

Anemia of chronic disease: pathophysiology and laboratory diagnosis

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Classic iron deficiency (ID) does not represent a challenge for the laboratory and physicians. The anemia that accompanies infection, inflammation, and cancer, commonly termed anemia of chronic disease (ACD), features apparently normal or increased iron stores. However, 20% of these patients have iron-restricted erythropoiesis (functional ID), an imbalance between the iron requirements of the erythroid marrow and the actual iron supply. Functional ID leads to a reduction in red cell hemoglobinization, causing hypochromic microcytic anemia. The diagnosis of functional ID in real time is based on measuring the hemoglobin content of reticulocytes. An examination of the biochemical markers of iron metabolism demonstrates weaknesses in the diagnosis of functional ID. We developed a diagnostic plot for the assessment of iron status in ACD and the detection of advancing ID in patients with ID, ACD, and the combined state of functional ID and ACD. The plot indicates the correlation between a marker of the iron supply for erythropoiesis (ie, the ratio of the soluble transferrin receptor value to the logarithm of the ferritin value) and the reticulocyte hemoglobin content and functions as a marker of iron demand. The diagnostic plot shows good selectivity for assessing the iron status of disease-specific anemias such as classic ID, end-stage renal failure, cancer-related anemia, and the anemia of infection and inflammation. The therapeutic implications of the diagnostic plot are to differentiate patients who should be administered oral iron supplements, recombinant human erythropoietin (r-HuEPO), or a combination of r-HuEPO and iron. The response of erythropoiesis to r-HuEPO depends on the iron supply and the proliferation of erythropoiesis. The lack of an increase or a decrease in reticulocyte hemoglobin levels indicates a nonresponder to r-HuEPO or functional ID.

PMID: 15790548 [PubMed - indexed for MEDLINE]