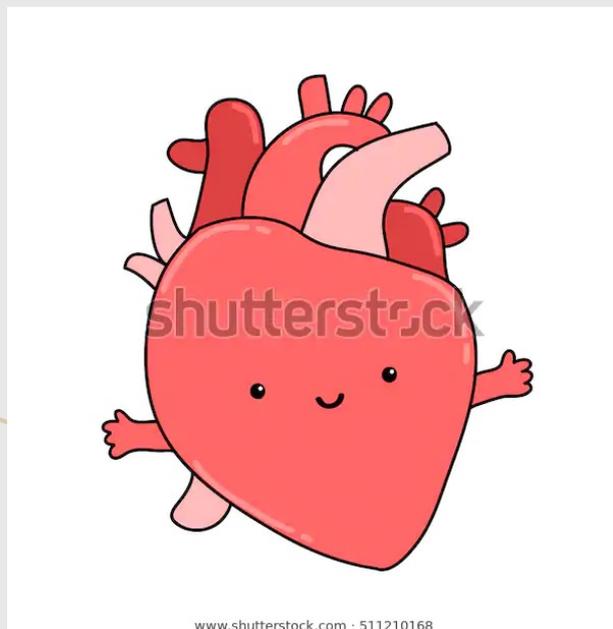
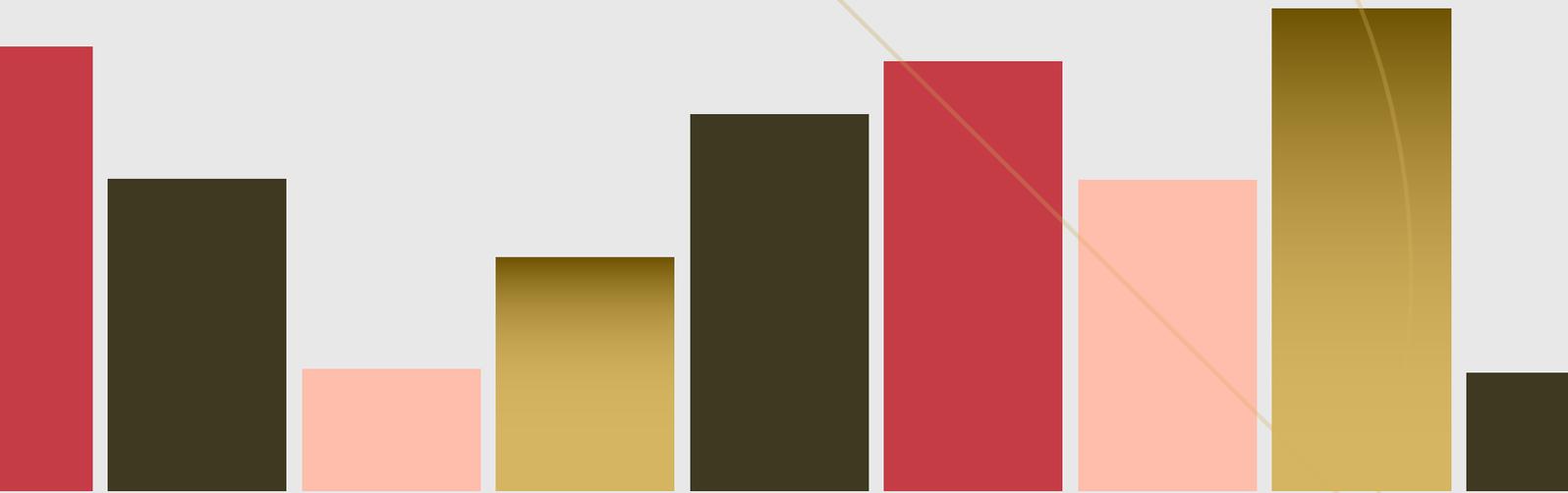


# The Heart A

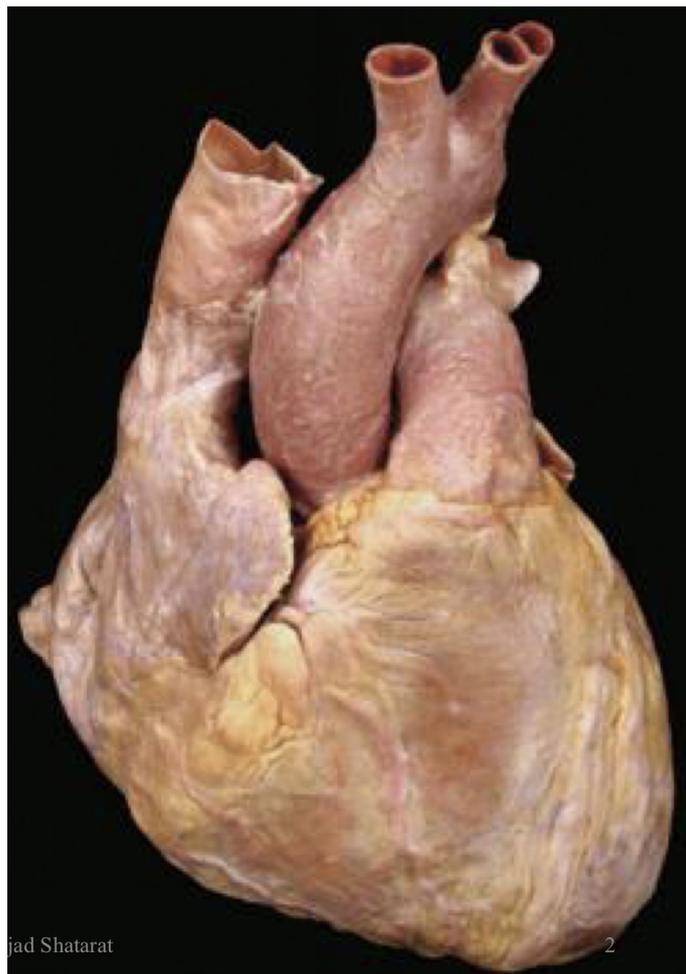
Done By : Reham Badayneh



So , we are going to start talking about the heart :-

# The Heart

- The heart, slightly larger than one's loosely clenched fist
- It is a double, self-adjusting suction and pressure pump (Moore, clinically oriented Anatomy)
- The heart is a pair of valved muscular pumps combined in a single organ (Gray's Anatomy)
- The general shape of the heart is that of a pyramid that has fallen over and is resting on one of its sides.



**REFER TO THE VIDEO IN THE LECTURE : (here is the link )**

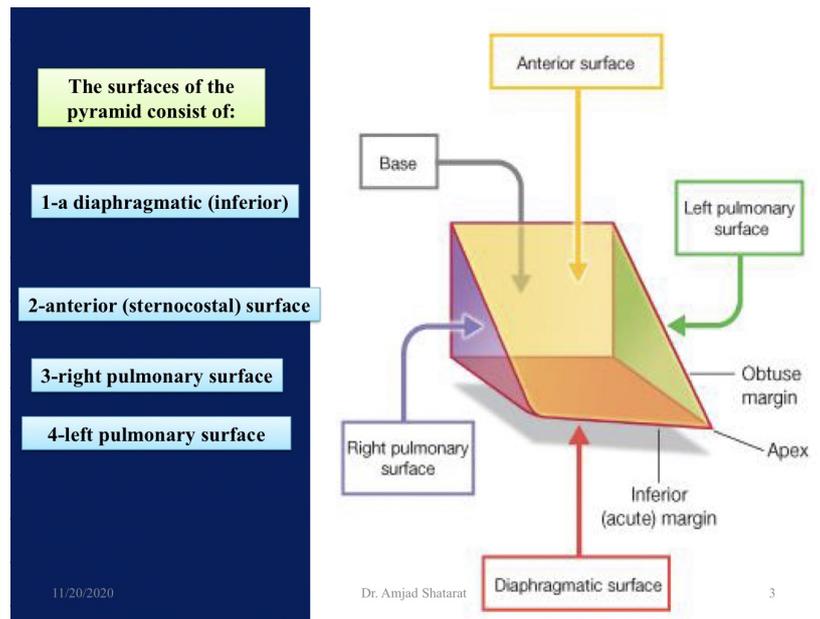
**<https://youtu.be/mihCWZSNV1I>**

**FROM (2:37 - 4:47 )**

**The heart has :-**

- Apex
- A Base
- 4 Surfaces
- 4 Borders

## **I. The Apex**



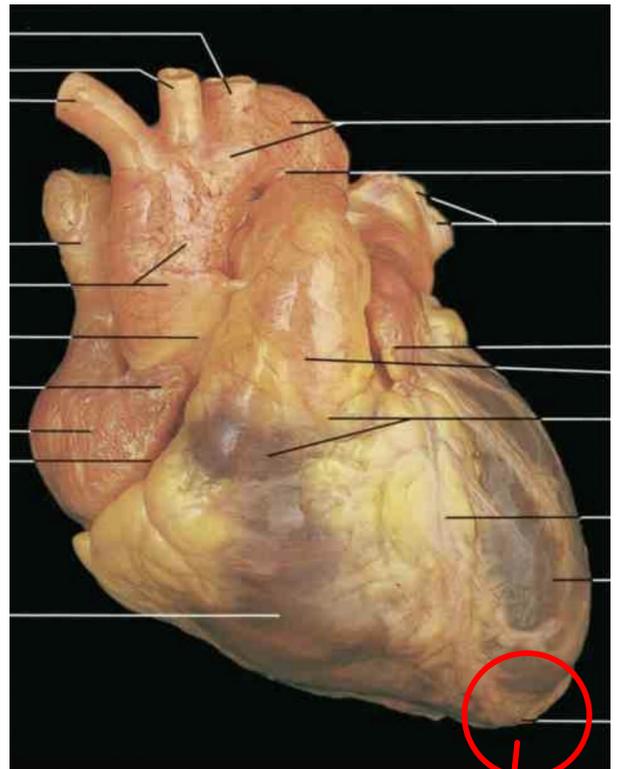
**REFER TO THE LECTURE VIDEO**

**From ( 5:30 - 5:32)**

- . It is formed by the inferolateral part of the left ventricle
- It is directed downward forward, and to the left
- Lies posterior to the left 5th intercostal space usually approximately 9 cm (a hand's breadth) from the median plane

**. Clinically important , why ??**

**It 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**

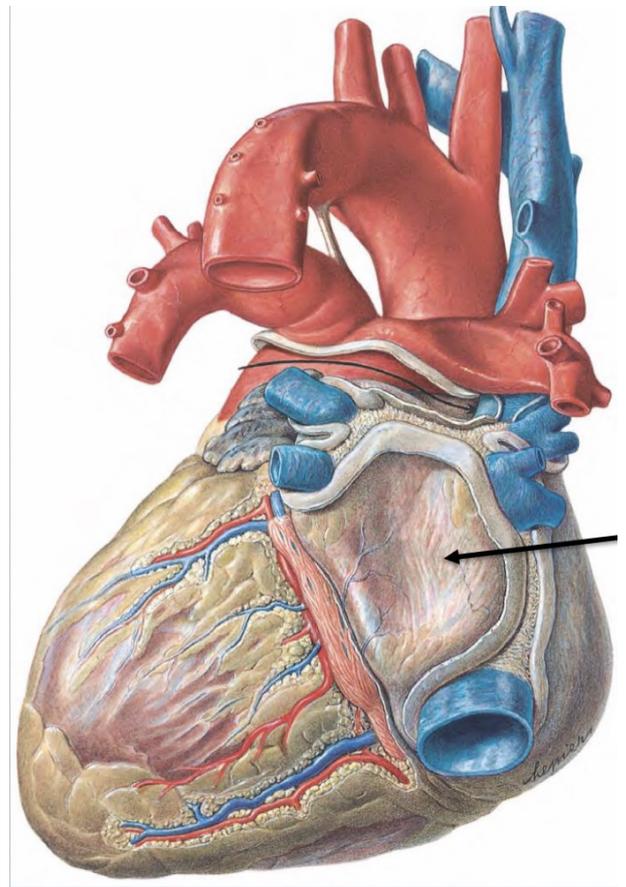


**The apex of the heart**

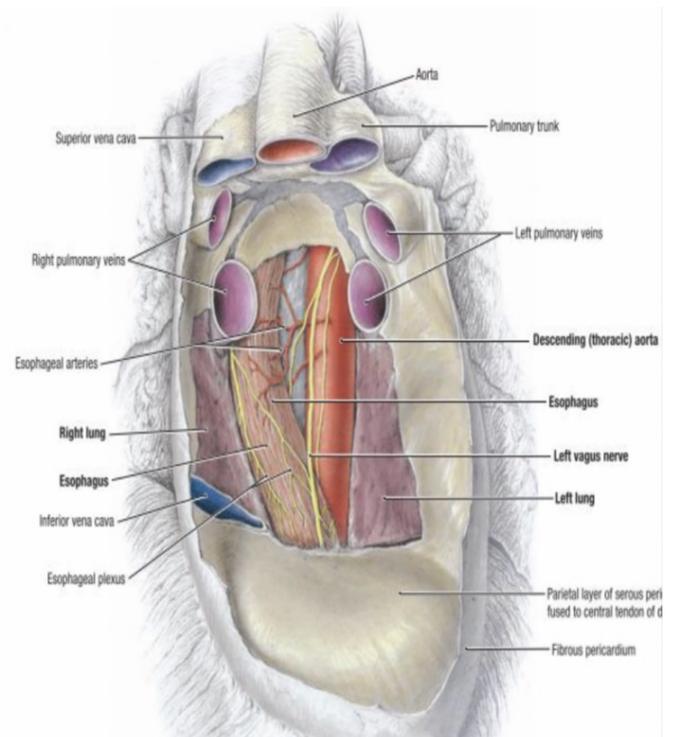
## II. The base

REFER TO THE VIDEO FROM  
(8:35-10:52)

- 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 descending aorta .



# III. Surfaces of the heart

Why do we have to know the contribution of each chamber into the walls ??

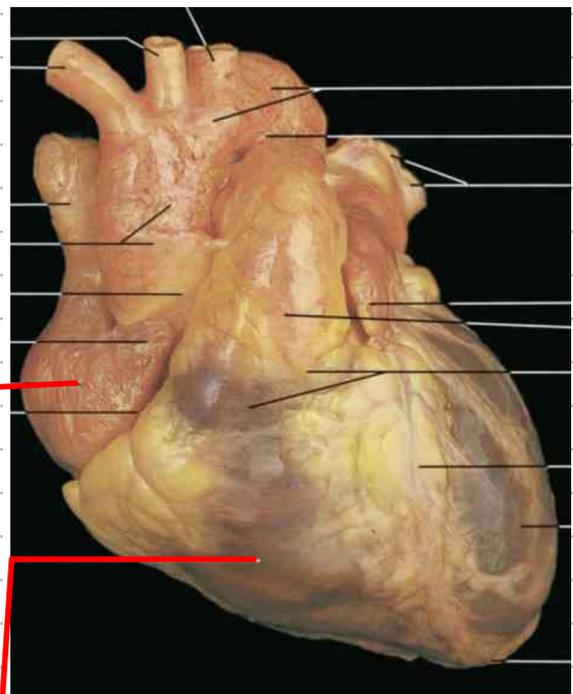
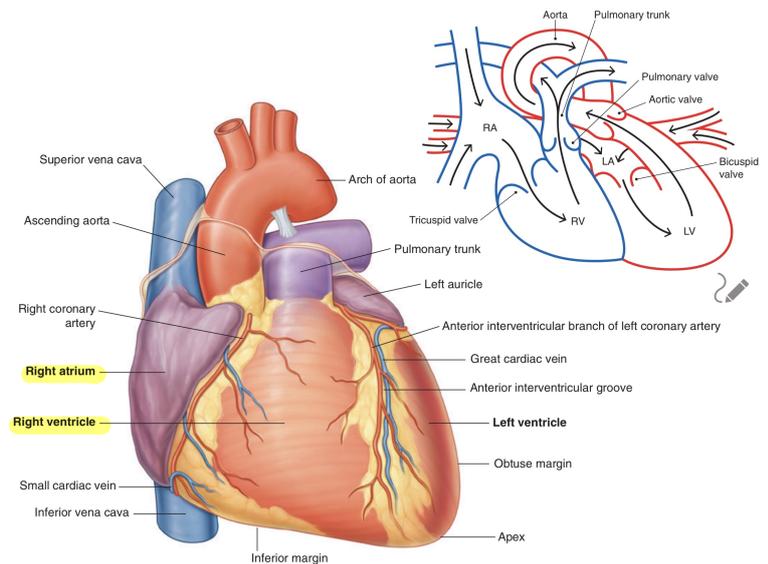
Because we image these walls on X-ray for example and we see if any wall is getting thicker or enlarged , so we need to know this wall is made by which chamber ; thus it gives us an indication about which chamber is diseased .

## A- The Sternocostal Surface

REFER TO THE VIDEO FROM (12:00-14:16 )

During embryogenesis the heart was right in the middle ( so the left atrium , left ventricle , right atrium and right ventricle behind it ) , now before birth the heart rotates 45 degrees to the left and NOW this is the final position of the adult heart .

Now , what happened ??  
The rotation of the heart forced the right atrium and the right ventricle to become a little bit anterior , so as a result the Sternocostal surface ( The Anterior Surface ) now is made up of the Right Atrium and The Right Ventricle .



Right atrium

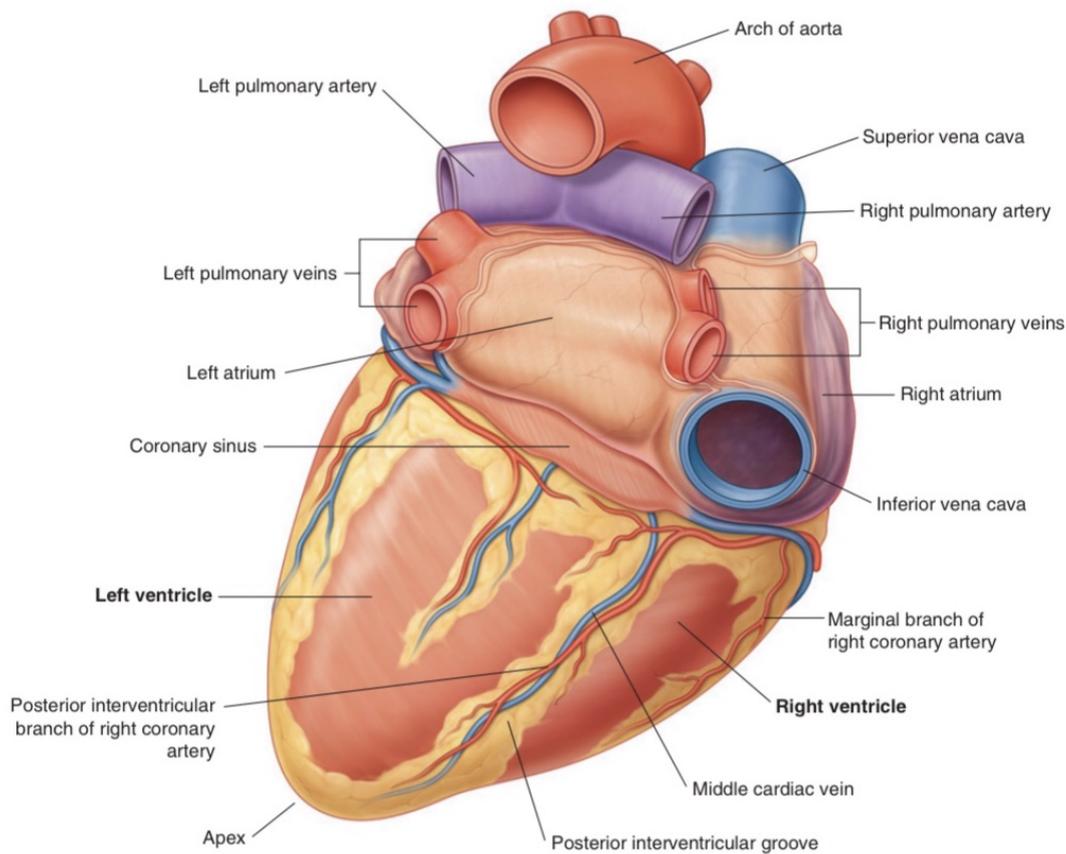
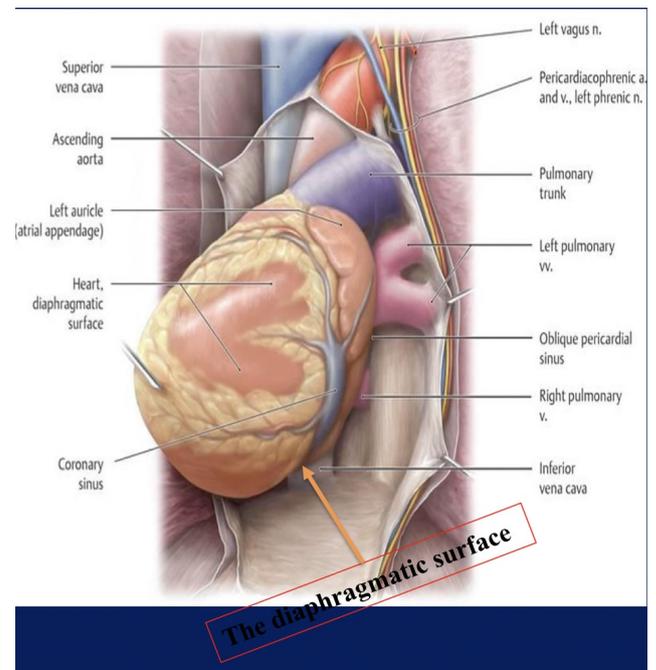
Right ventricle

## B- The Diaphragmatic surface

-it is formed mainly by the **right ventricle and left ventricle** separated by the posterior interventricular groove .

**The inferior surface of the right atrium** , into which inferior vena cava opens , also forms part of this surface

It is related mainly to the central tendon of the diaphragm .



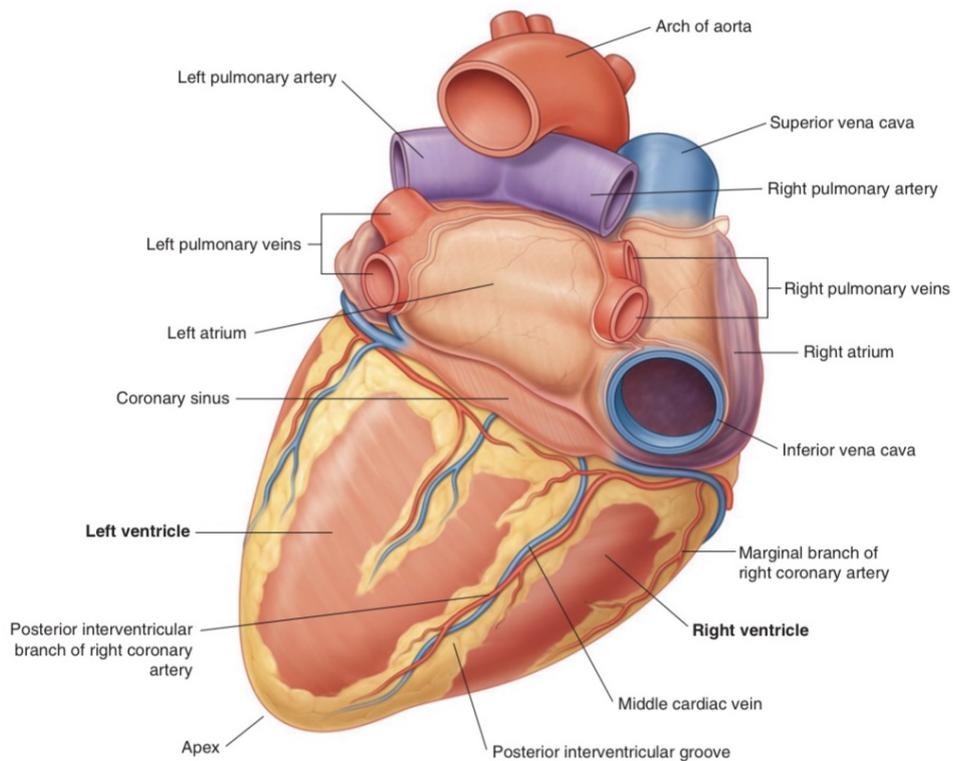
## C- The Left Pulmonary surface

faces the left lung, is broad and convex, and consists of the left ventricle and a portion of the left atrium

it forms the cardiac impression in the left lung

## D- The right pulmonary surface

faces the right lung, is broad and convex, and consists of the right atrium



## **Borders of the heart on an X-ray**

(Here we are talking about the borders of the heart on an X-ray rather than the real borders of the heart )

**REFER TO THE VIDEO ( 14:51-19:08)**

### **A- The Right Border**

The right border in a standard posterior-anterior view consists of :-

The superior vena cava

The right atrium

The inferior vena cava

### **B- The Left Border**

It consists of :-

The arch of the aorta

The pulmonary artery

The left ventricle

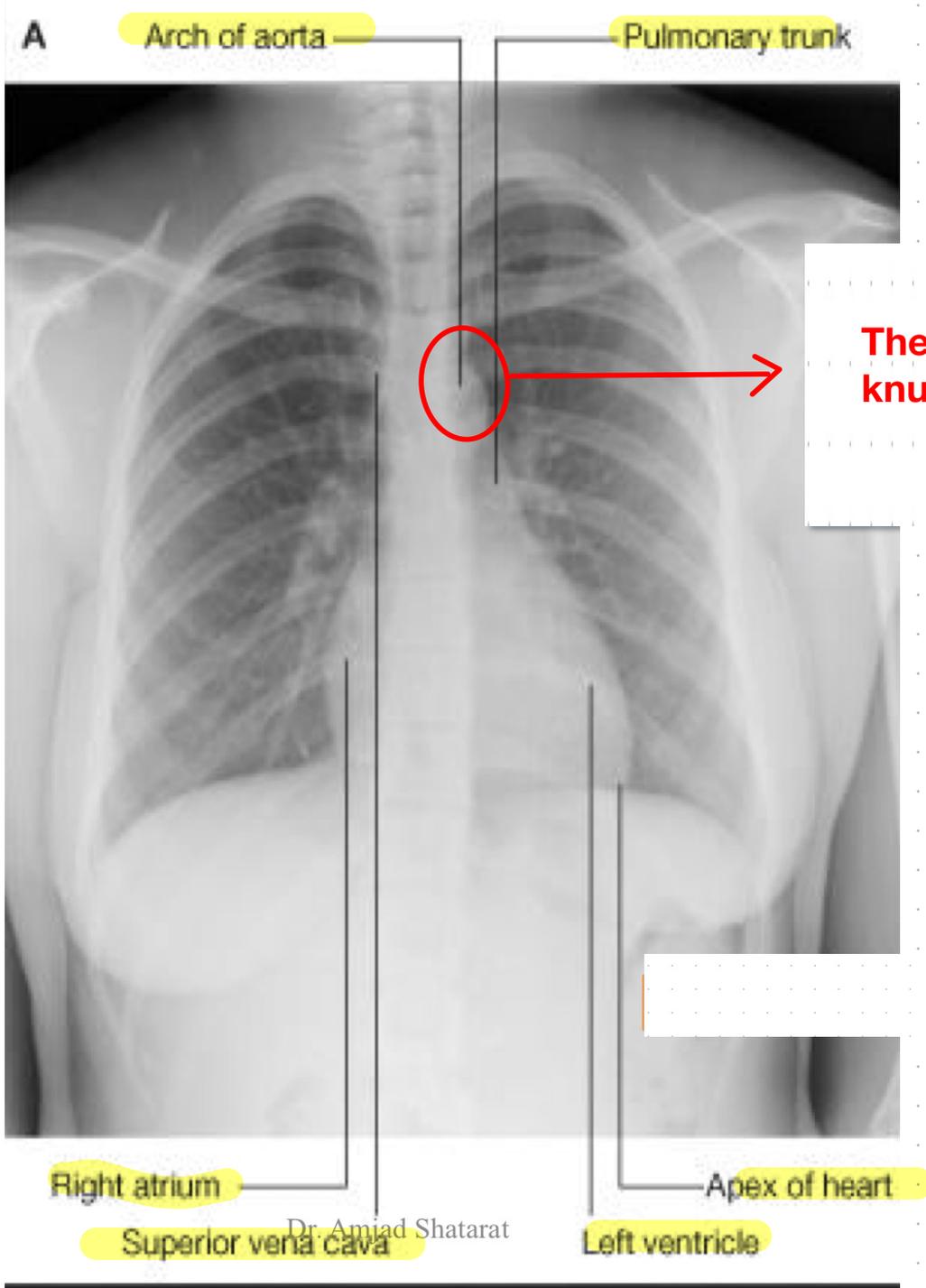
(We can add the contribution of the left auricle )

### **C-The Inferior Border**

It consists of :-

The right ventricle

The left ventricle at the apex



Dr. Amjad Shatarat

# The coronary sulcus

REFER TO THE VIDEO FROM ( 21:24-26:08)

Circles the heart ( not a horizontal circle ) , separating the atria from the ventricles .

Named coronary because they make a crown around the heart .

It contains :-

The right coronary artery

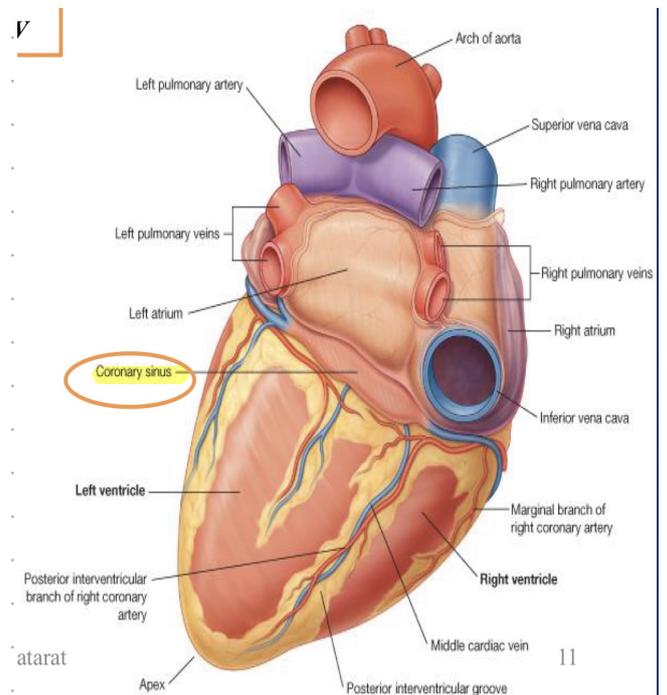
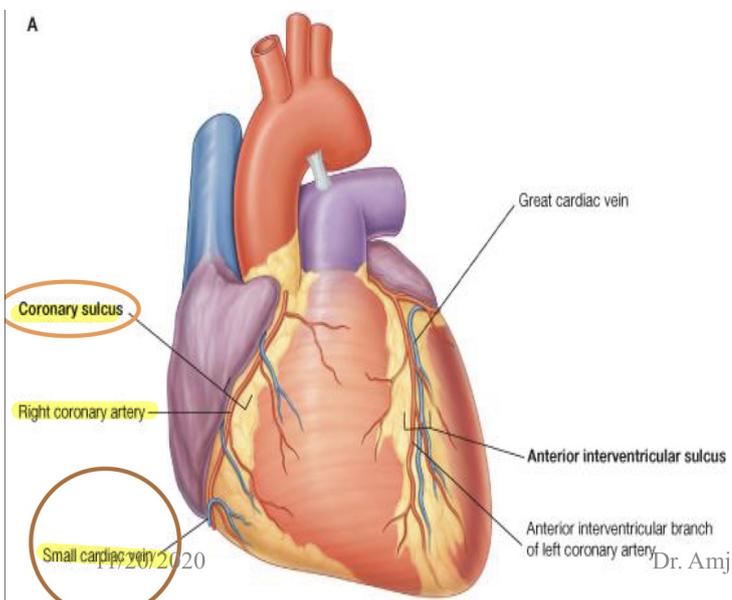
The small cardiac vein

The coronary sinus

The circumflex branch of the left coronary artery .

Why we are having the circumflex branch of the left coronary artery not the left itself ??

Because the left coronary artery is very short so it divides into the anterior interventricular artery and the left circumflex artery .



## I. The Anterior Interventricular sulcus

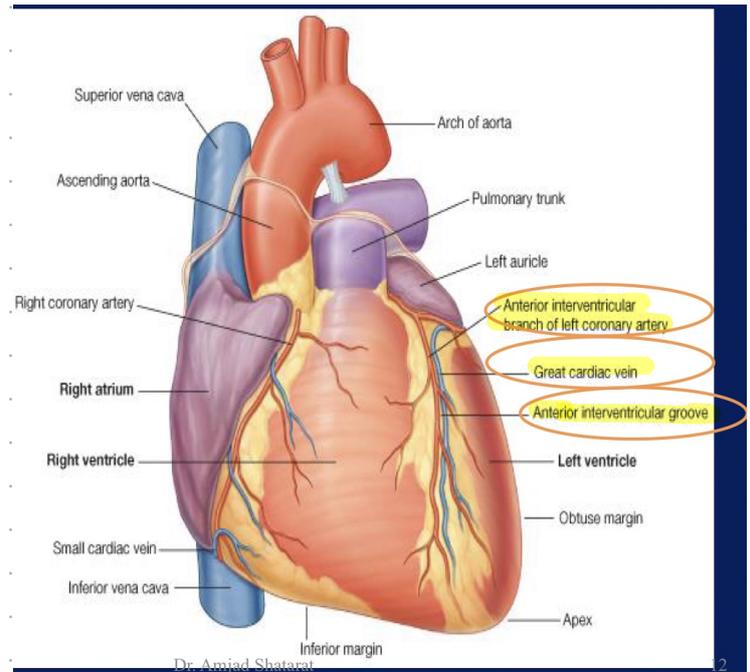
REFER TO THE VIDEO FROM  
( 26:12-28:20)

Is on the anterior surface of the heart

Contains :-

1- The anterior interventricular artery

2- The great cardiac vein



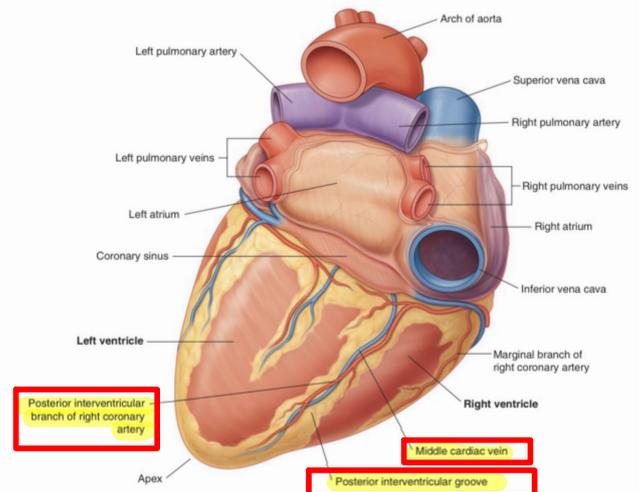
## II. The Posterior Interventricular sulcus

It is on the diaphragmatic surface of the heart (the inferior surface )

Contains :-

1- The posterior interventricular artery .

2- The middle cardiac vein .



192 Fig. 3.66 Diaphragmatic surface of the heart.

The walls of the heart are composed of cardiac muscle :-

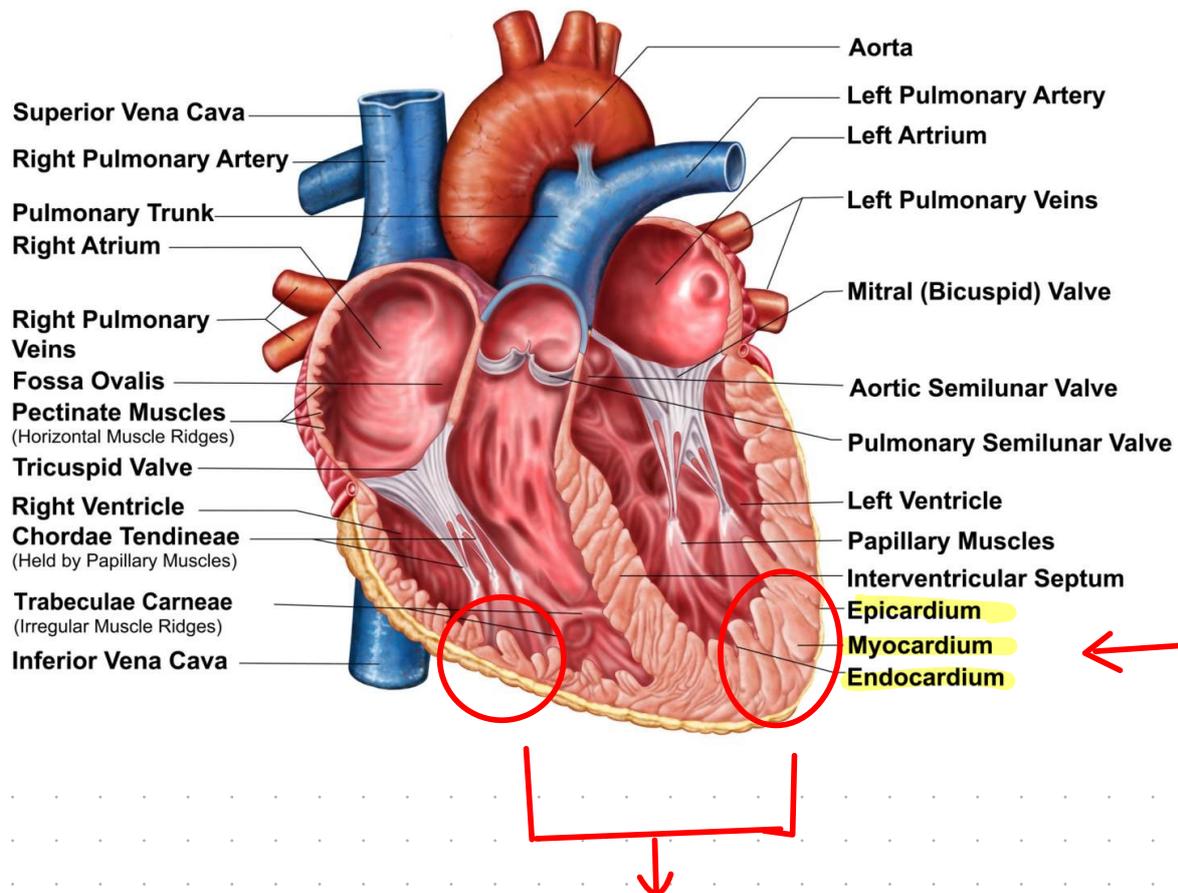
REFER TO THE VIDEO (28:48-30:33)

1- The myocardium; covered externally with serous pericardium

The myocardium in the left ventricle is 3 time thicker than the myocardium in the right ventricle

2-The epicardium (the visceral layer of the serous pericardium ) ; and lined internally with a layer of endothelium

3-The endocardium.



Notice the difference between the thickness of the myocardium between the two ventricles

## Fibrous skeleton of the heart

This is a complex framework of dense collagen forming four fibrous rings (L. anuli fibrosi)

1-That surround the orifices of the valves And

2- Right and left fibrous trigone (formed by connections between rings) and

3-The membranous parts of the interatrial and interventricular septa

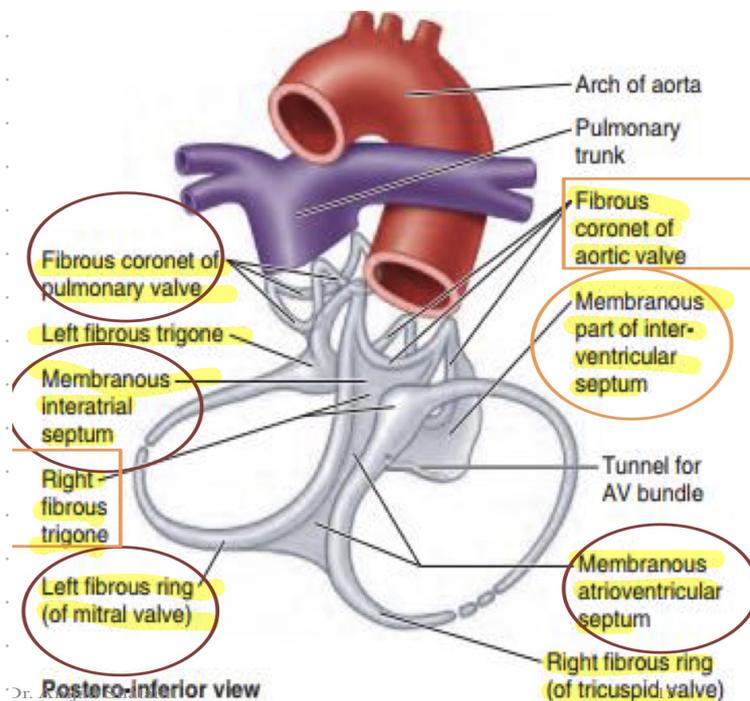
### The fibrous skeleton of the heart:-

1-Keeps the orifices of the AV and semilunar valves patent and prevents them from being overly distended by an increased volume of blood pumping through them.

2-Provides attachments for the leaflets and cusps of the valves.

3-Provides attachment for the myocardium

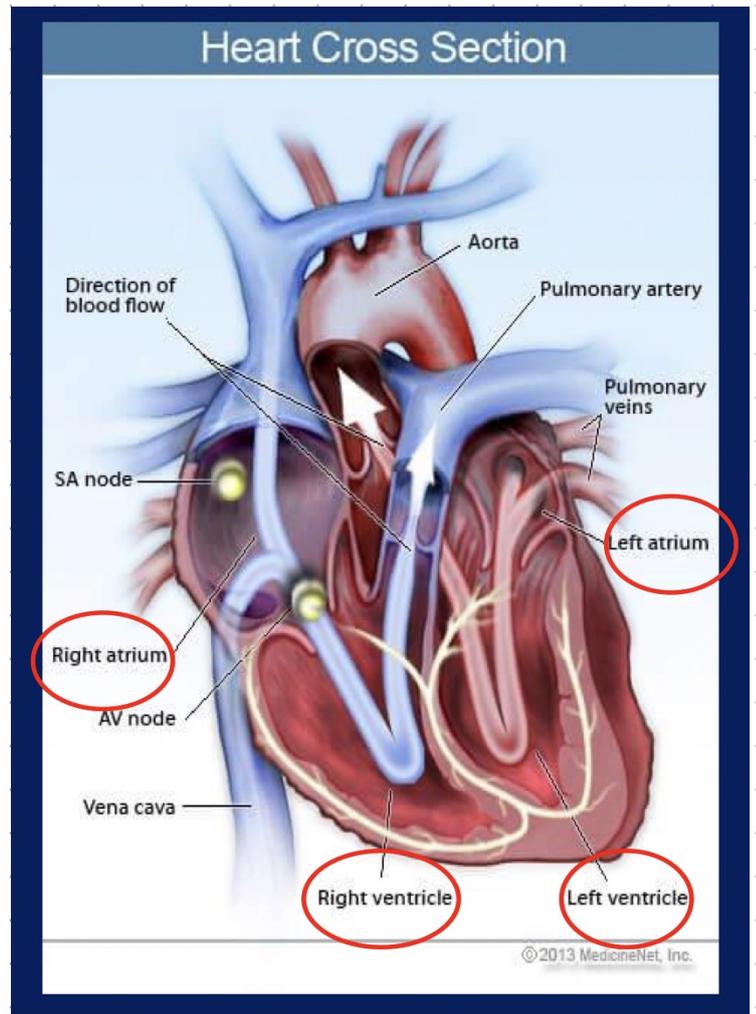
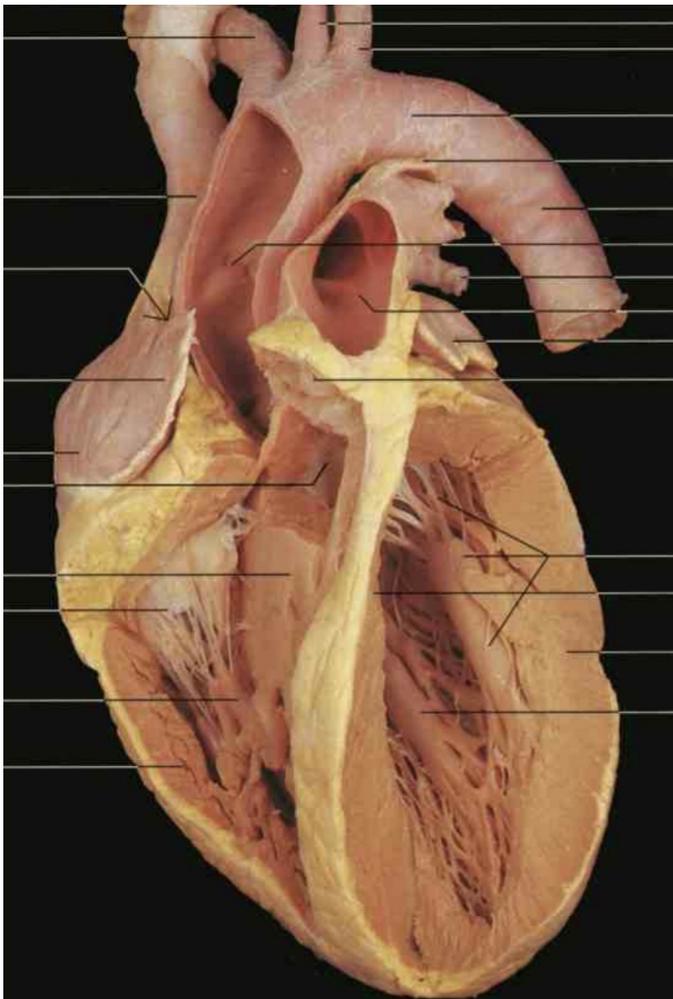
4-Forms an electrical “insulator,” by separating the myenterically conducted impulses of the atria and ventricles so that they contract independently and by surrounding and providing passage for the initial part of the AV bundle of the conducting system of the heart (VIPPPP)



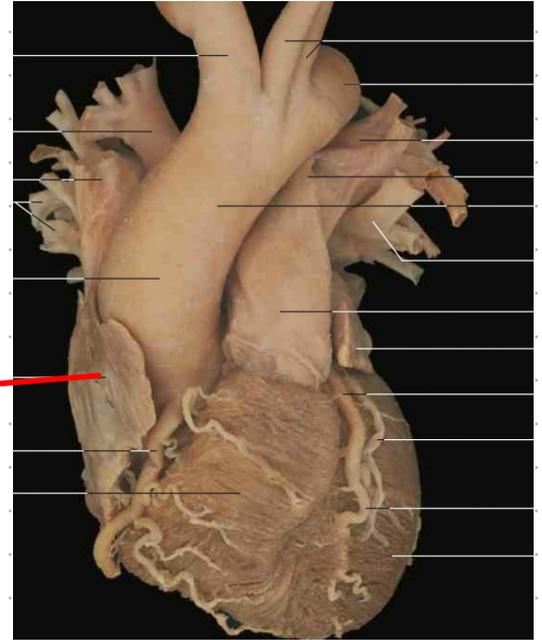
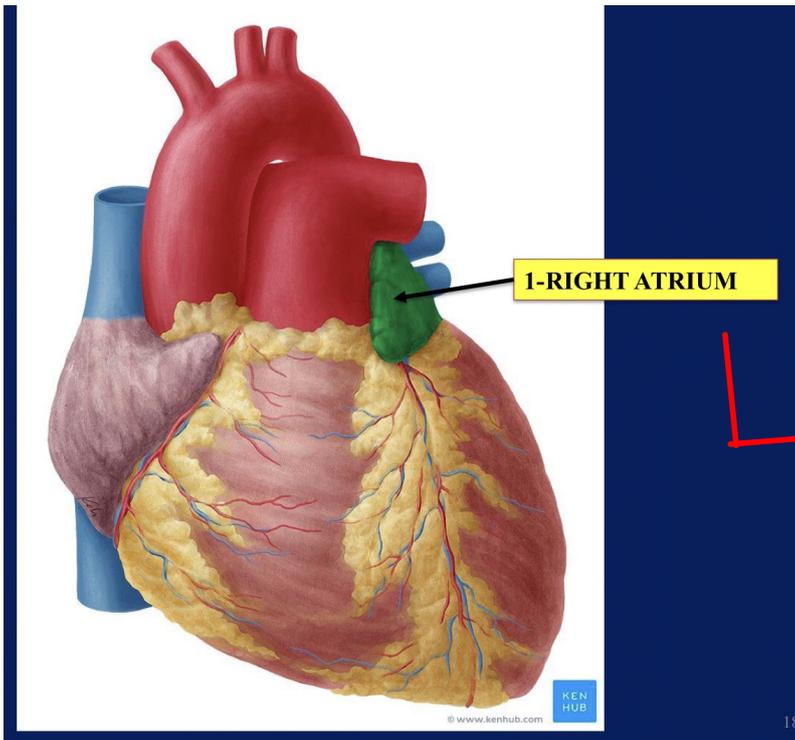
# Chambers of the heart

The heart is divided by septa into four chambers:

- 1-THE RIGHT ATRIUM
- 2-LEFT ATRIUM
- 3- THE RIGHT VENTRICLE
- 4-LEFT VENTRICLE



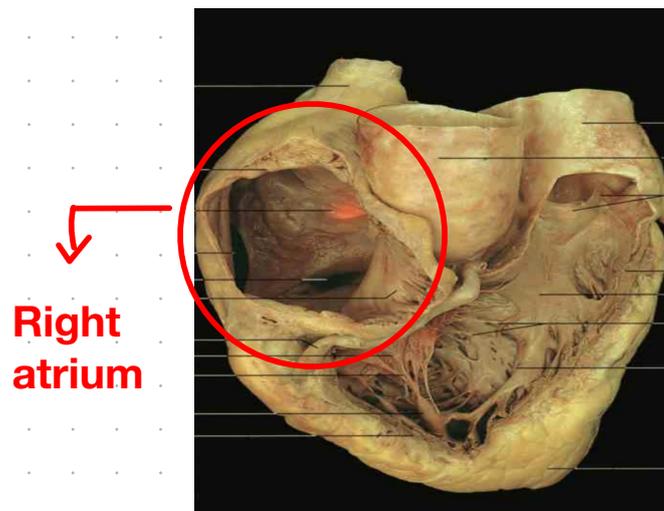
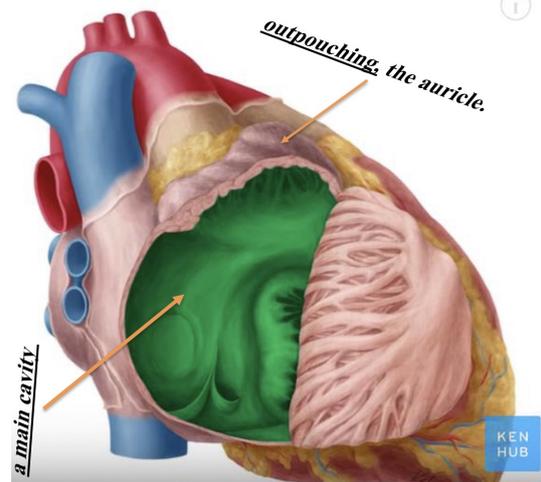
# 1- The right atrium



The right atrium consists of a main cavity and a small outpouching, the auricle.

## Note

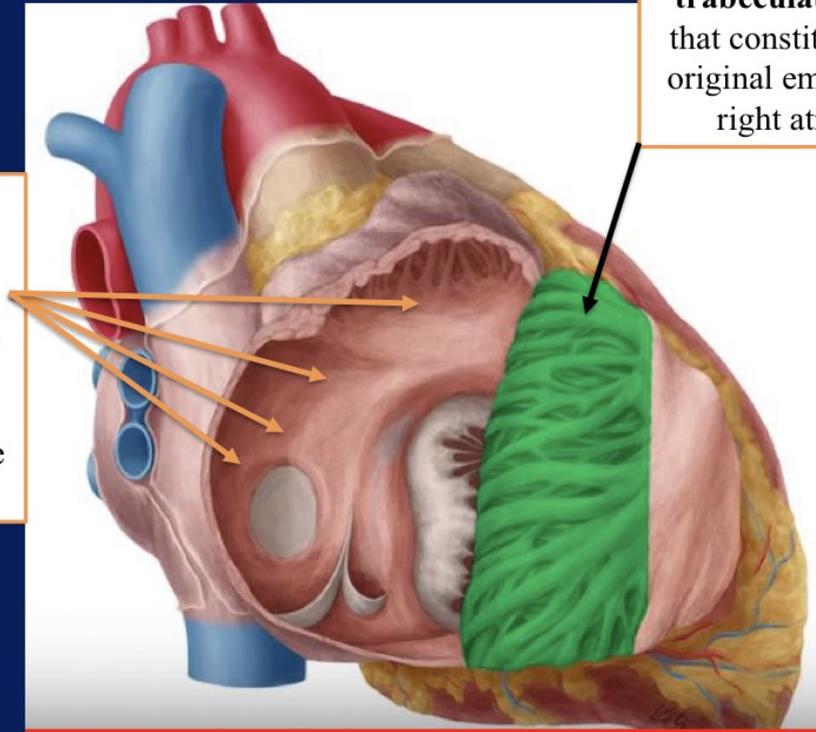
The term “auricle” is often improperly used instead of atrium. The true auricle is then regrettably called “auricular appendage” instead of atrial appendage, which is morphologically correct. The term “auricular fibrillation” is clinically incorrect and should be atrial fibrillation



The right atrium consists of two parts:

2-a thin-walled  
anterior  
trabeculated part  
that constitutes the  
original embryonic  
right atrium

(1) a posterior smooth-walled  
part derived from the  
embryonic sinus venosus  
(the sinus venarum)  
into which enter the  
superior and inferior venae  
cavae



**Why we have smooth part and rough part ??**

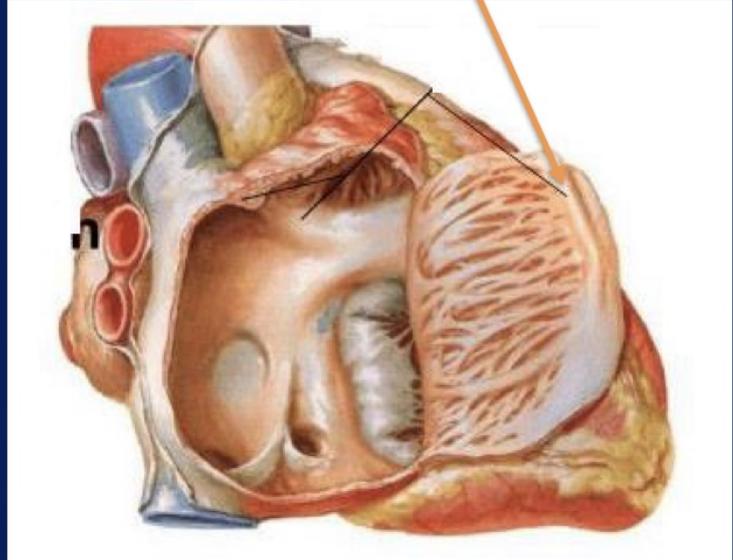
**This is Because the atrium has two origins in embryogenesis ( The anterior one -the rough one - it is the primitive atrium and then it expands on the account of Sinus Venarum and thats why the sinus venarum is smooth )**

Internally, the two parts of the atrium are separated by a ridge of muscle

### **The crista terminalis**

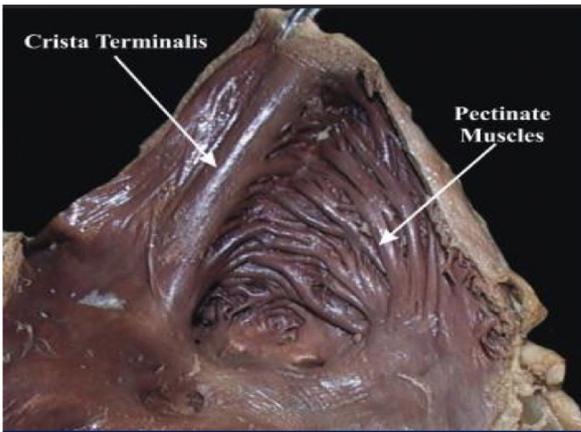
#### **The crista terminalis**

is most prominent superiorly, next to the SVC orifice, then fades out to the right of the IVC ostium. Its position corresponds to that of the *sulcus terminalis externally*

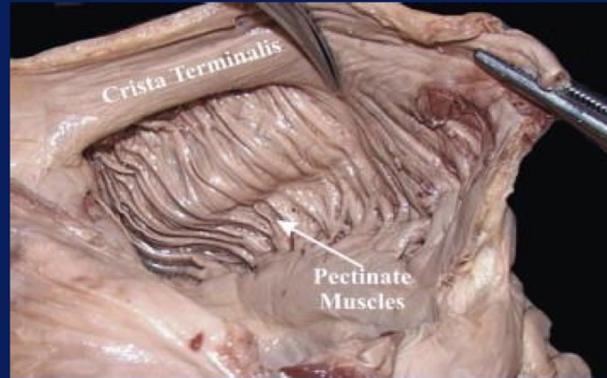


**In the picture the anterior wall is reflected , now if we put the anterior wall back we can see that anterior to the crista termenalis is the trabeculated area and posterior to it is the smooth area .**

**So , Crista Termenalis is a ridge between the Trabeculated anterior area and the posterior smooth area ; thus , Crista Termenalis is a landmark between the different origins of the right atrium .**



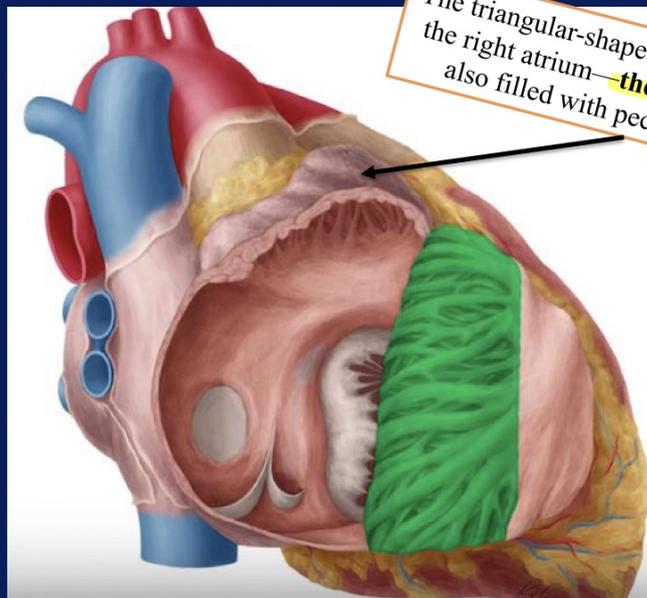
❖ From the lateral aspect of the crista terminalis, a large number of **pectinate muscles** run laterally and generally parallel to each other along the free wall of the atrium.



Dr. Amjad Shatarat

11/20/2020

The ear-like right auricle is a conical muscular pouch that projects from Rt. atrium like an add-on room, increasing the capacity of the atrium as it **overlaps the ascending aorta.**



The triangular-shaped superior portion of the right atrium—**the right auricle**—is also filled with pectinate muscles.

The right auricle usually is not well demarcated externally from the rest of the atrium. The right auricle is a convenient, ready-made **point of entry for the cardiac surgeon and is used extensively.**

11/20/2020

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**The right auricle also originates from the primitive atrium**

**The right auricle is larger than the left auricle**

You may wonder how surgeons reach valves to repair them ??

The auricle serves as a point of entry to these valves to repair them without further damaging of other important walls ( for example , the right ventricle and the left ventricle ; since if we cut and damage these ventricles the myocardium would be replaced by fibrous tissue which would harm the heart itself ) .

## Openings into THE RIGHT ATRIUM

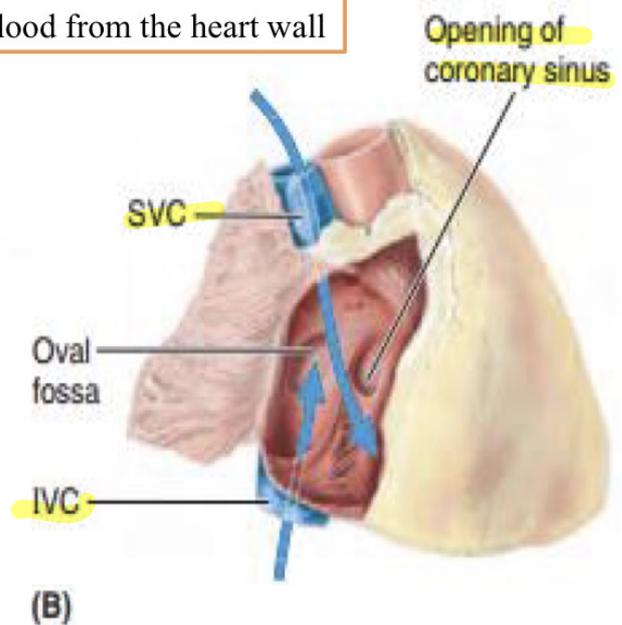
1-The superior vena cava opens into the upper part of the right atrium

2-The inferior vena cava opens into the lower part of the right atrium

3-The *coronary sinus*, which drains most of the blood from the heart wall

4-The *right atrioventricular orifice* is guarded by THE TRICUSPID VALVE

**The Right Atrioventricular Orifice can be diseased , stenosed , dilated and the valves also can be diseased**



Remember the SVC drains the Upper part of the body ( above the diaphragm ) and the IVC drains the lower part of the body ( below the diaphragm )

**THE VENOUS DRAINAGE OF THE LUNGS WILL BE DISCUSSED LATER .**

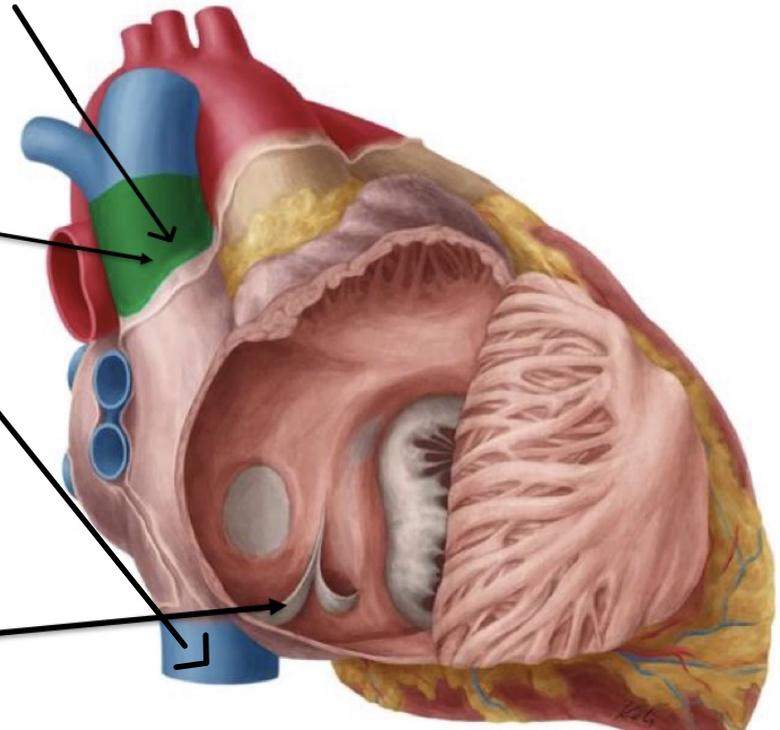
## 1-The superior vena cava

- ❖ returns blood from head, neck and upper limb and also receives blood from the chest wall and the esophagus via the azygos system

## 2-The inferior vena cava

- is larger than its superior counterpart:
- it drains blood from all structures below and **including the diaphragm** into the lowest part of the atrium near the septum.
- Anterior to its orifice is a flap-like valve

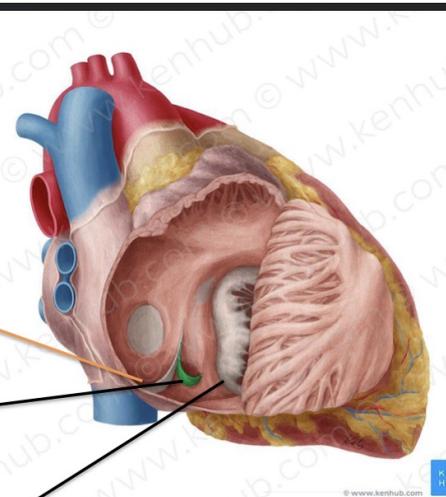
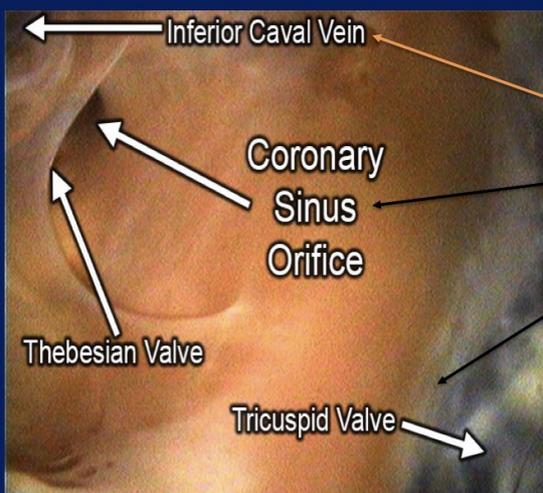
the Eustachian valve or valve of the inferior vena cava



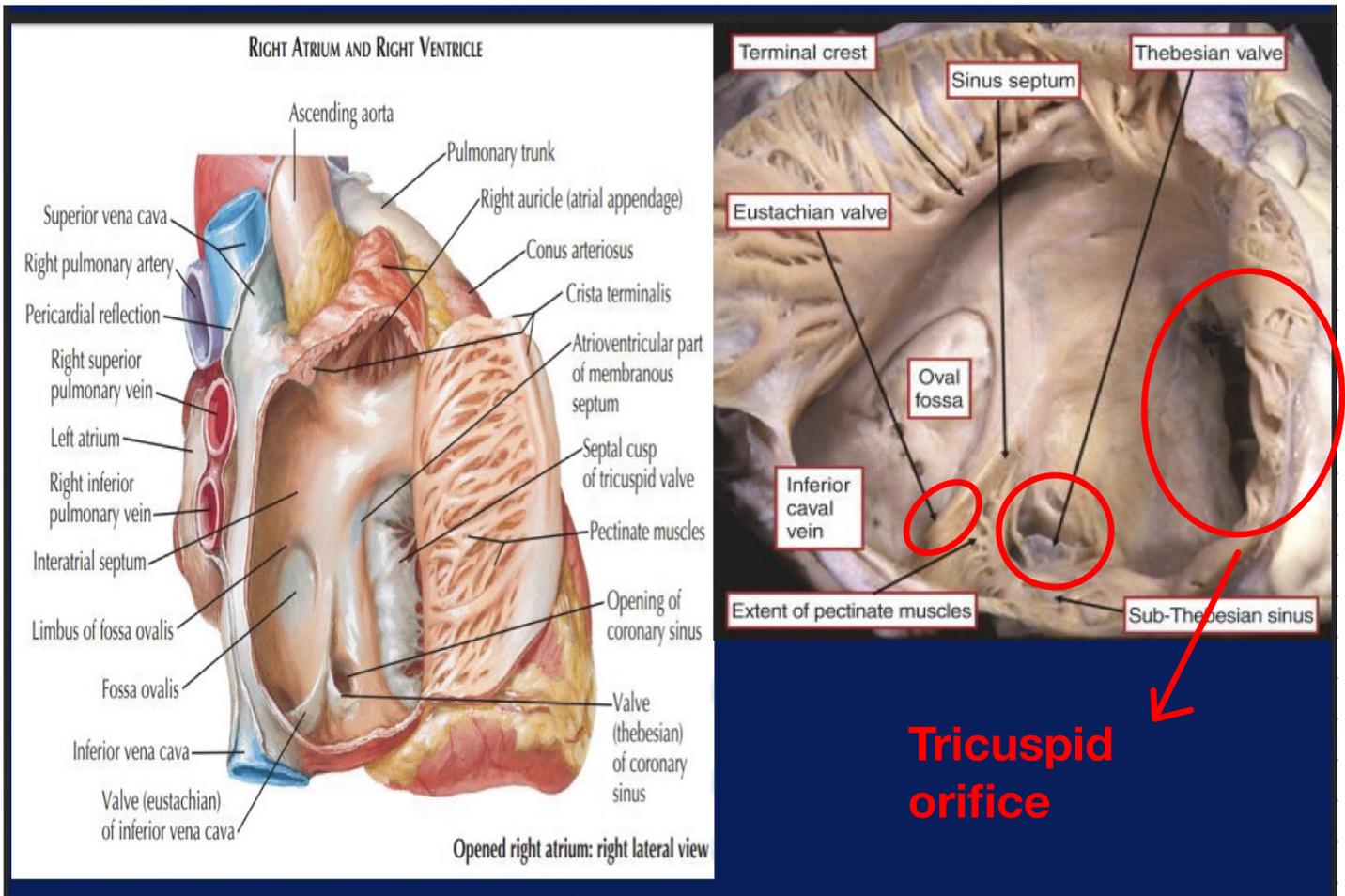
The Eustachian valve is rudimentary in adults

But in Fetal life it was large , when it serves to direct richly oxygenated blood from the placenta ( By the umbilical veins ) through the foramen ovale of the atrial septum into the left atrium

**3-The coronary sinus** opens into the venous atrial component between the orifice of the inferior vena cava, the fossa ovale and the vestibule of the atrioventricular opening



The coronary sinus is often guarded by a thin, semicircular valve that covers the lower part of the orifice  
**Thebesius' valve**  
also known as the  
**Thebesian valve**



**4-Several small venous ostia, draining the minimal atrial veins, are found scattered around the atrial walls. They return a small fraction of blood from the heart, and are most numerous on the septal aspect.**

**The anterior cardiac veins and, sometimes, the right marginal vein may enter the atrium through larger ostia**

# Fetal Remnants in the right Atrium

The fossa ovalis and anulus ovalis.

These latter structures lie on the atrial septum, which separates the right atrium from the left atrium

The fossa ovalis is a shallow depression, which is the site of the foramen ovale in the fetus

The anulus ovalis forms the upper margin of the fossa.

