

Anatomy of the Heart

Done by:

**RheemaAlfhadil
JumanahAlbeeybe**

Revised by:

Enjood Mansour

Anatomy of the Heart

Heart: lies in the middle mediastinum covered by fibroserous sac called pericardium

Surfaces:

Apex:

- It is formed by the left ventricle.
- lies at the level of left 5th intercostal space.

Anterior (sternocostal):

- Divided by **coronary**(atrio-ventricular)**groove** into :
- **Atrial part**, formed mainly by right atrium.
- **Ventricular part**, the right 2/3 is formed by right ventricle, while the left 1/3 is formed by left ventricle.
- Anterior interventricular groove (lodging the anterior interventricular artery and the great cardiac vein) "great cardiac vein is the main drainage of the heart"
- Coronary groove/atrioventricular groove (containing the R. coronary artery)
- Inferior part contains the marginal branch of the R. coronary artery
- **Infundibulum** (funnel-shaped part below pulmonary trunk)

Inferior surface (diaphragmatic):

- Formed by the 2-ventricles, mainly **left ventricle(left 2/3)**.
- Separated from the heart's base by the coronary sulcus
- Posterior interventricular groove (which lodges the posterior interventricular artery and the middle cardiac vein)

Posterior surface (base):

- Mainly formed by the **L. atrium**
- Lies opposite middle **thoracic vertebrae(5-8)**.
- **4 pulmonary veins** open into it
- Is separated from the vertebral column by **descending aorta, esophagus** and **oblique sinus of pericardium**.
- Bounded inferiorly by the **coronary sulcus (contains coronary sinus)**

Chambers:

Right side of the heart

Right atrium:

Crista terminalis divides right atrium into:

- 1- Anteriorly has: **musculi pectinati**
- 2- Posteriorly (**sinus venarum**) has: interarterial septum (which contains: **fossa ovalis + annulus ovalis**) (**very important**)
- 3- contains the **cristae terminalis (inner)** and the **sulcus terminalis (outer)**
- 4- **Openings:** SVC (with no valve because the blood flows downward with gravity), IVC (with a valve), small openings for small veins, coronary sinus (with a well-defined valve), R. atrioventricular orifice (has a fibrous ring around it that provides attachment for the tricuspid valve)

Right ventricle:

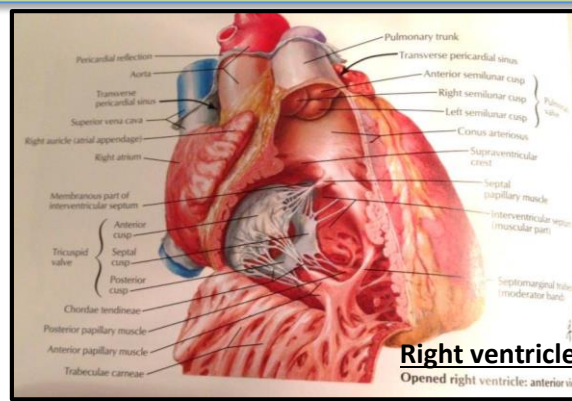
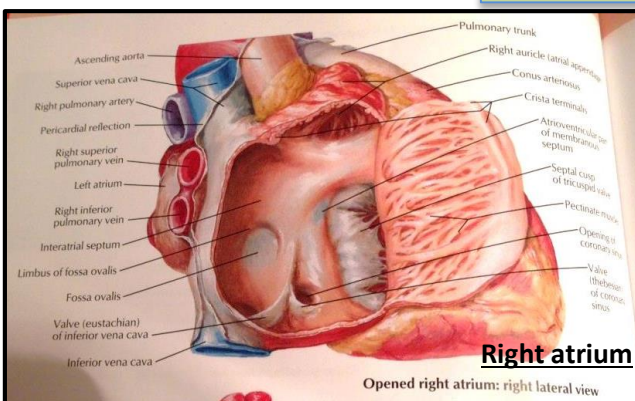
- 1- trabeculae carnae on its wall
- 2- Large projections (**papillary muscles**): anterior, septal, and posterior. All of which provide attachment to the cusps via the **chordae tendinae**
- 3- The anterior papillary muscle is attached to the interventricular septum by **the moderator band**
- 4- Infundibulum is smooth with no muscles

Right Atrioventricular (Tricuspid) orifice:

- 1- Guarded by a fibrous ring which provides **attachment** to the cusps of the valve
- 2- The **atrial surface is smooth** but the **ventricular surface is rough** (same thing for the mitral/bicuspid valve which will be discussed later)
- 3- Admits tips of three fingers

Pulmonary orifice

- 1- 3 semi lunar valves (**2 anterior and 1 posterior**) → Opposite: aortic valve (discussed later)
- 2- Surrounded by fibrous ring to attach the pulmonary cusps
- 3- Cusps are concave superiorly and convex inferiorly (like pockets) To muscles or chordae tendinae



Left side of the heart

Left atrium:

1. base of the heart
2. left aruicle has **musculi pectineti**
3. It receives the Oxygenated blood from **4 pulmonary veins**
4. It sends the blood to left ventricle through **Atrioventricular orifice** which sorrounded **by Mitral valves (bicusped)**

Left ventricle:

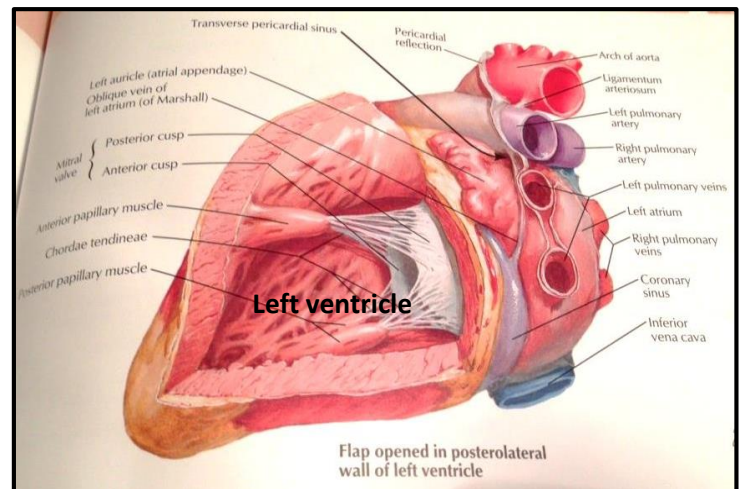
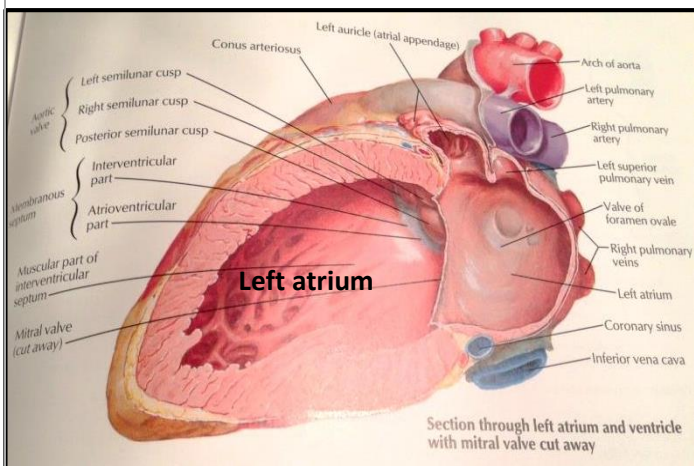
1. It has **a thicker myocardium wall** than right ventricle, and it formed by **trabecula carnae**
2. It has 2 large projection connected to Mitral valves called "**papillary muscles**": 1)anterior 2)posterior
3. Mitral valves attached to papillary muscles by **cordae tendinae** (small fibrous tendons attached to the apex of papillary muscles)
4. It sends the blood to the Ascending aorta via **aortic orifice**

Left Atrioventricular orifice:

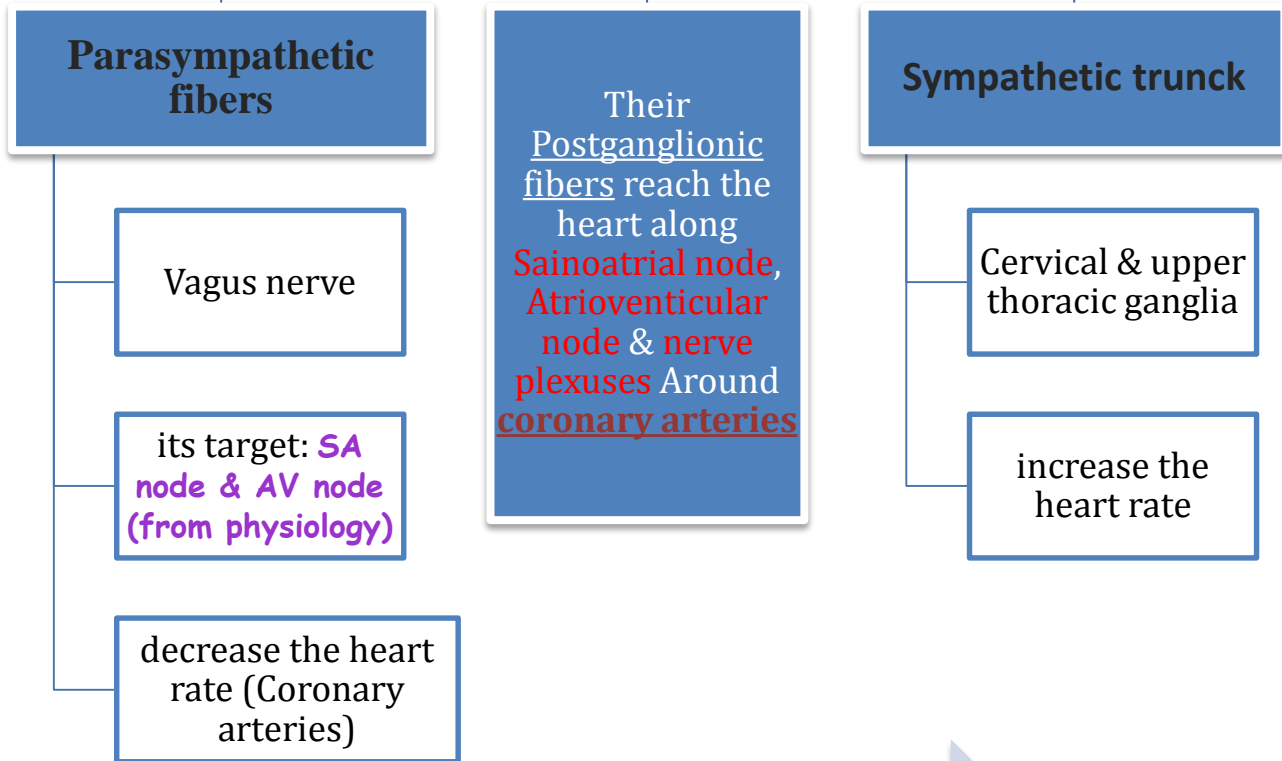
1. It is smaller than the right side because it is gaurded **byMitral valves (Bicusped)**
2. It is sorrounded by Fibrous ring which **gives attachment** to mitral valves
3. position of the mitral valves:
a)Anterior (Right side) b)Posterior (Left side)
4. It has 2 surfaces: **Atrial (smooth surface) + Venticular (Rough surface due to cordae tendinae "attachment of cusps")**

Aortic orifice

1. It has same as Pulmonary trunk **3 semilunar cusps** but different position: **2 posterior & 1 Anterior**
2. Guarded by fibrous ring for attachment and smooth wall
3. no **chordae tendinae** or **papillary muscles** are attached to the cusps.
4. a smooth area between aortic orifice and L.ventricle called "**Aortic vestibule**"



Nerve supply via Cardiac plexuses



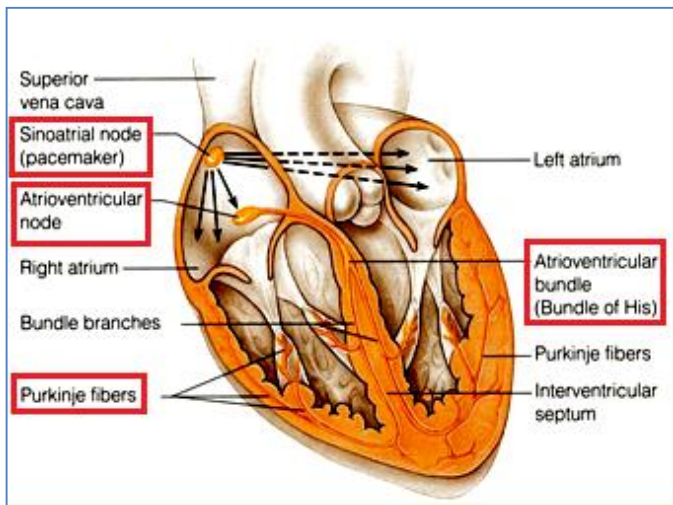
-Conduction system of the heart:

Sinoatrial node (SA node) located in **right atrium**

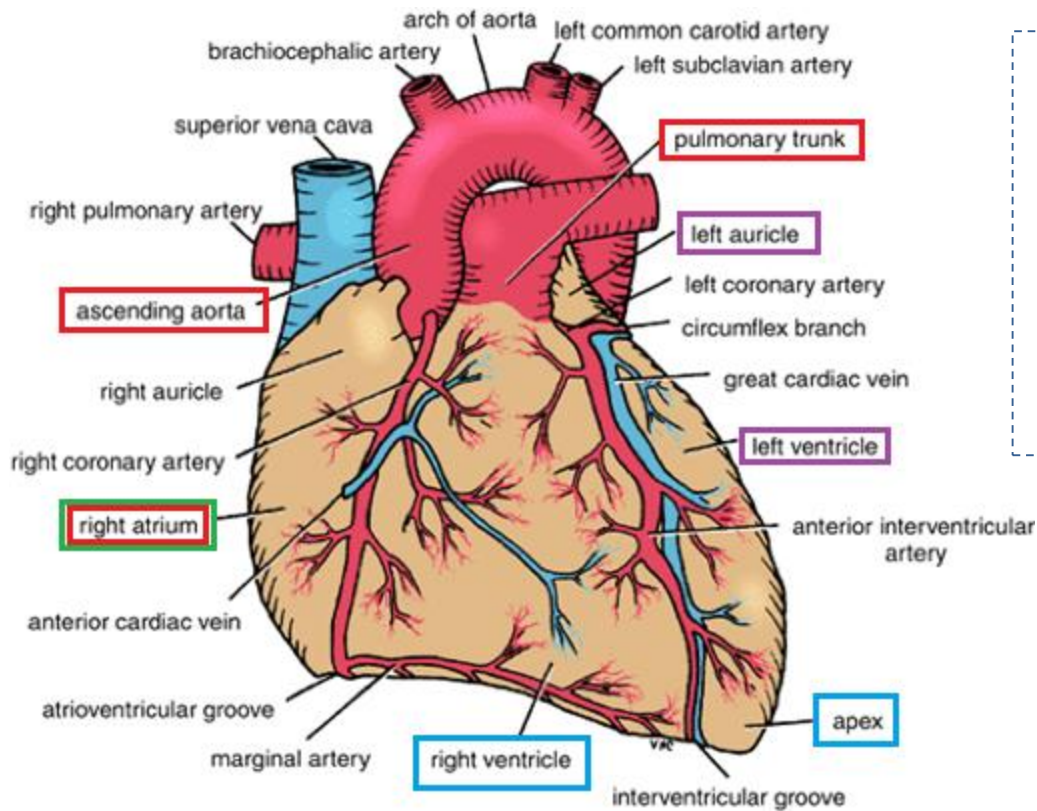
Atrioventricular node (AV node) located in **at the junction of atria and ventricles**

Atrioventricular bundles (Bundles of His) is located in the **interventricular septum**

The Purkinje fibers are located inside the **walls of the ventricles**.



The SA node called **the Pacemaker of the heart** because it generates the rhythmical electrical impulses



Heart border
Upper border
+ left atrium
Right border
Lower border
Left border

Summary:

R. Atrium	R. Ventricle	L. Atrium	L. Ventricle
<ul style="list-style-type: none"> ✓ Anterior: musculipectinati ✓ Posterior: fossa ovalis and annulus ovalis ✓ Cristae terminalis 	<ul style="list-style-type: none"> ✓ Trabeculae carneae ✓ Orifices: atriovent. and pulmonary ✓ 3 Papillary muscles ✓ Chordae tendinae attached to tricuspid valves 	<ul style="list-style-type: none"> ✓ Base of the heart and has smooth wall ✓ Musculipectentiin left auricle ✓ Opening of 4 pulmonary veins 	<ul style="list-style-type: none"> ✓ Trabecular carneae ✓ 2 papillary muscles ✓ cordnaetendinae attached to mitral valves ✓ Orifices: Atriovent. & Aortic

✓ The innervation of the heart by **Parasympathetic & sympathetic** plexuses.
 ✓ Conduction system of the heart starts with **SA node > AV node > bundle of his > Purkinji fibers.**

Questions:

- 1- **A 32-year-old patient who weighs 275 lb comes to the doctor's office. On the surface of the chest, the physician is able to locate the apex of the heart:**
 - (A) In the level of the sternal angle
 - (B) In the left 4th intercostal space
 - (C) In the left 5th intercostal space
 - (D) In the right 5th intercostal space

- 2- **A 27-year-old cardiac patient with an irregular heartbeat visits her doctor for examination. Where should the physician place the stethoscope to listen to the sound of her mitral valve?**
 - (A) Over medial end of the 2nd left intercostal space
 - (B) Over medial end of 2nd right intercostal space
 - (C) In the left 4th intercostal space at the midclavicular line
 - (D) In the left 5th intercostal space at the midclavicular line

- 3- **A 19-year-old man came to the emergency department, and his angiogram exhibited that he was bleeding from the vein that is accompanied by the posterior interventricular artery. Which of the following is most likely to be ruptured?**
 - (A) Great cardiac vein
 - (B) Middle cardiac vein
 - (C) Anterior cardiac vein
 - (D) Oblique veins of left atrium

- 4- **A 5-year-old girl is brought to the emergency department because of breathing difficulties, palpitations, and shortness of breath. Doppler study of the heart reveals an atrial septal defect (ASD). This malformation usually results because of the incomplete closure of which embryonic structure?**
 - (A) Ductus arteriosus
 - (B) Ductus venosus
 - (C) Sinus venarum
 - (D) Foramen ovale



5- A 54-year-old patient is implanted with an artificial cardiac pacemaker. Which of the following conductive tissues of the heart had a defective function that required the pacemaker?

- (A) AV bundle (bundle of His)
- (B) AV node
- (C) SA node
- (D) Purkinje fibers

6- which part of the heart lies mainly in the base?

- (A) right atrium
- (B) left atrium
- (C) right ventricle
- (D) left ventricle

7- which blood vessels open in the base?

- (A) pulmonary arteries
- (B) pulmonary veins
- (C) aorta artery

8- the site sanatrial node (SAN) is in?

- (A) right atrium
- (B) left atrium
- (C) right ventricle
- (D) left ventricle

Videos

- The Heart and Major Vessels [PART 1](#) , [PART 2](#)
- Right Atrium - [3D](#)
- Right Ventricle - [3D](#)
- Left Atrium - [3D](#)
- Left Ventricle - [3D](#)
- Heart and coronary circulation - [dissection](#)
- Arteries and Veins [Model](#)

3D animated models [Picture](#)

Answers:

1	2	3	4	5	6	7	8
C	D	B	D	C	B	B	A