Table 9.2 Causes of anaemia

Decreased red cell production

Defective haemoglobin production
- Iron deficiency
- Anaemia of chronic disease
- Sideroblastic anaemia

Defective DNA synthesis (megaloblastic anaemia)
- Vitamin B12 deficiency
- Folic acid deficiency

Stem cell failure, e.g. aplastic anaemia

Bone marrow replacement, e.g. infiltration by malignant disease

Inadequate erythropoietin stimulation, e.g. chronic renal failure

Other nutritional and toxic factors
- Scurvy
- Protein malnutrition
- Chronic liver disease
- Hypothyroidism

Increased red cell destruction, i.e. haemolytic anaemias

Intrinsic defect of erythrocytes

Congenital
- Haemoglobinopathies, e.g. sickle cell anaemia and thalassaemias
- Membrane defects, e.g. hereditary spherocytosis
- Enzyme deficiency, e.g. glucose 6-phosphate dehydrogenase deficiency (G6PD)

Acquired, e.g. paroxysmal nocturnal haemoglobinuria

Extrinsic cause for haemolysis

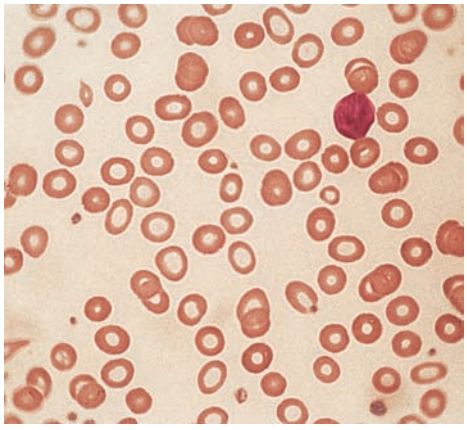
Immune-mediated
- Autoimmune haemolytic anaemia
- Haemolytic disease of the newborn
- Blood transfusion-related haemolysis
- Drug-induced immune haemolytic anaemia

Direct acting
- Infections, e.g. malaria
- Snake venom
- Physical trauma, e.g. microangiopathy
- Hypersplenism

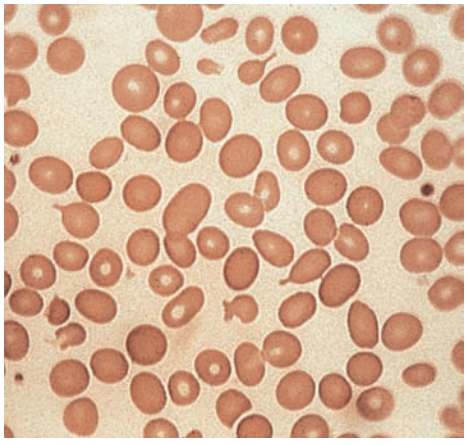
Blood loss

Anaemia can be classified according to its cause (Tables 9.1 and 9.2) or according to the appearance of the blood (Figs 9.8 and 9.9). It is important to know both because the first investigation of a pale patient is to perform a full blood count which will detail the haemoglobin level in the blood, the number of red blood cells, the size of the red cells (mean corpuscular volume) and

Figure 9.9 (a) Microcytosis and hypochromia in a case of iron-deficiency anaemia. (b) Oval macrocytes in a case of pernicious anaemia



(a)



(b)

the haemoglobin in a red cell (mean corpuscular haemoglobin). If the haemoglobin level indicates that the patient is anaemic, then you can use the MCV and MCH to classify the anaemia on cell size and haemoglobin concentration and also look up the possible causes in Table 9.2. Let us try it for an imaginary patient. Remember '…cytic' refers to the cell and '…chromic' refers to the haemoglobin concentration.

A 21-year-old woman goes to see her general practitioner for a prenatal health check as she wishes to become pregnant for the first time. The doctor advises her about the risks of smoking and alcohol on the fetus and performs a physical examination and finds no abnormalities. Her blood pressure is normal and he takes a blood sample for further analysis. The blood result and normal values are shown in Table 9.3.