequate hematological response to recombinant erythropoietin, the use of oral iron or iron–dextran is recommended to ensure the maximum effectiveness of recombinant erythropoietin in specific patients (1).

This issue of Clinical Chemistry contains two papers that examine the measurements of serum iron and total iron-binding capacity (TIBC) in the presence of iron–dextran (2, 3). In these articles, the Kodak Ektachem analyzer is shown to detect minimal amounts of iron–dextran (<6%); constant-potential coulometry and a conventional colorimetric assay with ferrozine recognize larger amounts (55–70% and 20–30%, respectively) in serum (3). Jacobs and Alexander (2) describe a method that allows measurement of transferrin-bound iron, TIBC, total iron, and dextran-bound iron, with use of sodium dithionite to disassociate dextran-bound iron and preparative alumina (Al₂O₃) columns to separate free iron and iron–dextran from transferrin.

Is measuring the iron–dextran content of blood important? The dose of iron–dextran given to patients for treatment is normally cleared from the circulation by the reticuloendothelial system (4) within two weeks. Thus, measuring serum iron or TIBC within a few weeks of the administration of iron–dextran would be unusual and of little value. The inability to adequately quantify the concentration of iron–dextran in serum has not been regarded as a disadvantage because only a portion of the injected iron–dextran may be important in metabolic iron pools. Under certain circumstances, however, it may be important to determine the content of dextran–iron in serum; e.g., the effect of iron overload or of repeated injections of iron–dextran on the clearance of iron–dextran from serum is unknown. Is clearance significantly retarded in patients with iron overload, thereby increasing the concentrations of circulating iron–dextran? As shown by Vercammen et al. (3), the amount of this circulating iron–dextran pool detected depends on the specific methodology used by individual laboratories. Measurement of the total body iron pool, including iron–dextran, also may be important, given the known association of bacterial infections with increased total body iron in chronic renal failure patients (5, 6).

Repeated measurement of ferritin concentrations in serum throughout the course of chronic renal failure could improve detection of iron deficiency or iron overload in these patients (7, 8). Measurement of circulating transferrin receptor, which increases in tissue iron deficiency, may prove to be another valuable laboratory tool for detection of iron deficiency (9, 10). Careful monitoring of iron status in patients with chronic renal failure and avoiding indiscriminate use of iron–dextran would help to prevent iron overload in these patients.

References

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