

## **Blood**

Blood is a fluid connective tissue. It circulates continually around the body, allowing constant communication between tissues distant from each other.

**Function:** It transports:

- 1.oxygen from the lungs to the tissues, and carbon dioxide from the tissues to the lungs for excretion
  - 2.nutrients from the alimentary tract to the tissues, and cell wastes to the excretory organs, principally the kidneys
  - 3.hormones secreted by endocrine glands to their target glands and tissues
  - 4.heat produced in active tissues to other less active tissues
  - 5.protective substances, e.g. antibodies, to areas of infection
- clotting factors that coagulate blood, minimising bleeding from ruptured blood vessels.

**Composition:** 1.Blood is composed of a clear, straw-coloured, watery fluid called *plasma* in which several different types of blood cell are suspended.

2.Plasma normally constitutes 55% of the volume of blood. The remaining 45% is cellular fraction of blood.

### **Plasma**

The constituents of plasma are water (90 to 92%) and dissolved and suspended substances, including:

plasma proteins

inorganic salts

nutrients, principally from digested foods

waste materials

hormones

gases.

### **Plasma proteins**

Plasma proteins, which make up about 7% of plasma, are normally retained within the blood, into the tissues. They are largely responsible for creating the osmotic pressure of blood which keeps plasma fluid within the circulation. If plasma protein levels fall, because of either reduced production or loss from the blood vessels, osmotic pressure is also reduced, and fluid moves into the tissues (oedema) and body cavities. Plasma viscosity (thickness) is due to plasma proteins.

### **Albumins**

These are the most abundant plasma proteins (about 60% of total) and their main function is to maintain normal plasma osmotic pressure. Albumins also act as carrier molecules for free fatty acids, some drugs and steroid hormones, transport some hormones and mineral salts, e.g. thyroglobulin carries the hormone thyroxine and transferrin carries the mineral iron

### **Globulins**

Their main functions as *antibodies* (immunoglobulins), which are complex proteins produced by lymphocytes that play an important part in immunity. They bind to, and neutralise, foreign materials (antigens) such as micro-organisms.

### **Clotting factors**

These are responsible for coagulation of blood. *Serum* is plasma from which clotting factors have been removed. The most abundant clotting factor is *fibrinogen*

### **Electrolytes**

These have a range of functions, including muscle contraction (e.g.  $\text{Ca}^{2+}$ ), transmission of nerve impulses (e.g.  $\text{Ca}^{2+}$  and  $\text{Na}^{+}$ ), and maintenance of acid–base balance (e.g. phosphate, ). The pH of blood is maintained between 7.35 and 7.45 (slightly alkaline) by an ongoing complicated series of chemical activities, involving buffering systems.

### **Nutrients**

The products of digestion, e.g. glucose, amino acids, fatty acids and glycerol, are absorbed from the alimentary tract. Together with mineral salts and vitamins they are used by body cells for energy, heat, repair and replacement, and for the synthesis of other blood components and body secretions.