# PERCARDIUM & HEART

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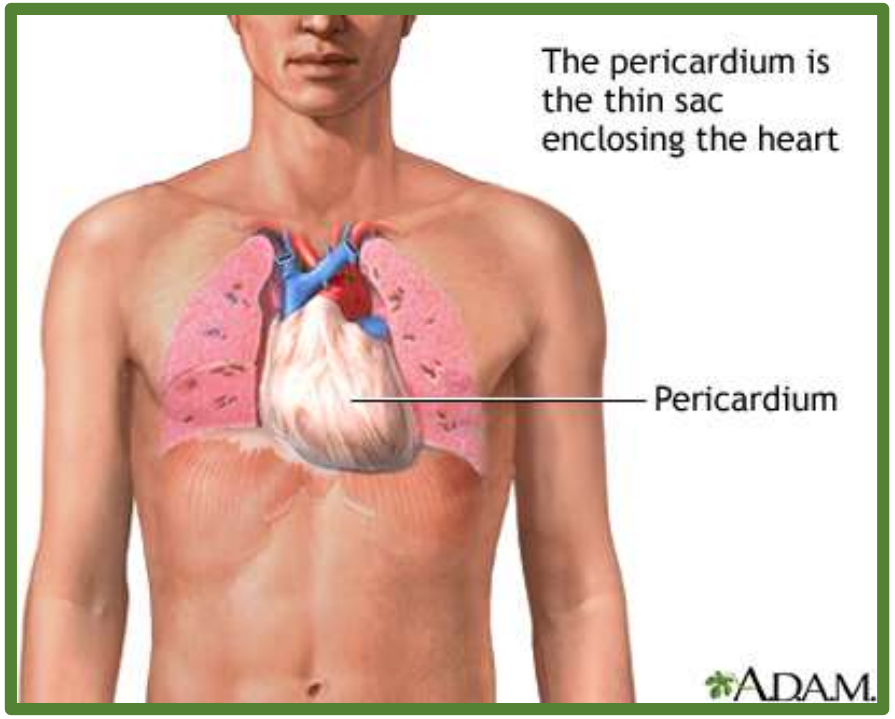
Monday 5 May 2025

# Pericardium

The pericardium is a fibroserous sac that encloses the heart and the roots of the great vessels.

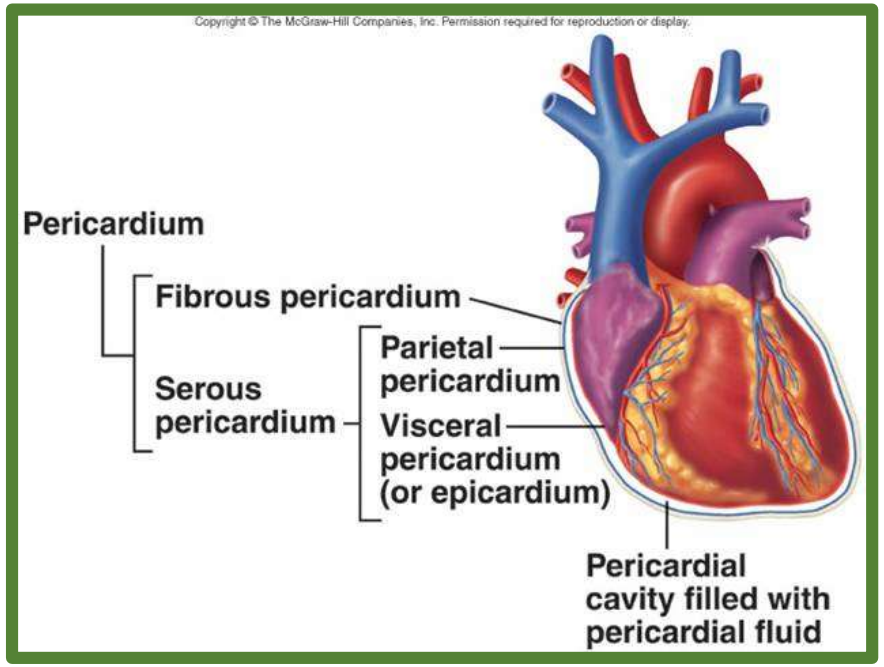



** Functions

1- Maintains a constant position of the heart.

2- Being non elastic, it prevent over distension of the heart.

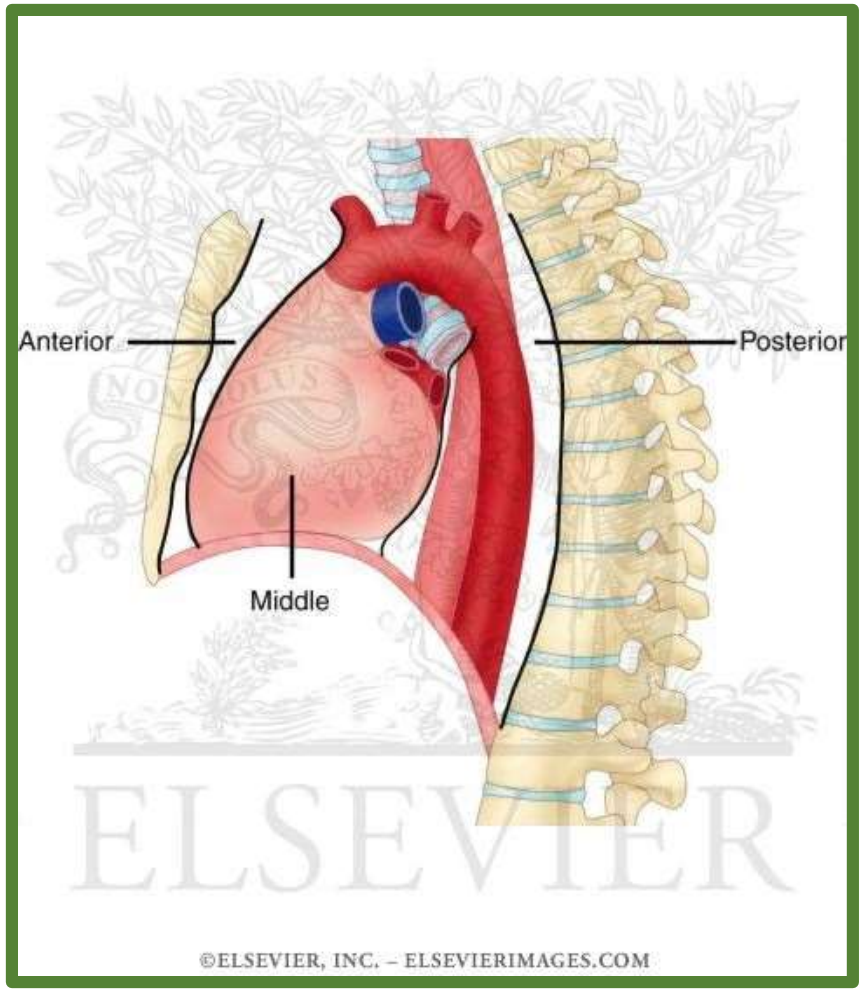
3- Keeps the mouths of the blood vessels open.

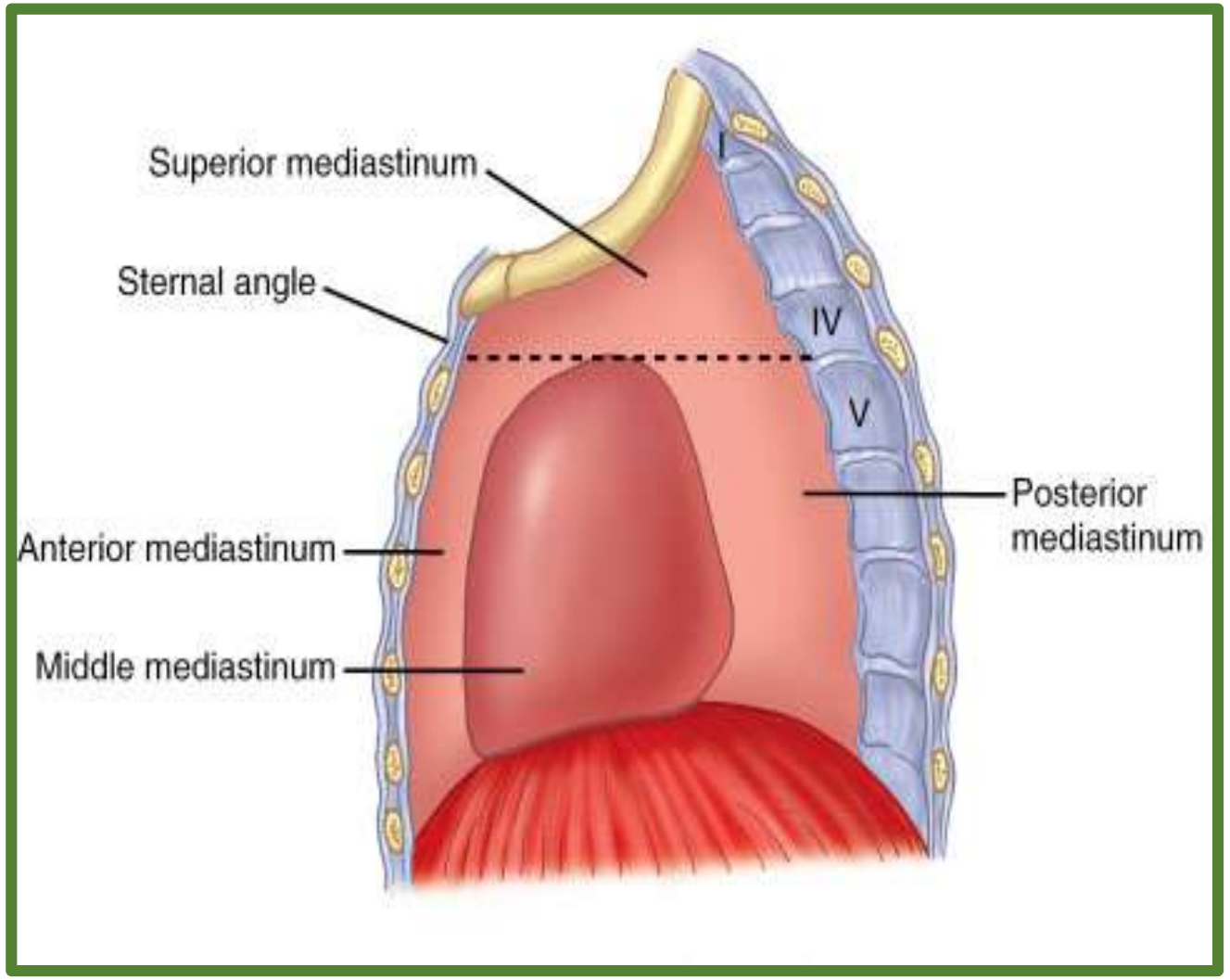


# Pericardium



**The pericardium lies within the middle mediastinum , posterior to the body of the sternum and the 2nd to the 6th costal cartilages and anterior to the 5th to the 8th thoracic vertebrae**



# Fibrous Pericardium



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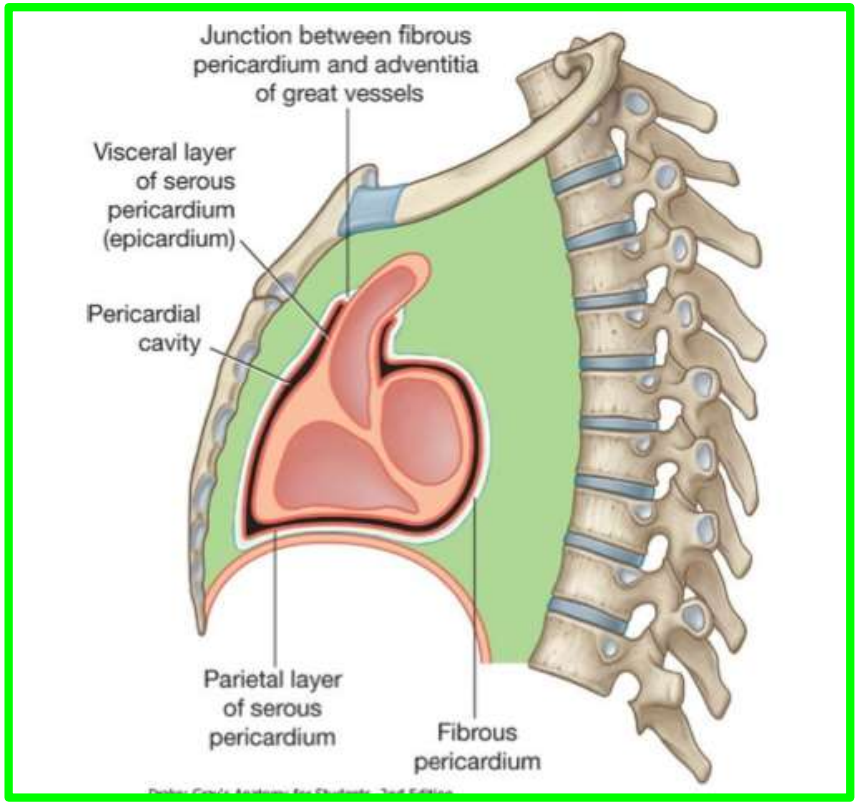
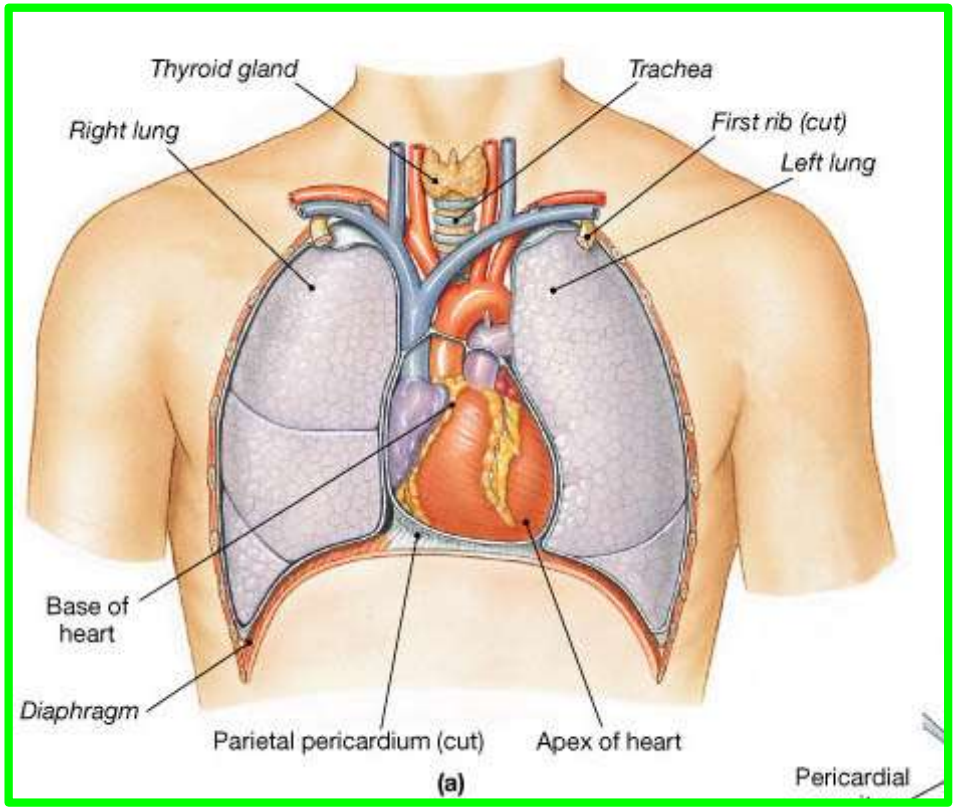
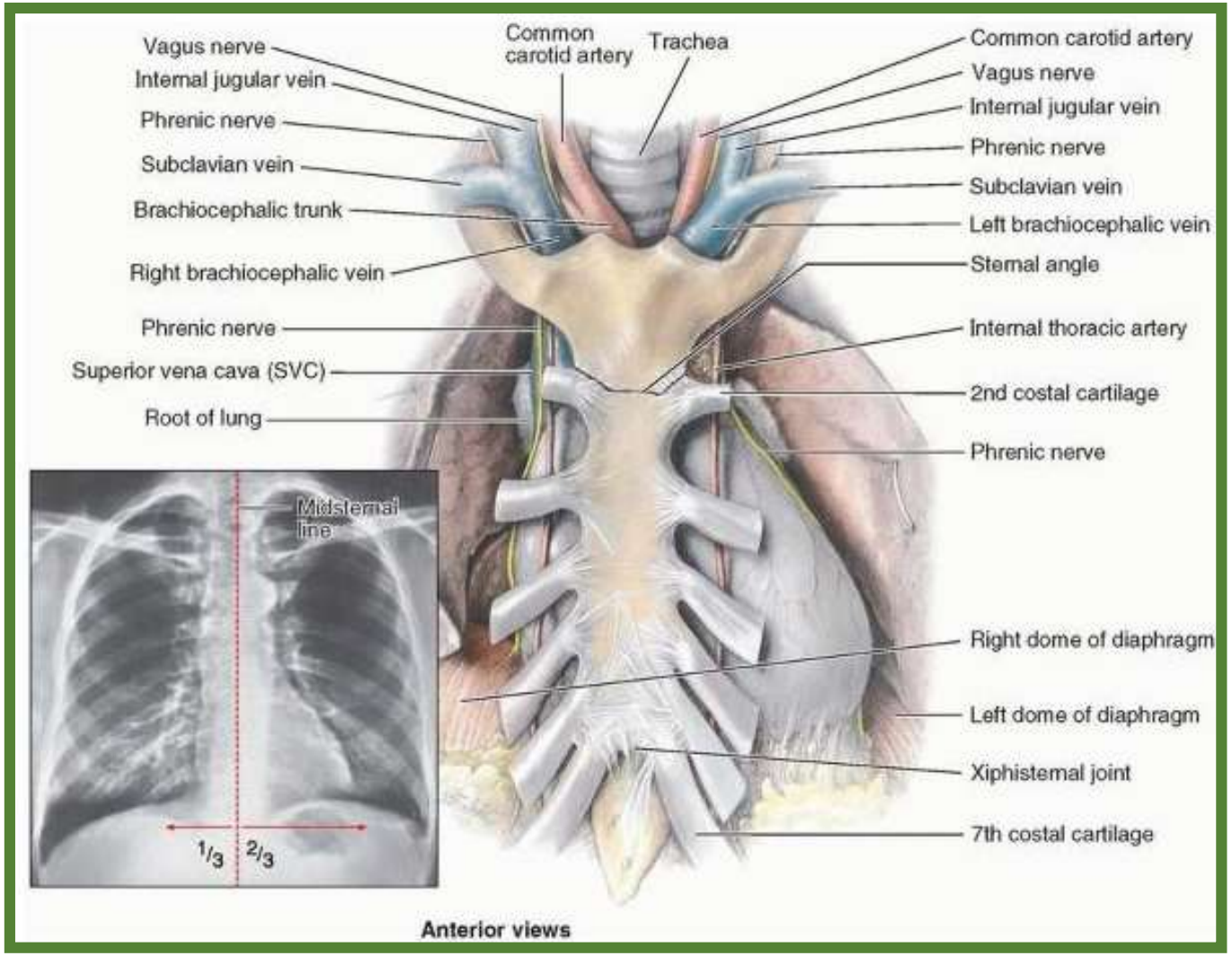
- ✓ Is the strong fibrous part of the sac.
- ✓ It is firmly attached below to the central tendon of the diaphragm.
- ✓ It fuses with the outer coats of the great blood vessels passing through it namely, the aorta, the pulmonary trunk, the superior and inferior venae cavae, and the pulmonary veins



# Fibrous Pericardium

**The fibrous pericardium is attached in front to the sternum by the sternopericardial ligaments (Superior and Inferior)**



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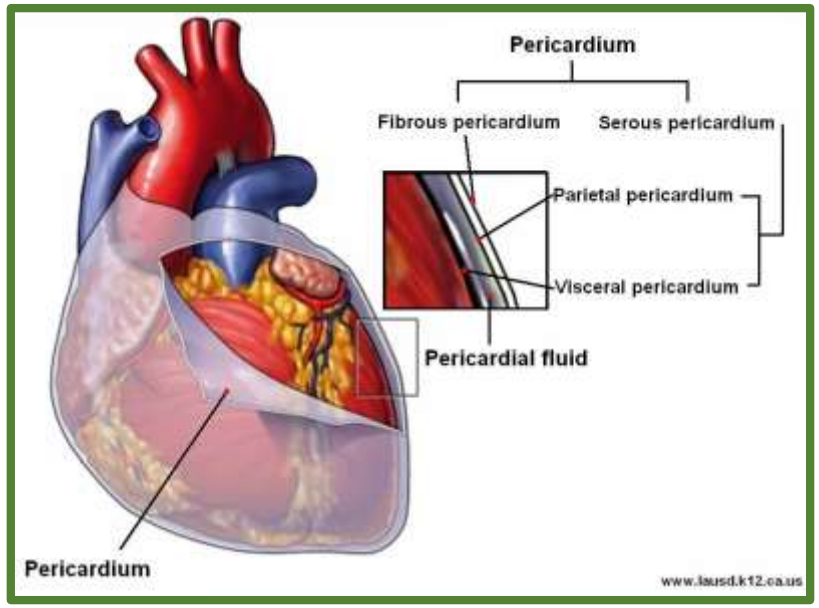
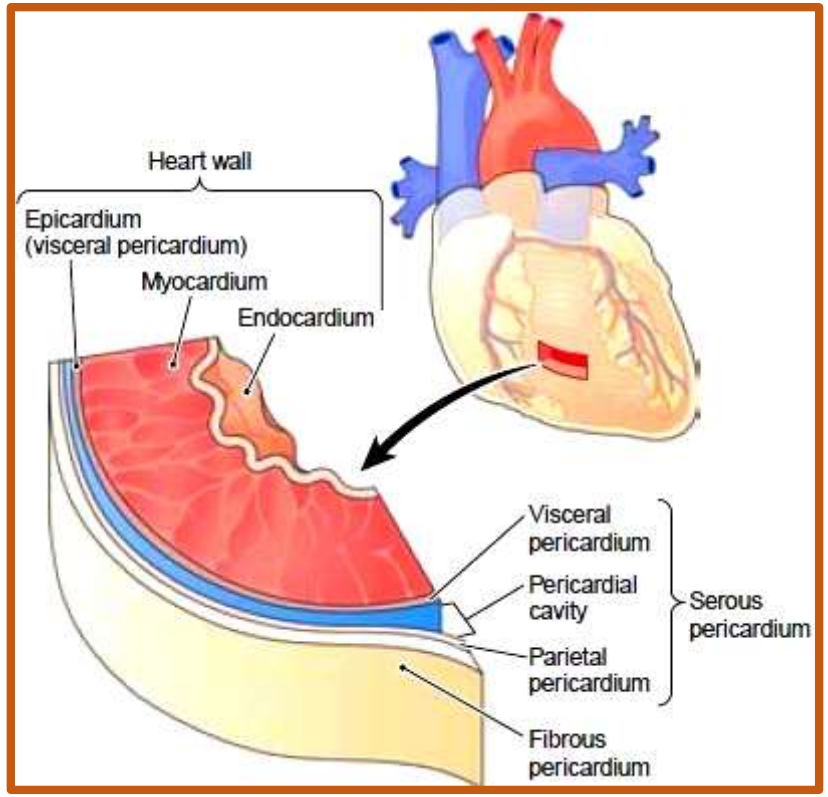
# Serous Pericardium

The serous pericardium lines the fibrous pericardium and coats the heart.

- It is divided into parietal and visceral layers

- The parietal layer lines the fibrous pericardium and is reflected around the roots of the great vessels to become continuous with the visceral layer of serous pericardium that closely covers the heart

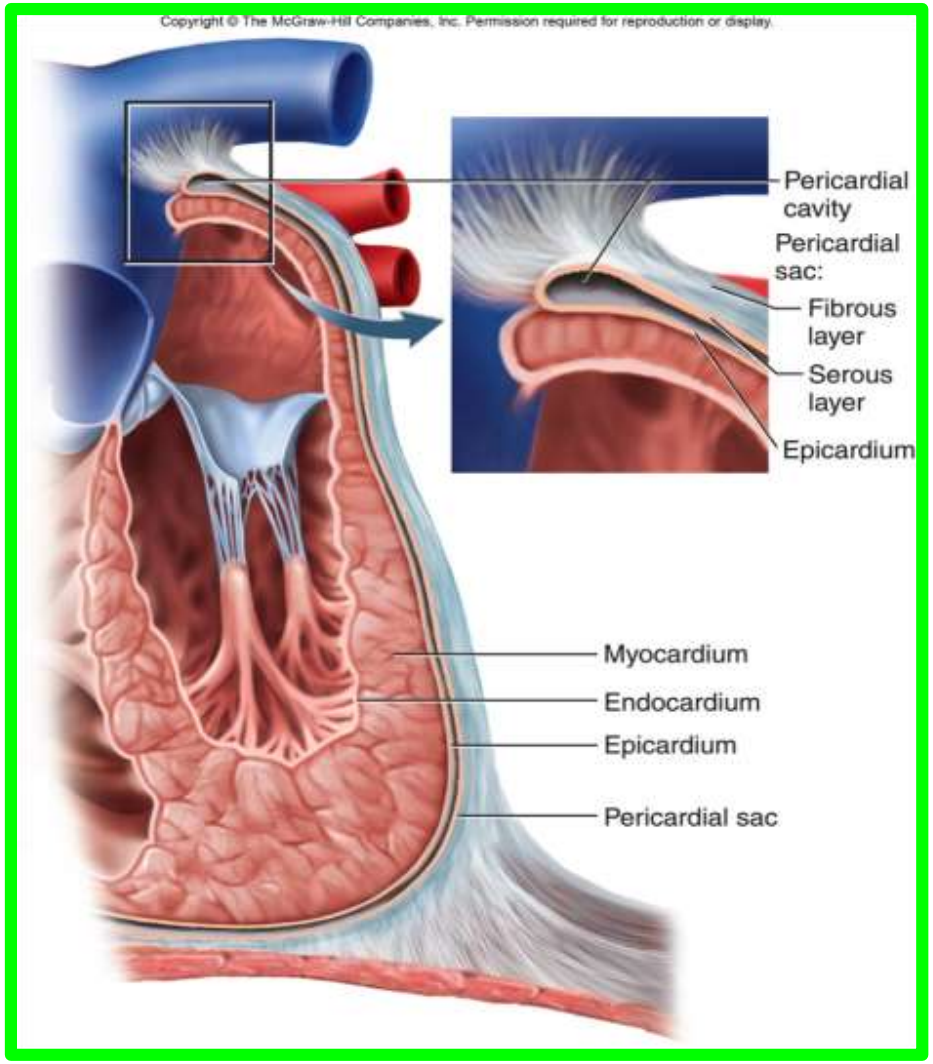


# Serous Pericardium

- The visceral layer is closely applied to the heart and is often called the epicardium.

The slitlike space between the parietal and visceral layers is referred to as the pericardial Cavity.




Normally, the cavity contains a small amount of tissue fluid (about 50 mL), the pericardial fluid, which acts as a lubricant to facilitate movements of the heart

# The arterial supply of the pericardium



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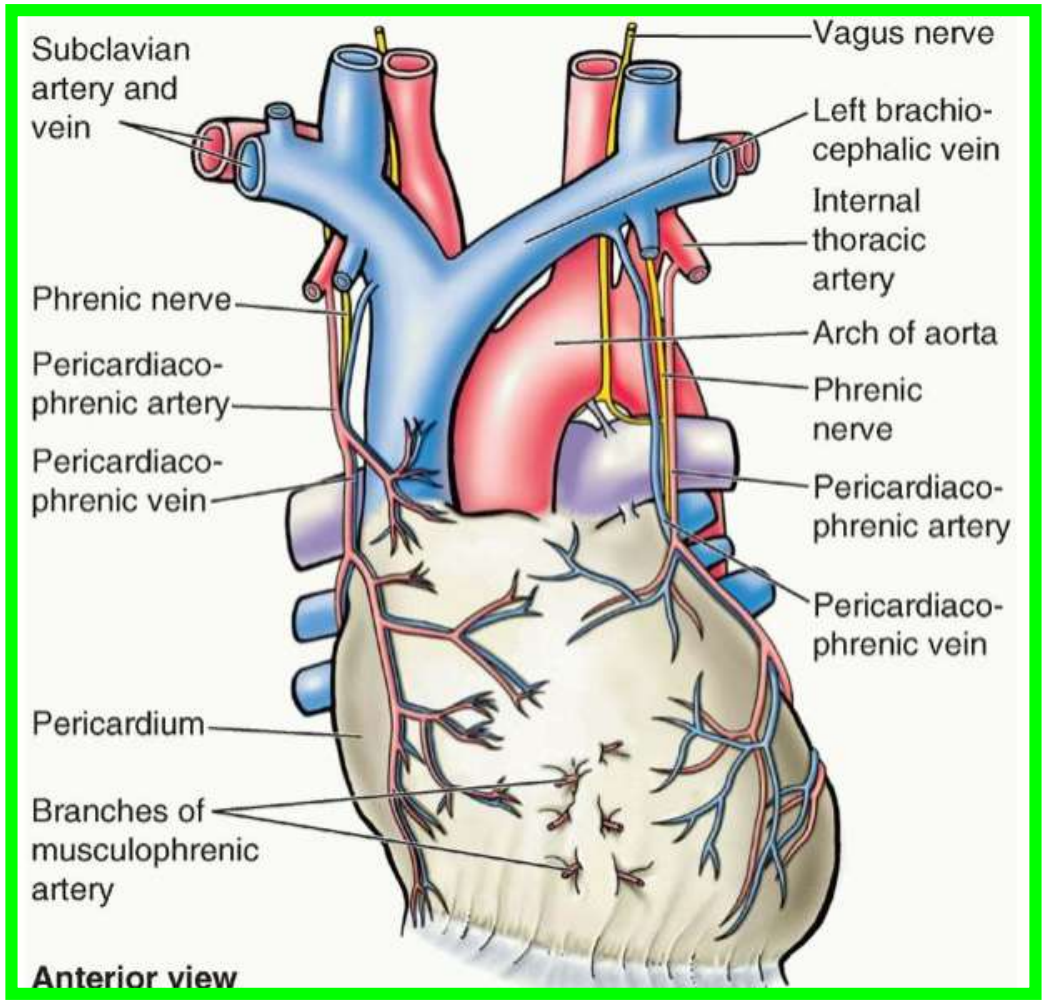
is mainly from branch of the internal thoracic artery, (the pericardiacophrenic artery)

Smaller contributions of blood come from the:

- Musculophrenic artery, a terminal branch of the internal thoracic artery.

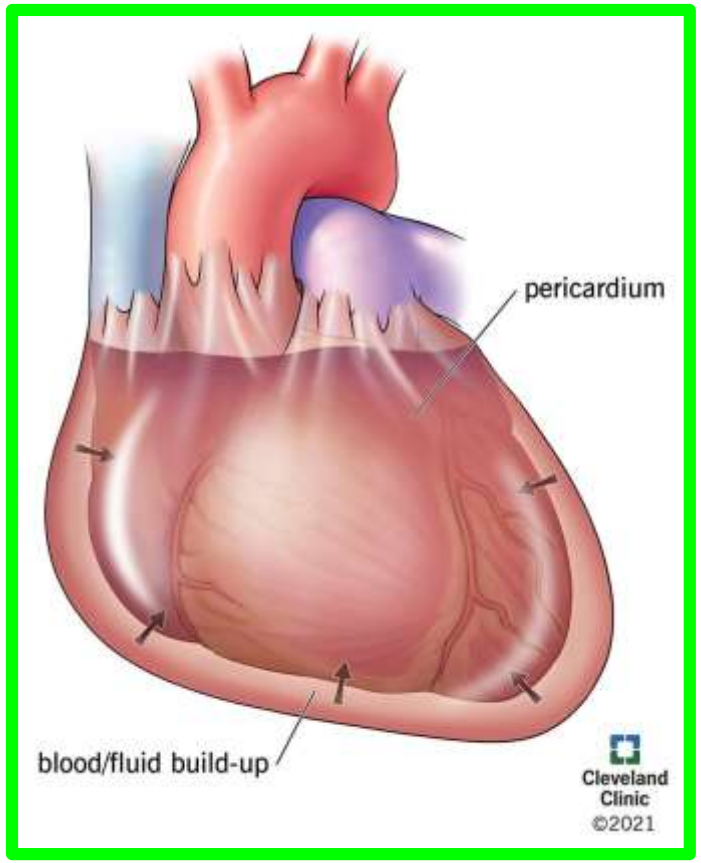
- Bronchial, esophageal, and superior phrenic arteries, branches of the thoracic aorta.

- Coronary arteries (visceral layer of serous pericardium only), the first branches of the aorta.



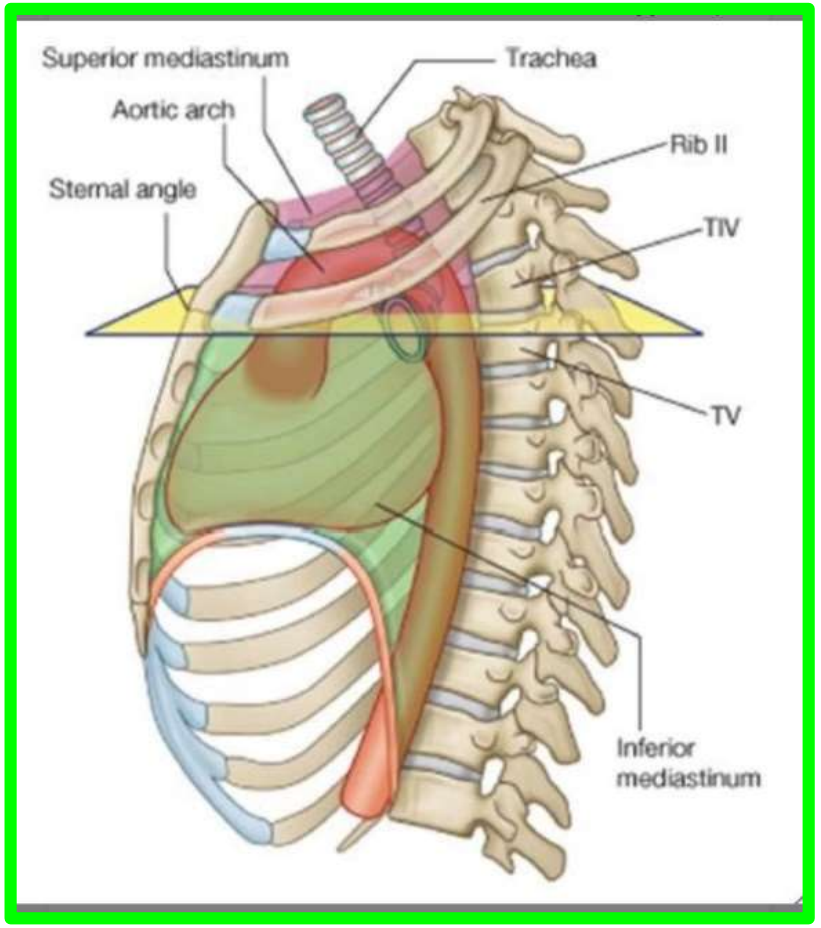
** Applied anatomy; in certain disease the pericardial cavity may contain.

1. Blood (haemopericardium).
2. Pus (pyopericardium).
3. Lymphatic (chylopericardium).
4. Excess fluid than normal (pericardial effusion).



# Importance of the level of T4/T5 (sternal angle)

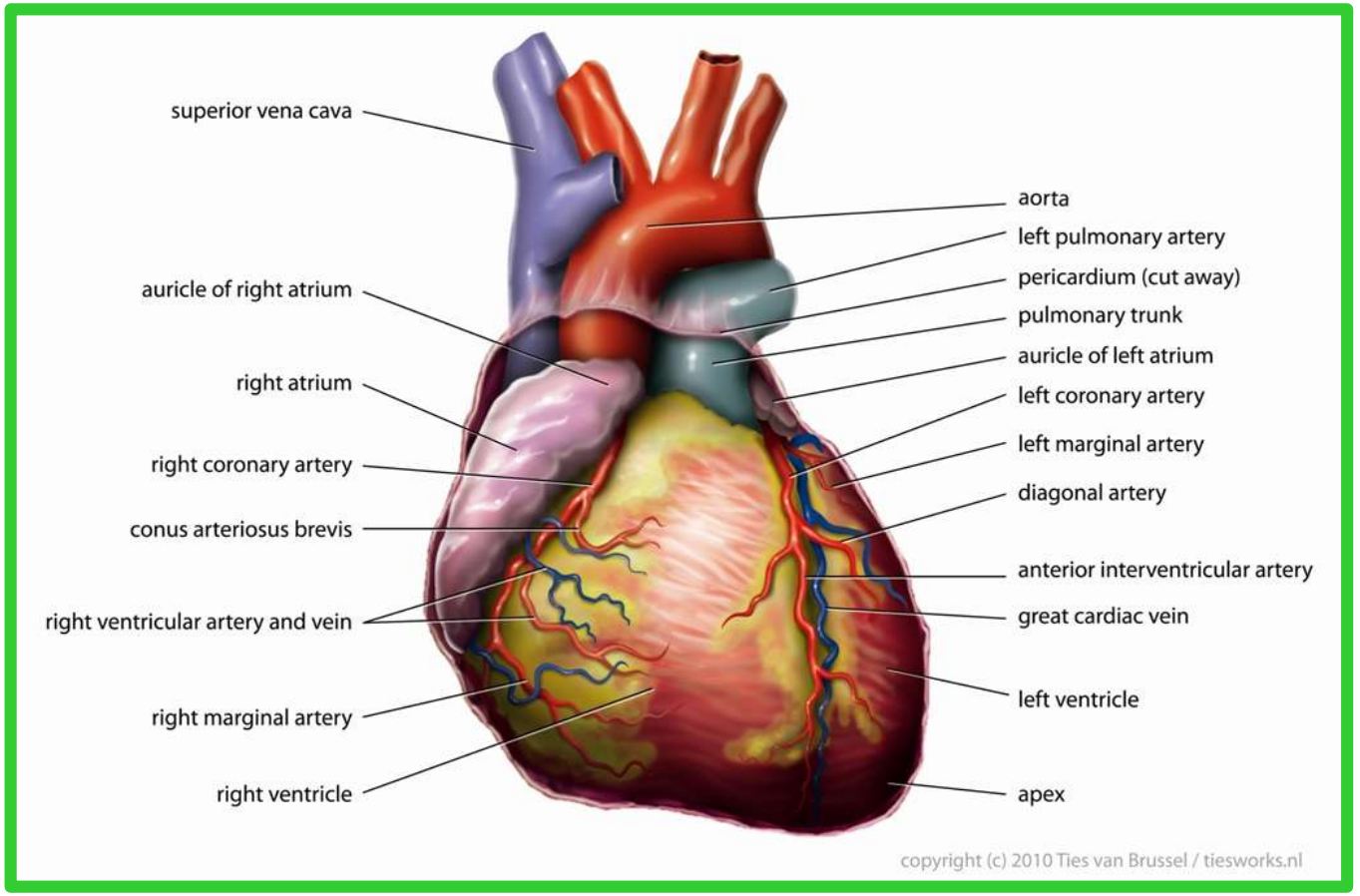
1. Junction of superior and inferior mediastinum.
2. Level of beginning and termination of arch of aorta.
3. Level of beginning of descending aorta.
4. Level of termination of azygos vein in the back of SVC.
5. Level of bifurcation of the trachea.
6. Level of bifurcation of the pulmonary trunk.
7. Level of sternal angle and anterior end of the 2nd rib.



# Heart

## ** Position:

- ✓ It lies obliquely in the middle mediastinum inside the pericardium.
- ✓ Its long axis (the line drawn from the center of the base to the apex) is directed downwards, forwards and to the left.



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# Heart

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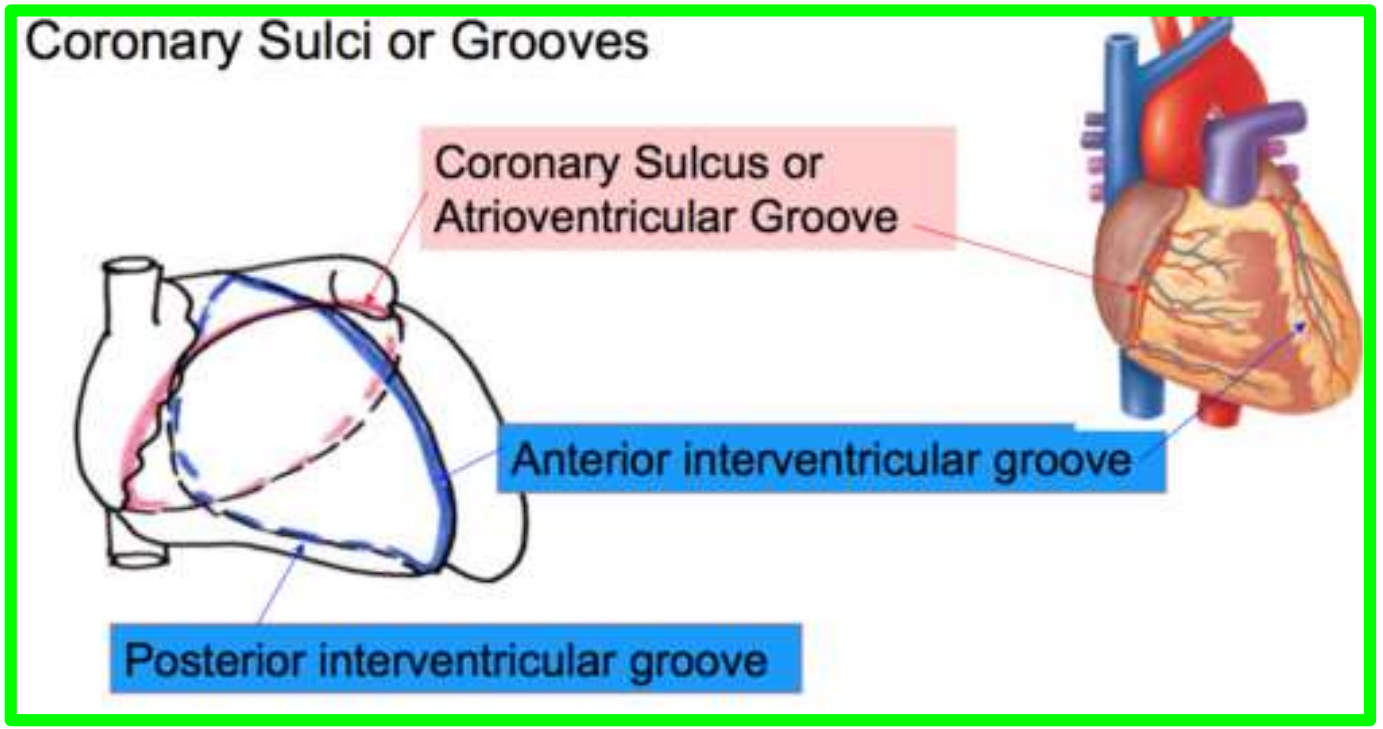
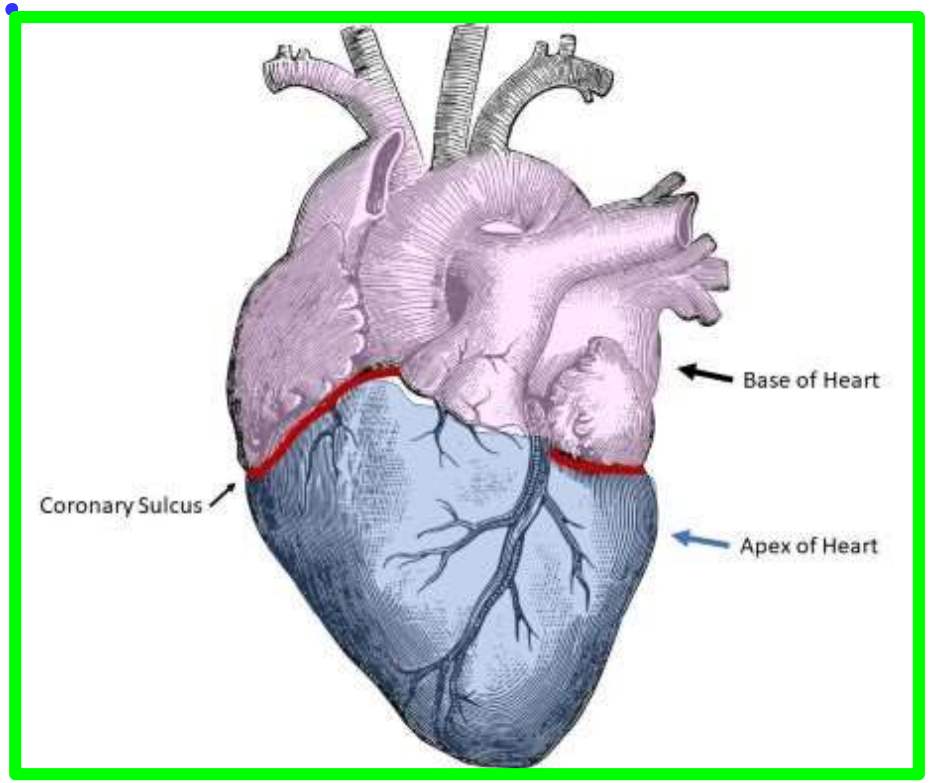
** Shape: It is a conical muscular organ somewhat larger than a closed fist.

** It consists of four chambers, two atria and two ventricles.

✓ The 2 atria are separated from the 2 ventricles (on the surface) by the atrio-ventricular (coronary) groove.

✓ The 2 ventricles are separated from each other (on the surface) by the anterior and posterior interventricular grooves.

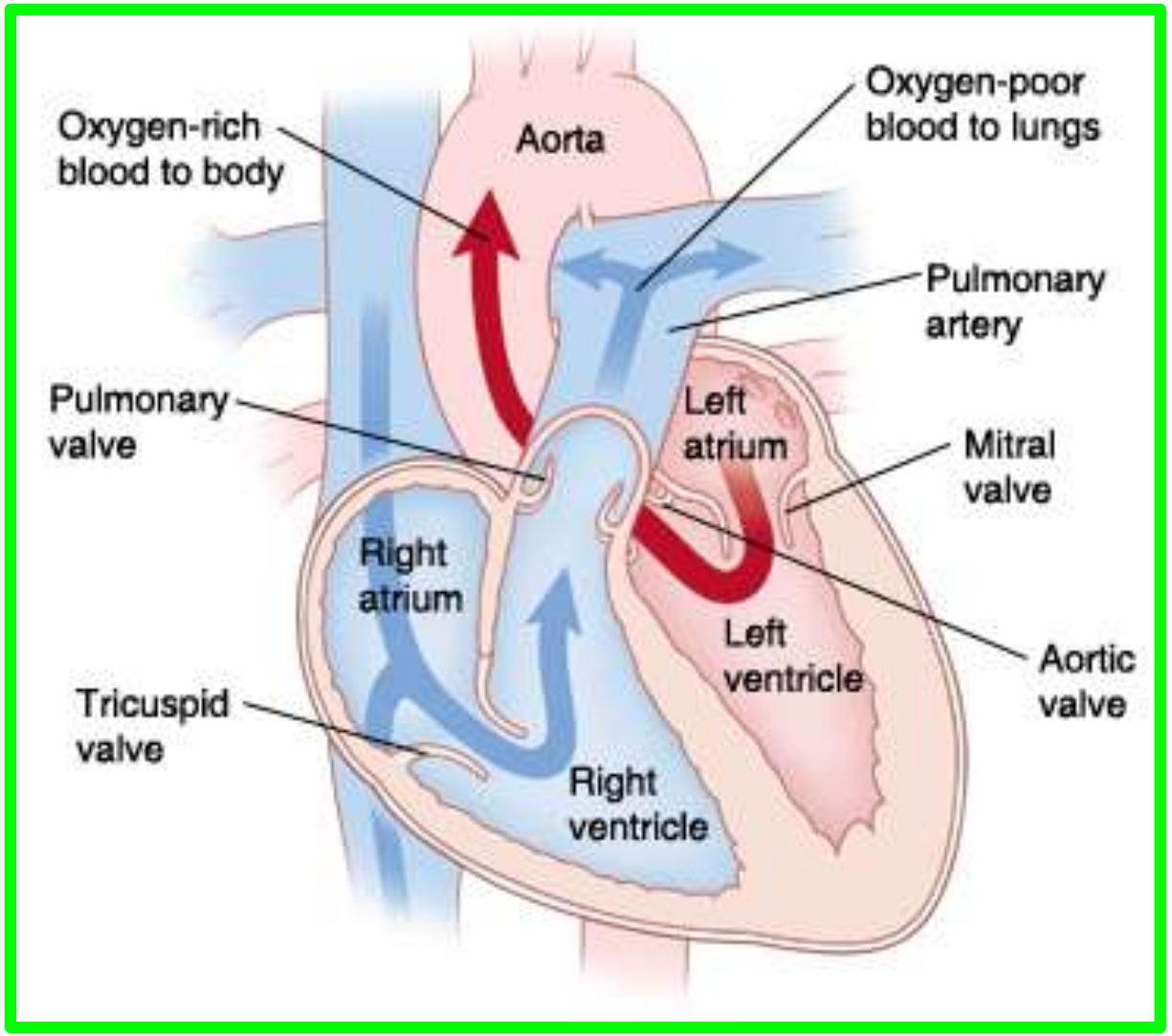


# Heart

❖The left side of the heart receives well-oxygenated blood from the lungs through the pulmonary veins and pumps it into the aorta for distribution to the body.

❖The right side of the heart receives poorly oxygenated blood from the body through the SVC and IVC and pumps it through the pulmonary trunk to the lungs for oxygenation.

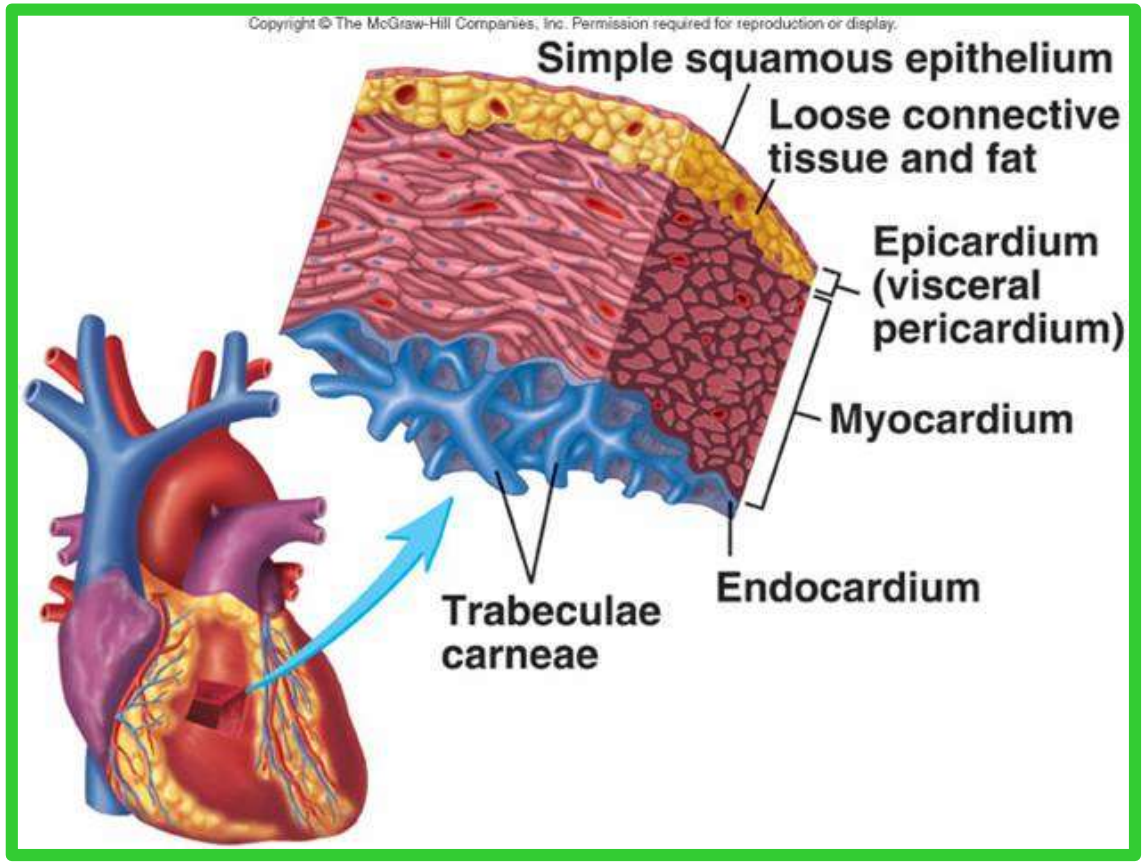


# Heart

The wall of the heart consists of three layers; from superficial to deep, they are:

- **Epicardium**, a thin external layer (mesothelium) formed by the visceral layer of serous pericardium

- **Myocardium**, a thick middle layer composed of cardiac muscle




- **Endocardium**, a thin internal layer (endothelium and subendothelial connective tissue) or lining membrane of the heart that also covers its valves.

# ORIENTATION OF HEART



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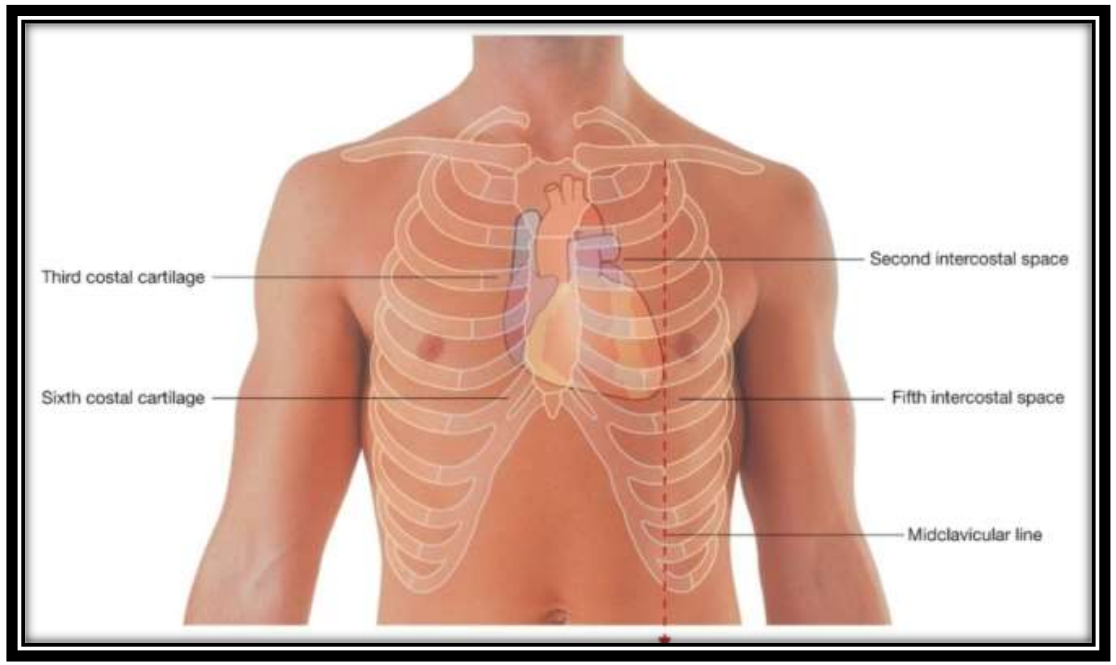
✓The heart and roots of the great vessels within the pericardial sac are related anteriorly to the sternum, costal cartilages, and the medial ends of the 3rd to 5th ribs on the left side.

✓ The heart and pericardial sac are situated obliquely, lying about two thirds to the left and one third to the right of the median plane.


✓The heart is shaped like a tipped-over, three-sided pyramid with an apex, base, and four surfaces.

# ORIENTATION OF HEART

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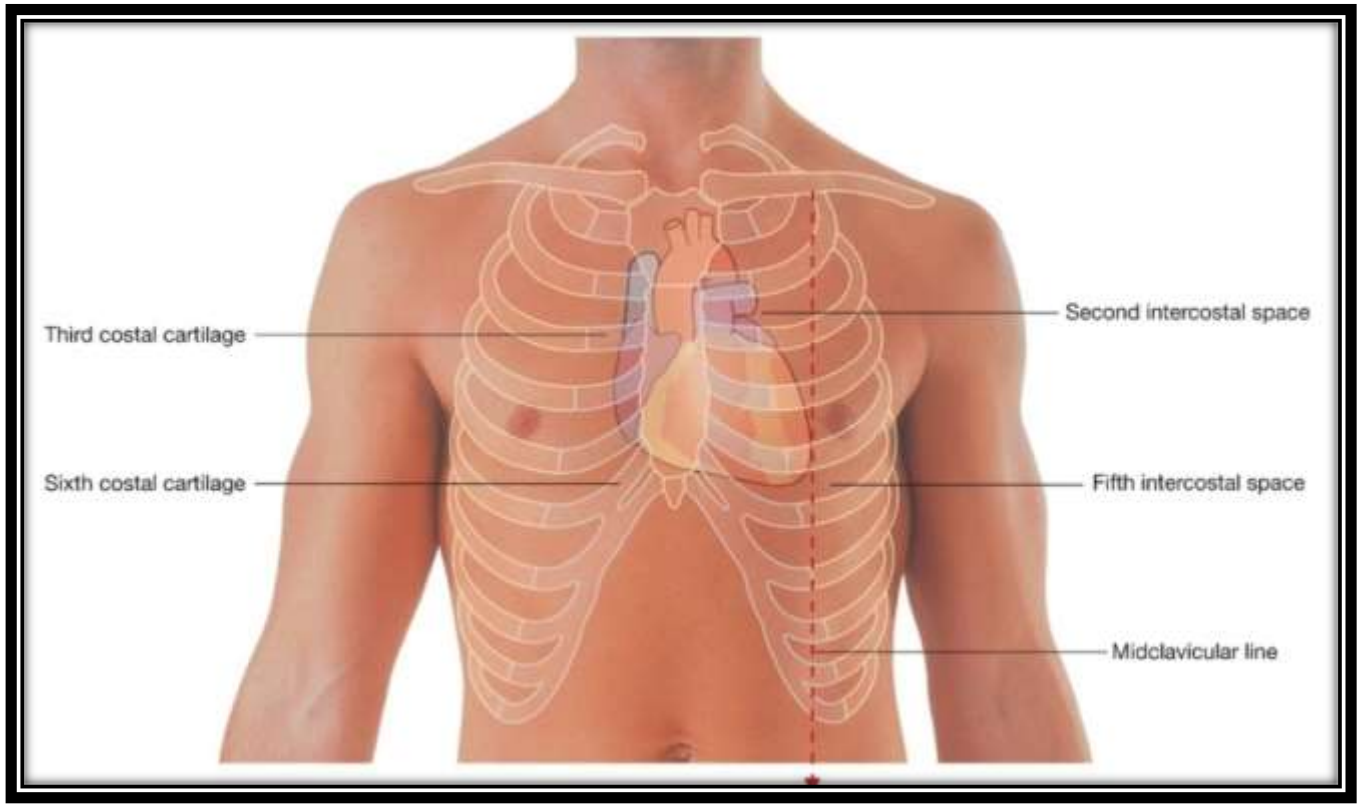
## The apex of the heart

- Is directed anteriorly and to the left and is formed by the inferolateral part of the left ventricle
- Is located posterior to the left 5th intercostal space in adults, usually 9 cm from the median plane.

Is where the sounds of mitral valve closure are maximal (apex beat); the apex underlies the site where the heartbeat may be auscultated on the thoracic wall.



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# ORIENTATION OF HEART

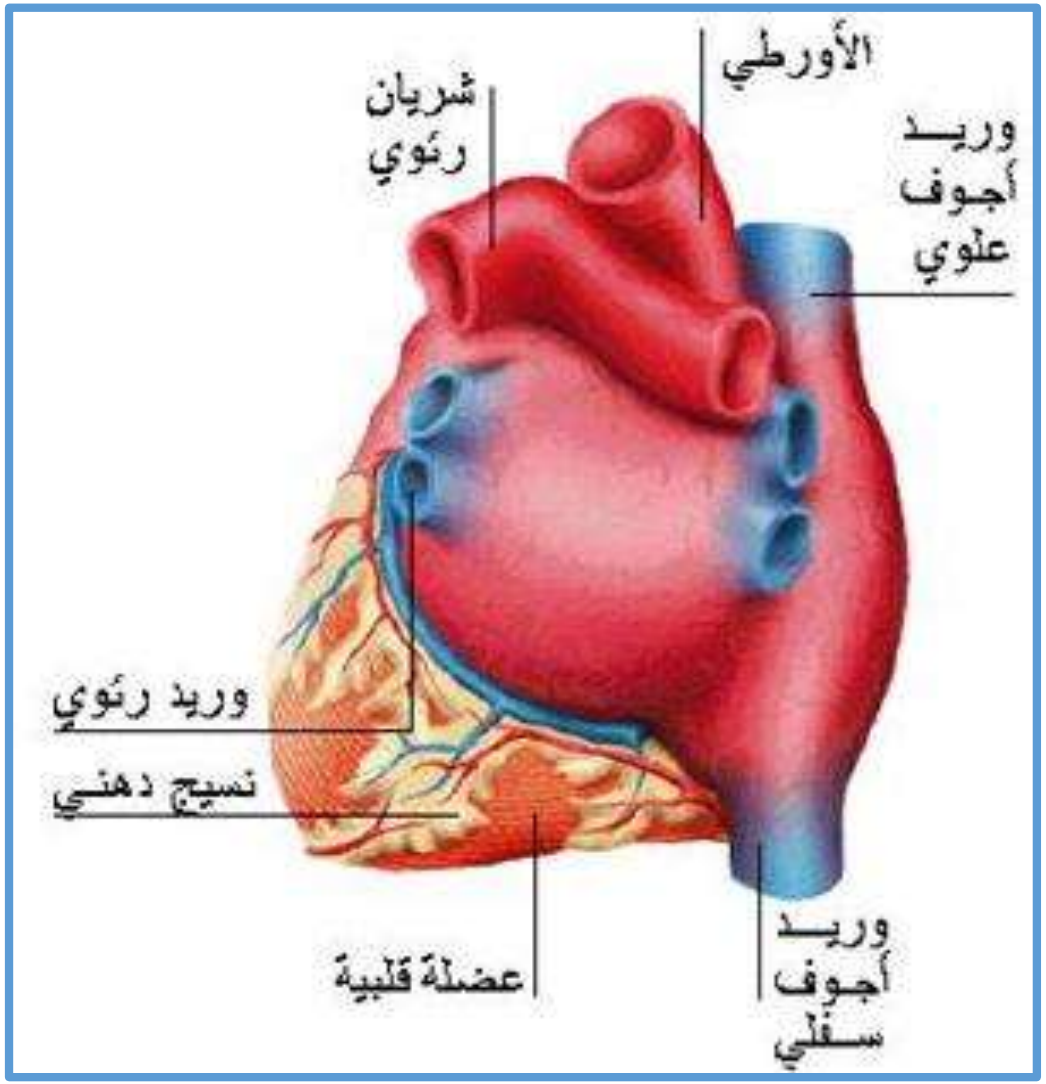
## The base of the heart

Is the heart's posterior aspect

- Is formed mainly by the left atrium, with a lesser contribution by the right atrium

- Faces posteriorly toward the bodies of vertebrae T6–T9 and is separated from them by:

✓the pericardium,
✓oblique pericardial sinus,
✓esophagus,
✓and aorta.

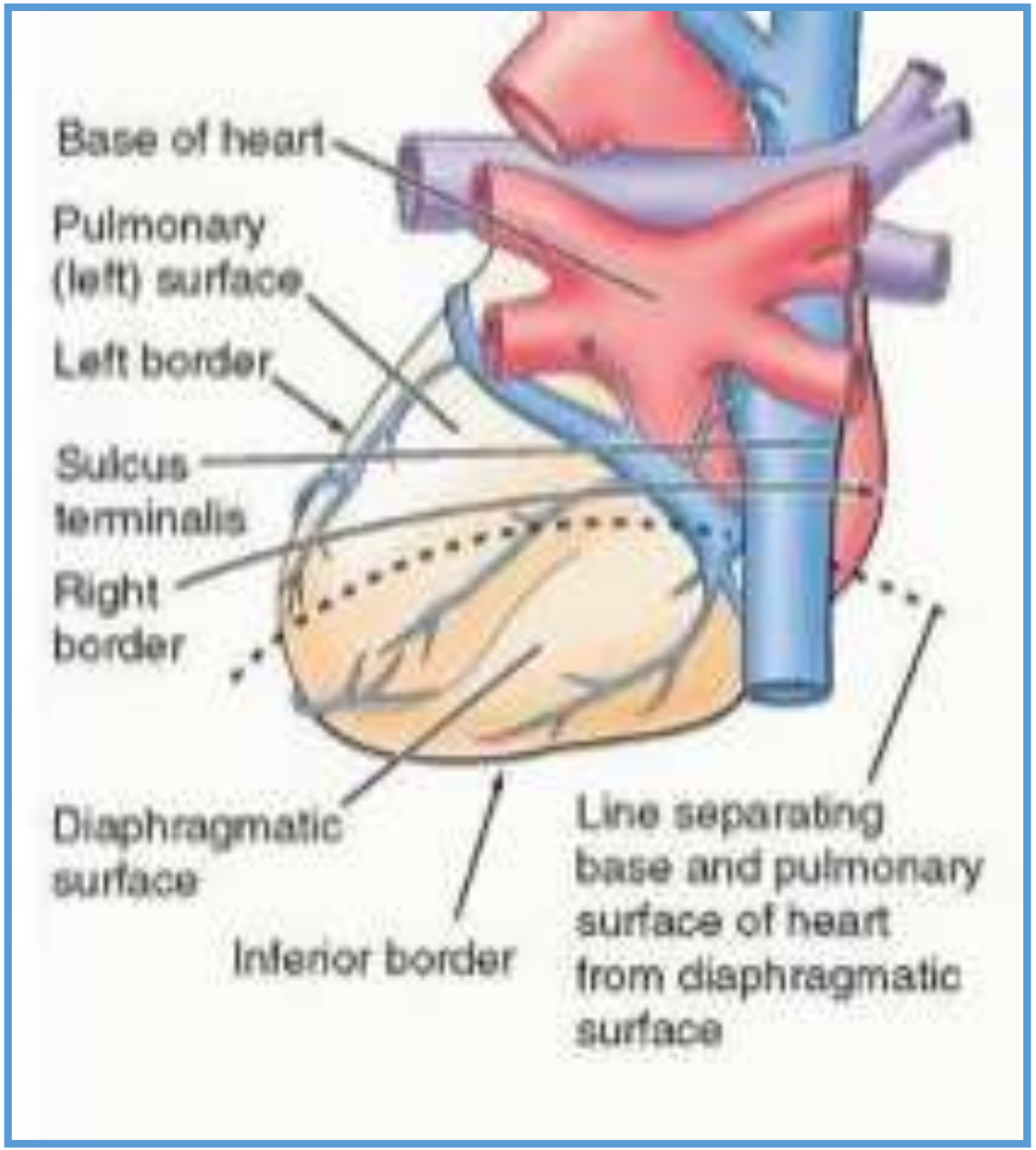


# ORIENTATION OF HEART

## The base of the heart

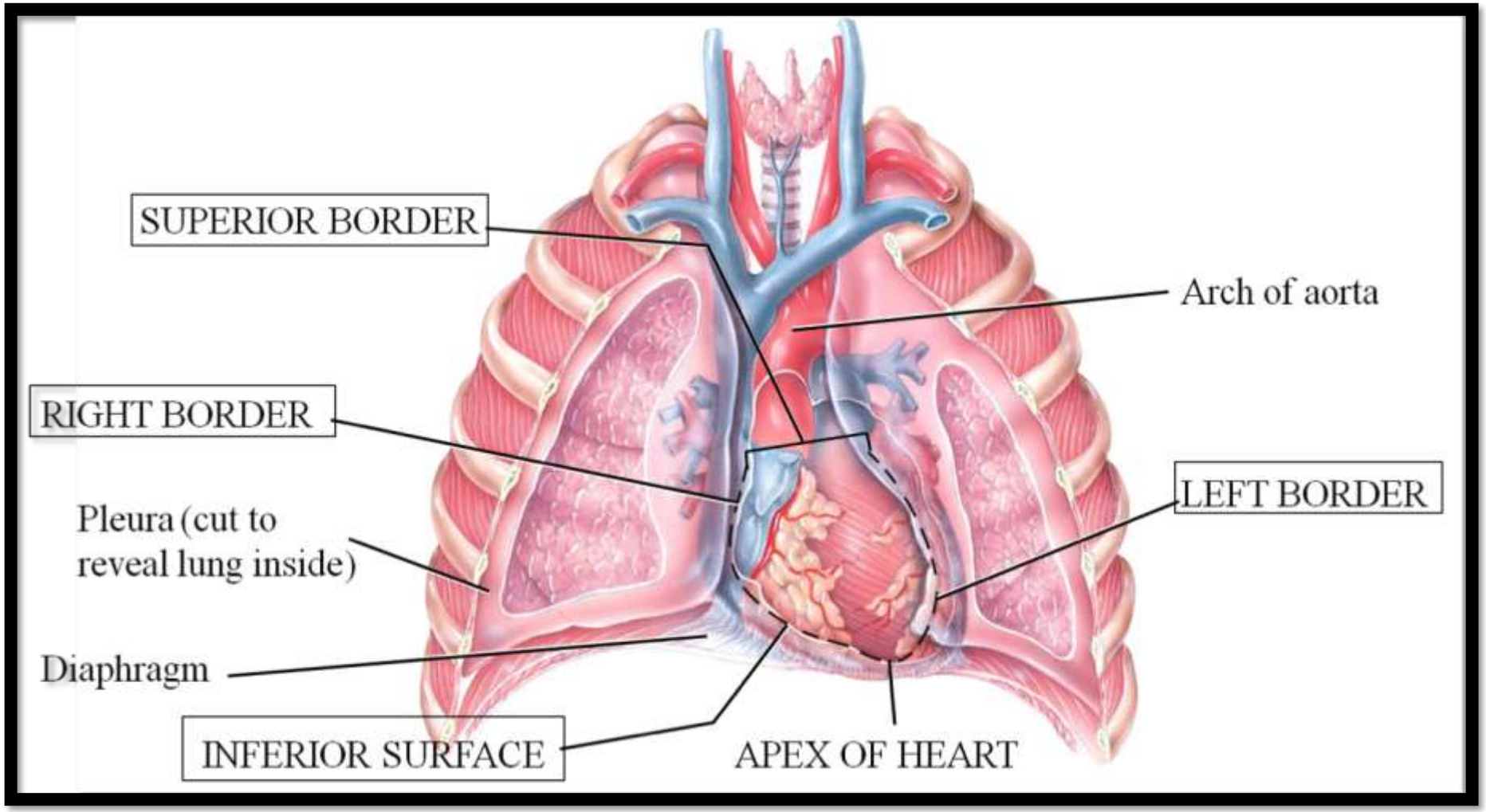
- Extends superiorly to the bifurcation of the pulmonary trunk and inferiorly to the coronary sulcus (groove)

- Receives the pulmonary veins on the right and left sides of the left atrium and the superior and inferior venae cavae at the superior and inferior ends of the right atrium.



**Note that the base of the heart is called the base because the heart is pyramid shaped; the base lies opposite the apex.**

**The heart does not rest on its base; it rests on its diaphragmatic (inferior) surface.**



# ORIENTATION OF HEART

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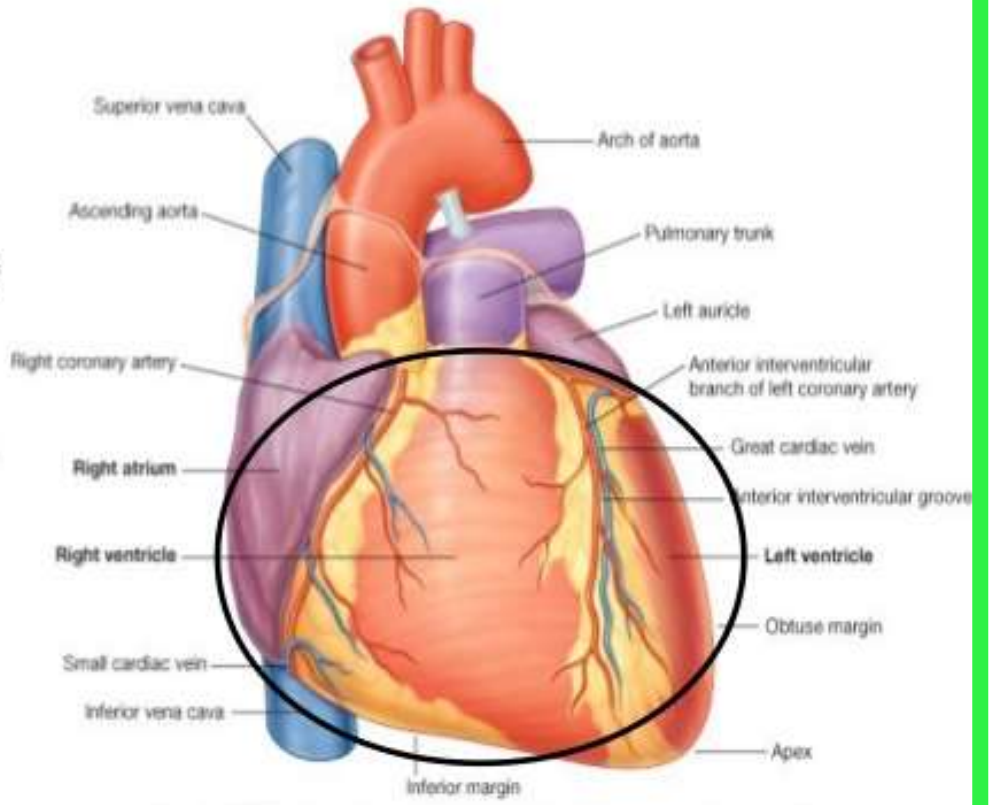
## The four surfaces of the heart are the:::

- **Anterior (sternocostal) surface**, formed mainly by the right ventricle(2/3) and by the left ventricle(1/3).

### Anterior/Sternocostal surface

- Faces anteriorly and consists chiefly of "Rt Ventricle" with some Rt Atrium on right and some of Lt Ventricle on Lt



# The four surfaces of the heart are the:::

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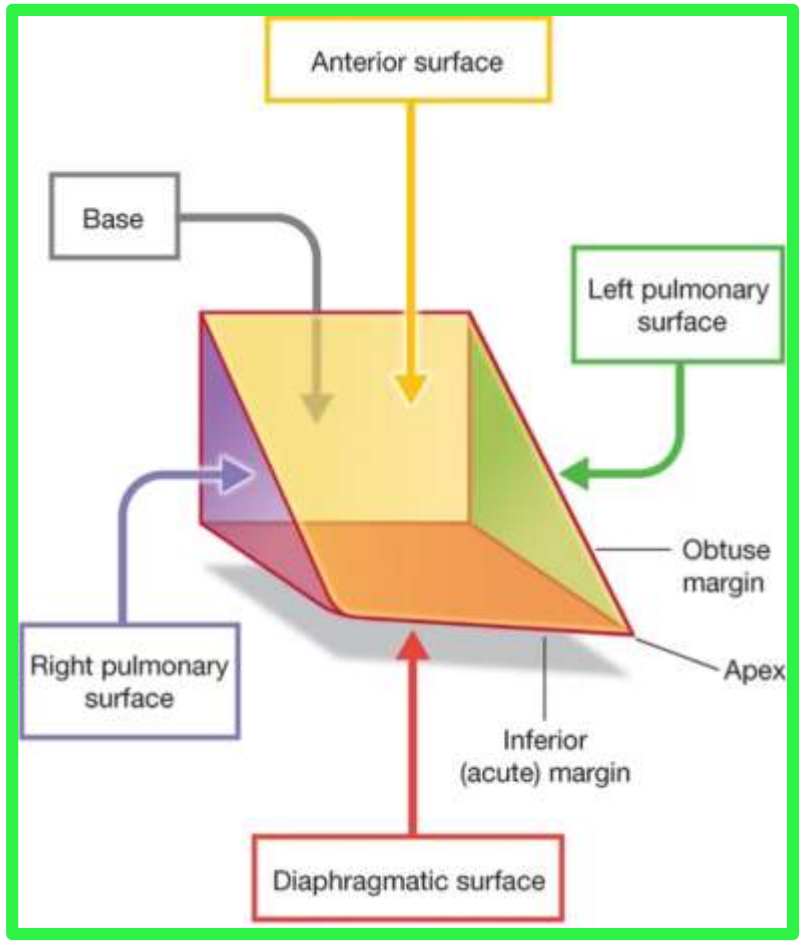
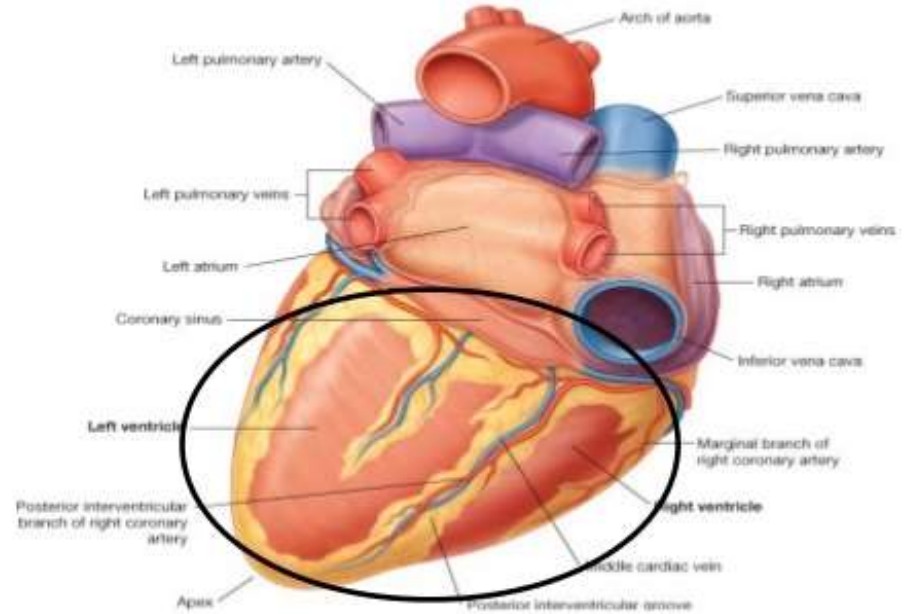
- **Diaphragmatic (inferior) surface, formed mainly by the left ventricle (2/3) and partly by the right ventricle(1/3); it is related to the central tendon of the diaphragm.**



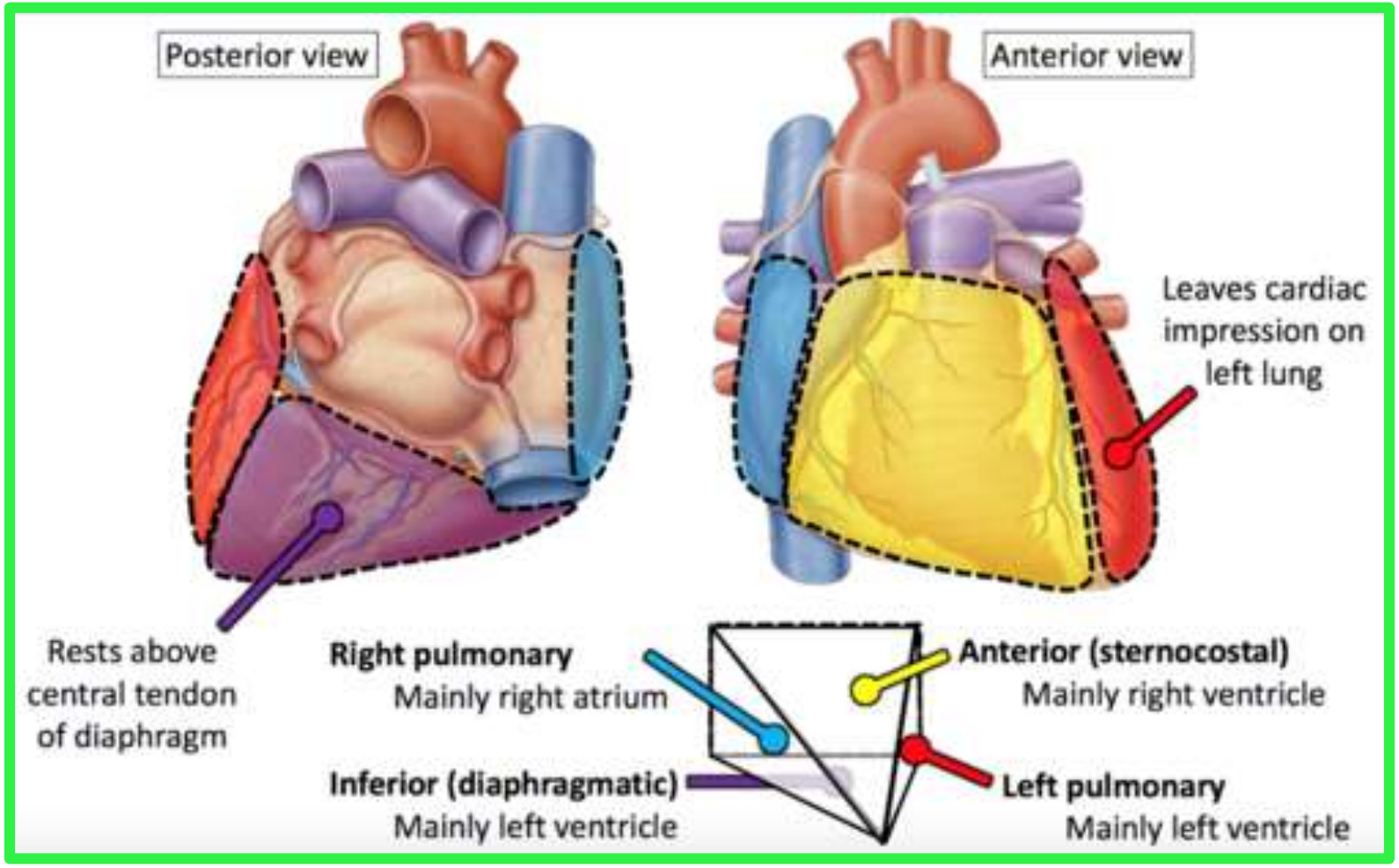

## Inf/Diaphragmatic surface

- In Anatomical position rests on this surface
- Consists chiefly of Lt ventricle and a small portion of Rt ventricle



# The four surfaces of the heart are the:::

- **Left pulmonary surface**, consists mainly of **the left ventricle**; it forms the cardiac impression of the left lung.
- **Right pulmonary surface**, formed mainly by **the right atrium**



# Surface Anatomy

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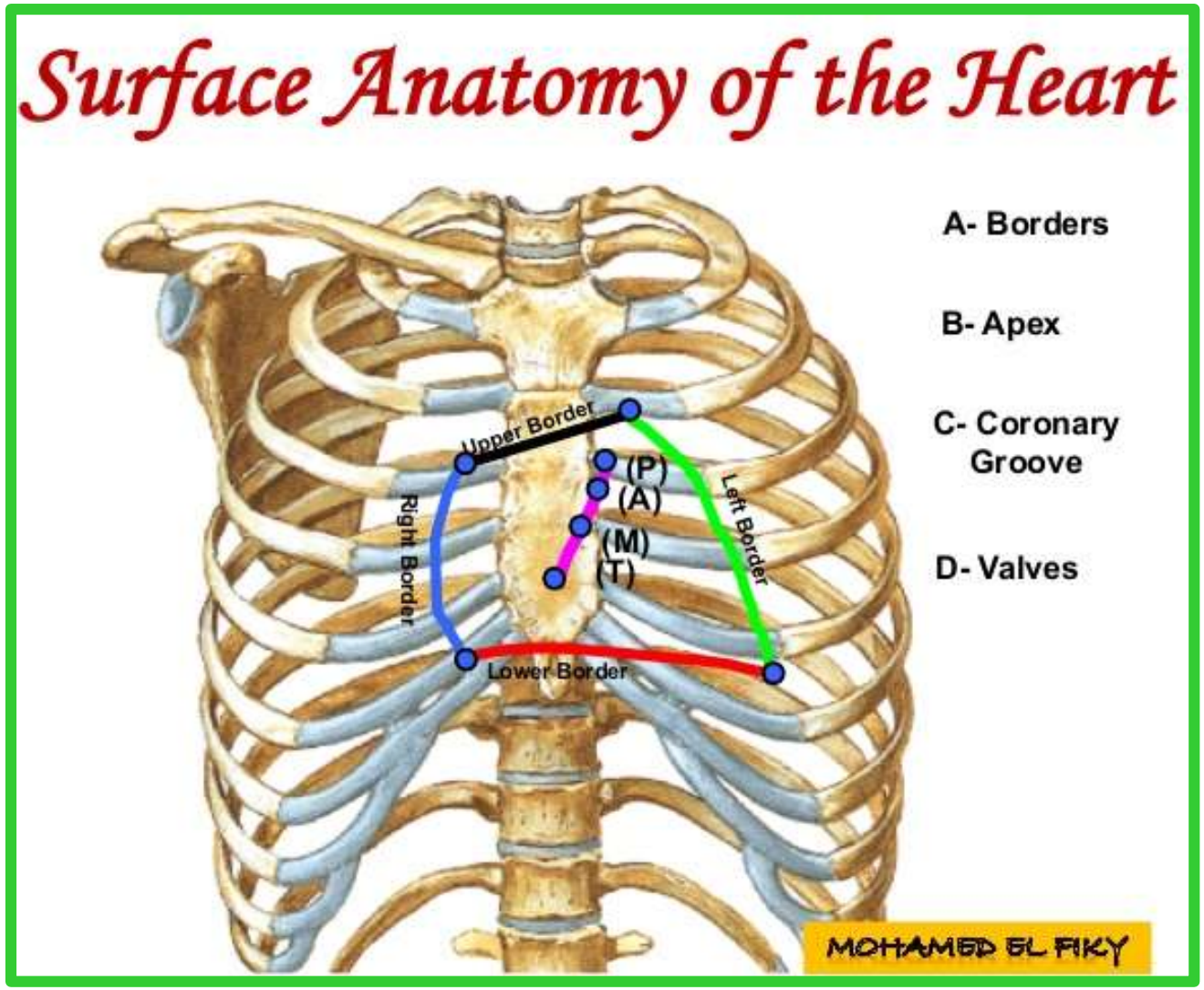
- The superior border corresponds to a line connecting the inferior border of the 2nd left costal cartilage to the superior border of the 3rd right costal cartilage.

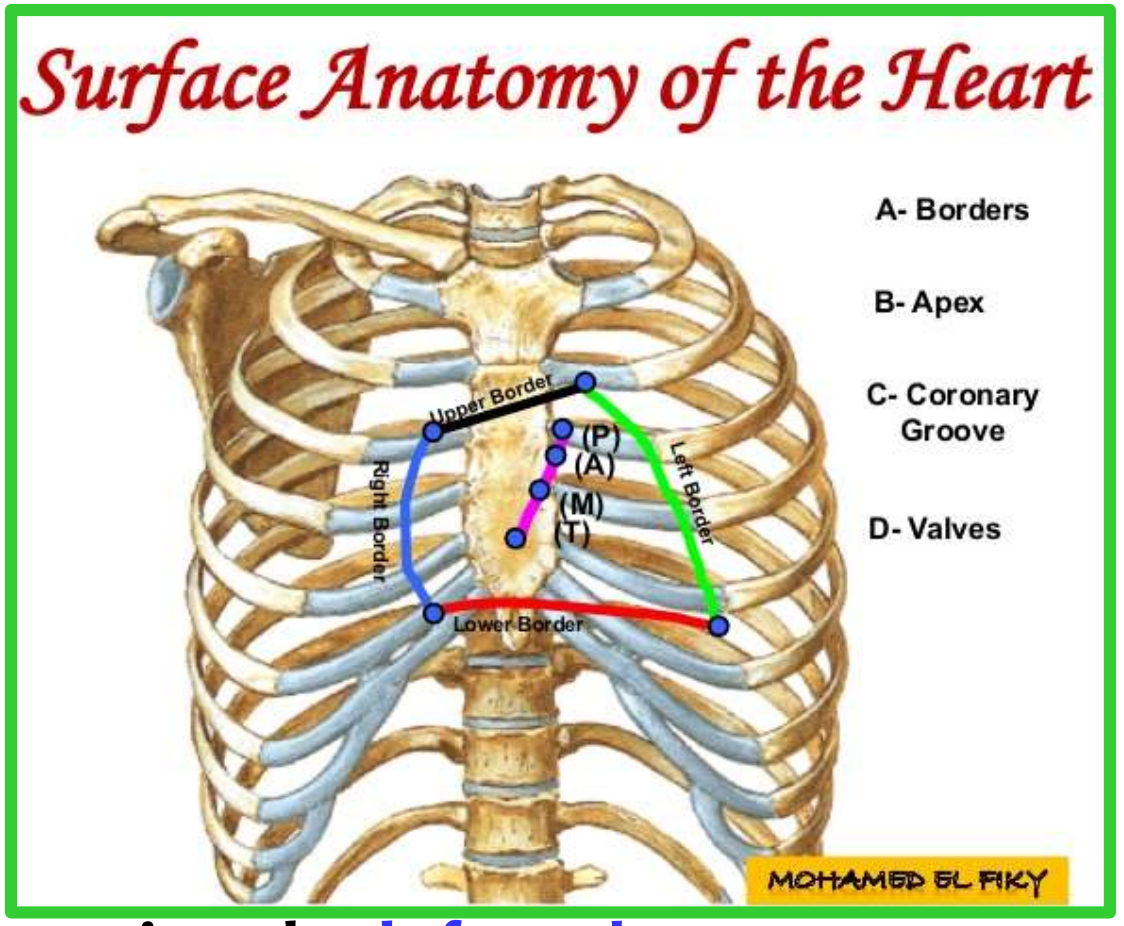
- The right border corresponds to a line drawn from the 3rd right costal cartilage to the 6th right costal cartilage; this border is slightly convex to the right.



# Surface Anatomy



- The inferior border corresponds to a line drawn from the inferior end of the right border to a point in the 5th intercostal space close to the left midclavicular line; the left end of this line corresponds to the location of the apex of the heart and the apex beat.




- The left border corresponds to a line connecting the left ends of the lines representing the superior and inferior borders.

*These borders are important to recognize when examining a radiograph of the heart*

# Surface Anatomy

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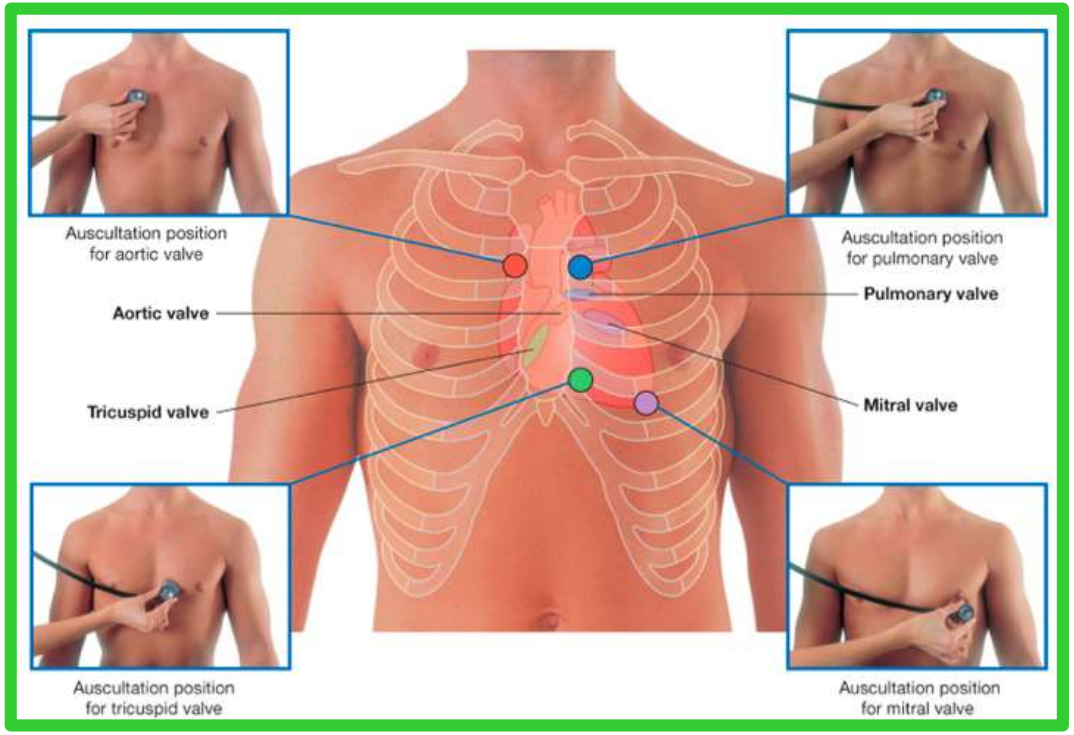
**The apex beat** is an **impulse that results from the apex being forced against the anterior thoracic wall when the left ventricle contracts.**




**The location of the apex beat (mitral area) varies in position; it may be located in the 4th or 5th intercostal spaces, 6–10 cm from the midline of the thorax. Below and medial to the left nipple**

# Auscultation of the Heart Valves

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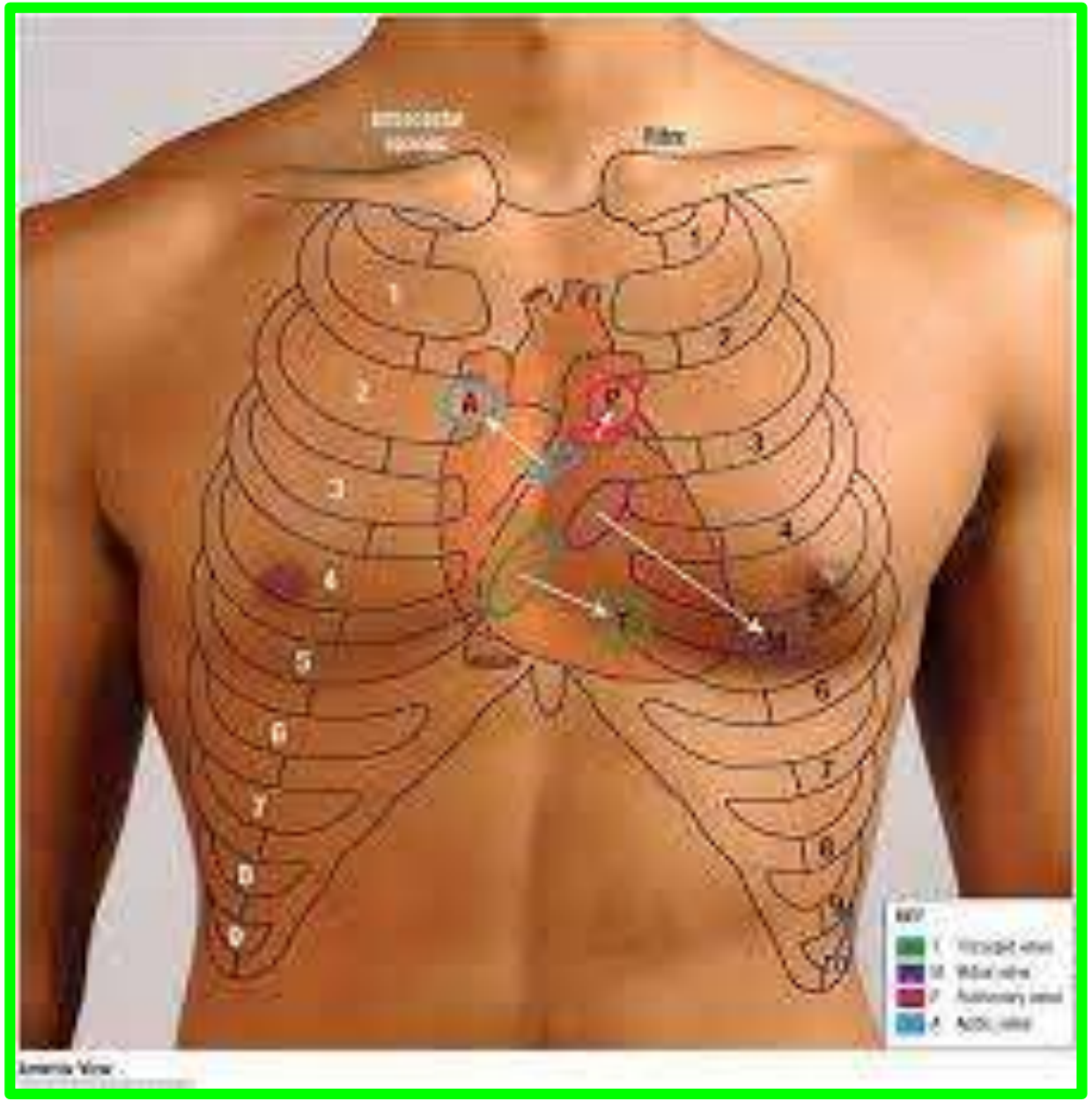
On listening to the heart with a stethoscope, one can hear two sounds: lub-dup.

✓The first sound is produced by the contraction of the ventricles and the closure of the tricuspid and mitral valves.

✓The second sound is produced by the sharp closure of the aortic and pulmonary valves.



# Surface anatomy of the valves :



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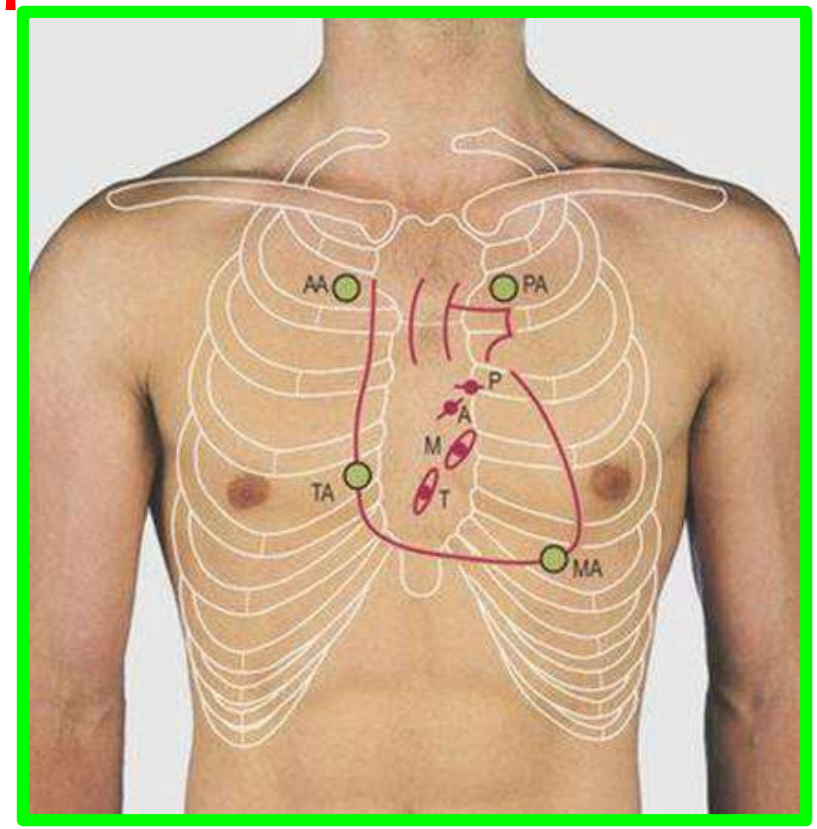
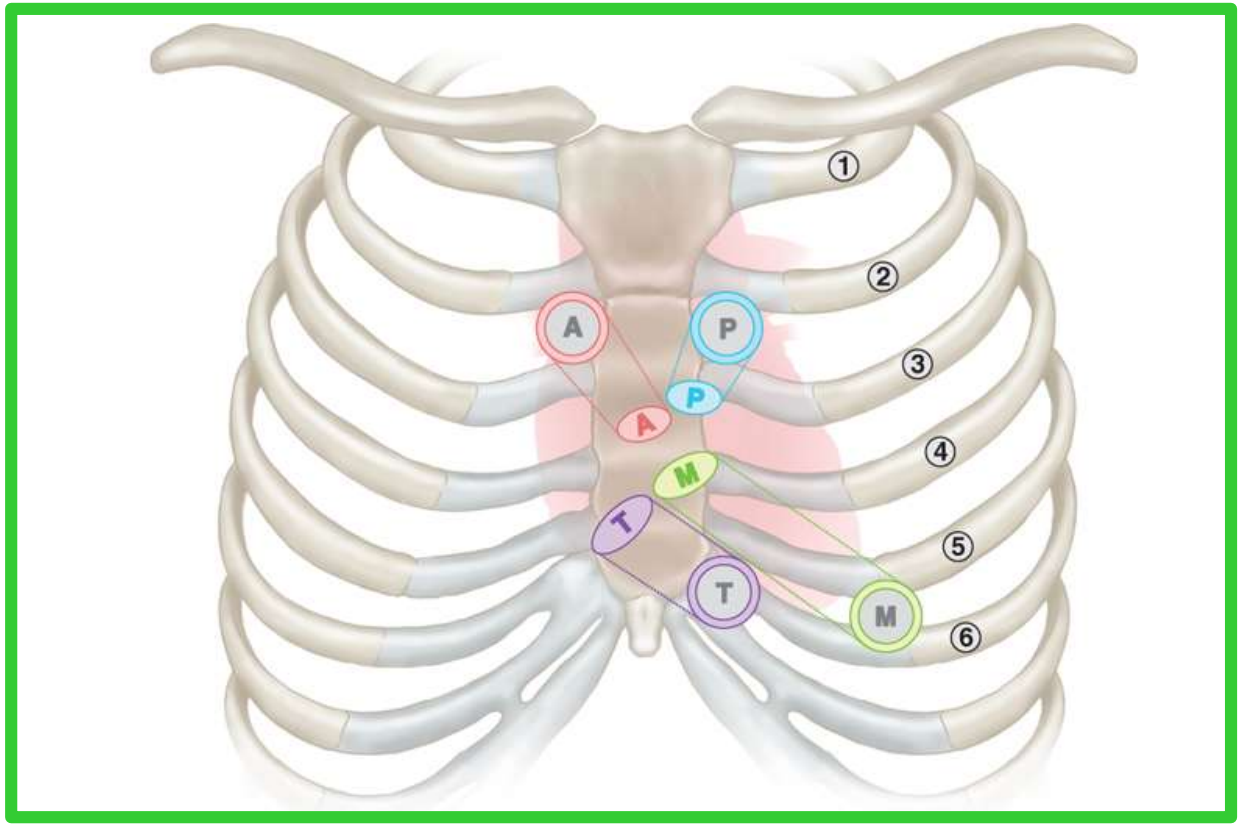
- All the valve of the heart behind the left border of the sternum except the tricuspid valve behind the center of the sternum.

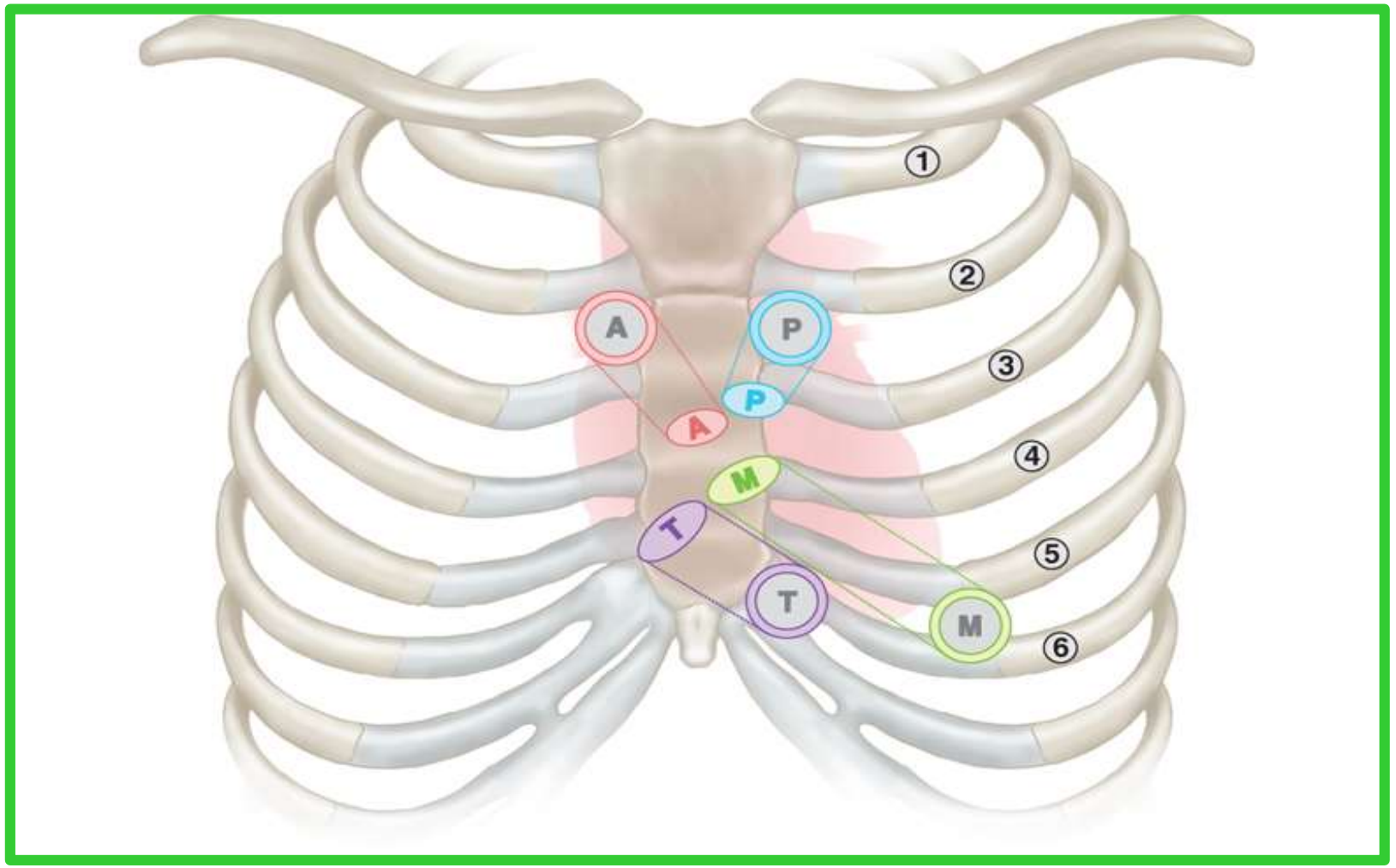



- ❖ Pulmonary valve: opposite the level of the left 3rd sterno-costal junction.
- ❖ Aortic valve: opposite the level of the left 3rd intercostal space.

# Surface anatomy of the valves :

- **Mitral valve:** opposite the level of the **left 4th sterno-costal junction.**
- **Tricuspid valve:** opposite the level of the **left 4th intercostal space.**

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# Auscultation of the Heart Valves

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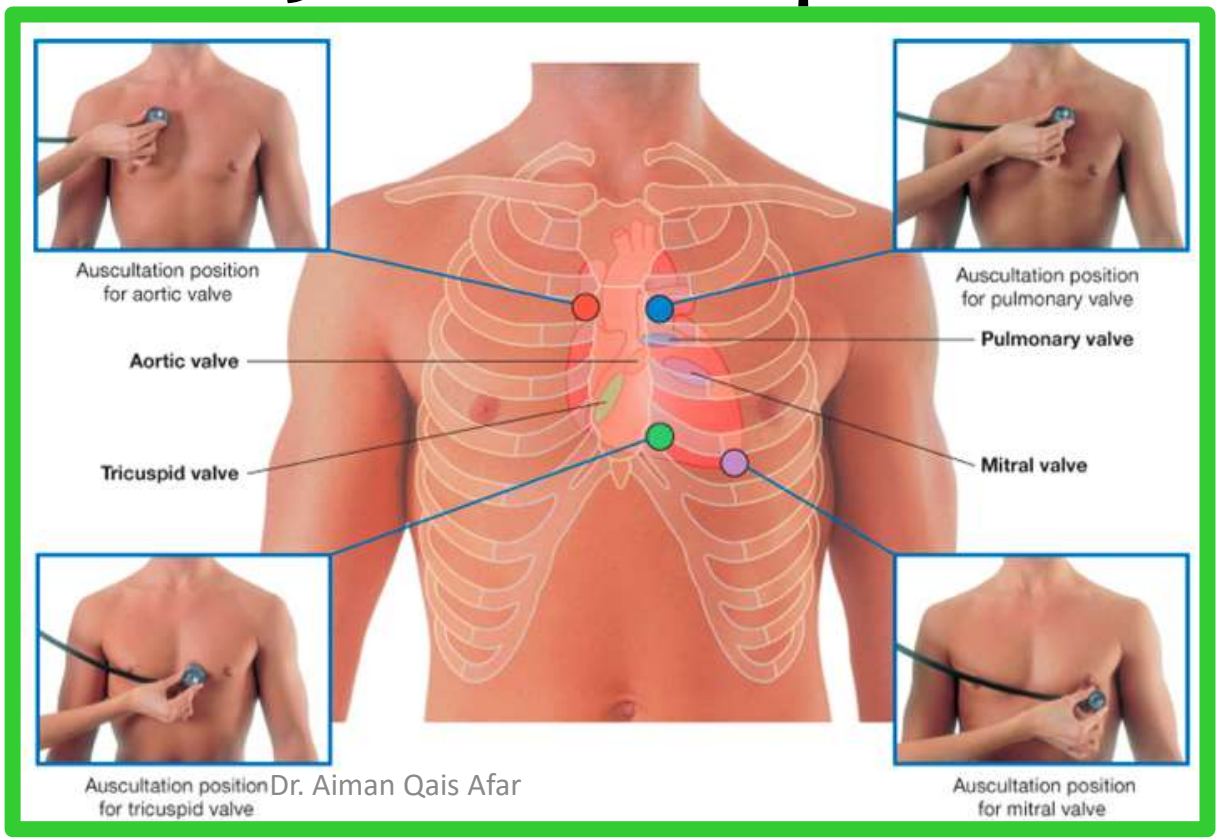
The areas (sites) of auscultation are

- **Aortic valve (A):** 2nd intercostal space to right of sternal border
- **Pulmonary valve (P):** 2nd intercostal space to left of sternal border
- **Tricuspid valve (T):** near left sternal border in 5th or 6th intercostal space
- **Mitral valve (M):** apex of heart in 5th intercostal space in midclavicular line



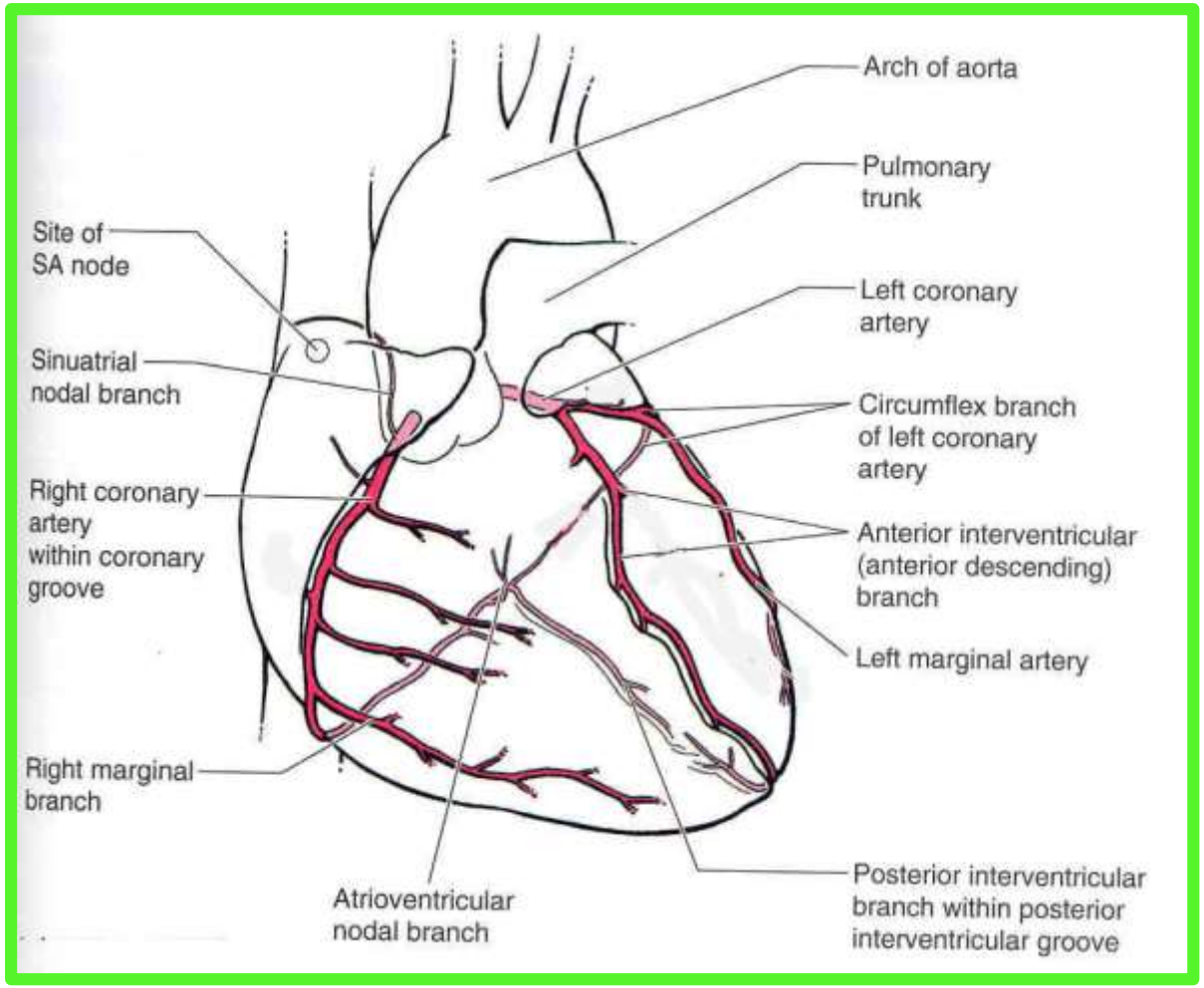
# The Arterial Supply of the Heart

## The coronary arteries

the first branches of the aorta, supply the myocardium and epicardium.

The right and left coronary arteries arise from the:

- ✓corresponding aortic sinuses at the proximal part of the ascending aorta
- ✓ just superior to the aortic valve
- ✓ pass around opposite sides of the pulmonary trunk

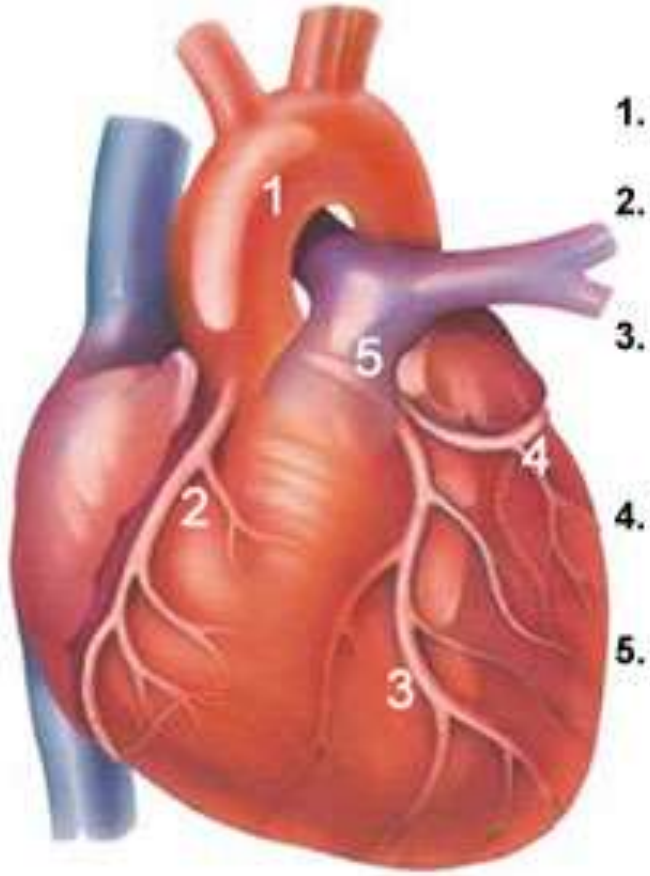


# The Arterial Supply of the Heart

## The right coronary artery

✓ It descends almost vertically in the right atrioventricular groove.

✓At the inferior border of the heart it continues posteriorly along the atrioventricular groove to anastomose with the left coronary artery in the posterior interventricular groove.




1. Aorta
2. Right Coronary Artery
3. Left Anterior Descending Coronary Artery
4. Circumflex Coronary Artery
5. Left Main Coronary Artery

# The right coronary artery

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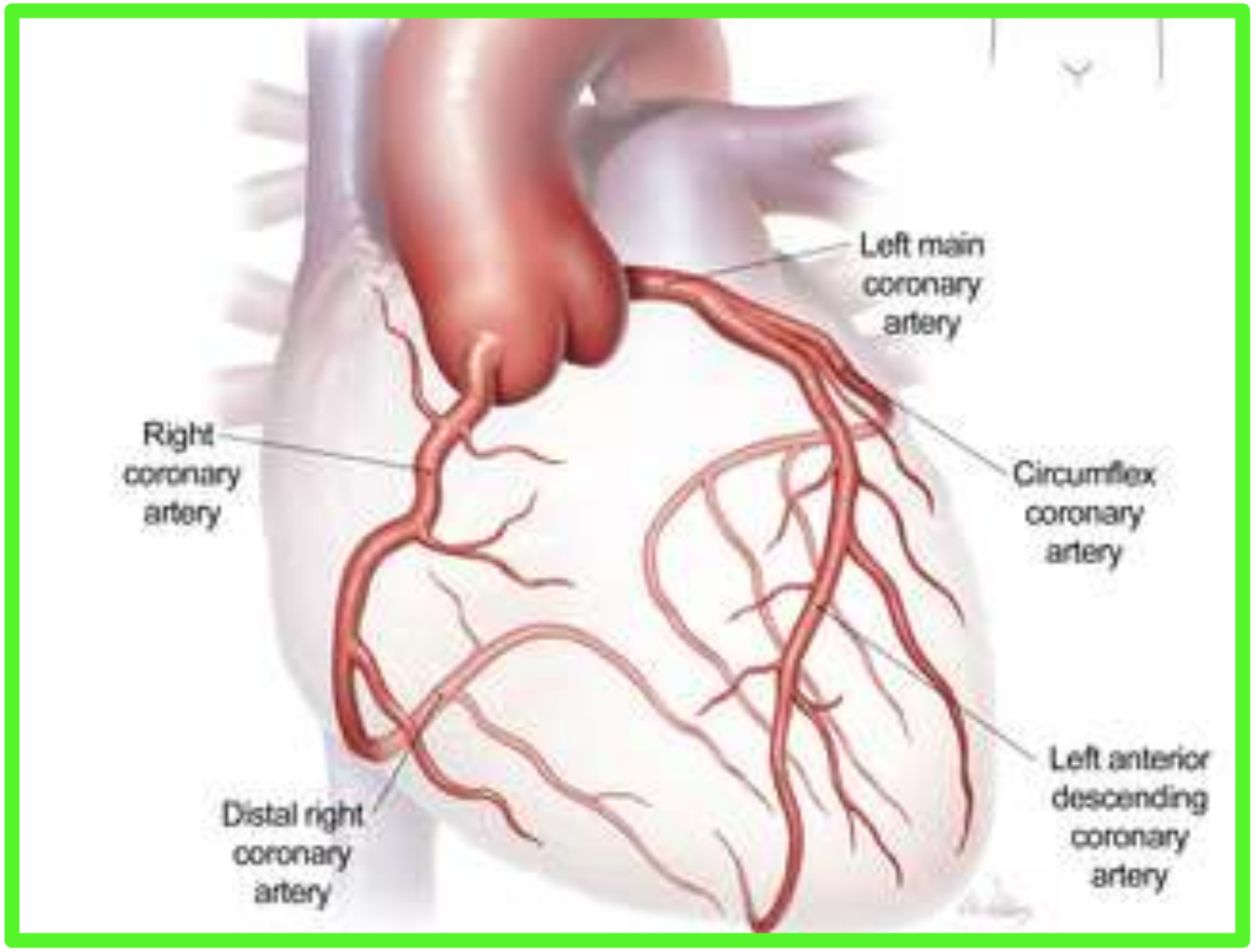


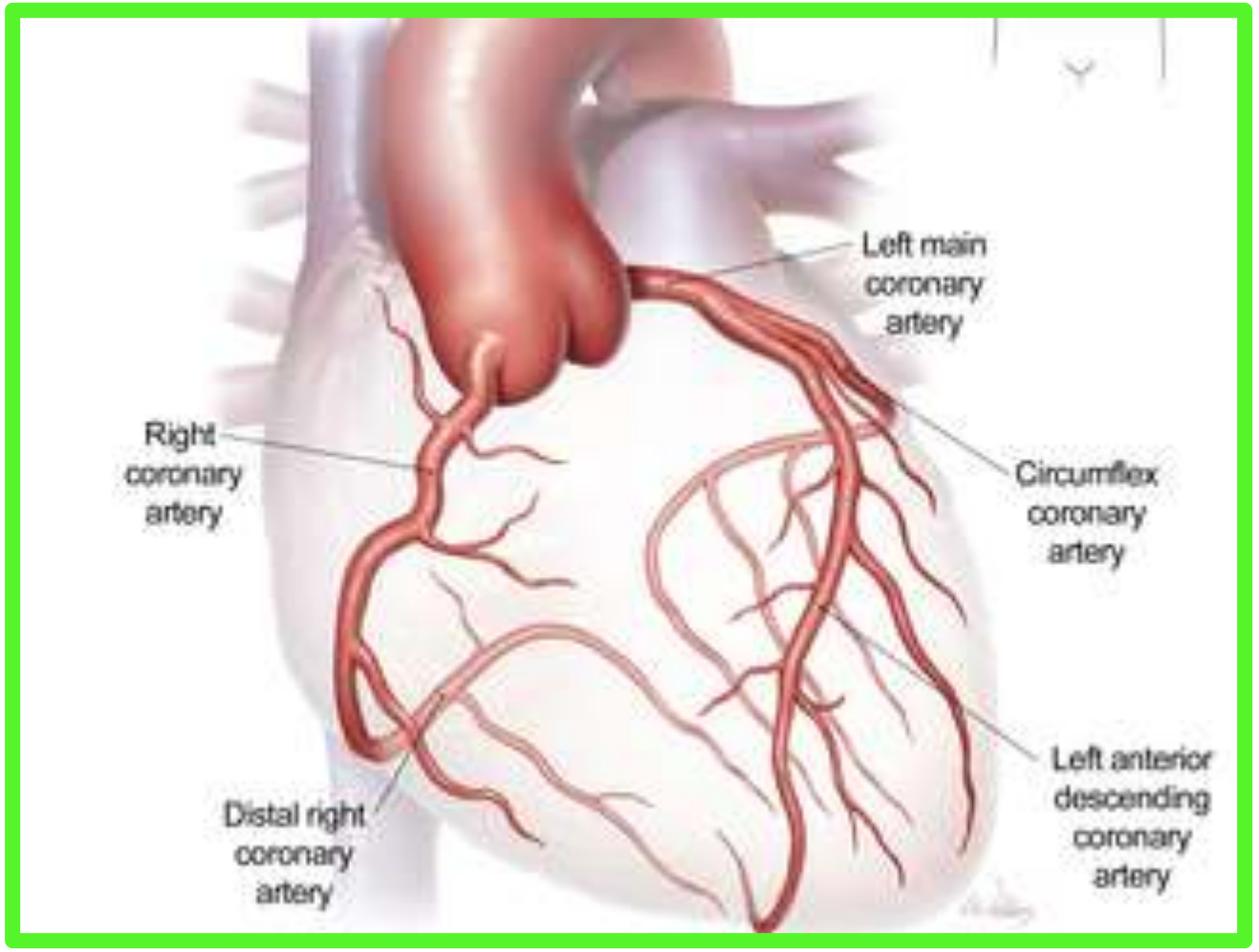

**Typically, the RCA supplies:**

- ✓ **The right atrium.**
- ✓ **Most of right ventricle.**
- ✓ **Part of the left ventricle (the diaphragmatic surface).**
- ✓ **Part of the IV septum, usually the posterior third.**

# The left coronary artery (LCA)

- arises from the left aortic sinus of the ascending aorta

- As it enters the coronary sulcus, the LCA divides into two branches:
- The anterior IV branch
- ("left anterior descending" artery)
- The circumflex branch



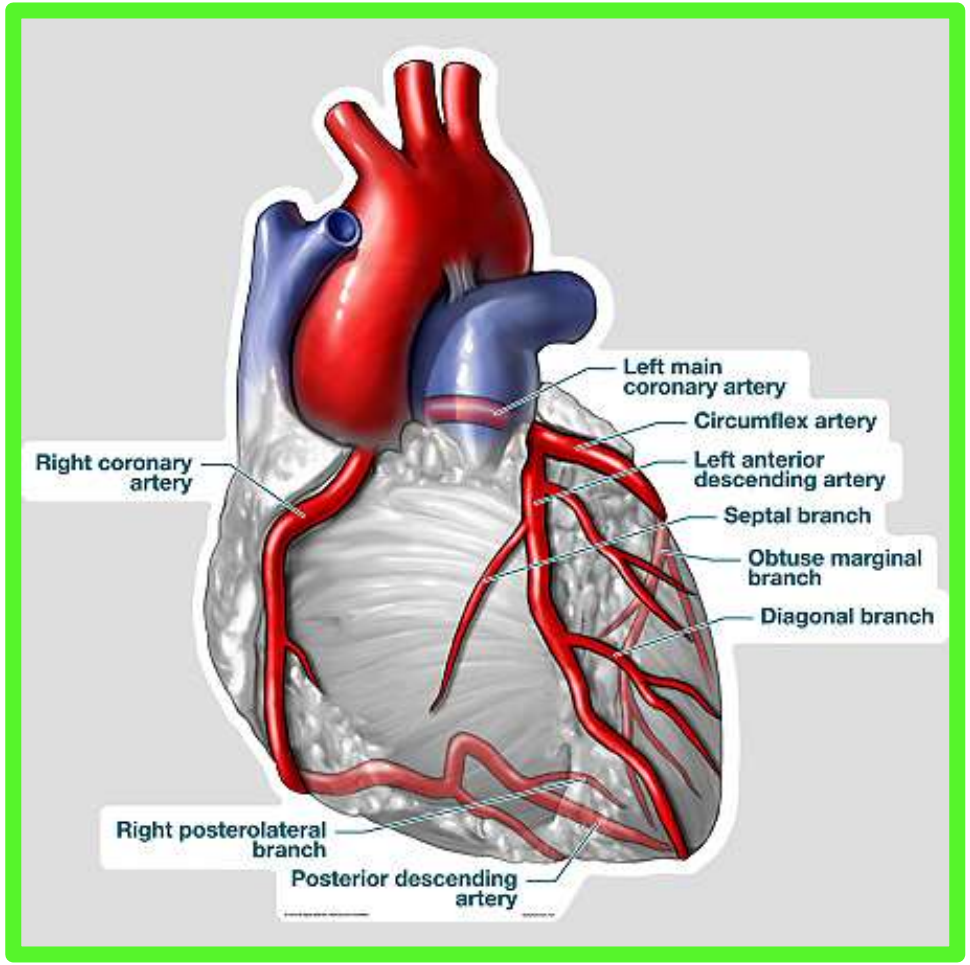

Dr. Aiman Al Maathidy
Tuesday 5 November 2024

# The left coronary artery (LCA)

Dr. Aiman Al Maathidy
Tuesday 5 November 2024

- The anterior IV branch passes along the IV groove to the apex of the heart.

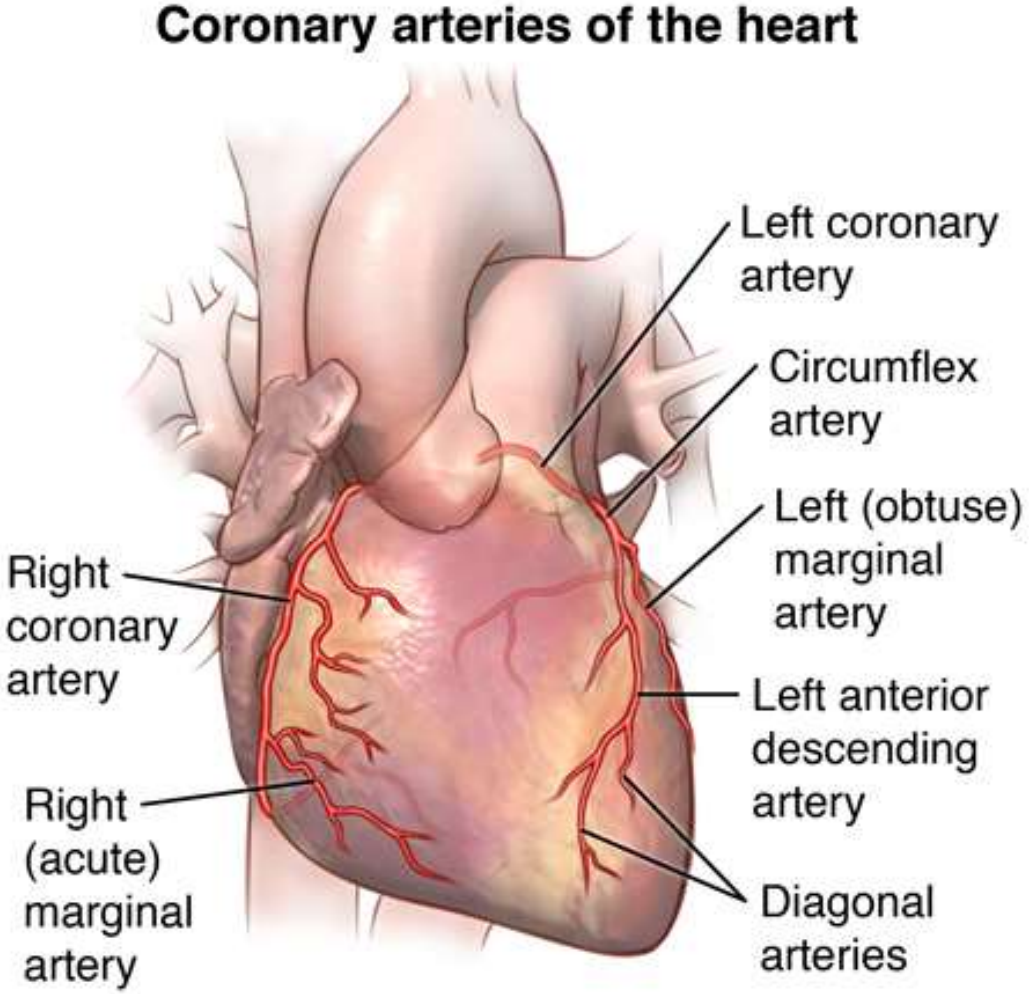
Here it turns around the inferior border of the heart and commonly anastomoses with the posterior IV branch of the right coronary artery.



# The left coronary artery (LCA)

❑The smaller circumflex branch follows the coronary sulcus around the left border of the heart to the posterior surface of the heart.

❖The left marginal branch of the circumflex branch follows the left margin of the heart and supplies the left ventricle.



Dr. Aiman Qais Afar
Monday 5 May 2025