

# Study Guide Heart

1. **Heart** is a pumping organ that lies beneath sternum in mediastinum. Apex of the heart is tilted to the left side. The left side ventricle beats stronger and aorta passes from the left side; we feel the heart on left side of chest.
2. **Pericardium** – It is a serous membrane; outer parietal pericardium and inner visceral pericardium, cavity filled with pericardial fluid makes the frictionless movements of heart. Outer pericardium is fixed to diaphragm.
3. **Histology of Heart:** 3- layers of heart wall = Epicardium –visceral epithelium and connective tissue, Myocardium – is the thickest middle layer of cardiac muscles and inner Endocardium – Connective tissue and endothelium.
4. Myocardium has cardiac muscle fibers with striations, intercalated discs and branched muscle fibers.
5. **Systemic and pulmonary circuits** – Pulmonary Circulation: RV → pulmonary trunk → pulmonary arteries → capillary beds in lungs → pulmonary veins → LA

Systemic Circulation: LV → Aorta → arteries → capillary beds in organs/tissues → veins → Superior/ Inferior vena cava → RA

6. **Flow of Blood** through heart and records Pulmonary and Systemic circuits. Superior and Inferior Vena cava → Right Atrium → Tricuspid valve → right ventricle → semi-lunar valve → pulmonary trunk → pulmonary artery → Capillary bed in Lungs → pulmonary veins → left atrium → bicuspid valve → left ventricle → semi-lunar valve → aorta → capillary beds in tissues of body → superior and inferior vena cava.
7. **Heart Sounds:** Lubb – 1<sup>st</sup> sound of heart caused due to closure of AV valves; Dupp – is the 2<sup>nd</sup> sound of heart caused due to closure of Semi-lunar valves. Lubb-Dupp ..... Lubb-Dupp ..... Lubb-Dupp .....
8. **Bicuspid valve = Mitral's valve** is formed of 2 cusps and **tricuspid valve** is formed of 3 cusps.
9. **Chordae Tendinae** – White collagenic cords are attached to cusps of valves at one end and fixed to muscles of ventricles at the other end. These help in keeping the cusps in position and prevent back-flow of blood into atria.
10. **Coronary circulation:** left and right coronary arteries supply blood to the muscles of heart. This blood is returned through coronary veins and coronary sinus to right atrium.
11. Contraction of heart = **Systole**, Relaxation of heart = **diastole**
12. **Conduction system** is formed of special cardiac muscle fibers and has 5 parts: SA node, AV node, AV bundle, Bundle branches, and Purkinje fibers.
  - a. **SA Node** is sino-atrial node. It lies in RA near the base of superior vena cava. It acts as the pace maker of heart because it possesses a spontaneous rhythmic contraction. It stimulates the atria for contraction. SA node also stimulates AV node.
  - b. **AV node** is present in interatrial septum. It receives the impulse from SA node and passes the action potential to AV bundle

## 13. Cardiac Cycle

- a. **Ventricular Filling:** AV valves = open, SL valves = closed Atria and ventricles filling with blood
- b. **Atrial contraction** and Ventricular Filling – ventricles filling with blood

- c. **Isovolumetric Ventricular Contraction:** Both AV and SL valves closed – it is to raise Blood pressure above than that of main arteries.
  - d. **Ventricular Ejection:** AV valve = closed but SL valve open
  - e. **Isovolumetric Ventricular Relaxation:** Both AV and SL valves closed – it is to lower Blood pressure than that of atria.
14. **Flow of blood** is Superior and Inferior Vena cava → Atria → Ventricles → Pulmonary and Aortic trunks. The part receiving blood always has lower blood pressure than part passing blood into it.
  15. **Hormonal Regulation** – Epinephrine and Norepinephrine increase both heart beat and stroke volume. Thyroid hormone and Glucagon increase force of contraction = stroke volume.
  16. **Sympathetic NS** – post ganglionic nerve fibers release Norepinephrine and increase both heart beat and stroke volume. Stimulant.
  17. **Parasympathetic NS** – post ganglionic nerve fibers release Acetylcholine and decrease force of contraction. Inhibitor.

### Recap Heart

1. Heart lies ----- of chest.
2. Heart feels on the left side because its ----- lies on left side and -----, major artery also passes on left side.
3. Heart is covered by a double serous membrane, the -----.
4. Cardiac muscle fibers form the thicker middle layer -----.
5. ----- and ----- vena cava open into ----- of heart.
6. Right atrium opens into right ventricle through -----.
7. RV passes blood to pulmonary trunk through ----- valve.
8. Pulmonary arteries carry oxygen- ----- blood to lungs.
9. Pulmonary veins carry oxygen - ----- blood to ----- of heart.
10. Closure of AV valves produces 1<sup>st</sup> sound of heart -----.
11. Closure of semi-lunar valves produces the 2<sup>nd</sup> sound of heart -----.
12. AV valve on left side is ----- and on right side is -----.
13. White thin long stiff structures present in ventricles are -----.
14. ----- arteries supply blood to walls of heart and arise from aorta.
15. ----- veins collect blood from walls of heart and open into ----- that open into right atrium.
16. ----- is the pace maker of heart.
17. Contraction of ventricles is caused due to depolarization of -----.
18. Pulmonary circulation carries oxygen poor blood from ----- of heart to lungs through ----- and brings oxygen rich blood to ----- of heart through -----.
19. Contraction of heart is ----- and its relaxation is -----.
20. Systolic pressure of a young healthy adult is -----mm/Hg and diastolic pressure is -----mm/Hg.
21. When blood is passing from ventricles to main arteries ----- valve is open and blood pressure in ventricles is --- ----- than blood pressure in main arteries.
22. Sympathetic NS releases Epinephrine which ----- heart beat and stroke volume.
23. Parasympathetic NS releases Acetylcholine which ----- heart beat.