



## Anemia: Ironing Out the Details



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Almost all anemias are due either to underproduction of erythrocytes or excessive loss or destruction of erythrocytes (hemolysis).

Determining the etiology always begins with the complete blood count (CBC) and the peripheral blood film; the latter may give morphologic clues as to the diagnosis. The most important features to concentrate on with regards to the CBC include determining if the white blood cell count and platelet count are normal. If one or all cell lines are abnormal, it is more likely to be a bone marrow problem. If it is an isolated anemia, concentrate on the hemoglobin level, the mean corpuscular volume (MCV) and the reticulocyte count.

### When should iron deficiency anemia be suspected?

Iron deficiency is the most common cause of anemia. Isolated or uncomplicated iron deficiency is seen most often with rapid growth or during gestation and in patients with excessive uterine or gastrointestinal blood loss.

The key laboratory measurement for its identification is the serum ferritin. A low hemoglobin concentration in a patient with a ferritin < 20 µg/L is diagnostic of iron deficiency anemia. (Note: The serum iron is not a useful test in iron deficiency anemia and need not be ordered unless you are uncertain about the diagnosis and wish to distinguish it from the anemia of chronic inflammation.)

The MCV often drops after the ferritin and may not be in the microcytic range in mild iron deficiency anemia. The drop in the MCV may be more useful in this situation.

It is important to note, the serum ferritin may be elevated in inflammatory states, making the diagnosis of iron deficiency difficult, particularly in the elderly. This is why a ferritin of up to 100 µg/L may still represent iron deficiency.



► **What are the causes of macrocytic anemia?**

Ask yourself, “Is this a megaloblastic process or just macrocytic (*i.e.*, larger, round erythrocytes)?” Some bone marrow problems, such as myelodysplasia and multiple myeloma, lead to a macrocytic, non-megaloblastic anemia. The presence of oval macrocytes and hypersegmented neutrophils on the blood film is strongly suggestive of a megaloblastic anemia. You may also see pancytopenia in severe cases of megaloblastic anemia.

► **What is anemia of chronic inflammation?**

This is the second most common anemia after iron deficiency. It is primarily an anemia due to underproduction of red cells. It is seen in inflammatory conditions (such as rheumatoid arthritis), infections and neoplasms. Laboratory findings include a normocytic anemia (about 25% microcytic), a normal or decreased reticulocyte count, a “boring” blood film and a normal or increased ferritin.

► **What tests should be ordered if I suspect a hemolytic anemia?**

Along with a raised reticulocyte count, clues to a hemolytic process include a raised, indirect (unconjugated) bilirubin, a diminished serum haptoglobin and, sometimes, a raised serum lactate dehydrogenase. The blood film may give morphologic clues. Spherocytes usually indicate an antibody-mediated hemolytic anemia. Fragments (schistocytes) are seen in microangiopathic hemolytic anemia (*i.e.*, disseminated intravascular coagulation and leaky heart valve). A direct antibody test (Coomb’s test) is positive in most antibody-mediated hemolytic anemias.

► **How do I diagnose myelodysplasia?**

Clues to the diagnosis of myelodysplasia include:

- older patient with progressive anemia (median age 65),
- usually macrocytic,
- may have pancytopenia and
- abnormal neutrophils (pseudo Pelger-Huet cell).

► **Which anemic patients should be referred?**

Refer patients whose diagnoses fall under the following categories:

- cause of anemia can’t be sorted,
- suspicion of myeloma, myelodysplasia or hemolytic anemia and/or
- iron deficiency anemia can’t be corrected.

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