SNS COLLEGE OF ALLIED HEALTH SCIENCE

Affiliated to The Tamil Nadu Dr. M.G.R Medical University, Chennai

DEPARTMENT OF RADIOGRAPHY AND IMAGING TECHNOLOGY

COURSE NAME : HUMAN ANATOMY AND PHYSIOLOGY RELEVANT TO RADIOLOGY

UNIT : CARDIOVASCULAR SYSTEM

TOPIC : STRUCTURE AND FUNCTION OF HUMAN HEART.

FACULTY NAME : MRS.G.HELANA JOY

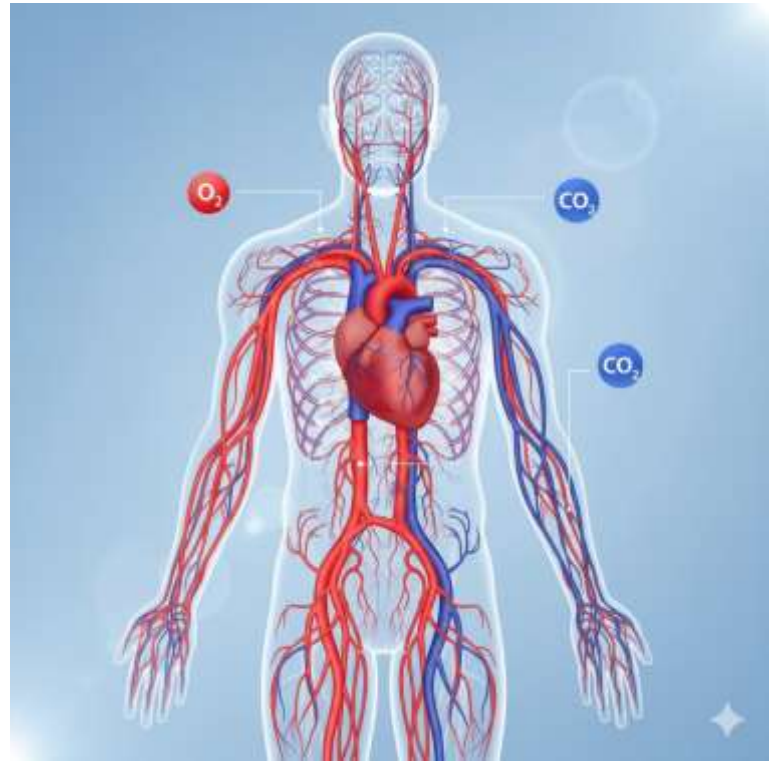
INTRODUCTION TO THE CARDIOVASCULAR SYSTEM (DEFINE)

- **What is the Cardiovascular System? (Circulatory System)**

➢ **Primary role:** Transport of oxygen, nutrients, hormones, and removal of waste products.

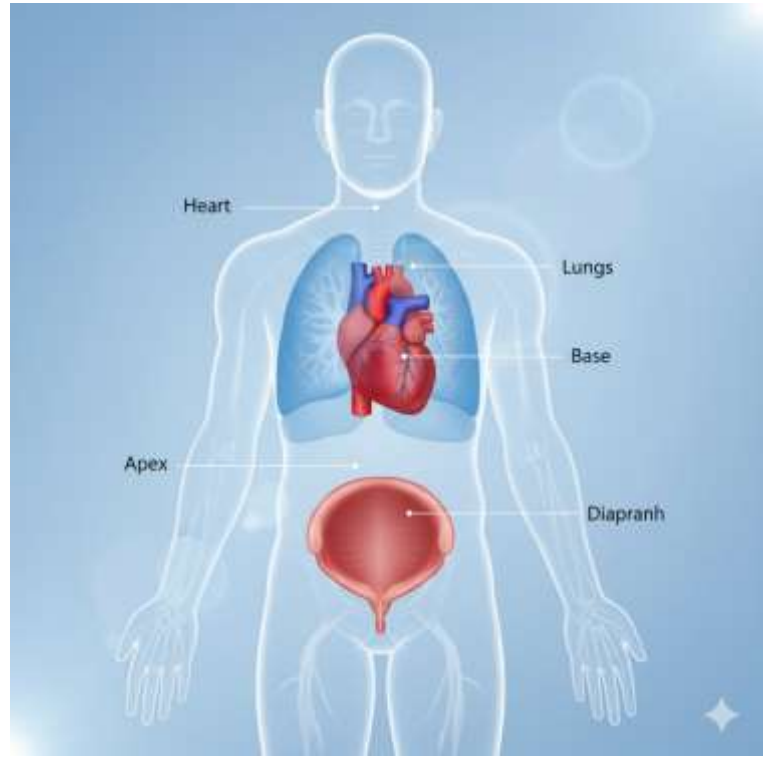
➢ **Components:** Heart (pump), Blood Vessels (arteries, veins, capillaries - transport network), Blood (transport medium).

➢ Importance of a healthy cardiovascular system.



ANATOMY OF THE HEART - LOCATION AND SIZE

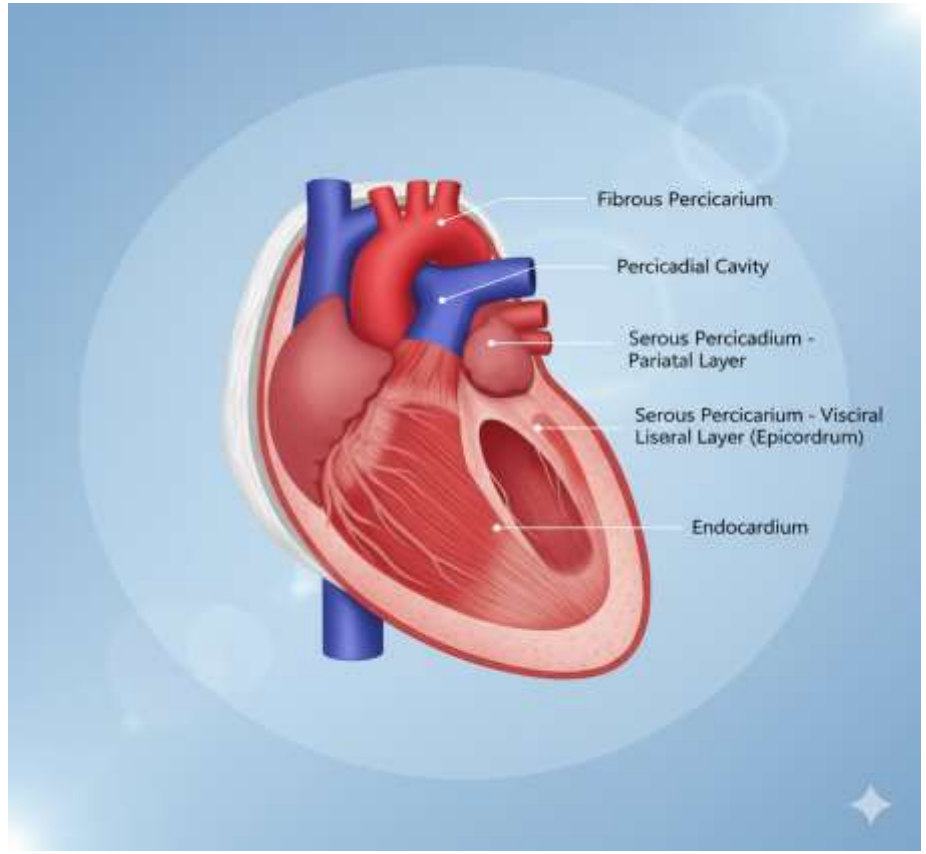
- **Location:** Mediastinum, slightly to the left of the midline, between the lungs, resting on the diaphragm.
- **Size:** Approximately the size of a clenched fist.
- **Weight:** ~250-350 grams.
- **Orientation:** Apex (pointed end) points inferiorly and to the left; Base (broader end) points superiorly and to the right.



LAYERS OF THE HEART WALL

Pericardium:

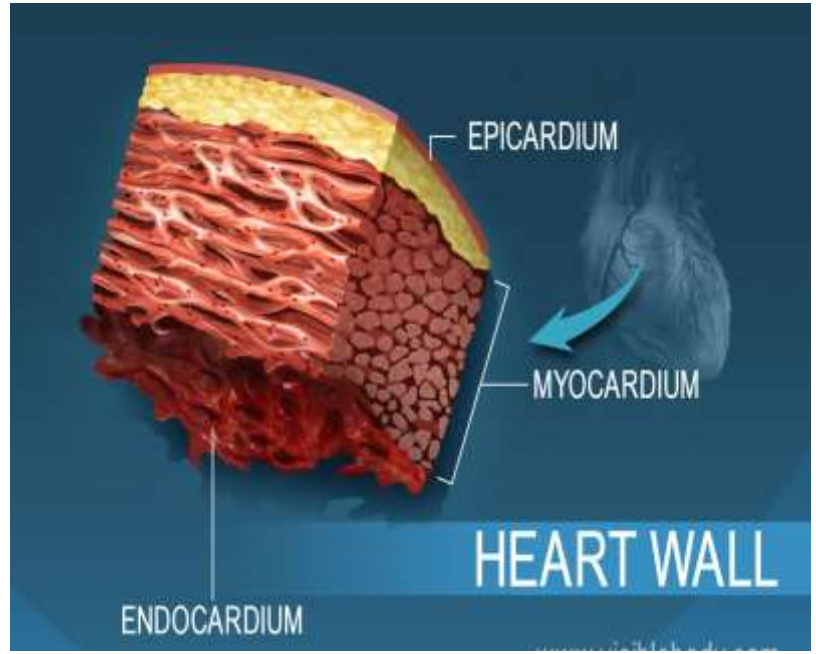
- Fibrous Pericardium: Outer, tough protective sac.
- Serous Pericardium: Double-layered (parietal and visceral - epicardium). Contains pericardial fluid to reduce friction.



LAYERS OF THE HEART WALL

Heart Wall Proper:

- **Epicardium:** Outermost layer, visceral layer of serous pericardium.
- **Myocardium:** Middle, thickest layer, composed of cardiac muscle tissue. Responsible for pumping action.
- **Endocardium:** Innermost layer, smooth epithelial lining that covers heart chambers and valves.

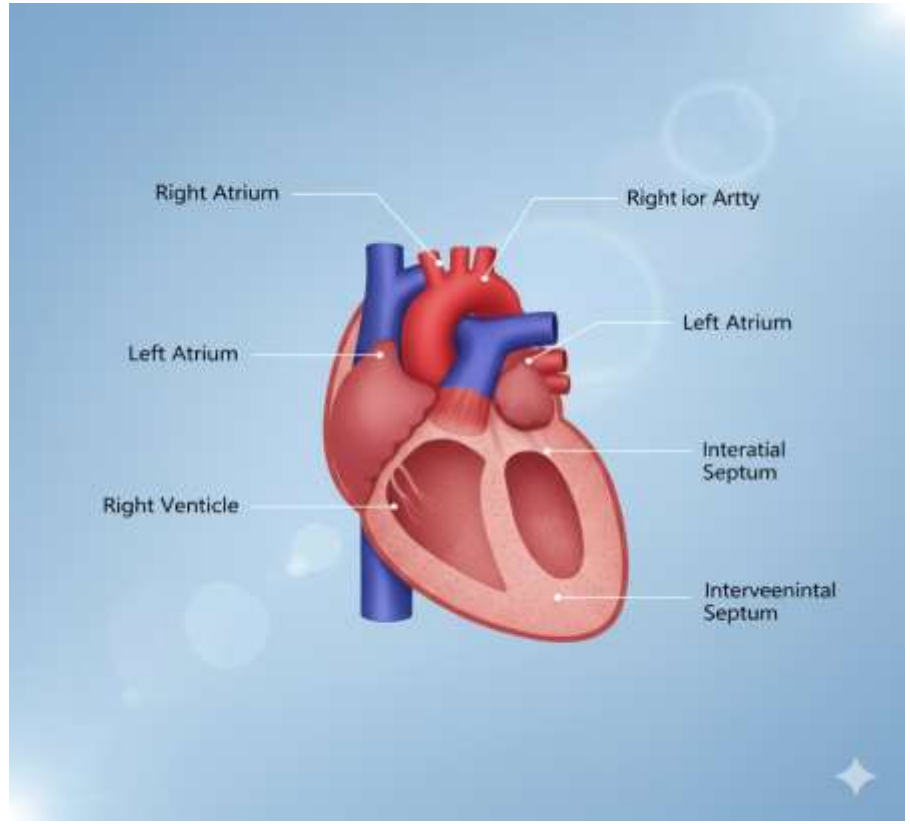


CHAMBERS OF THE HEART

Four Chambers:

•*Atria (receiving chambers):* Right Atrium & Left Atrium. Thin-walled, receive blood from systemic and pulmonary circulations.

•*Ventricles (pumping chambers):* Right Ventricle & Left Ventricle. Thick-walled, pump blood into pulmonary and systemic circulations.

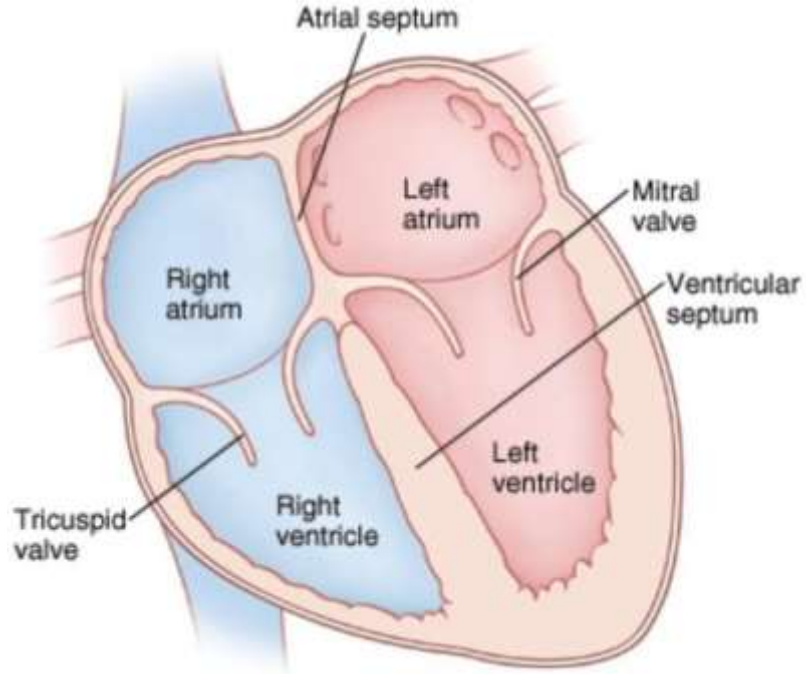


CHAMBERS OF THE HEART

Septa:

•Interatrial Septum: Divides atria.

•Interventricular Septum: Divides ventricles.

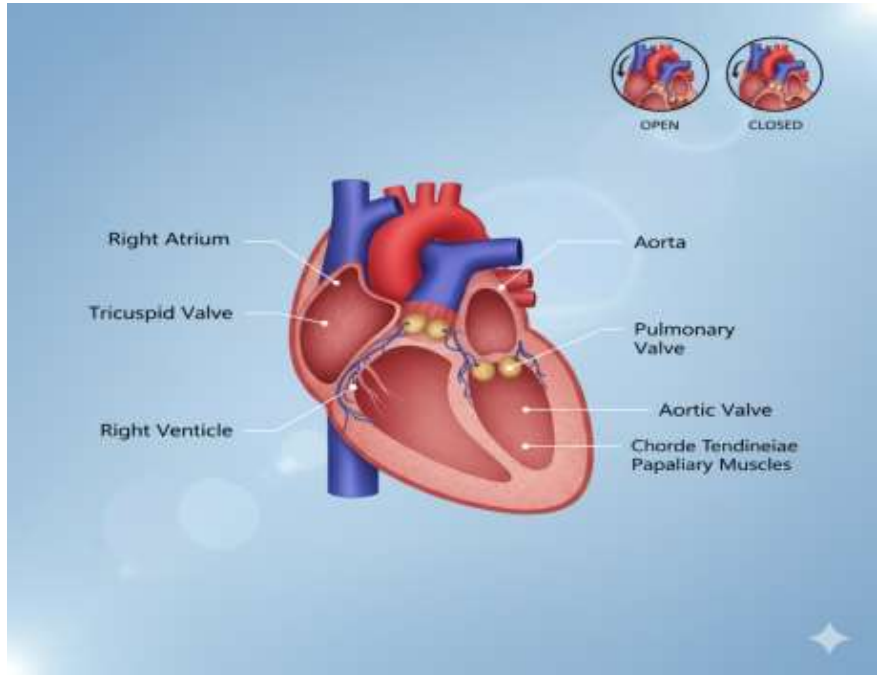


VALVES OF THE HEART

Function: Ensure one-way blood flow, prevent backflow.

Atrioventricular (AV) Valves: Located between atria and ventricles.

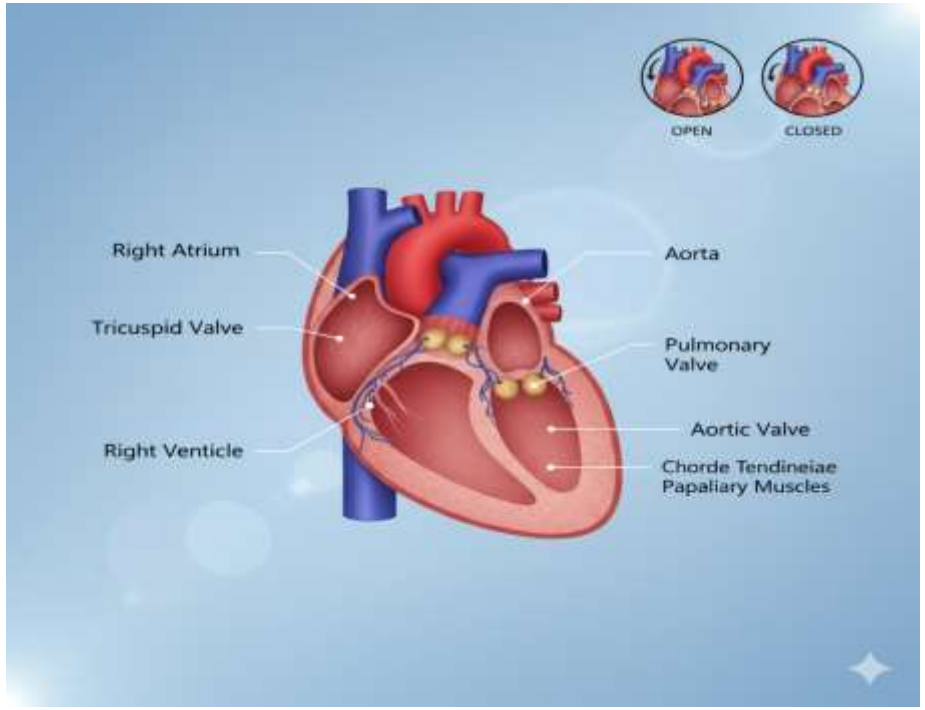
- *Tricuspid Valve:* Between Right Atrium and Right Ventricle (3 cusps).
- *Bicuspid (Mitral) Valve:* Between Left Atrium and Left Ventricle (2 cusps).



VALVES OF THE HEART

Semilunar (SL) Valves: Located at the exits of the ventricles.

- *Pulmonary Valve:* At the exit of the Right Ventricle into the pulmonary artery.
- *Aortic Valve:* At the exit of the Left Ventricle into the aorta.
- Chordae Tendineae and Papillary Muscles (for AV valves).



BLOOD FLOW THROUGH THE HEART (PULMONARY CIRCULATION)

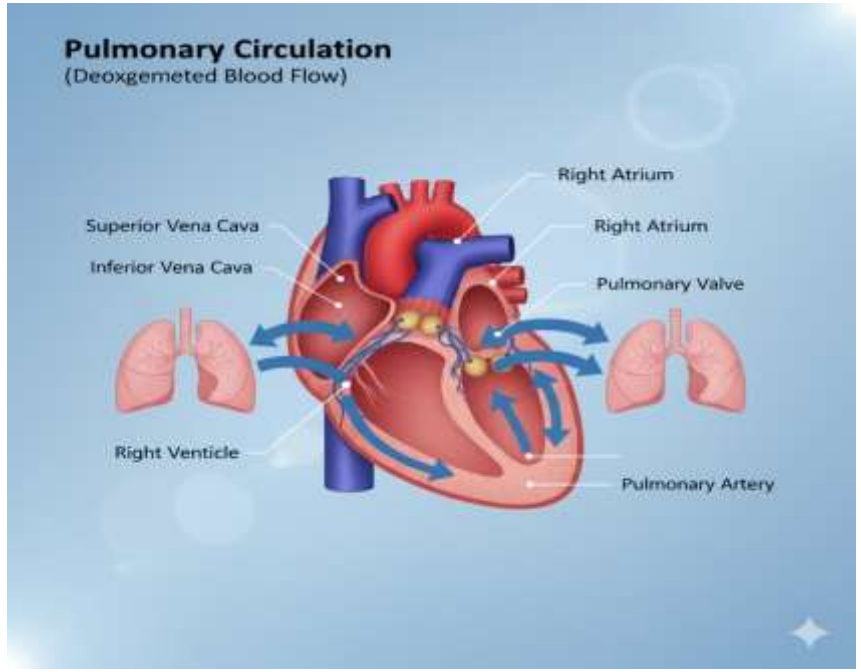
Deoxygenated blood enters **Right Atrium** from:

- Superior Vena Cava (upper body)
- Inferior Vena Cava (lower body)
- Coronary Sinus (heart wall)

Right Atrium → (Tricuspid Valve) → **Right Ventricle**

Right Ventricle → (Pulmonary Valve) →

Pulmonary Artery → Lungs (gas exchange)



BLOOD FLOW THROUGH THE HEART (SYSTEMIC CIRCULATION)

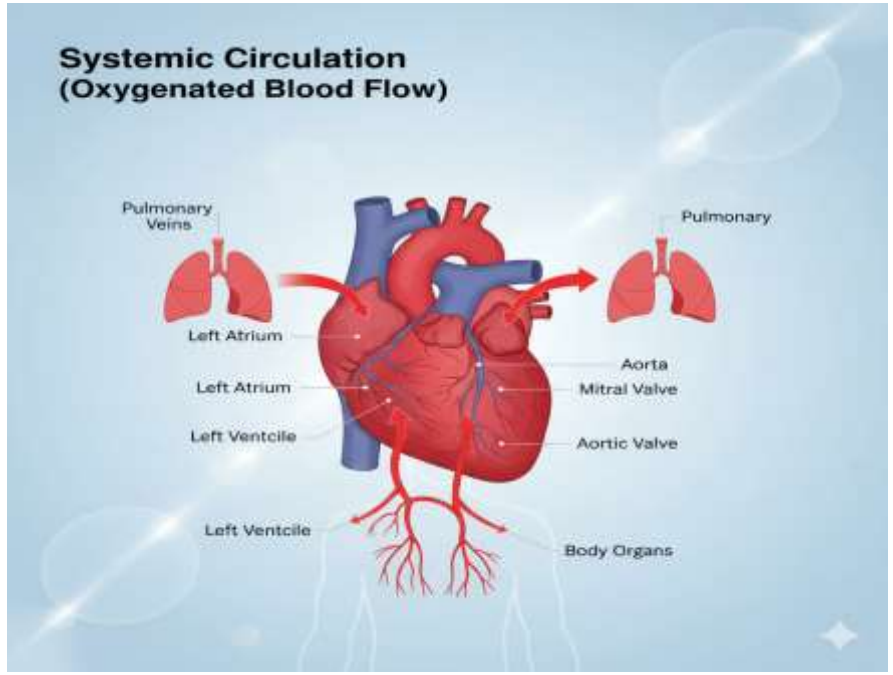
Oxygenated blood returns from lungs via

Pulmonary Veins to **Left Atrium**.

Left Atrium → (Mitral/Bicuspid Valve) →

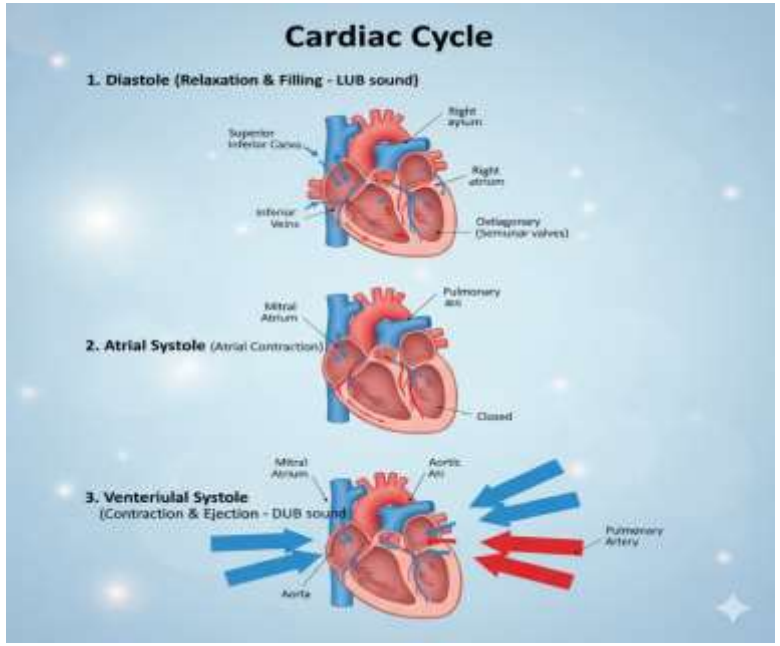
Left Ventricle

Left Ventricle (strongest chamber) → (Aortic Valve) → **Aorta** → Systemic circulation (distributes oxygenated blood to the rest of the body).



THE CARDIAC CYCLE

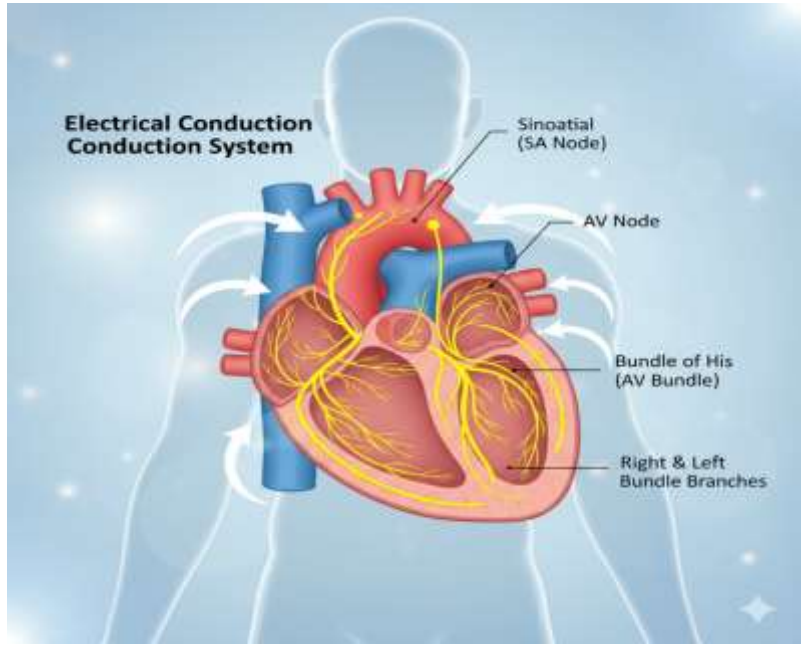
- **Definition:** All events associated with one heartbeat.
- **Systole:** Contraction phase (chambers expel blood).
- **Diastole:** Relaxation phase (chambers fill with blood).
- **Typical cycle:** Atrial systole, Ventricular systole, followed by a period of relaxation.
- **Heart Sounds (Lub-Dub):** S1 (closing of AV valves), S2 (closing of SL valves).



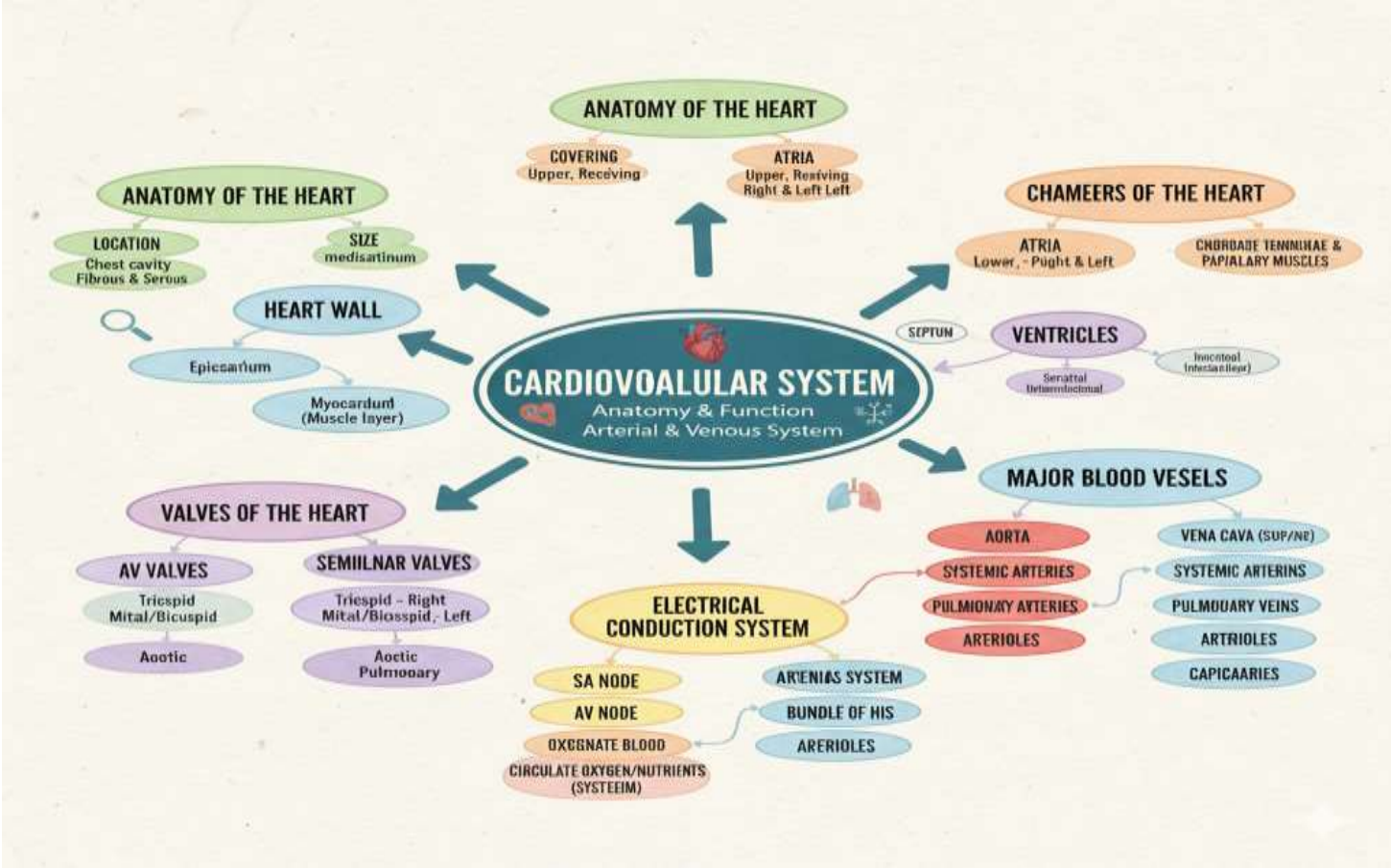
CONDUCTION SYSTEM OF THE HEART

Heart's intrinsic electrical system.

- **Sinoatrial (SA) Node:** "Pacemaker" of the heart, initiates electrical impulses.
- **Atrioventricular (AV) Node:** Delays impulse, allowing atrial contraction to complete.
- **Bundle of His (AV Bundle):** Transmits impulse to ventricles.
- **Bundle Branches (Right & Left):** Conduct impulses down interventricular septum.
- **Purkinje Fibers:** Distribute impulses throughout ventricular myocardium, causing contraction.



SUMMARY


CARDIOVOALULAR SYSTEM
Anatomy & Function
Arterial & Venous System
ANATOMY OF THE HEART
COVERING
Upper, Receiving
ATRIA
Upper, Reaiving
Right & Left Left
ANATOMY OF THE HEART
LOCATION
Chest cavity
Fibrous & Serous
SIZE
medisartinum
HEART WALL
Epicsarium
Myocardum
(Muscle layer)
CHAMEERS OF THE HEART
ATRIA
Lower, - Pught & Left
CNORDAE TENNINAE &
PAPIALARY MUSCLES
SEPTUM
VENTRICLES
Serattal
MAJOR BLOOD VESELS
AORTA
SYSTEMIC ARTERIES
PULMIONAY ARTERIES
ARERIOLES
VENA CAVA (SUP/NE)
SYSTEMIC ARTERINS
PULMOUARY VEINS
ARTRIOLES
CAPICAARIES
VALVES OF THE HEART
AV VALVES
Tricspid
Mital/Bicuspid
Aoctic
SEMIILNAR VALVES
Triespid - Right
Mital/Biosspid, Left
Aoctic
Pulmooary
ELECTRICAL
CONDUCTION SYSTEM
SA NODE
AV NODE
OXCGNATE BLOOD
CIRCULATE OXYGEN/NUTRIENTS
(SYSTEEIM)
ARENIAS SYSTEM
BUNDLE OF HIS
ARERIOLES

References

- Chapter 19: The Cardiovascular System: The Heart (for heart anatomy and function). https://openstax.org/books/anatomy-and-physiology-2e/pages/20-introduction

- **https://openstax.org/books/anatomy-and-physiology-2e/pages/19-1-heart-anatomy**

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