

Chapter 18 Study Guide
The Circulatory System and Blood

Section 18.1

- 1 What are the functions of the circulatory system?
- 2 What type of tissue is blood? What are the components of this tissue called? What is the “benchmark” for blood volume? What term describes the cellular component of this tissue?
- 3 If you put whole blood in a test tube, you may use a centrifuge to separate the whole blood into three fractions. What are the three portions called? What segment is at the bottom of the tube? What percent volume represent the red blood corpuscles? What term describes the RBC?
- 4 What type of mixture makes up 55% of the whole blood volume? Term used to name this volume? If you remove the protein fibrinogen, then what do we call this mixture? What will not happen after you remove fibrinogen?
- 5 What are the three major proteins found in blood? Where are most of the plasma proteins formed? Where is the other protein formed? Why are these proteins important? (hint: think osmosis)
- 6 What is viscosity? What component of blood has the greatest effect on blood’s viscosity? Why is this significant?
- 7 There are many nutrients and metabolic waste products circulating in the blood. What in blood may build up in concentration to cause mental confusion, heart problems, coma, and eventually death? How is this normally removed from the body?
- 8 What is the white cell volume of whole blood? What are the two major categories? What cell lines are in each group? What is the significance of this phrase: never let monkeys eat bananas.
- 9 What is hypoproteinemia? What might cause this condition? What is the “defining difference” between Kwashiorkor and Marasmus? Do you think the damage done during early child development is reversible later in life? Should this be considered a crime against humanity?

Section 18.2

- 10 What is hemopoiesis? Where does this occur? What are the two forms of hemopoiesis?
- 11 Where are pluipotent stem cells located? What type of stem cells are produced by pluipotent stem cells?
- 12 In eythroipoiesis, the pluripotent stem cell produces a erythrocyte colony forming unit. After this, how many days will it take to produce a new RBC? What stimulus forms ECFU? What organ recognizes the stimulus? What hormone is released by this organ? Where is the receptor located for the hormone?
- 13 What is the difference between hypoxia and hypoxemia? What three conditions may cause low oxygen levels? Which one is not avoidable once it is established?

14 During leukopoiesis, what type of WBC are produced by the granulocytes and agranulocytes? Which cell line produce WBC essential to immunity? What do we call these cells?

15 What is the low range of WBC in the blood? Overwhelming number of WBC in blood? Function? What is unique about “where” these WBC maybe located?

Section 18.3

16 Is a red blood cell really a cell? Do RBC have organelles? Explain. What fills the cytoplasm of a RBC? The RBC must maintain a resting membrane potential and operate the Na-K-Pump, but they do not have mitochondria. Where do RBC get their ATP from? One percent of new RBC still have part of an organelle. What do we call these not fully circulating RBC?

17 What is the RBC diameter? How do RBC pass through capillaries? Why? How long do RBC circulate in the blood? What molecules make the RBC’s membrane flexible? What will happen to an “old” RBC when it passes through a narrow (2 micrometer) diameter capillary? Where are capillaries 2 micrometer? What is the nickname for this organ? What “garbage collector” is in this organ to “clean up the mess”?

18 What three factors influence oxygen transport?

19 What nutritional factors are required for erythropoiesis?

20 Explain (draw sketch) the negative feedback mechanism that regulates erythrocyte homeostasis?

21 What is the difference between primary and secondary polycythemia? What dangers are associated with this condition?

22 What is anemia? What general factors may cause this condition? Consequences? What is pernicious anemia?

23 **Please Note: Knowing the following information about WBCs will be critical for you understanding of immunity. You will need to know WBC function for C10 and C21.**

24 What category of WBC do neutrophils belong with? What is the normal concentration of neutrophils in the blood? What happens to neutrophil blood concentration when you have a bacterial infection? What is this called? Do neutrophils only stay in the blood? Explain. What is a respiratory burst? Significance?

25 What category of WBC do eosinophils belong with? Where are they concentrated? What are they on the watch for? (who is trying to invade us?) What are two methods used by eosinophils to eliminate threats?

26 What category of WBC do basophils belong with? What is the difference in location between basophils and mast cells? What do mast cells have that basophils lack? Where do these molecules come from (what cell made them?) and what do they do? What special property is acquired by the mast cells with these receptors?

27 What do mast cells release upon second exposure to same bacteria? Function of each molecule? Why does this make sense?

28 What category of WBC do monocytes belong to? Why will the blood monocyte concentration increase? What type of molecule will monocytes secrete in response to foreign antigen? What is the function of these molecules? Are monocytes “restricted” to the blood? Explain.

29 Are platelets cells? Where do they come from? Function?

30 What cell line do cytotoxic T cells come from? What is unique about cT-cells? What do we call this ability? What do we mean by “specific”? What type of cells may a cT-cell kill? What type of cell activates a resting cT-cell so it may become an assassin?

31 What cell line do natural killer cells come from (NK)? Where may you find NK? What type of immunity do they provide? Explain What type of kiss do they deliver?

32 What causes WBC to stop moving with the blood flow and stick to the inner lining of the blood vessels? What is this called? What term describes a WBC moving into the tissue space? How long do granulocytes and agranulocytes live after they enter the tissue space?

33 What is the difference between leukopenia and leukocytosis?

Section C18.4 > Hemostasis

34 What terms describes the cessation of bleeding in small blood vessels? What three mechanisms working together will stop blood from bleeding out in small blood vessels? What formed element plays a significant role in all three steps? Will this process stop a hemorrhage?

35 What functions do platelets perform in hemostasis?

36 How long do platelets circulate in the blood? Where are 40% of the platelets stored? Why?

37 What are the “three steps to hemostasis”? What is the role of prostacyclin and thromboxane in platelet plug formation?

38 What occurs during coagulation? What enzyme is required?

39 There are many circulating proteins involved in the coagulation pathway. What organ makes these structural and functional proteins? What two pathways may initiate coagulation? Where is the origin for each pathway? What is the time delay associated with each pathway? Why does it make sense to rub wound area? Is this a negative or positive feedback mechanism?

40 What is heparin?

41 Important vocabulary terms: Thrombus, embolism, infarction, thrombocytosis, thrombocytopenia,

Section C18.5 Blood Types (We will cover this topic in lab)

42 What are antigens? What is the difference between self and foreign antigens?

43 There are many different classes of blood antigens. The ABO System causes the greatest concern in medicine. How many antigens are in this system? This results in how many blood types in this system? What is the relationship between RBC antigen and associated antibodies in the ABO System?

- 44 What occurs when RBC experience agglutination? Why? If this occurs then what might occur in smaller blood vessels?
- 45 What is the most common blood type in the ABO system? The rarest? Universal donor? Universal recipient?
- 46 How is the Rh Blood Type System different than the ABO System? What are the two rules that explain the Rh System?