N3: ANATOMY AND PHYSIOLOGY
1st Semester, Academic Year 2022-2023

LECTURE: CARDIOVASCULAR SYSTEM: THE BLOOD
STUDY GUIDE

Introduction
The cardiovascular system includes the heart, the blood vessels and the blood. These three components work together to bring about homeostasis. Blood contributes to homeostasis by transporting oxygen, carbon dioxide, nutrients, and hormones to and from your body's cells. It helps regulate body pH and temperature, and provides protection against disease through phagocytosis and the production of antibodies.

I. Learning Outcomes:
At the end of the session, you should be able to:

1. Describe the characteristics and components of blood and its functions.
2. Describe the formation of blood cells.
3. Describe the structure, functions, life cycle, and production of red blood cells
4. Describe the structure, functions, and production of white blood cells (WBCs).
5. Describe the different types of white blood cells and their functions.
6. Describe the structure, function, and origin of platelets
7. Differentiate among the different ABO and Rh blood groups
8. Explain the importance of donor and recipient blood type matching

II. Activities

ACTIVITY	DESCRIPTION
1. Asynchronous lecture	Powerpoint slides and video presentation
2. Post-lecture quiz	10-point quiz (with respiratory system)

III. Reference:
Tortora, & Derrickson. (2012). Chapter 19: The Cardiovascular System: The Blood in *Principles of anatomy and physiology* (13th ed.) or its equivalent in other editions.

IV. General Instructions

- Read Chapters 19 of the reference book. Use the study guide provided.
- There are other links to videos which are optional viewing.
- There are activities provided in this guide to further facilitate learning. There will be a forum assigned to each of the activities. This is where you will make your submissions.
- After the activities, there will be a 10-point quiz which will form part of your grades (together with Respiratory system module).

- From 11am to 12 nn, we will have an online meeting where you can bring up your questions. The link will be posted separately.

V. Topic and Study Guide

A. Functions and components of blood

1. Name the general functions of blood
2. Physical characteristics of blood
3. Overview of the components of blood

* Refer to Figure 19.1 Components of blood in a normal adult (p. 730) and Table 19.1 Substances on the blood plasma of your reference.

a. Blood plasma/plasma- the liquid extracellular matrix; what is left in blood after all the formed cellular elements are removed

- What are the substances found in plasma?

b. Formed elements

1) Red blood cells
- What is hematocrit?
- What is the significance of lower-than-normal hematocrit and high-then-normal hematocrit?

2) Platelets

3) White blood cells- granular (neutrophils, eosinophils, basophils) and agranular leukocytes (lymphocytes and monocytes)

B. Formation of blood cells

1. What is hemopoiesis? Where does hemopoiesis occur in different life stages in humans?
2. What are hemopoietic growth factors, examples of these and their functions?

* Refer to Figure 19.3 Origin, development, and structure of blood cells (p. 733) in your reference.

You can view this video to further illustrate (optional):

https://www.youtube.com/watch?v=XVWOlKdpF_I
Hematopoiesis | Hematologic System Diseases from Khan Academy

C. Components of the Blood

1. Red Blood Cells

- Describe the structure, functions, life cycle, and production of red blood cells

*Refer to Figure 19.5 Formation and destruction of red blood cells, and the recycling of hemoglobin components (p. 737) of your reference or its equivalent.

You can view this video to further illustrate (optional):

https://www.youtube.com/watch?v=cATQFej6oAc

Haematology - Red Blood Cell Life Cycle
By Armando Hasudungan

- Describe the negative feedback mechanism of RBC production and what factors affect RBC production

2. White Blood Cells
   - Describe the structure, functions, and production of white blood cells (WBCs).
   - What may be the significance of high and low white blood cell counts?
   - How do white blood cells fight pathogenic bacteria?
   - What are the types of white blood cells and their functions?

3. Platelets
   - Describe the structure, function, and origin of platelets

* Refer to Table 19.3 Summary of Formed Elements in Blood (p. 742) in your reference book.

D. Blood groups and blood types
   - Distinguish between the ABO and Rh blood groups.
     * Refer to Figure 19.12 Antigens and antibodies of the ABO blood types (p. 748) of your reference book

   - Explain why it is so important to match donor and recipient blood types before administering a transfusion.
     * Refer to Table 19.6 Summary of ABO Blood Group Interactions (p. 749) of your reference book

E. Hemostasis
   1. Define hemostasis
   2. Describe the three mechanisms that contribute to hemostasis (vascular spasm, platelet plug formation and blood clotting (coagulation)
   3. Identify the stages of blood clotting and explain the various factors that promote and inhibit blood clotting.
   4. What is the role of vitamin K in clotting?

   You can view this video to have an overview of hemotasis (optional):

   https://www.youtube.com/watch?v=x8TLTTyyPfI
   Hemostasis: Control of Bleeding, Coagulation and Thrombosis
   From Alila Medical Media