



جامعة المستقبل  
AL MUSTAQBAL UNIVERSITY  
كلية العلوم

قسم الأنظمة الطبية الذكية

## General Anatomy and Physiology

### (L4) The Heart

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The principal components of the cardiovascular system are:

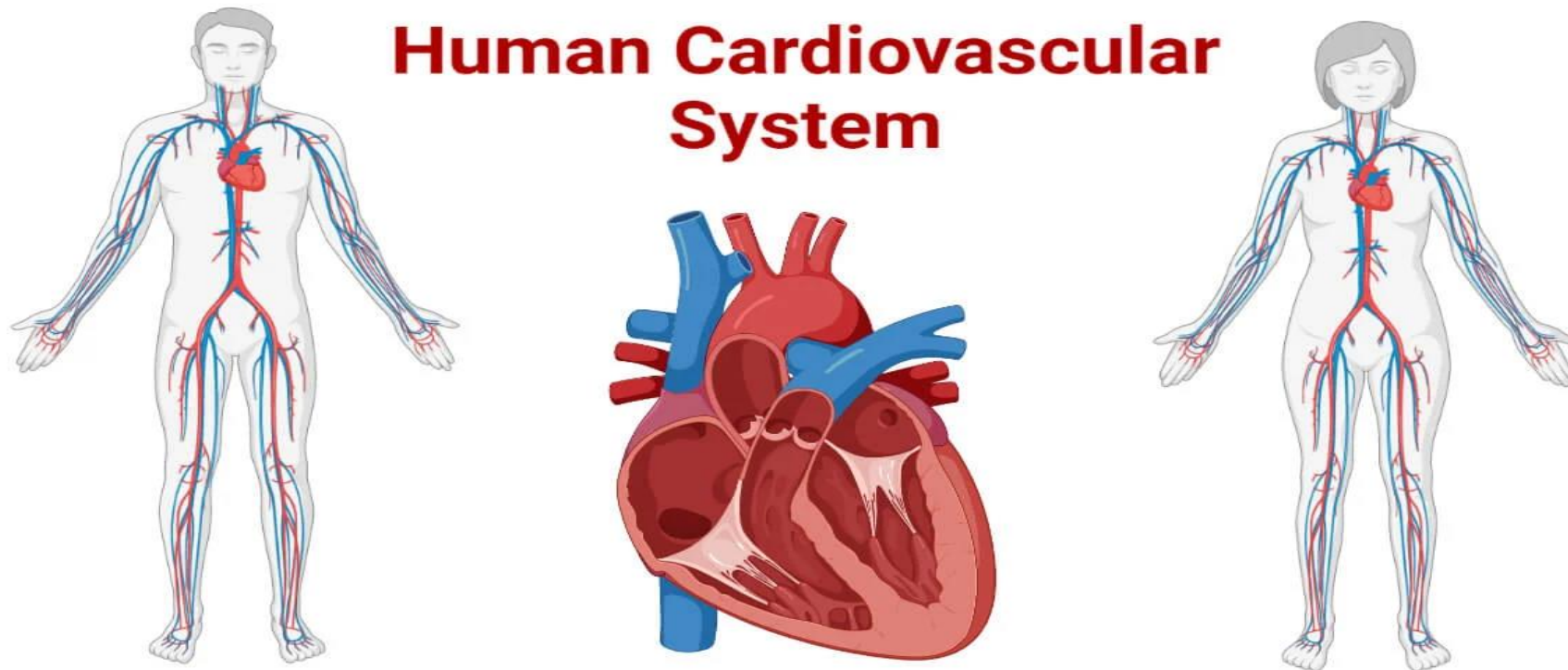
**1- blood**

**2-blood vessels**

**3-the heart.**

The primary function of the **cardiovascular system** is to provide an adequate supply of oxygen and nutrients to all cells of the body and carry away the waste products of their metabolism.

Blood carries materials to and from the tissues, blood vessels are conduits that bring blood close to cells, and the heart is used to create the pressure that is needed to propel blood around th



# Arteries vs Veins

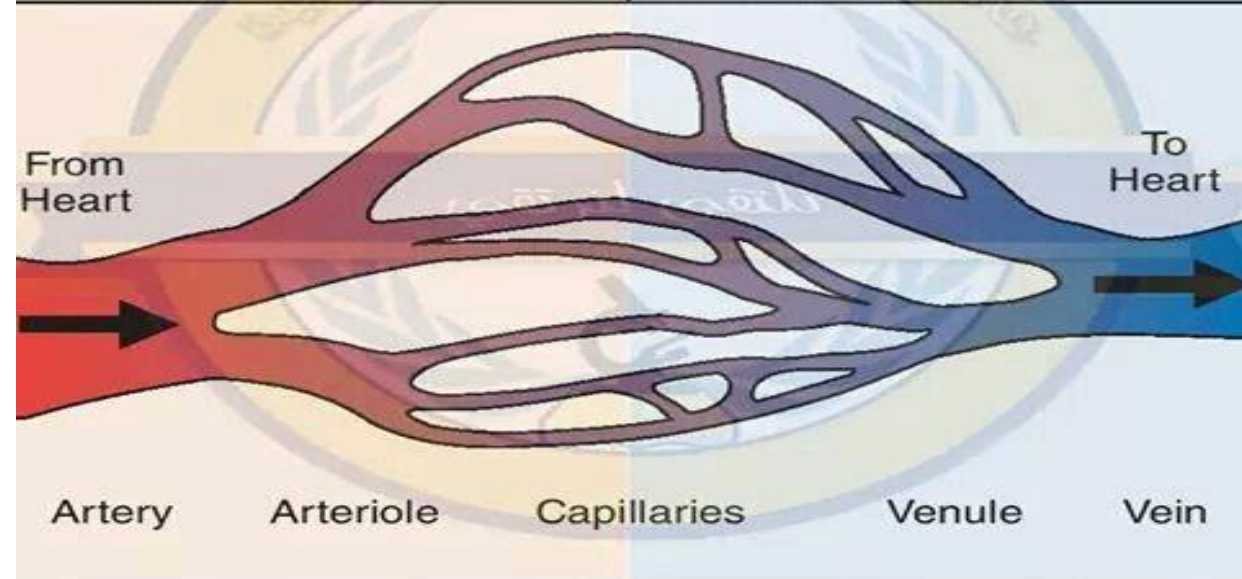
The blood vessels that carry blood **AWAY** from heart are called arteries.

The blood vessels that carry blood **TOWARDS** the heart are called veins.

Only in **systemic circulation** arteries carry oxygenated blood, while in the **pulmonary circulation** arteries carry deoxygenated blood.

## ARTERIES VERSUS VEINS

Arteries	Veins
1. Carry blood from the heart, carry oxygenated blood (except pulmonary artery)	1. Carry blood to the heart, carry deoxygenated blood (except pulmonary vein)
2. Normally bright red in color	2. Normally dark red in color
3. Elastic walls that expand with surge of blood	3. Thin walls/less elastic
4. No valves	4. Valves
5. Can feel a pulse	5. No pulse



# Heart Chambers and Valves

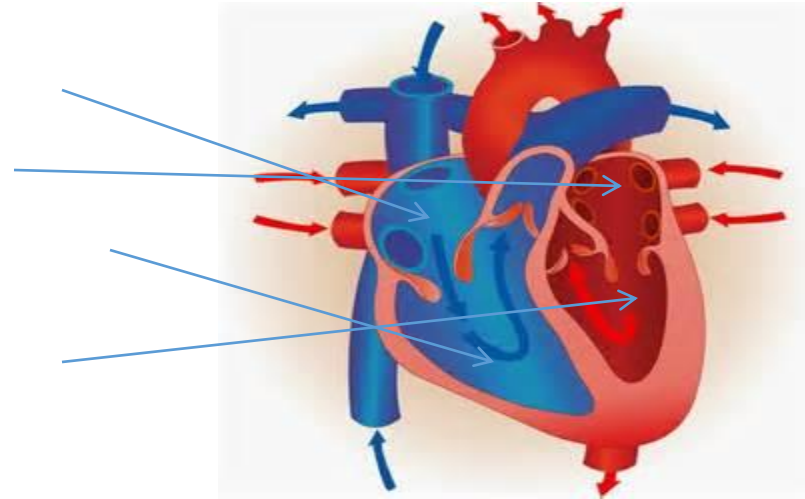
The human heart has four chambers, which are responsible for pumping blood and maintaining blood circulation throughout the body. The four chambers are named:

The **right atrium**

The **left atrium**

The **right ventricle**

The **left ventricle**



Blood is only pumped to one direction. Four heart valves ensure that blood does not flow backward within the heart.

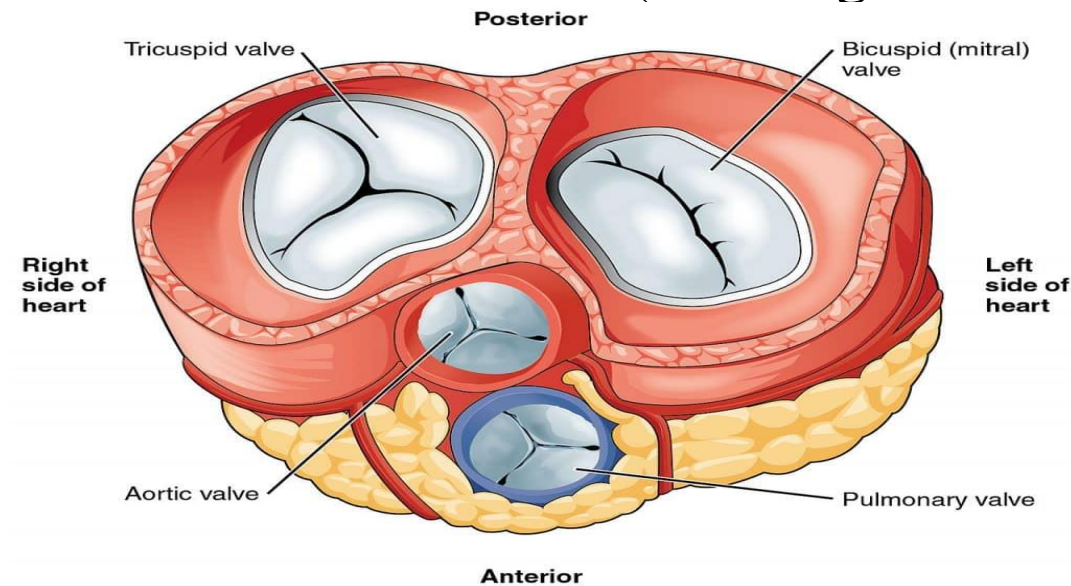


# The Four Heart Valves are Named:

- ❖• The **tricuspid valve** (from *tri-* + *cuspid*, meaning “having three points”) located between right atrium and ventricle.
- ❖• The **pulmonary valve** (from *pulmon/o*, meaning “lungs”) located between right ventricle and pulmonary artery. Also called semilunar valve.
- ❖• The **mitral valve**, also called **bicuspid valve** ( from *bi-* + *cuspid*, meaning “having two points”) located between left atrium and ventricle.
- ❖• The **aortic valve** located between left ventricle and aorta.

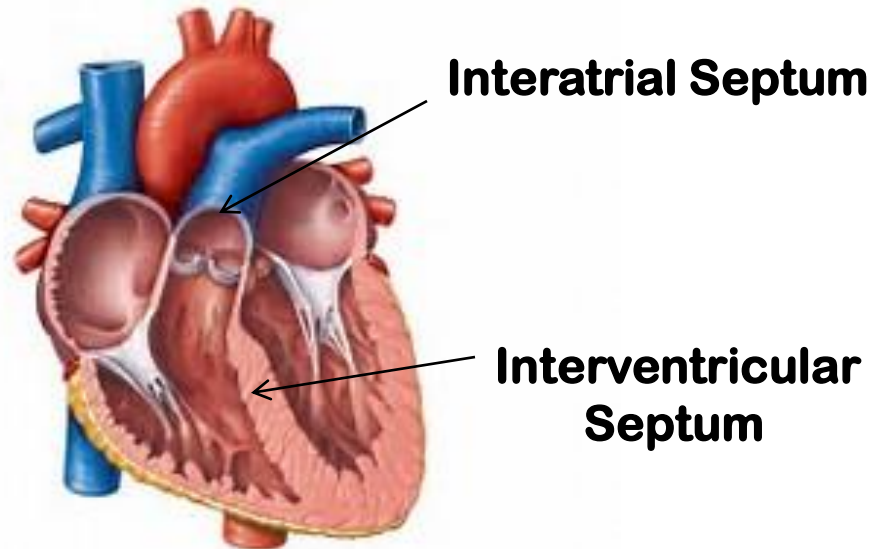
The tricuspid and bicuspid valves are also called **atrioventricular valves** (meaning “located between the atrium and ventricle”).

The pulmonary valve and The aortic valve are called **semilunar valves**.



# Structure of the Heart

- ❖ The heart is divided into the left and right side by partitions called **septa** (singular septum).
- ❖ The **interatrial septum** separates the two upper chambers, called atria (from *atri/o*, meaning “upper chambers”).
- ❖ The **interventricular septum** separates the two lower chambers, called ventricles (from *ventricul/o*, meaning “lower chamber”).

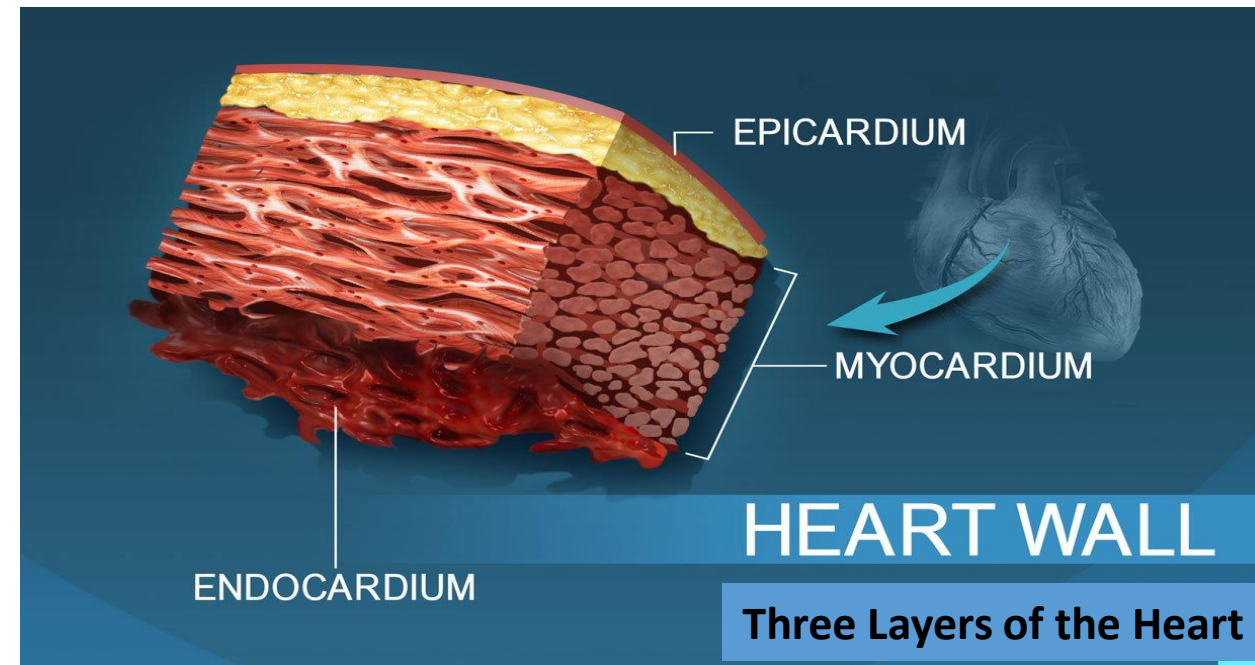


## The Heart Wall Consists of Three Layers:

- ❖ **The endocardium** (from *endo-* + *cardi/o* + *-ium*, meaning “inner layer of the heart”)
- ❖ **The myocardium** (from *my/o* + *cardi/o* + *-ium*, meaning “heart muscle”) is the muscular middle layer of the heart that consists of heart muscle cells.
- ❖ **The epicardium** (from *epi-* + *cardi/o* + *-ium*, meaning “outer layer of the heart”).

❖ **The pericardium** (from *peri-* + *cardi/o* + *-ium*, meaning “surrounding the heart”) is a membranous sac that surrounds the heart.

❖ It consists of two layers called the **visceral pericardium** (adheres to the epicardium) and **parietal pericardium** (the outer coat)..



# Function of the Heart

The heart functions to circulate blood around the body. The right and left side of the heart pump blood into two different circulations.

The right side pumps **deoxygenated** (from *de-* + *oxygenated*, meaning “without oxygen”) blood into the **pulmonary circulation**, while the left side pumps oxygenated blood into the **systemic circulation**.

The right atrium receives deoxygenated blood from the body tissues via the **superior** (from super- meaning “above”) and **inferior** (meaning below) **vena cava** (from ven/o meaning “vein”).

The blood enters the **right atrium**, which pumps the blood into **the right ventricle**. The tricuspid valve prevents blood from flowing backward into the right atrium. The right ventricle pumps the blood into the **pulmonary artery** via the pulmonary valve.



The **pulmonary artery** will deliver the **deoxygenated** blood to the lungs, where gas exchange occurs.

Oxygen is taken from the air into the blood (now called **oxygenated blood**), while carbon dioxide is expelled from the blood into the air.

The **oxygenated blood** returns to the left side of the heart via the **pulmonary veins**.

The oxygenated blood enters the **left atrium**.

The **left atrium** pumps blood into the left ventricle. The mitral valve prevents blood from flowing backward into the left atrium.

The **left ventricle** pumps the blood into the aorta and **systemic circulation**. The oxygenated blood is delivered everywhere in the body (besides the lungs).

# Contraction of the Heart

The contraction of the muscular wall of the heart chambers, called **myocardium** generates the force to pump blood.

The heart contraction is divided into two phases: **systole** (meaning “contraction”) and **diastole** (meaning “relaxation”).

Blood is pumped from the chambers during a contraction phase.

The heart chambers are filled with blood during a relaxation phase.

# THANK YOU!

