

Chapter 17 – Blood

Names _____

Period _____

Please list four delivery functions of blood, two regulatory functions, and two protection functions.

Delivery (distribution) functions

1 - _____

3 - _____

2 - _____

4 - _____

Regulatory functions

1 - _____

2 - _____

Protection functions

1 - _____

2 - _____

Please list three classes of substances normally found dissolved in plasma.

1 - _____

2 - _____

3 - _____

Please complete the following table relating to the proteins found in plasma.

Constituent	Description / Importance
	60% of plasma proteins; important for osmotic balance
Fibrinogen	_____ % of plasma proteins Important in _____
_____	36% of plasma proteins transport proteins antibodies
Nonprotein Nitrogenous Substances	(list 5)
_____	Organic Chemicals absorbed from the digestive tract
Respiratory Gases	_____

What is the normal life span of erythrocytes? _____ days

What three food nutrients (other than normally required proteins and carbohydrates) are essential for erythropoiesis?

1 - _____

2 - _____

3 - _____

What is the fate of aged or damaged red blood cells? _____

What is the fate of the released hemoglobin? _____

Please check (✓) all the factors that would serve as stimuli for erythropoiesis.

_____ Hemorrhage

_____ Living at a high altitude

_____ Insufficient hemoglobin per RBC

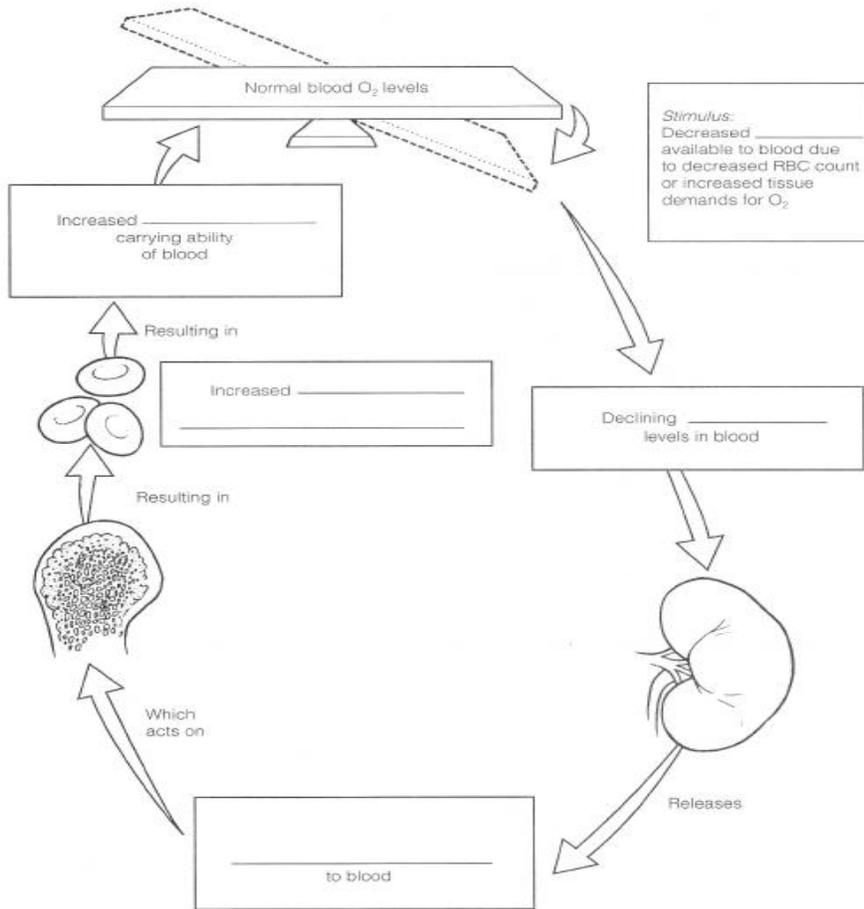
_____ Breathing pure oxygen

The figure below depicts (in incomplete form) the erythropoietin mechanism for regulating the rate of erythropoiesis. Several statements are incomplete. Complete the statements that have answer blanks and then choose colors (other than yellow) to identify the structures with color coding circles. Color all arrows on the diagram yellow.

The kidney

Red bone marrow

RBCs



Please provide the information requested to fully characterize each structural aspect of red blood cells.

Cell shape _____

Nucleate or anucleate? _____

Organelles present? _____

Major molecular content of the cytoplasm _____

Substance that accounts for the flexibility of the membrane _____

Please provide the information requested to fully describe each functional characteristic of red blood cells.

Type of metabolism, aerobic or anaerobic? _____

Explain why the RBC metabolism is of this type. _____

Molecular makeup of hemoglobin _____

The portion of hemoglobin that binds oxygen _____

The portion of hemoglobin that binds carbon dioxide _____

Site of oxygen loading _____

Site of carbon dioxide loading _____

Please match the terms indicating specific types of anemias with the appropriate descriptions

- | | | |
|---------------------|---------------------------|-----------------------|
| A. Aplastic anemia | C. Hemorrhagic anemia | E. Pernicious anemia |
| B. Hemolytic anemia | D. Iron-deficiency anemia | F. Sickle-cell anemia |

- _____ A genetic disorder in which abnormal hemoglobin is produced and becomes spiky under hypoxic conditions
- _____ A common occurrence after transfusion error
- _____ The bone marrow is destroyed or severely inhibited
- _____ A consequence of acute blood loss
- _____ A possible consequence of sickle-cell anemia
- _____ Results from inadequate intake of iron-rich foods or conditions involving chronic types of bleeding (gastric ulcers)
- _____ A common problem of individuals who have a portion of their stomach removed to manage bleeding ulcers

Please rank the following lymphocytes in order of their relative abundance (in the blood of a healthy person) from 1 (most abundant) to 5 (least abundant).

- | | | |
|-------------------|-----------------|-------------------|
| _____ Lymphocytes | _____ Basophils | _____ Neutrophils |
| _____ Eosinophils | _____ Monocytes | |

Using the choices below, please identify the cell types or blood elements that fit the following descriptions.

- | | | |
|--------------------|------------------|-------------------|
| A. Basophil | D. Lymphocyte | G. Neutrophil |
| B. Eosinophil | E. Megakaryocyte | H. Platelets |
| C. Formed elements | F. Monocyte | I. Red blood cell |

- | | |
|---|--|
| _____ Granulocyte with the smallest granules | _____ Contains hemoglobin; therefore involved in oxygen transport |
| _____ _____ Granular leukocytes | _____ Increases in number during chronic infections; the largest WBC |
| _____ Also called an erythrocyte, anucleate | _____ _____ The only formed elements that are not spherical |
| _____ _____ Phagocytic leukocytes that avidly engulf bacteria | _____ _____ _____ Also called white blood cells |
| _____ _____ Agranular leukocytes | _____ Granulocyte with two types of granules |
| _____ Fragments to form platelets | _____ A T cell or a B cell |
| _____ Increases in number during allergy attacks | |
| _____ Releases histamine during inflammatory reactions | |

Using the choices below, correctly complete the following brief description of the blood clotting process.

- | | | | | |
|--------------|------------|--------------------|-------------|-------------|
| Break | Fibrin | Phosphatidylserine | Prothrombin | Thrombin |
| Erythrocytes | Fibrinogen | Platelets | Serotonin | Thromboxane |

Clotting begins when a _____ occurs in a blood vessel wall. Almost immediately, _____ clinging to the blood vessel wall and release _____ and _____ which help decrease blood loss by constricting the vessel. _____ on the platelet surface promotes the pathway leading to formation of prothrombin activator, which causes _____ to be converted to _____. Once present, thrombin acts as an enzyme to attach _____ molecules together to form long, threadlike strands of _____ which then traps _____ flowing by in the blood.

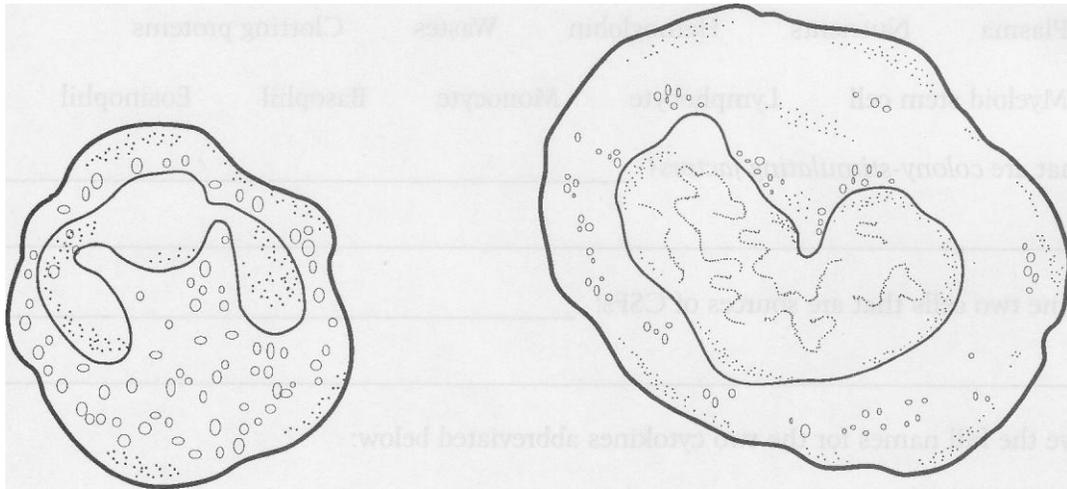
Please match the terms with their correct description.

- | | | |
|---|-----------------------|--|
| A. Activated clotting factors inhibited by heparin and antithrombin III | D. Embolus | I. Endothelial cell secretions (prostacyclin and others) |
| B. Activated factor XII | E. Hemophilia A | J. Thrombin |
| C. Coagulation factors washed away by flowing blood | F. Hemophilia B | K. Thrombocytopenia |
| | G. Intact endothelium | L. Thrombus |
| | H. Plasmin | |

- _____ Two circumstances that prevent unnecessary enlargement of blood clots
- _____ Natural "clot-buster" chemical; causes fibrinolysis
- _____ Hereditary bleeder's disorder resulting from a lack of factor VIII
- _____ Two factors that prevent undesirable clotting in an unbroken blood vessel
- _____ Free-floating blood clot
- _____ Plasmin activators
- _____ Clot formed in an unbroken blood vessel
- _____ Bleeder's disease that is a consequence of too few platelets
- _____ Hereditary disease resulting from a deficiency of factor IX

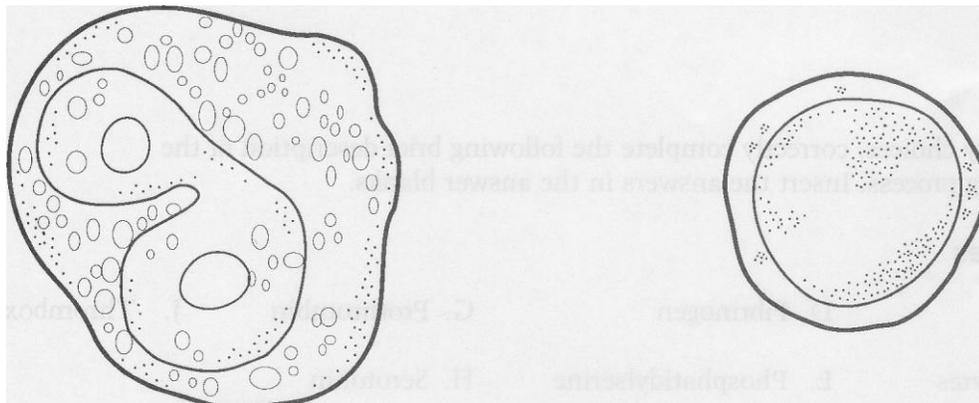
Four leukocytes are diagrammed in the figure below. First, follow the directions for coloring each leukocyte as it appears when stained with Wright's stain. Then, identify each leukocyte type by writing the correct name in the blank below each illustration.

- Color the granules pale violet, the cytoplasm pink, and the nucleus dark purple
- Color the nucleus deep blue and the cytoplasm pale blue
- Color the granules bright red, the cytoplasm pale pink, and the nucleus red-purple
- For this smallest white blood cell, color the nucleus deep purple-blue and the sparse cytoplasm pale blue-green



A _____

B _____



C _____

D _____

Please complete the following table concerning ABO blood groups.

Blood type	Antigens	Antibodies in plasma	Can donate blood to type	Can receive blood from type
Type A	A			
Type B		Anti-A		
Type AB			AB	
Type O	None			

Ms. Pratt is claiming that Mr. X is the father of her child. Ms. Pratt's blood type is O negative. Her baby boy has type A positive blood. Mr. X's blood is typed and found to be type B positive. Could he be the father of her child? If not, what blood type would the father be expected to have?

When a person is given a transfusion of mismatched blood, a transfusion reaction occurs. Define the term transfusion reaction.

Please fill in the table of normal blood values; if appropriate, include units for both males and females.

Characteristic	Normal Value or Range
% Body Weight	
Blood Volume	
Arterial pH	
Blood Temperature	
RBC Count	
Hematocrit	
Hemoglobin	
WBC Count	
Differential WBC Count	
Neutrophils	
Eosinophils	
Basophils	
Lymphocytes	
Monocytes	
Platelet Count	

- 8)** Mrs. Francis comes to the clinic complaining of fatigue, shortness of breath, and chills. Blood tests show anemia and a bleeding ulcer is diagnosed. What type of anemia is this?
- 9)** After multiple transfusions, Mr. Cosby experiences a weak transfusion reaction. Is this likely to be caused by the ABO antigens or other antigens? What should be done to avoid this type of reaction?
- 10)** A red marrow biopsy is ordered for two patients—one a child and the other an adult. The specimen is taken from the tibia of the child but from the iliac crest of the adult. Please explain why different sites are used to obtain marrow samples in adults and children.
- 11)** Why is someone more likely to bleed to death when an artery is cleanly severed than when an artery is crushed and torn?
- 12)** Knowing the pathways of hemopoiesis, please explain why leukemia reduces RBC and platelet counts.
- 13)** Please explain the phenomenon called "athlete's anemia."
- 14)** John, a novice to cigarette smoking, is trying to impress his buddies by smoking two packs a day—inhaling every drag. What do you think will happen to his reticulocyte count? Explain your reasoning.