Anatomy

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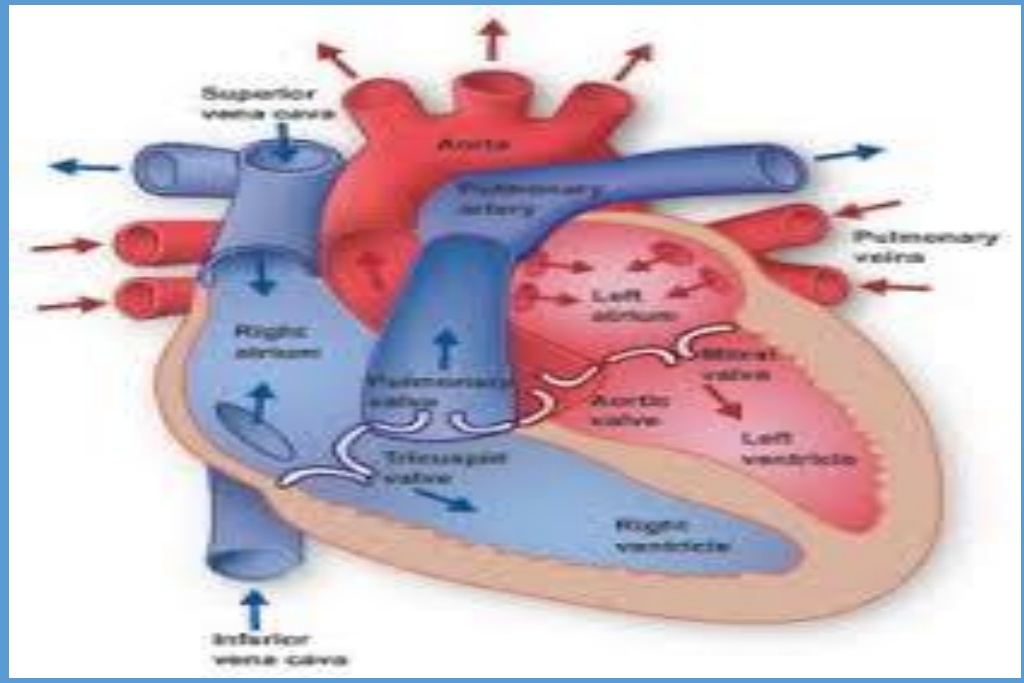

Anatomy of the Heart

The heart is a muscular, four-chambered organ responsible for pumping blood throughout the body. It is located in the thoracic cavity, slightly to the left of the midline, between the lungs, and enclosed in a protective sac called the pericardium.

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1. Structure of the Heart

The heart consists of the following key components:

A. Chambers of the Heart

The heart has four chambers:

- **Right Atrium**:
  Receives deoxygenated blood from the body through the **superior vena cava**, **inferior vena cava**, and **coronary sinus**.
- **Right Ventricle**:
  Pumps deoxygenated blood to the lungs through the **pulmonary artery**.
- **Left Atrium**:
  Receives oxygenated blood from the lungs via the **pulmonary veins**.
- **Left Ventricle**:
  Pumps oxygenated blood to the body through the **aorta**.
  The walls of the left ventricle are thicker than those of the right ventricle to generate enough force to pump blood throughout the body.

B. Valves of the Heart

- Valves ensure one-way blood flow and prevent backflow:
- **Atrioventricular (AV) Valves**:
  - **Tricuspid Valve**: Between the right atrium and right ventricle.
  - **Mitral (Bicuspid) Valve**: Between the left atrium and left ventricle.
- **Semilunar Valves**:
  - **Pulmonary Valve**: Between the right ventricle and pulmonary artery.
  - **Aortic Valve**: Between the left ventricle and aorta.

C. Layers of the Heart Wall

The heart wall has three layers:

1.Epicardium: The outer layer; part of the pericardium.

2.Myocardium: The thick muscular middle layer responsible for contraction.

3.Endocardium: The inner layer that lines the chambers and valves.

D. The Pericardium

The heart is enclosed in a double-layered sac:

Fibrous Pericardium: The outer tough, protective layer.

Serous Pericardium:

- **Parietal Layer**: Lines the fibrous pericardium.
- **Visceral Layer (Epicardium)**: Covers the surface of the heart.
- The space between these layers is the **pericardial cavity**, filled with fluid to reduce friction during heartbeats.

2. Blood Vessels Associated with the Heart

1.Arteries (carry blood away from the heart):

Aorta: Transports oxygenated blood from the left ventricle to the body.

Pulmonary Arteries: Carry deoxygenated blood from the right ventricle to the lungs.

2.Veins (return blood to the heart):

Superior and Inferior Vena Cava: Bring deoxygenated blood to the right atrium from the body.

Pulmonary Veins: Bring oxygenated blood from the lungs to the left atrium.

3. Conduction System of the Heart

The heart has its own electrical system to regulate its rhythmic contractions:

1.Sinoatrial (SA) Node:

Located in the right atrium.

Acts as the natural pacemaker, initiating electrical impulses.

2.Atrioventricular (AV) Node:

Located between the atria and ventricles.

Delays the impulse slightly to allow the atria to contract before the ventricles.

3.Bundle of His:

Conducts the impulse from the AV node to the ventricles.

4.Purkinje Fibers:

Spread the impulse through the ventricular walls, causing contraction

4. Blood Flow Through the Heart

1.Deoxygenated Blood Flow:

Blood from the body enters the right atrium via the superior and inferior vena cava.

Passes through the tricuspid valve into the right ventricle.

Pumped through the pulmonary valve into the pulmonary arteries to the lungs.

2.Oxygenated Blood Flow:

- ❑Blood returns from the lungs to the left atrium via the pulmonary veins.
- ❑Passes through the mitral valve into the left ventricle.
- ❑Pumped through the aortic valve into the aorta, which distributes blood

4. Blood Flow Through the Heart (Continued)

2.Oxygenated Blood Flow (Continued):

- ❑Pumped through the aortic valve into the aorta, which distributes oxygenated blood to the entire body via the systemic circulation

5. Coronary Circulation

The heart has its own blood supply through the coronary arteries and veins:

1.Coronary Arteries:

Arise from the base of the aorta and supply oxygen-rich blood to the myocardium.

Major branches:

Right Coronary Artery (RCA): Supplies the right atrium, right ventricle, and part of the conduction system.

Left Coronary Artery (LCA): Divides into:

Left Anterior Descending (LAD) Artery: Supplies the front of the left ventricle and septum.

Circumflex Artery: Supplies the left atrium and back of the left ventricle.

2.Cardiac Veins:

Collect deoxygenated blood from the heart muscle and return it to the right atrium via the coronary sinus.

6. Heart Sounds and Cardiac Cycle

1.Heart Sounds:

The "lub" (S1): Closing of the tricuspid and mitral valves during ventricular contraction (systole).

The "dub" (S2): Closing of the pulmonary and aortic valves during ventricular relaxation (diastole).

2.Cardiac Cycle:

Systole: The ventricles contract, ejecting blood into the pulmonary artery and aorta.

Diastole: The ventricles relax, allowing them to fill with blood from the atria.

Common Heart Conditions

1.Coronary Artery Disease (CAD): Narrowing of the coronary arteries due to plaque buildup, leading to reduced blood flow.

2.Myocardial Infarction (Heart Attack): Blockage in a coronary artery, causing damage to heart muscle.

3.Arrhythmias: Irregular heart rhythms caused by problems in the conduction system.

4.Congestive Heart Failure (CHF): The heart's inability to pump blood effectively.

5.Valvular Diseases: Dysfunction of heart valves, such as stenosis or regurgitation.