

THE CIRCULATORY SYSTEM LECTURE 4

**1ST YEAR-BIOLOGY SUBJECT –LABORATORY
SCIENCE DEPARTMENTS**

ALZAHRAA UNIVERSITY – COLLEGE OF PHARMACY

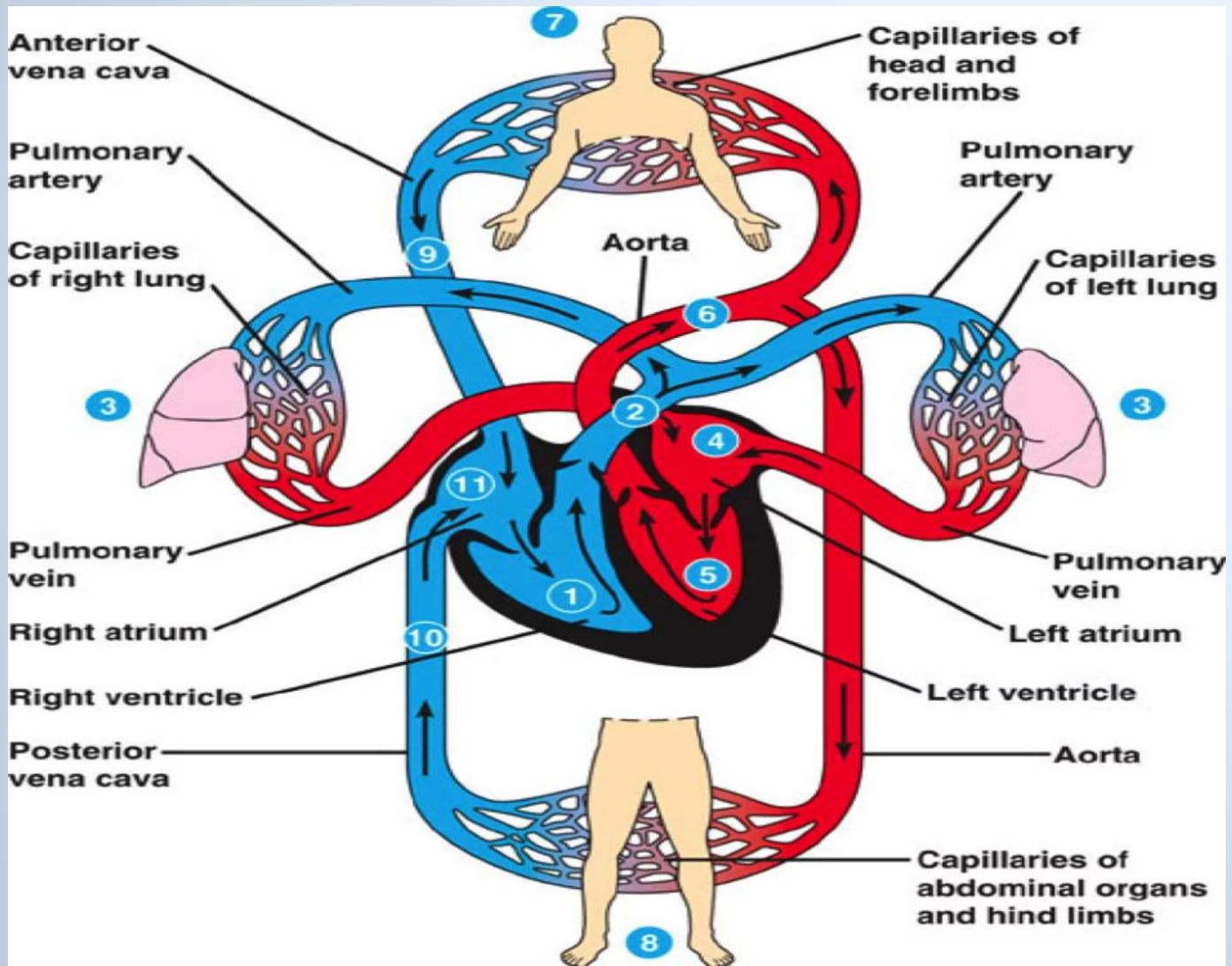
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M.B.Ch.B , F.I.C.M.S /PATH

Learning objectives

1. Identify the component of cardiovascular system
2. Summarize the function of the cardiovascular system
3. List types of blood cells and their functions
4. Knowing the types of blood circulation

THE CIRCULATORY SYSTEM



The Circulatory System

▶ **introduction**

The circulatory system, also known as the cardiovascular system,

▶ **Its general function include**

1. **Transport of oxygen, nutrients, hormones throughout the body**
2. **Protection through transport of immune cell .**
3. **Regulation It plays a critical role in maintaining homeostasis of body conditions include temperature ,ph .**

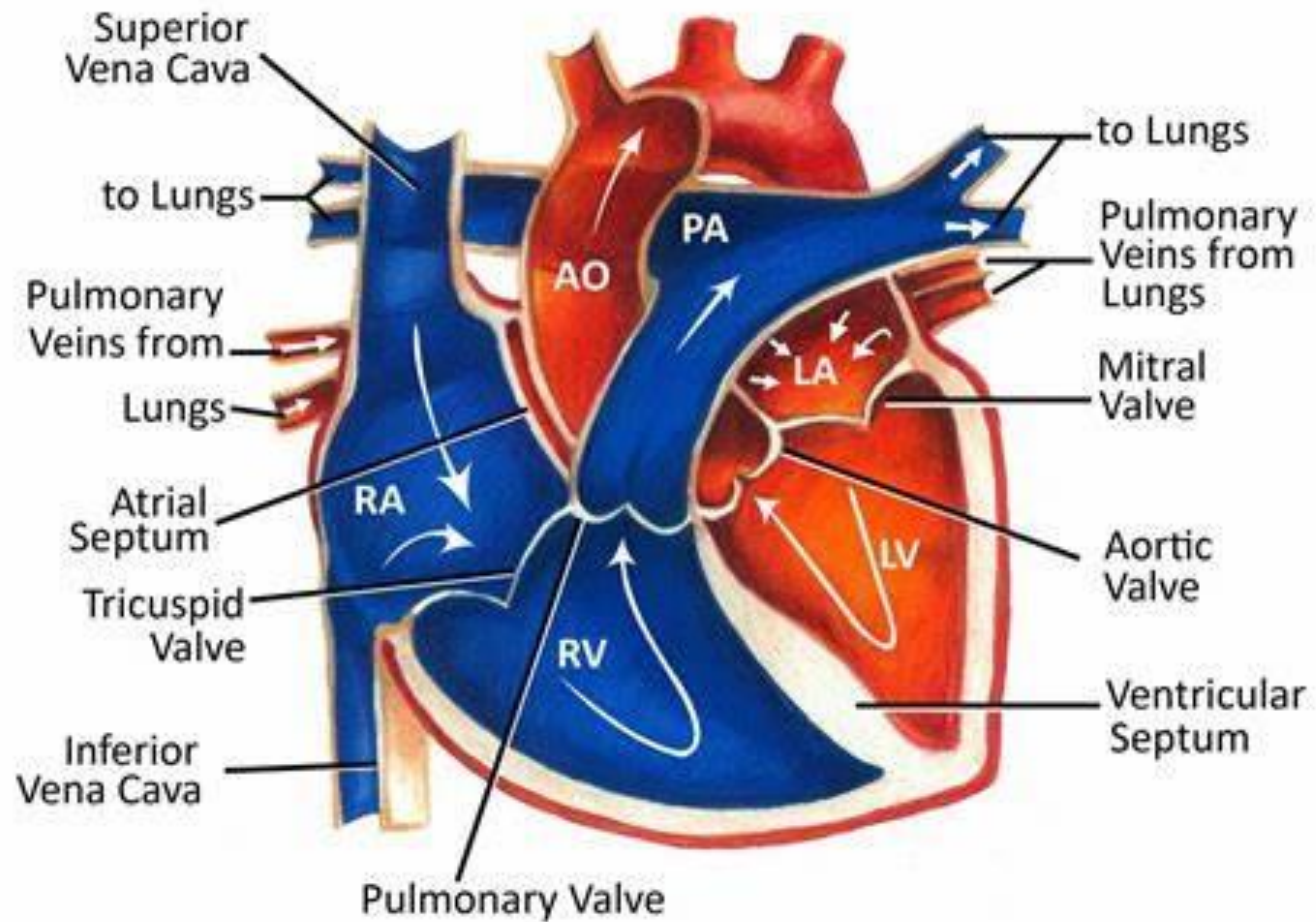
Components of the Circulatory System

- ▶ There are 4 major component of the Circulatory System
 1. Heart
 2. Blood Vessels
 3. Lymphatic vessels
 4. blood

Heart

- ▶ **Heart:**
- ▶ The heart is the muscular pump (double pump) that drives blood circulation.
- ▶ **Internally a wall called the septum separate the heart into right and left side**
- ▶ **Heart valves keep blood flowing in the right direction and prevents its backward movement**
- ▶ **The valve that lies between atria and ventricle called atrioventricular valves**

Normal Heart



Heart consists of four chambers:

- **Right atrium:** Receives deoxygenated blood from the body via the vena cava.
- **Right ventricle:** Pumps deoxygenated blood to the lungs via the pulmonary artery.
- **Left atrium:** Receives oxygenated blood from the lungs via the pulmonary veins.
- **Left ventricle:** Pumps oxygenated blood to the entire body via the aorta.
- ▶ The heart operates in a rhythmic cycle, alternating between **systole** (contraction) and **diastole** (relaxation)

2- Blood Vessels:

▶ **Blood Vessels:**

- ▶ The network of blood vessels forms the pathways through which blood flows. These include:
 1. **Arteries:** Carry oxygen-rich blood away from the heart (except the pulmonary artery).
 2. **Veins:** Return deoxygenated blood to the heart (except the pulmonary veins).
 3. **Capillaries:** Thin-walled vessels where gas exchange occurs between blood and tissues.

Arteries

- ▶ **Arteries:** Carry oxygen-rich blood away from the heart (except the pulmonary artery).
- ▶ Arteries carry blood under high pressure
- ▶ Therefore Arteries have a thick wall wrapped with elastic muscle tissue to allow it withstand the high pressure and changing pressure during cardiac contraction

Veins

- ▶ **Veins:** Return deoxygenated blood to the heart (except the pulmonary veins).
- ▶ **The blood in the veins under low pressure** therefor the walls of the vein are not thick and elastic as those of arteries
- ▶ **veins in the lower limbs has one way valve to ensure that the blood travel only toward the heart**

- ▶ **Capillaries:** Thin-walled vessels where gas exchange occurs between blood and tissues.
- ▶ **3 - Lymphatic system:-** it assist the cardiovascular system as it collect excess interstitial fluid and return it to the cardiovascular system
- ▶ **As exchange occur some fluid collects in the tissue this excess fluid enters the lymphatic vessels**

4- Blood Composition of blood

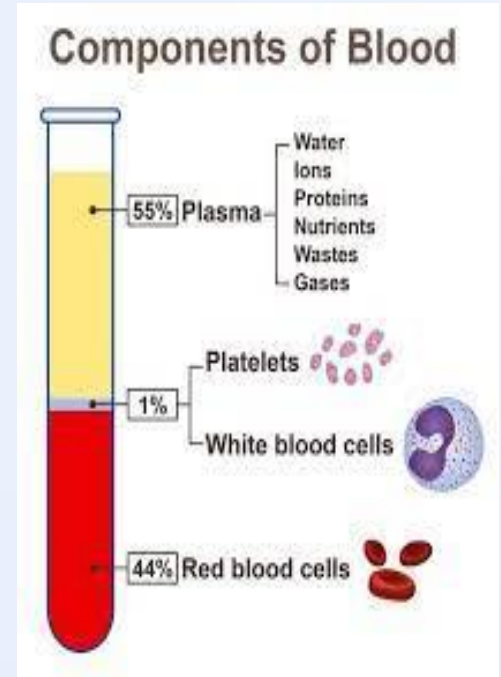
The circulating medium composed of **Blood cells**

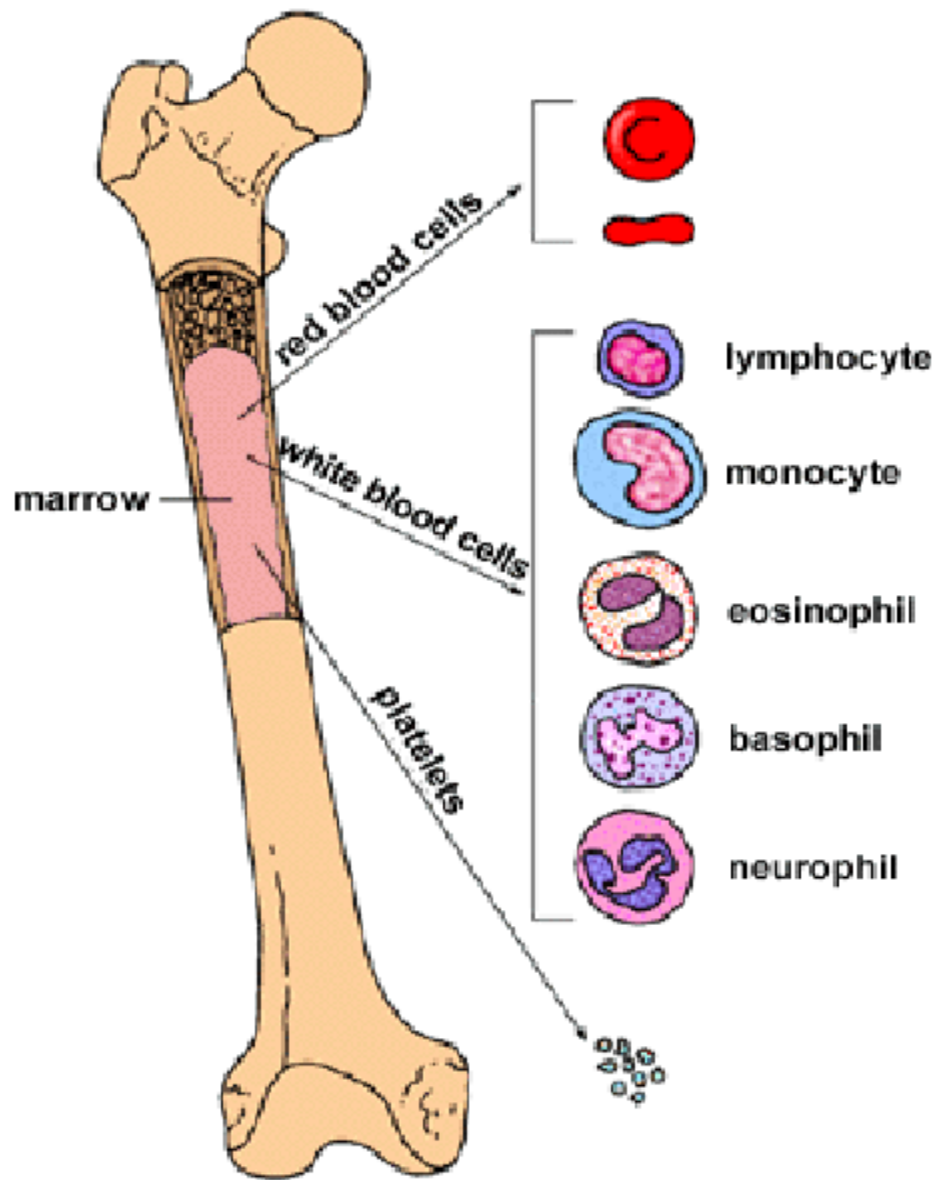
1. Red blood cell
2. White blood cell
3. Platelet

Plasma-: : The liquid portion that carries hormones, nutrients, and waste products

It contains 3type of proteins:

1. ●Albumin
2. ●Globulins
3. ●Fibrinogen





Stem cells of bone marrow are the origin of all blood cells

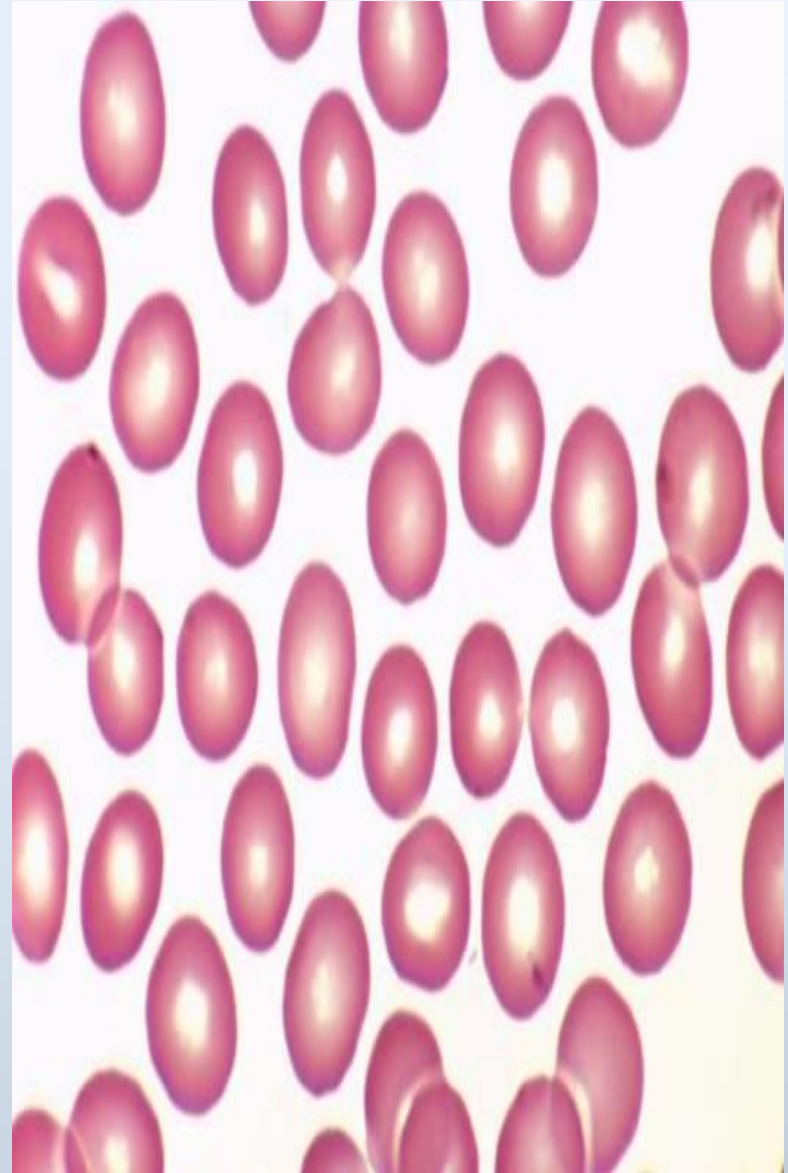
Peripheral Blood: Erythrocytes

RBCs constitute the largest number of cells in the blood

- **Biconcave discs**
- **NO NUCLEUS**
- Contain Hemoglobin

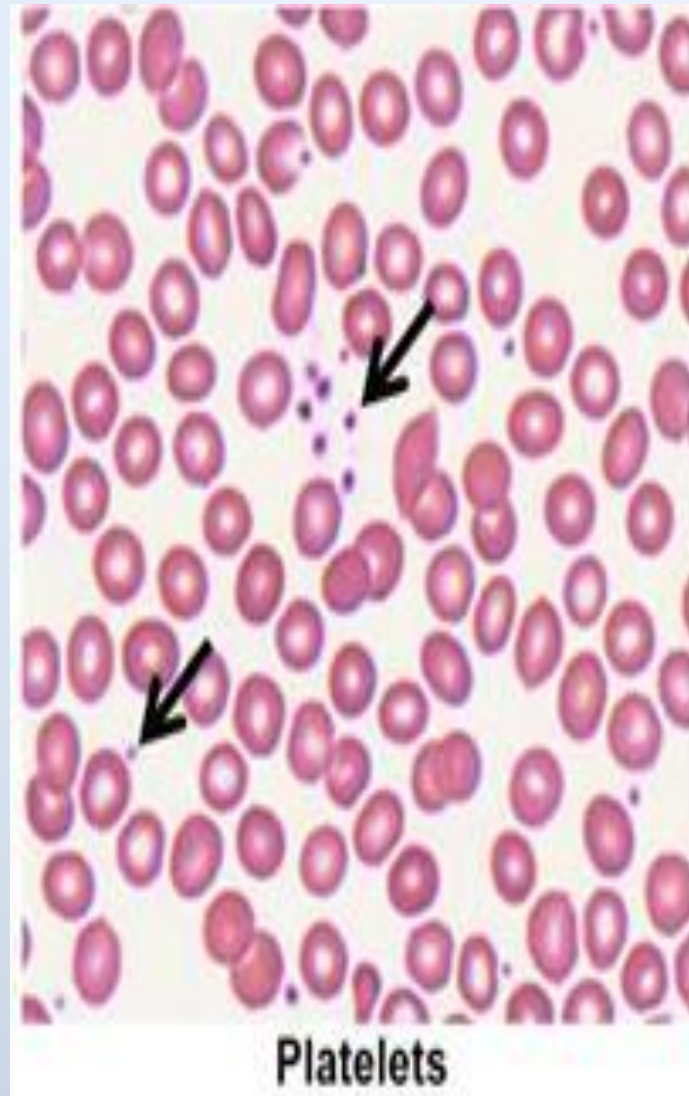
Function

carry oxygen towards the tissues from the lungs. It does this by binding oxygen to hemoglobin.



Platelets

- **Function has a role in blood clotting**



Leukocytes

Granulocytes

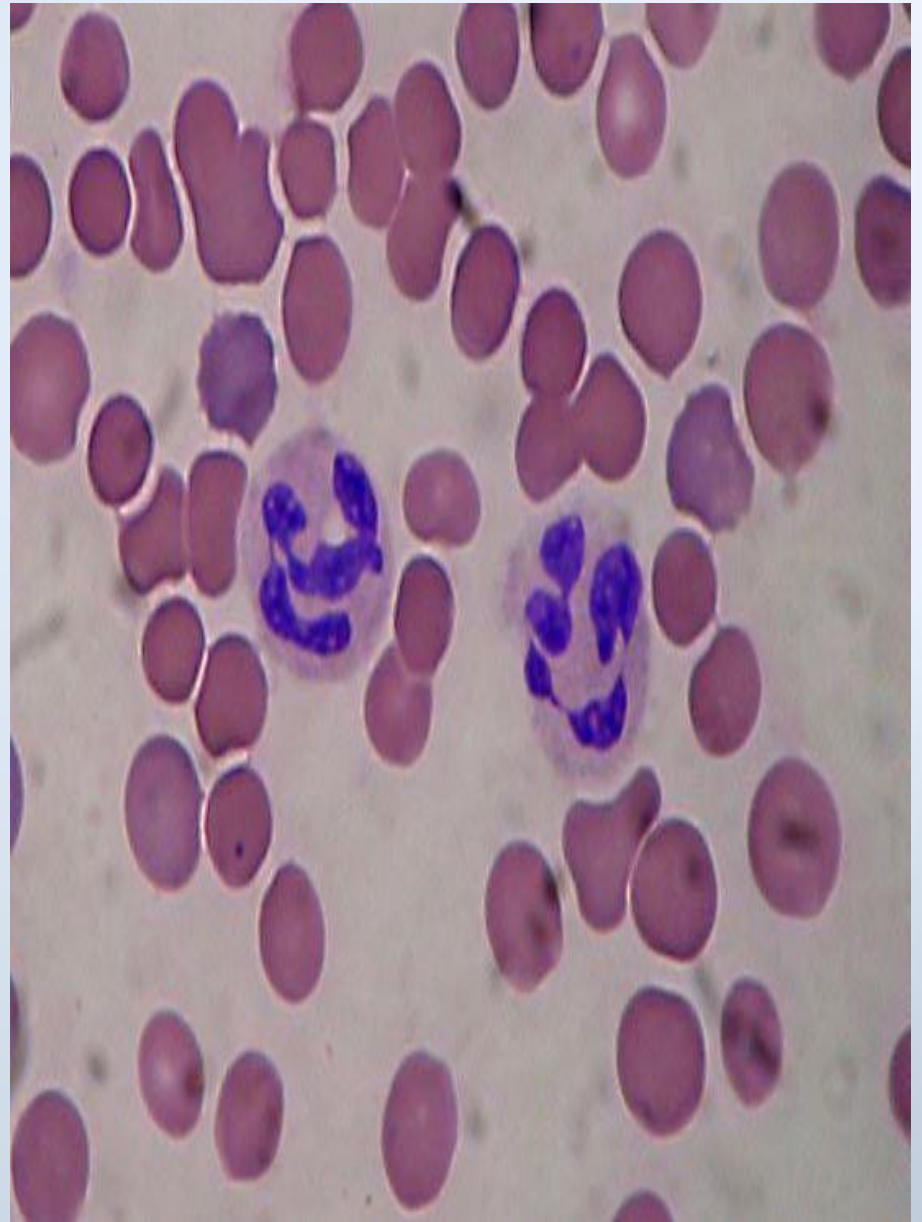
1. •neutrophils (phagocytosis)
2. •eosinophils (allergies)
3. •basophils (promote inflammation)

•A granulocytes

1. •lymphocytes (production of circulating antibodies)
2. •monocytes (macrophages)

Granulocytes: Neutrophils

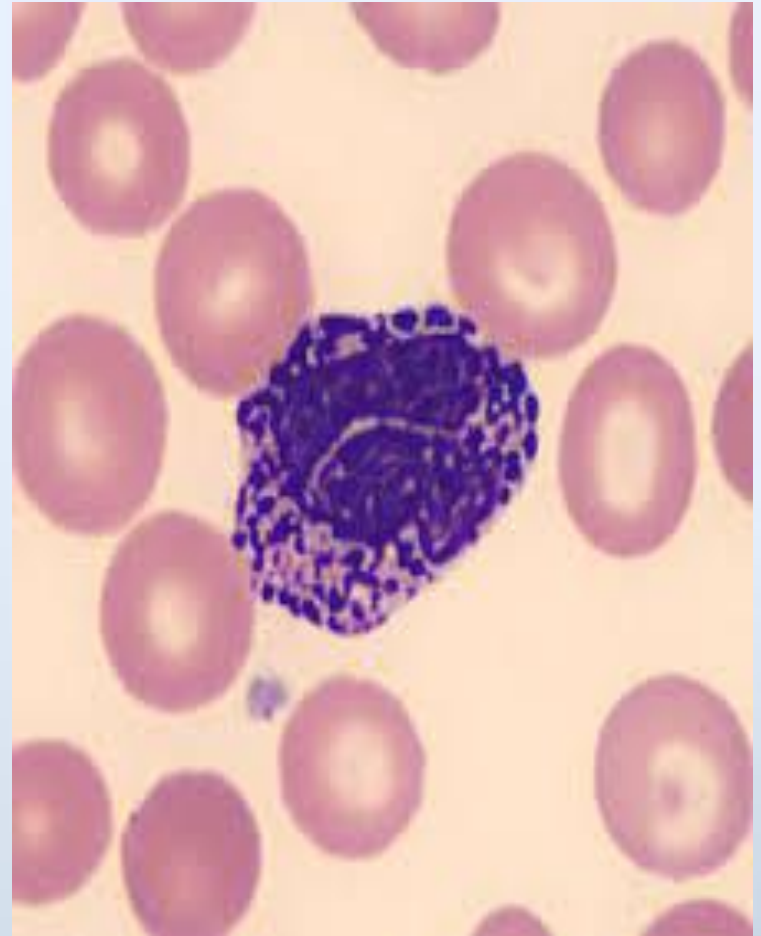
- Most numerous WBC in blood
- Multilobed nucleus
- **Granules 2 types**
 1. Azurophilic granules
 2. Specific granules
- **Function**
 1. 1 st wave of cells in acute inflammation
 2. • can phagocytose bacteria



Granulocytes: Basophils

Rare

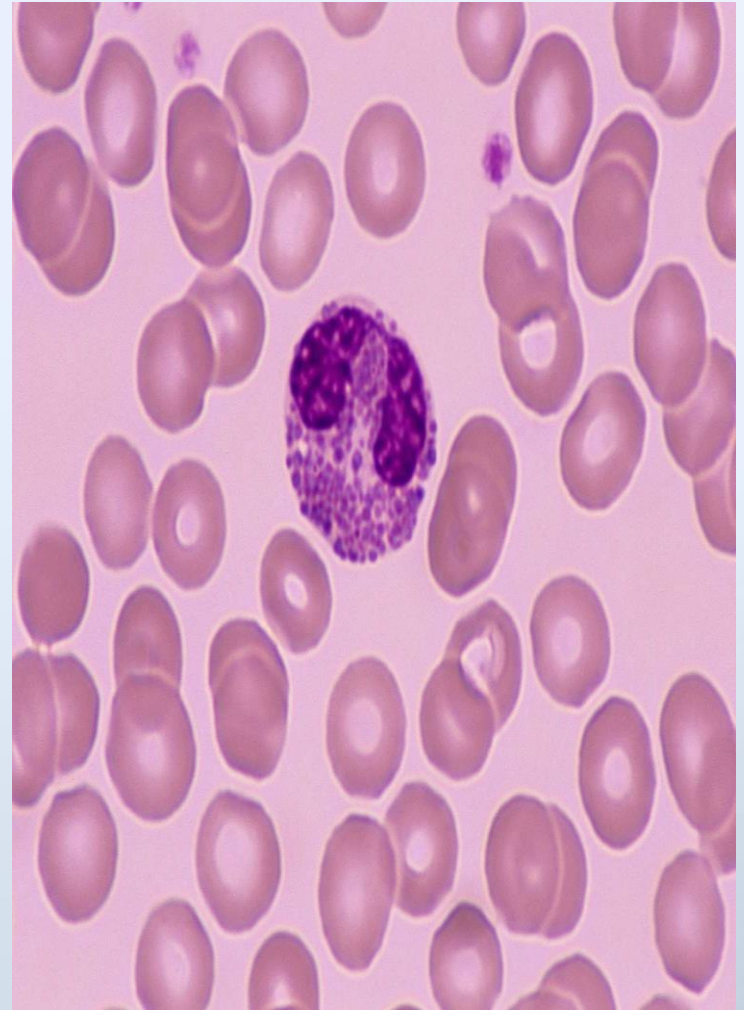
- Lobulated nucleus
- Dark Blue Granules
- **Function**
- has a Role in hypersensitivity and anaphylaxis



Eosinophils

Bilobed nucleus

- Bright pink Granules
- **Function:**
- Important in allergic reactions, parasitic infections ,



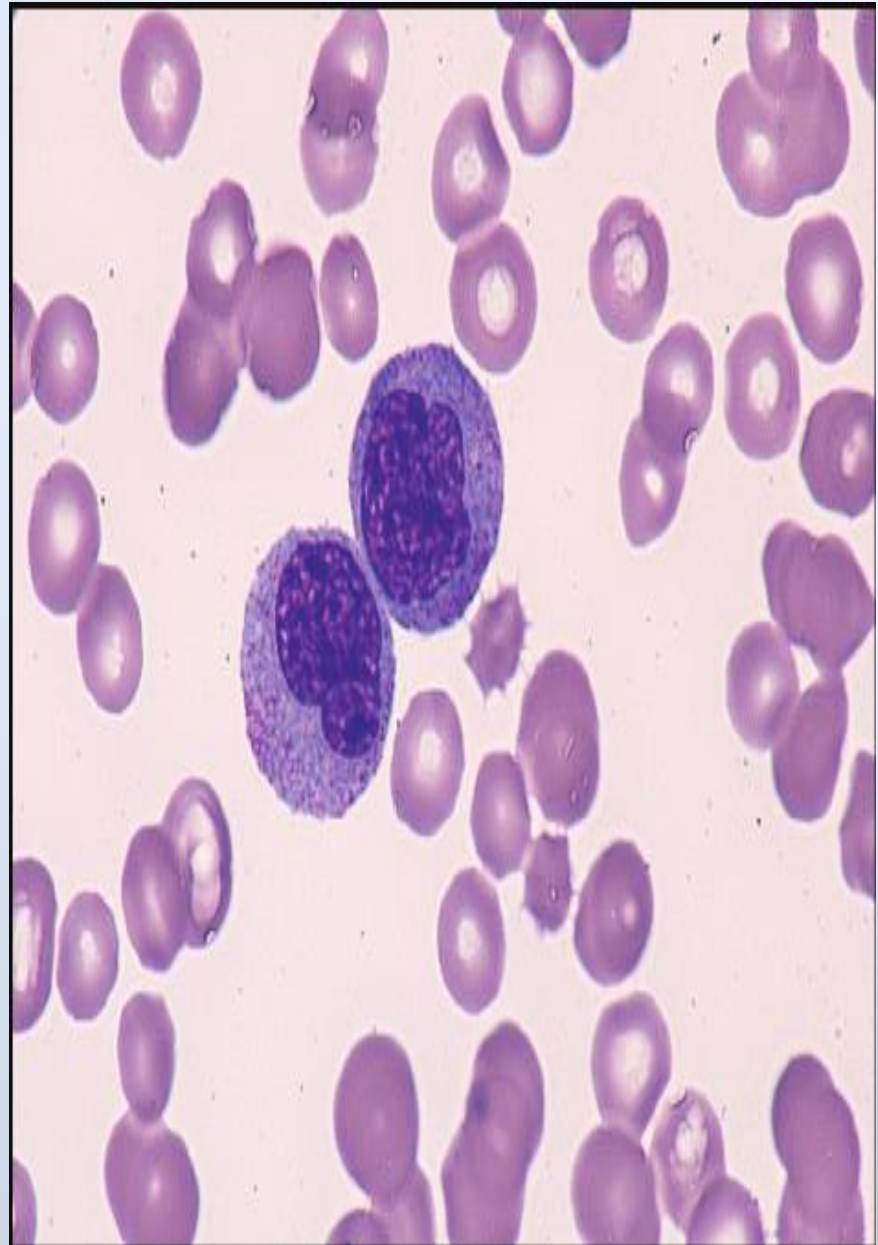
Agranulocytes

-1 Monocytes

- Largest WBCs in blood smear
- Nucleus often kidney-shaped
- No granules

Function

- Precursor of macrophages in tissues



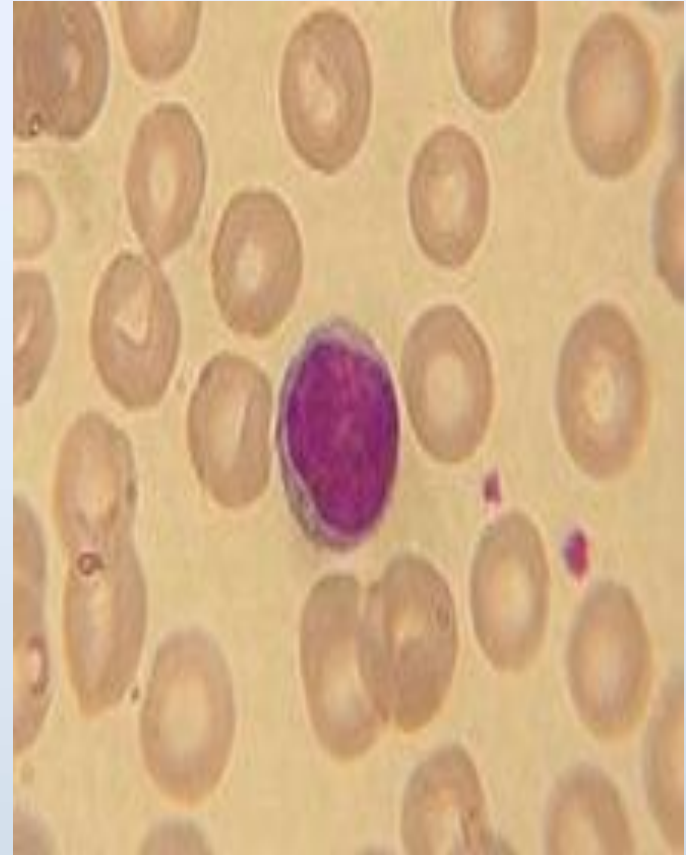
Lymphocytes

- About size of RBCs

Next most common
after neutrophils

Main functional

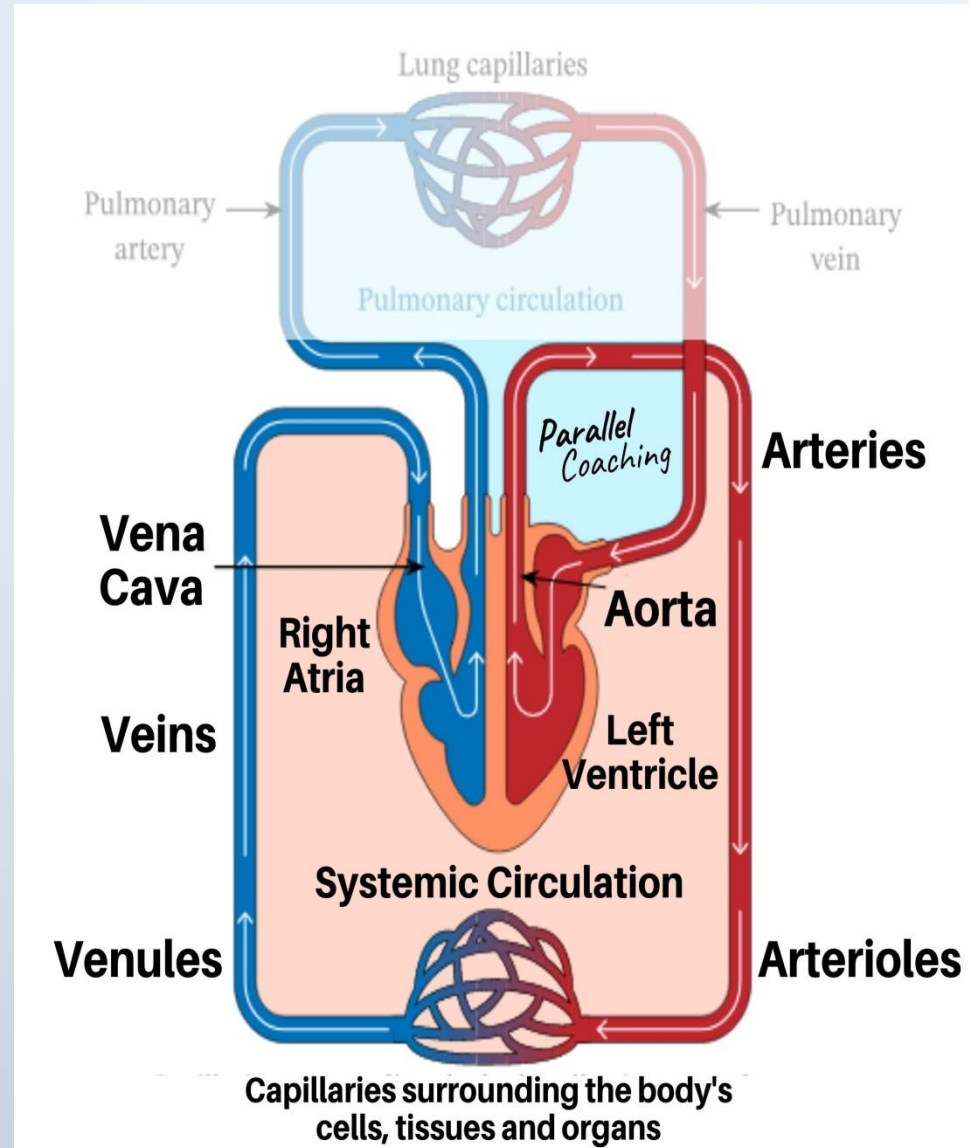
One of the cells of
adaptive immune
system



Types of Circulation

► 1- Systemic Circulation:

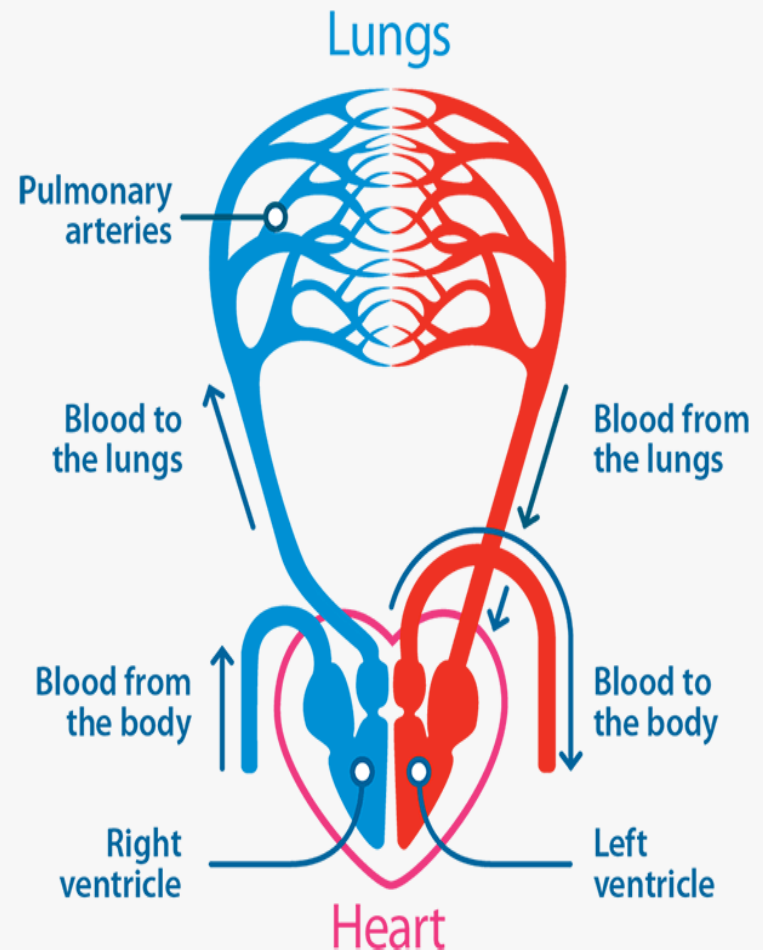
- Involves the movement of oxygenated blood from the left side of the heart to the body and the return of deoxygenated blood to the right side of the heart.
- Essential for delivering nutrients and oxygen to tissues.



2- Pulmonary Circulation:

- The pathway where deoxygenated blood is pumped from the right side of the heart to the lungs for oxygenation and then returned to the left side of the heart.

Pulmonary circulation



Coronary Circulation:

- ▶ The specialized system that supplies the heart muscle (myocardium) with oxygenated blood through coronary arteries.

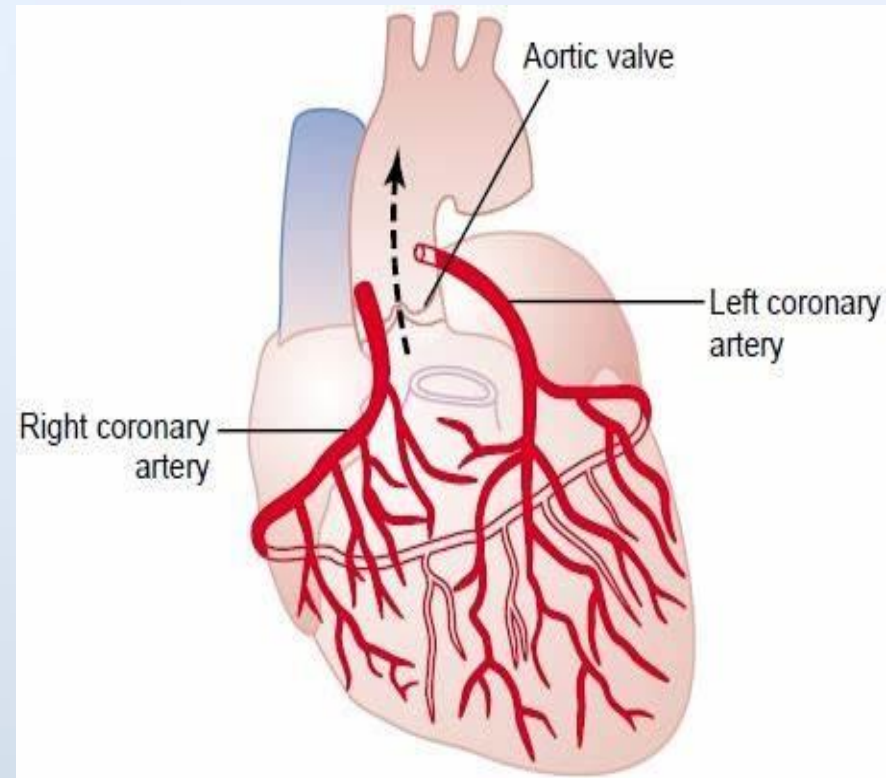
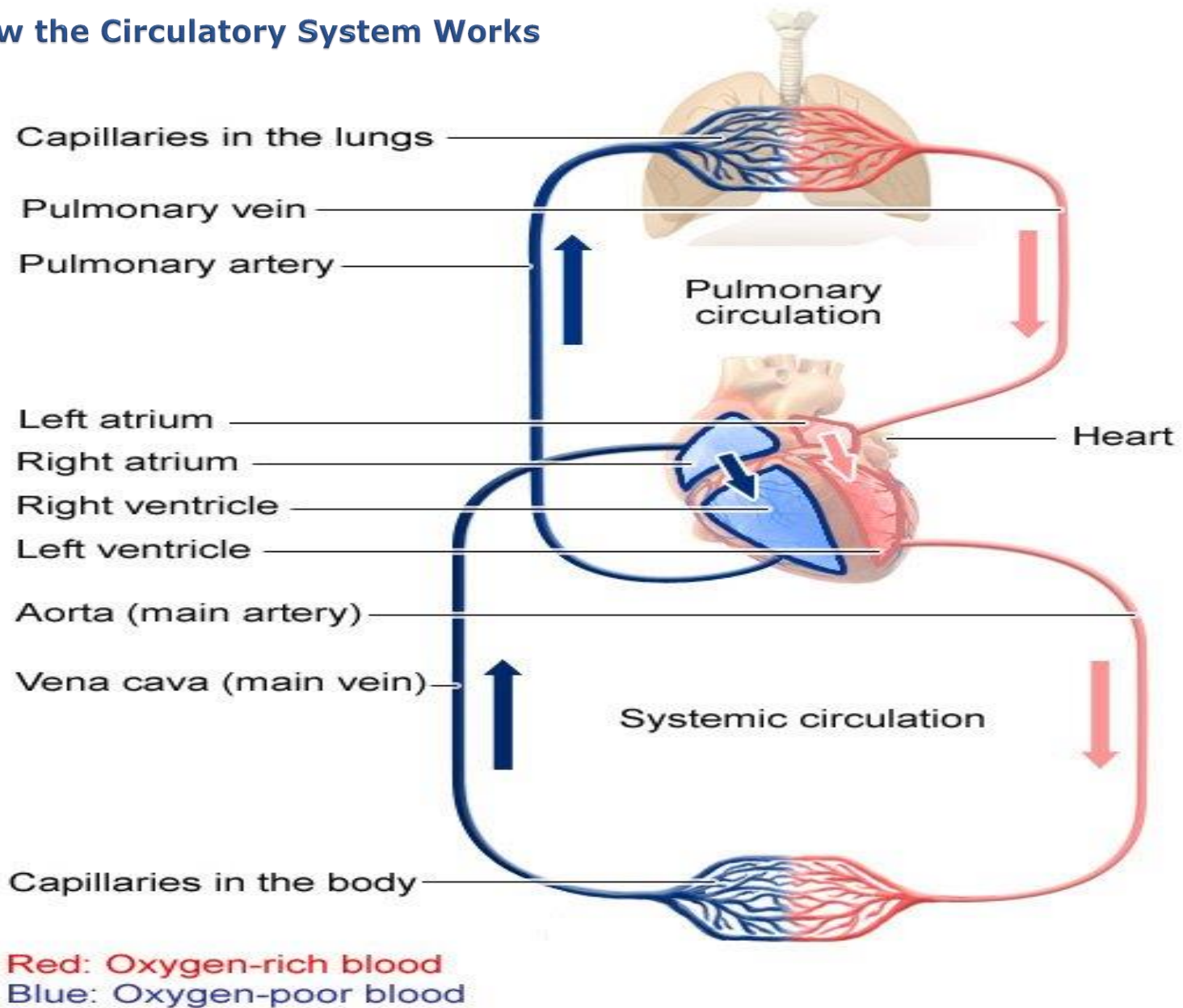


Figure 21-3

The coronary arteries.

How the Circulatory System Works



THANK YOU
ANY QUESTIONS ?