



Red Blood Cell and Bleeding Disorders

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In this chapter we will first consider diseases of red cells. By far, the most common and important are the anemias, red cell deficiency states that usually have a nonneoplastic basis. We will then complete our review of blood diseases by discussing the major bleeding disorders and complications of blood transfusion.

Anemias

Anemia is defined as a reduction of the total circulating red cell mass below normal limits. Anemia reduces the oxygen-carrying capacity of the blood, leading to tissue hypoxia. In practice, the measurement of red cell mass is not easy, and anemia is usually diagnosed based on a reduction in the *hematocrit* (the ratio of packed red cells to total blood volume) and the *hemoglobin concentration* of the blood to levels that are below the normal range. These values correlate with the red cell mass except when there are changes in plasma volume caused by fluid retention or dehydration.

There are many classifications of anemia. We will follow one based on underlying mechanisms that is presented in **Table 14-1**. A second clinically useful approach classifies anemia according to alterations in red cell morphology, which often point to particular causes. Morphologic characteristics providing etiologic clues include red cell size (normocytic, microcytic, or macrocytic); degree of hemoglobinization, reflected in the color of red cells (normochromic or hypochromic); and shape. In general, microcytic hypochromic anemias are caused by disorders of hemoglobin synthesis (most often iron deficiency), while macrocytic anemias often stem from abnormalities that impair the maturation of erythroid precursors in the bone marrow. Normochromic, normocytic anemias have diverse etiologies; in some of these anemias, specific abnormalities of red cell shape (best appreciated through visual inspection of peripheral smears) provide an important clue as to the cause. The other indices can also be assessed qualitatively in smears, but precise measurement is carried out in clinical laboratories with special instrumentation. The most useful red cell indices are as follows: