

Biology 48 - Human Physiology
Lecture Summary Sheet - Norris

Hematology

I. Definitions

- A. Extracellular Fluid
- B. Interstitial Fluid

II. General Functions:

III. Composition of Blood

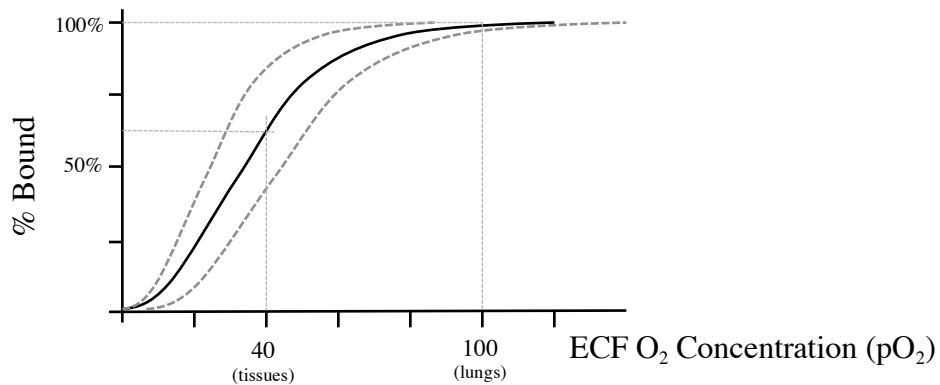
A. Plasma

- 1. Three main groups of proteins:
 - a. Albumins (60%)
 - b. Globulins (36%)
 - c. Fibrinogens (4%)
- 2. Other Components of Plasma:
- 3. Lipid Transport

B. Cellular Elements (aka Formed Elements)

1. Erythrocytes (RBC)

a. Hemoglobin (oxyhemoglobin dissociation curve)



- i. pH (Bohr effect)
- ii. Temperature
- iii. 2,3-Diphosphoglyceric Acid (2,3-DPG)

b. RBC Production / Destruction

The Reticuloendothelial System

- globin -
- iron -
- heme -

Erythropoietin

2. Leukocytes (WBC)

a. Granulocytes (PMN's)

- i. Neutrophils (60%)
- ii. Eosinophils (4%)
- iii. Basophils (1%)

b. Agranulocytes

- i. Monocytes (5%)
- ii. Lymphocytes (30%)
 - T cells -
 - B cells -

3. Platelets

IV. Hemostasis

A. Vasoconstriction

B. Platelet Plug

C. Fibrin Clot Formation

1. Extrinsic Pathway
2. Intrinsic Pathway

V. Blood Typing (an introduction to specific immunity)

A. Principles of Cell Recognition

1. Antigens (agglutinogens)
2. Antibodies (agglutinins)
3. Agglutination

B. RBC Recognition

1. ABO Group

<u>Blood Type</u>	<u>Antigen</u>	<u>Antibodies</u>	
A	A	B	
B	B	A	
AB	A + B	-	"universal recipient"
O	-	A + B	"universal donor"

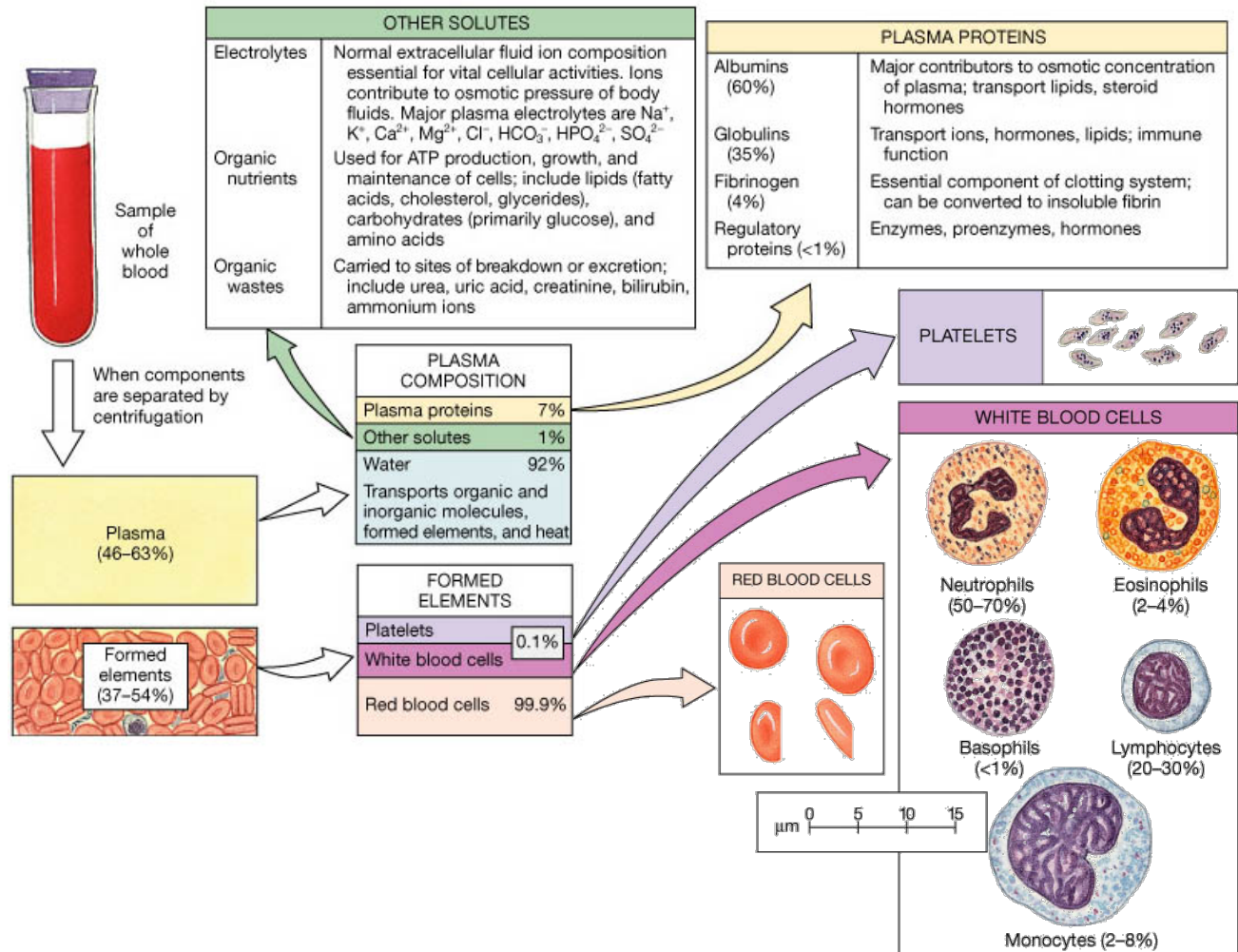
2. Rh Group

a. Erythroblastosis Fetalis

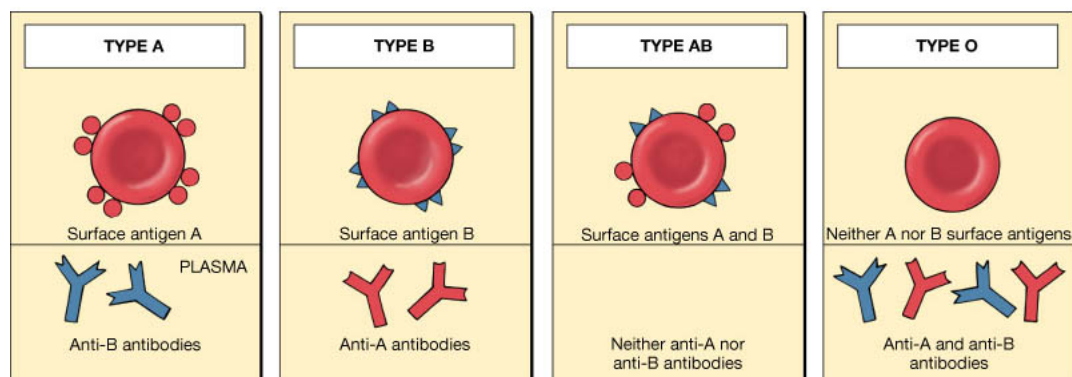
VI. Additional Key Terms / Topics

agglutination	anemia	carboxyhemoglobin	coagulation	embolism
formed elements	hemolysis	hemopoiesis	leukemia	leukopenia
lymphokines	methemoglobin	oxyhemoglobin	polycythemia	polymorphonuclear
serum	thrombus			

Blood Composition:



Blood Typing:



Clotting Mechanisms (Hemostasis):

Step 1 - Vasoconstriction

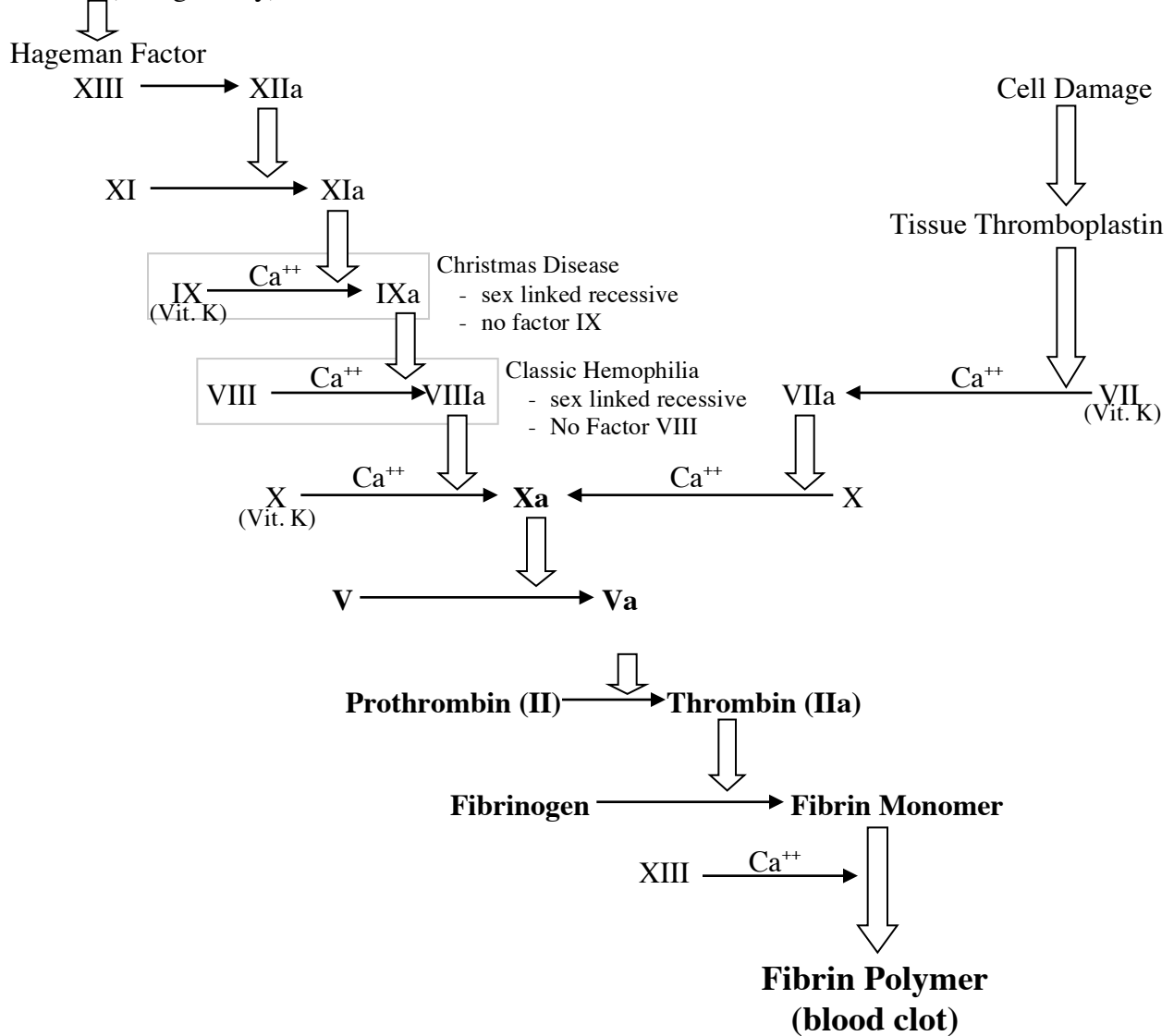
Step 2 - Platelet Plug Formation

Step 3 - Blood Clotting (intrinsic or extrinsic) – see below for detailed steps

INTRINSIC PATHWAY

EXTRINSIC PATHWAY

Surface (foreign body) Contact



Study Questions – Hematology:

1. Define “extracellular fluid” and “interstitial fluid”. How are these fluids related?
2. Describe the major functions of the blood.
3. Describe the general composition of the blood.
4. Describe the composition of plasma. Pay particular attention to the protein types found in the plasma in terms of identity, proportion and function.
5. What are the formed elements?
6. Describe the structure, quantity and function of erythrocytes.
7. What is anemia?
8. Describe the structure, quantity and function of hemoglobin.
9. Explain the relationship between oxygen concentration and hemoglobin-oxygen binding affinity.
10. Explain how moderate changes in ventilation (oxygen concentration in the lungs) effects oxygen concentration in the blood flowing through pulmonary capillaries.
11. Explain how moderate changes in cellular metabolism (oxygen concentration in the tissues) effects oxygen concentration in the blood flowing through tissue capillaries.
12. Explain how pH, temperature, carbon dioxide and 2,3-DPG effect hemoglobin. How do these factors contribute to oxygen distribution?
13. In summary - what factors enhance oxygen movement into the blood when in the lungs and oxygen movement from the blood when in the tissues?
14. Describe where erythrocytes are produced and how their production is regulated.
15. Describe where, when and how erythrocytes are removed from circulation. What is the destiny of the decomposition product of hemoglobin?
16. Identify and describe all of the different types of leukocytes, their normal proportions and functions.
17. Describe the structure and function of platelets.
18. Describe the three steps in hemostasis and what activates each step.
19. Describe the two different pathways leading to clot formation. How are the different pathways activated, how fast are they (comparatively), and what are the common steps (starting from prothrombin)?
20. What is the significance of a multi-stepped pathway leading to formation of a blood clot? How are calcium and vitamin K related to blood clotting? How are blood clots removed?
21. Define “antigen”, “antibody” and “agglutination.”
22. How are coagulation and agglutination similar? How are they different? Describe specifically how agglutination occurs.
23. What are the characteristics that identify type A, B, AB and O blood? Why is type AB blood the “universal recipient”? Why is type O blood the “universal donor”?
24. How are the ABO blood type and the Rh blood types similar? How are they different?
25. What is erythroblastosis fetalis? Is this disorder harmful to the mother? To the fetus? Under what conditions?