

CHAPTER 10 Blood

Blood, the river of life, is the body's primary means of transportation. Although it is the respiratory system that provides oxygen for the body, the digestive system that provides nutrients, and the urinary system that eliminates wastes, none of these functions could be provided for the individual cells without the blood. In less than one minute, a drop of blood will complete a trip through the entire body, distributing nutrients and collecting the wastes of metabolism.

Blood is divided into plasma (the liquid portion of blood) and the formed elements (the blood cells). There are three types of blood cells: red blood cells, white blood cells, and platelets. Together these cells and plasma provide a means of transportation that delivers the body's daily necessities.

Although the red blood cells in all of us are of a similar shape, we have different blood types. Blood types are identified by the presence of certain antigens in the red blood cells. Every person's blood belongs to one of four main blood groups: A, B, AB, or O. Any one of the four groups or "types" may or may not have the specific antigen called the Rh factor present in the red blood cells. If an individual has the Rh factor present in his or her blood, the blood is Rh positive. If this factor is missing, the blood is Rh negative. Approximately, 85% of the population have the Rh factor (Rh positive), and 15% do not have the Rh factor (Rh negative).

Your understanding of this chapter will be necessary to prepare a proper foundation for the circulatory system.

TOPICS FOR REVIEW

Before progressing to Chapter 11, you should have an understanding of the structure and function of blood plasma and cells. Your review should also include a knowledge of blood types and Rh factors.

BLOOD COMPOSITION

Circle the correct answer.

1. Which one of the following substances is not a part of the plasma?
 - A. Hormones
 - B. Salts
 - C. Nutrients
 - D. Wastes
 - E. All of the above are part of the plasma
2. The normal volume of blood in an adult is about:
 - A. 2-3 pints
 - B. 2-3 quarts
 - C. 2-3 gallons
 - D. 4-6 liters
3. Another name for red blood cells is:
 - A. Leukocytes
 - B. Thrombocytes
 - C. Platelets
 - D. Erythrocytes
4. Another name for white blood cells is:
 - A. Erythrocytes
 - B. Leukocytes
 - C. Thrombocytes
 - D. Platelets
5. Another name for platelets is:
 - A. Neutrophils
 - B. Eosinophils
 - C. Thrombocytes
 - D. Erythrocytes
6. Pernicious anemia is caused by:
 - A. A lack of vitamin B₁₂
 - B. Hemorrhage
 - C. Radiation
 - D. Bleeding ulcers
7. The laboratory test called hematocrit tells the physician:
 - A. The volume of white cells in a blood sample
 - B. The volume of red cells in a blood sample
 - C. The volume of platelets in a blood sample
 - D. The volume of plasma in a blood sample
8. An example of a nongranular leukocyte is a/an:
 - A. Platelet
 - B. Erythrocyte
 - C. Eosinophil
 - D. Monocyte

9. An abnormally high white blood cell count is known as:
 - A. Leukemia
 - B. Leukopenia
 - C. Leukocytosis
 - D. Anemia
10. A critical component of hemoglobin is:
 - A. Potassium
 - B. Calcium
 - C. Vitamin K
 - D. Iron
11. Sickle cell anemia is caused by:
 - A. The production of an abnormal type of hemoglobin
 - B. The production of excessive neutrophils
 - C. The production of excessive platelets
 - D. The production of abnormal leukocytes
12. The practice of using blood transfusions to increase oxygen delivery to muscles during athletic events is called:
 - A. Blood antigen
 - B. Blood doping
 - C. Blood agglutination
 - D. Blood proofing
13. The term used to describe the condition of a circulating blood clot is:
 - A. Thrombosis
 - B. Embolism
 - C. Hemoglobin
 - D. Platelet
14. Which one of the following types of cells is *not* a granular leukocyte?
 - A. Neutrophil
 - B. Lymphocyte
 - C. Basophil
 - D. Eosinophil
15. If a blood cell has no nucleus and is shaped like a biconcave disc, then the cell most likely is a/an:
 - A. Platelet
 - B. Lymphocyte
 - C. Basophil
 - D. Eosinophil
 - E. Red blood cell
16. Red bone marrow forms all kinds of blood cells, *except* some:
 - A. Platelets
 - B. Lymphocytes
 - C. Red blood cells
 - D. Neutrophils

17. Myeloid tissue is found in all but which one of the following locations?
- A. Sternum
 - B. Ribs
 - C. Wrist bones
 - D. Hip bones
 - E. Cranial bones
18. Lymphatic tissue is found in all but which of the following locations?
- A. Lymph nodes
 - B. Thymus
 - C. Spleen
 - D. All of the above contain lymphatic tissue
19. The "buffy coat" layer in a hematocrit tube contains:
- A. Red blood cells and platelets
 - B. Plasma only
 - C. Platelets only
 - D. White blood cells and platelets
 - E. None of the above
20. The hematocrit value for red blood cells is:
- A. 75%
 - B. 60%
 - C. 50%
 - D. 45%
 - E. 35%
21. An unusually low white blood cell count would be termed:
- A. Leukemia
 - B. Leukopenia
 - C. Leukocytosis
 - D. Anemia
 - E. None of the above
22. Most of the oxygen transported in the blood is carried by:
- A. Platelets
 - B. Plasma
 - C. Basophils
 - D. Red blood cells
 - E. None of the above
23. The most numerous of the phagocytes are the:
- A. Lymphocytes
 - B. Neutrophils
 - C. Basophils
 - D. Eosinophils
 - E. Monocytes

24. Which one of the following types of cells is *not* phagocytic?
- A. Neutrophils
 - B. Eosinophils
 - C. Lymphocytes
 - D. Monocytes
 - E. All of the above are phagocytic cells
25. Which of the following cell types functions in the immune process?
- A. Neutrophils
 - B. Lymphocytes
 - C. Monocytes
 - D. Basophils
 - E. Reticuloendothelial cells
26. The organ that manufactures prothrombin is the:
- A. Liver
 - B. Pancreas
 - C. Thymus
 - D. Kidney
 - E. Spleen
27. Which one of the following vitamins acts to accelerate blood clotting?
- A. A
 - B. B
 - C. C
 - D. D
 - E. K



If you have had difficulty with this section, review pages 256-265.

BLOOD TYPES RH FACTOR

28. Fill in the missing areas of the chart.

Blood Type	Antigen Present in RBCs	Antibody Present in Plasma
A	_____	Anti-B
B	B	_____
AB	_____	None
O	None	_____

Fill in the blanks

29. An _____ is a substance that can activate the immune system to make antibodies.
30. An _____ is a substance made by the body in response to stimulation by an antigen.
31. Many antibodies react with their antigens to clump or _____ them.
32. If a baby is born to an Rh negative mother and Rh positive father, it may develop the disease _____.
33. The term "Rh" is used because the antigen was first discovered in the blood of _____.
34. _____ stops an Rh negative mother from forming anti-Rh antibodies and thus prevents the possibility of harm to her next Rh positive baby.
35. Blood type _____ has been called the universal recipient.



If you have had difficulty with this section, review pages 262-265.

APPLYING WHAT YOU KNOW

36. Mrs. Payne's blood type is O positive. Her husband's type is O negative. Her newborn baby's blood type is O negative. Is there any need for concern with this combination?

37. After Mrs. Freund's baby was born, the doctor applied a gauze dressing to the umbilical cord for a short time. He also gave the baby a dose of vitamin K. Why did the doctor perform these two procedures?

38. WORD FIND

Can you find 24 terms from this chapter? Words may be spelled top to bottom, bottom to top, right to left, left to right, or diagonally.

H S H K L S U L O B M E A E S
K E E V M Z H E P A R I N D N
D T M F A C T O R Y E T I Q P
O Y A O H N B A T Q Y A R A R
N C T J G W E H N P N L B U D
O O O S Q L R M E T I S I P M
R K C E M O O N I H I Q F W W
H U R T C N I B P A S G Z T G
E E I Y O B O O I V E W E T X
S L T C M D S E C N R T U N R
U E Y O Y A I M E K U E L Y S
S T R G B S T H R O M B U S Q
E H Z A M S A L P N D Z P O N
T E N H F P D A P M E E I B W
E W B P H K B O N C K W X V J

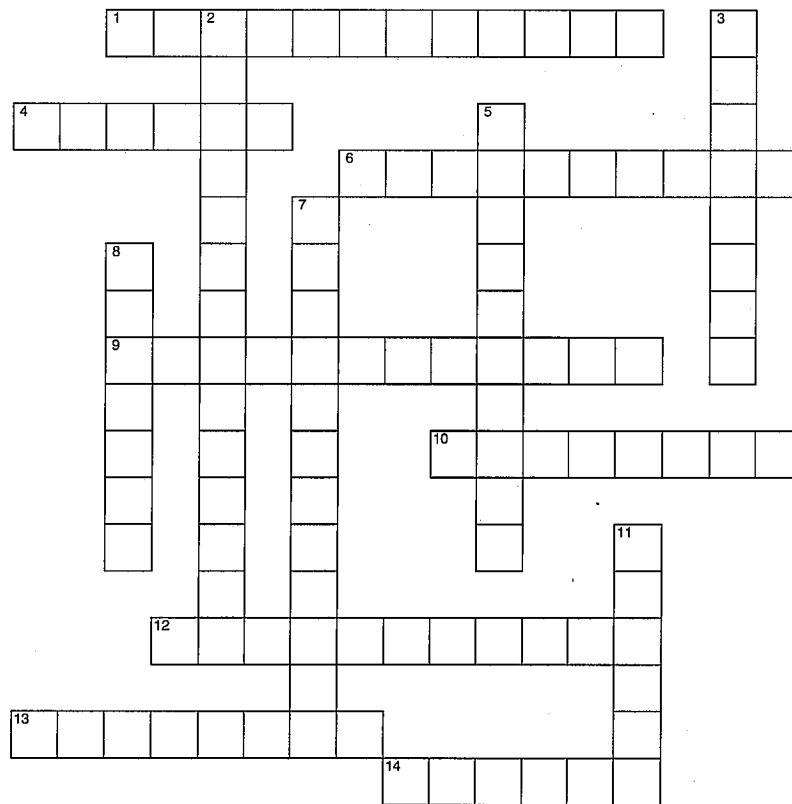
AIDS	Factor	Phagocytes
Anemia	Fibrin	Plasma
Antibody	Hematocrit	Recipient
Antigen	Hemoglobin	Rhesus
Basophil	Heparin	Serum
Donor	Leukemia	Thrombin
Embolus	Leukocytes	Thrombus
Erythrocytes	Monocyte	Type

DID YOU KNOW?

Blood products are good for approximately 21 days, whereas fresh frozen plasma is good for at least 6 months.

BLOOD

Fill in the crossword puzzle.



Across

1. Abnormally high WBC count
4. Final stage of clotting process
6. Oxygen-carrying mechanism of blood
9. To engulf and digest microbes
10. Stationary blood clot
12. RBC
13. Circulating blood clot
14. Liquid portion of the blood

Down

2. Type O (two words)
3. Substances that stimulate the body to make antibodies
5. Type of leukocyte
7. Platelets
8. Prevents the clotting of blood
11. Inability of the blood to carry sufficient oxygen

CHECK YOUR KNOWLEDGE

Multiple Choice

Circle the correct answer.

- Which of the following statements is *false*?
 - Sickle cell anemia is caused by a genetic defect.
 - Leukemia is characterized by a low number of WBCs.
 - Polycythemia is characterized by an abnormally high number of erythrocytes.
 - Pernicious anemia is caused by a lack of vitamin B₁₂.
- Deficiency in the number or function of erythrocytes is called:
 - Leukemia
 - Anemia
 - Polycythemia
 - Leukopenia
- Which of the following statements do *not* describe a characteristic of leukocytes?
 - They are disk-shaped cells that do not contain a nucleus.
 - They have the ability to fight infection.
 - They provide defense against certain parasites.
 - They provide immune defense.
- Which of the following substances is *not* found in serum?
 - Clotting factors
 - Water
 - Hormones
 - All of the above substances are found in serum
- Which of the following substances is *not* found in blood plasma?
 - Water
 - Oxygen
 - Hormones
 - None of the above
- An allergic reaction may increase the number of:
 - Eosinophils
 - Neutrophils
 - Lymphocytes
 - Monocytes
- What is a blood clot that is moving through the body called?
 - Embolism
 - Fibrosis
 - Heparin
 - Thrombosis
- When could difficulty with the Rh blood factor arise?
 - When an Rh negative man and woman produce a child.
 - When an Rh positive man and woman produce a child.
 - When an Rh positive woman and an Rh negative man produce a child.
 - When an Rh negative woman and an Rh positive man produce a child.

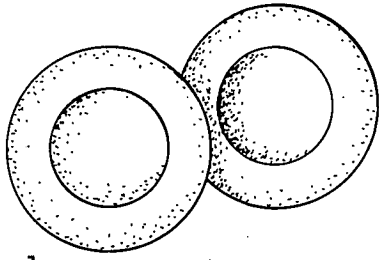
9. What is the primary function of hemoglobin?
 - A. To fight infection
 - B. To cause blood to clot
 - C. To carry oxygen
 - D. To transport hormones
10. Which of the following steps is *not* involved in blood clot formation?
 - A. A blood vessel is injured and platelet factors are formed.
 - B. Thrombin is converted into prothrombin.
 - C. Fibrinogen is converted into fibrin.
 - D. All of the above are involved in blood clot formation

Matching

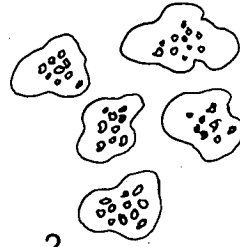
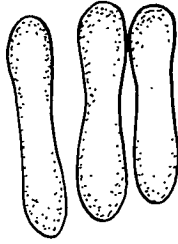
Select the most appropriate answer from column B for each item in column A. There is only one correct answer for each item.

<i>Column A</i>	<i>Column B</i>
_____ 11. Lymphocytes	A. Heparin
_____ 12. Erythrocytes	B. Contains anti-A and anti-B antibodies
_____ 13. Type AB	C. Clotting
_____ 14. Basophils	D. Immunity
_____ 15. Leukemia	E. Erythroblastosis fetalis
_____ 16. Platelets	F. Anemia
_____ 17. Type O	G. Cancer
_____ 18. Rh factor	H. Contains A and B antigens
_____ 19. Red bone marrow	I. Myeloid tissue
_____ 20. Neutrophils	J. Phagocytosis

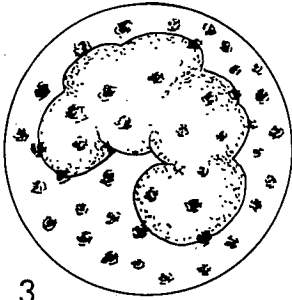
Human Blood Cells



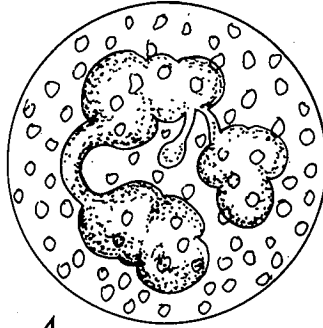
1



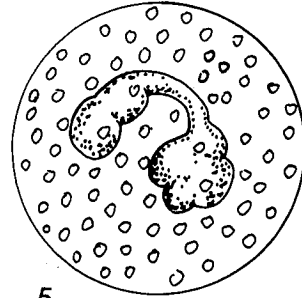
2



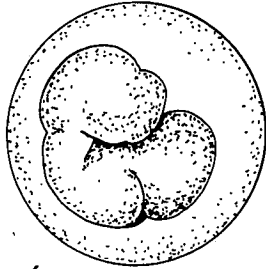
3



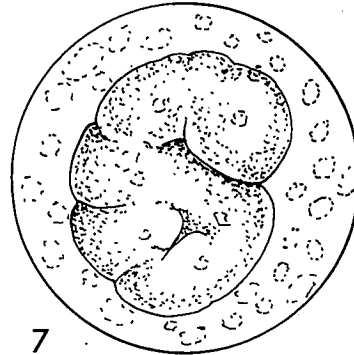
4



5



6



7

1. _____

5. _____

2. _____

6. _____

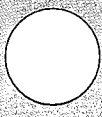
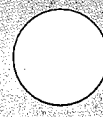
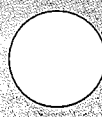
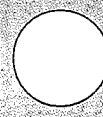





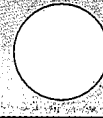
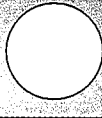
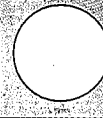
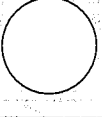
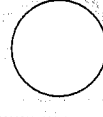
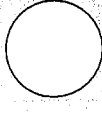
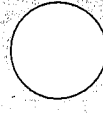
3. _____

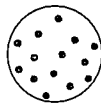
7. _____

4. _____

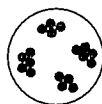
Blood Typing

Using the key below, draw the appropriate reaction with the donor's blood in the circles.

Recipient's blood		Reactions with donor's blood			
RBC antigens	Plasma antibodies	Donor type O	Donor type A	Donor type B	Donor type AB
None (Type O)	Anti-A Anti-B				
A (Type A)	Anti-B				
B (Type B)	Anti-A				
AB (Type AB)	(none)				



Normal blood



Agglutinated blood