

CHAPTER TWENTY-ONE

Answers to WHAT DID YOU LEARN?

1. Erythrocytes make up about 44% of whole blood.
2. The blood provides defense against pathogens and antigens that could harm us. In addition, blood can form clots on damaged blood vessels to prevent excessive fluid loss.
3. Plasma is composed of water, proteins, and other solutes (electrolytes, nutrients, respiratory gases, and waste products).
4. The four classes of plasma proteins are albumins, globulins, fibrinogen, and regulatory proteins.
5. Erythrocytes lack organelles to allow more room for hemoglobin, which increases their efficiency in gas transporting oxygen and carbon dioxide. However, the absence of both a nucleus and cellular organelles means that the erythrocyte cannot synthesize proteins for repair or replacement. Thus, the erythrocyte has a finite life span of about 120 days.
6. Transferrin and ferritin participate in recycling the iron ion of hemoglobin. Transferrin removes and transports the ion to the liver, where it is passed to ferritin, which stores it until it is needed and transported to the red bone marrow.
7. The transfusion of blood from a person with blood type AB to a person with blood type A would not be successful. The person with blood type A has anti-B antibodies and would react to the B surface antigens in the donor's blood, causing the blood to agglutinate.
8. Hemolysis is the rupture of erythrocytes. It can occur when erythrocytes clump (agglutinate) following a blood transfusion from an incompatible donor, or when the plasma membrane of an erythrocyte has abnormal proteins making it weak.
9. Leukopenia refers to a condition in which the number of leukocytes is below the normal range of between 5000–10,000 per microliter of blood.
10. The cytoplasm of granulocytes contains clearly visible microscopic specific granules, while that of agranulocytes lacks visible granules.
11. Basophils are involved in inflammation. Basophil granules release histamine causing vasodilation that leads to decreased blood pressure. Fluid leaking from dilated blood vessels causes swelling in a local area. Histamine release also occurs during allergy attacks, causing swelling around the nose and eyes. In addition, basophils release heparin, which inhibits blood clotting.
12. Megakaryocytes are large cells that form platelets by shedding small volumes of cytoplasm wrapped within a plasma membrane.
13. Hemocytoblasts are hemopoietic stem cells. They are pluripotent, meaning that they can develop into many different kinds of cells. They divide continuously to produce committed progenitor cells.