

CHAPTER TWENTY - ONE

Content Review

1. Blood plasma absorbs and distributes heat throughout the body. Blood vessels in the dermis can dilate and dissipate excess heat. Likewise, if heat needs to be conserved, these same blood vessels constrict, and blood is shunted to deeper blood vessels.
2. Globulins are the second largest group of plasma proteins (about 37% of all plasma proteins); they include alpha-, beta-, and gamma-globulins. The smaller alpha-globulins and larger beta-globulins primarily bind, support, and protect certain water-insoluble or hydrophobic molecules, hormones, and ions. Gamma-globulins, also called immunoglobulins, are the antibodies. Antibodies are soluble proteins that recognize and immobilize specific antigens.
3. The buffy coat contains leukocytes and platelets.
4. Erythrocytes have a unique biconcave disc shape that allows respiratory gases to be loaded and unloaded rapidly and efficiently. Additionally, their structure facilitates single-line stacking of these cells, termed a rouleaux, as they pass through small blood vessels, as well as enough flexibility to permit their passage through the smallest vessels.
5. Each hemoglobin molecule consists of four protein building blocks, called globins. Each globin contains a nonprotein (or heme) group that is in the shape of a ring with an iron (Fe) ion in the center of the ring. Oxygen binds to these iron ions for transport in the blood. The oxygen binding is fairly weak to ensure rapid attachment and detachment of oxygen from the hemoglobin.
6. Neutrophils have a multilobed nucleus (as many as five lobes) and cytoplasm with pale-colored specific granules. Eosinophils have a bilobed nucleus and cytoplasm with pink-orange to reddish specific granules. Basophils have a bilobed or S-shaped nucleus and cytoplasm with deep-purple specific granules. Lymphocytes have a round or slightly indented nucleus that fills the cell; the nucleus is darkly stained and surrounded by a thin rim of cytoplasm. These four leukocytes are about 1.5 times the diameter of an erythrocyte. Monocytes have a kidney- or U-shaped, pale-staining nucleus with abundant cytoplasm. They are almost three times the diameter of an erythrocyte.
7. Basophils are involved in the release of histamine and heparin during anti-inflammatory or allergic reactions. Lymphocytes attack pathogens, destroy cancer cells, coordinate immune cell activity, and produce antibodies.
8. Platelets are continually produced in the red bone marrow by cells called megakaryocytes. They are formed as the megakaryocytes shed small volumes of cytoplasm wrapped within a plasma membrane. They help produce a clot to prevent blood loss.
9. Hemopoiesis is the process of producing new formed elements in the blood. Hemocytoblasts are the hemopoietic stem cells from which formed elements are derived. The two lines of blood cell development are the myeloid line, which gives rise to erythrocytes, megakaryocytes, and all leukocytes except lymphocytes, and the lymphoid line, which forms the lymphocytes.
10. The hormones and growth factors in the bone marrow called colony-stimulating

factors (CSFs) influence the maturation and division of the blood stem cells.