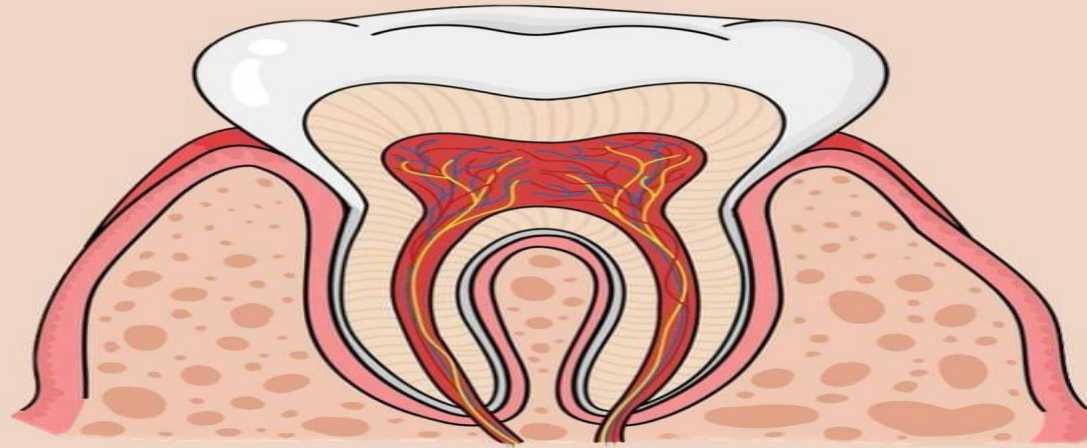




ANATOMY



LEC NO. : 14
DONE BY : Amir Freatat

وَقُلْ رَبِّ زِدْنِي عِلْمًا



Anatomy & Embryology

Cardiovascular system (Part 1)

CVS

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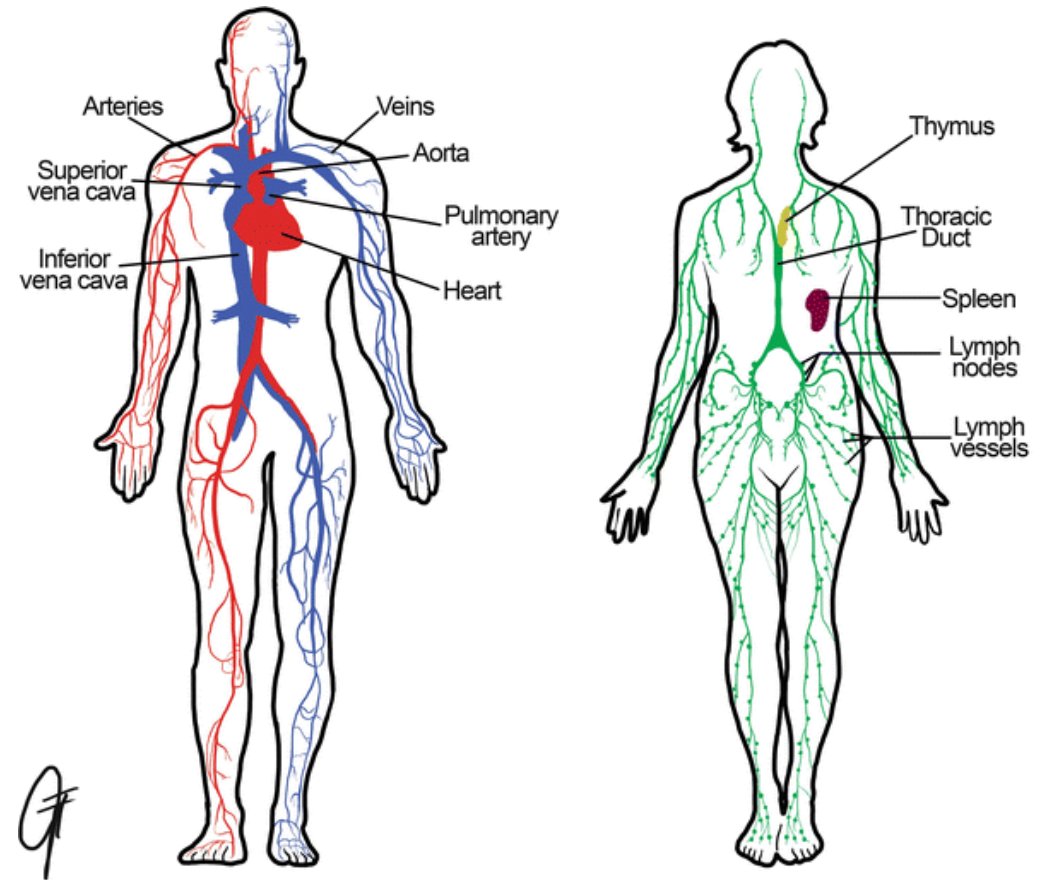
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- **Circulatory system** is the system responsible for:

- Distributing nutrients and O_2 to all body tissues and removing wastes and CO_2 from all body tissues.
- Regulates body temperature.
- Defence against infections and diseases.

Can be divided into:

1. **The cardiovascular system (CVS)**
Heart and blood vessels
2. **Lymphatic system**
Lymphatic vessels and lymphatic organs



Arteries and Veins

rich of O₂

- **Artery**: carries blood away from heart.

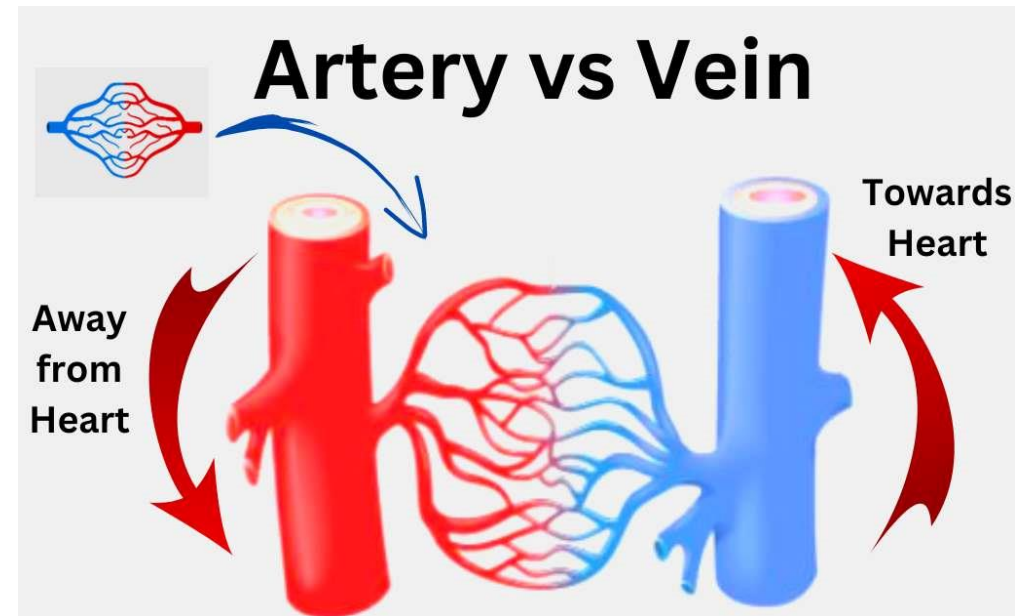
- **Vein**: carries blood towards the heart.

rich of CO₂

- Arteries always take blood away from the heart (a mnemonic to help you: **a**rtery=**a**way).

exceptions:

Nonoxygenat
(**Pulmonary artery** & **pulmonary veins**)



The heart

General characteristics:

- The first structure starts working in embryonic life (by the end of 4th week).
- An enlarged internally subdivided blood vessel, specialised for pumping.
- The heart is aligned **obliquely** in the thorax.
- Pumps blood through pulmonary circulation and systemic circulation
- Situated in the middle mediastinum and surrounded by **pericardium**

مجازي

→ Lungs (نخ للدم لـ Lungs)

in all over the Body (نخ للدم لـ Body)

→ low pressure

→ high pressure

← الفضا والزوي حيد بالقلب

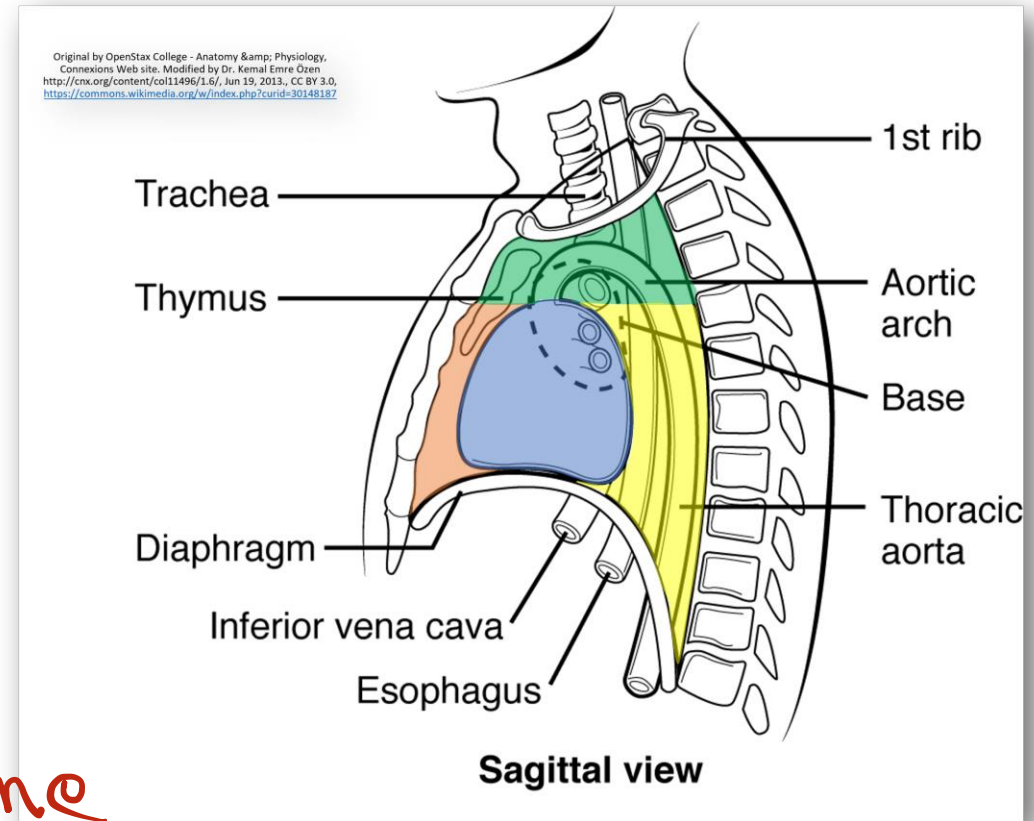
pulmonary: close to the heart

Location of heart

- **Mediastinum**, is a space in the thorax contains all the thoracic organs **except the lungs**.
- Divided into two parts, **superior and inferior**, the inferior mediastinum is further divided into anterior, middle and posterior
- **Pericardium** is serous sac situated in the middle mediastinum that surrounds and protects the heart.

→ fold → serous membrane which secretes serous fluids

peri: محيط



صندوق دد لثا كونه : heart + صحنه

Pericardium

- Boundaries:

- **Anteriorly:** body of sternum and 2nd to 6th costal cartilages

- **Posteriorly:** 5th to 8th thoracic vertebrae

- **Inferiorly:** diaphragm *main respiratory muscle*

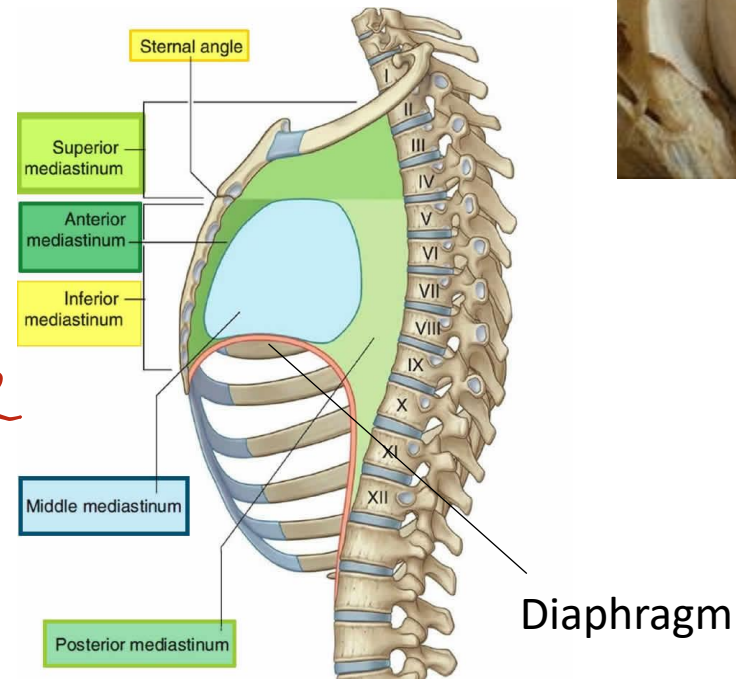
- Functions of pericardium:

- Restrict excessive movements of the heart

- Act as a lubricated container

pericardium

Pericardium



Pericardium

The pericardium is divided into:

➤ **Fibrous pericardium** (strong, outer layer), attached firmly to the diaphragm below
بمنع حركة القلب من heart لـ diaphragm

➤ **Serous pericardium** lines the fibrous pericardium and divided into:

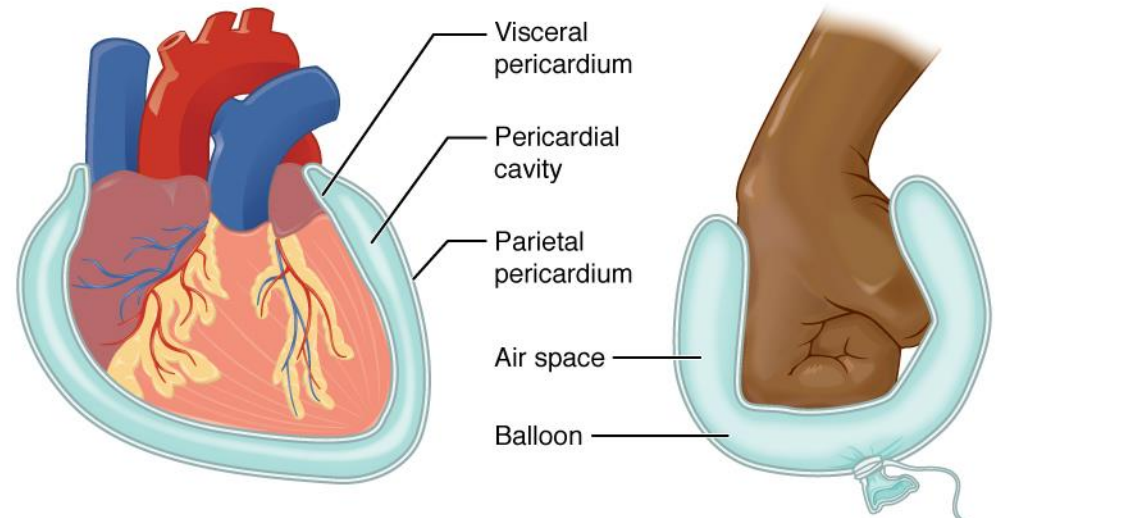
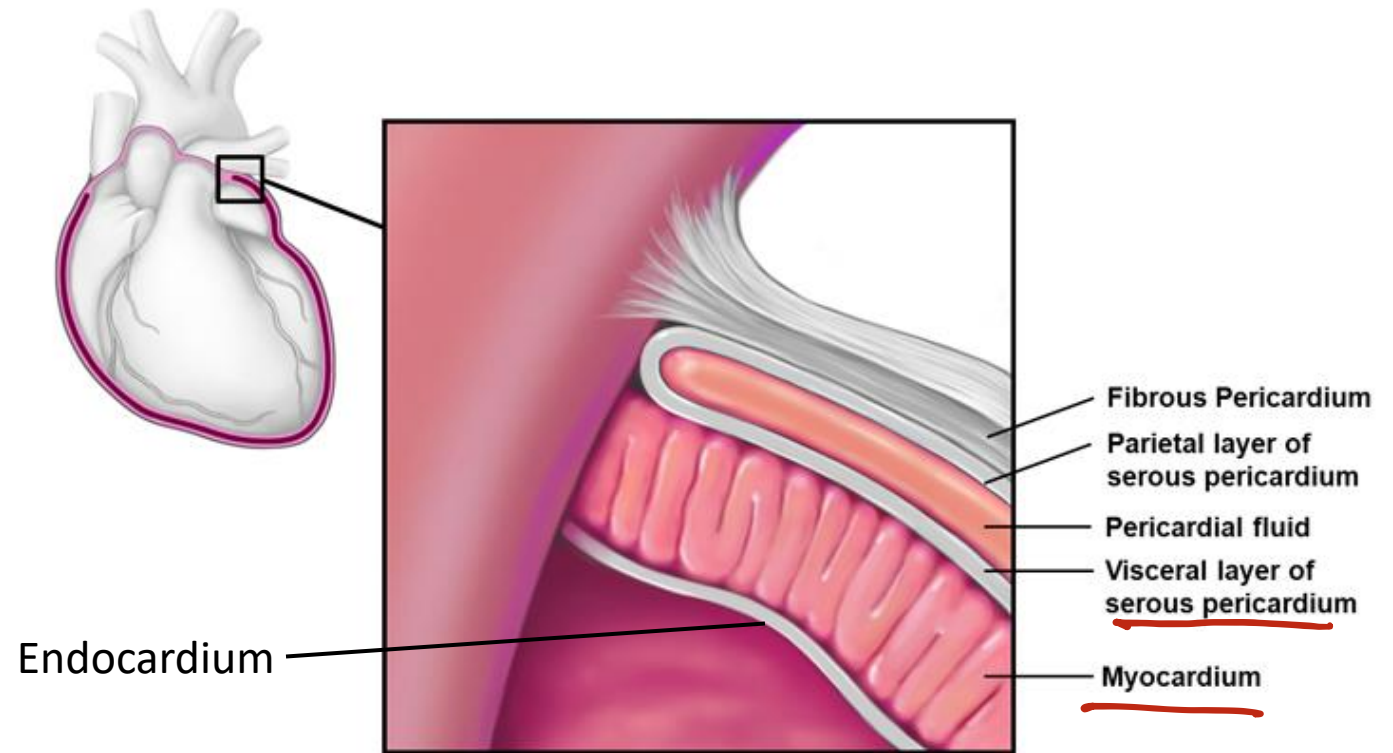
➤ **Parietal pericardium**

➤ **Visceral pericardium**

(epicardium)

ما يدخل الصقو

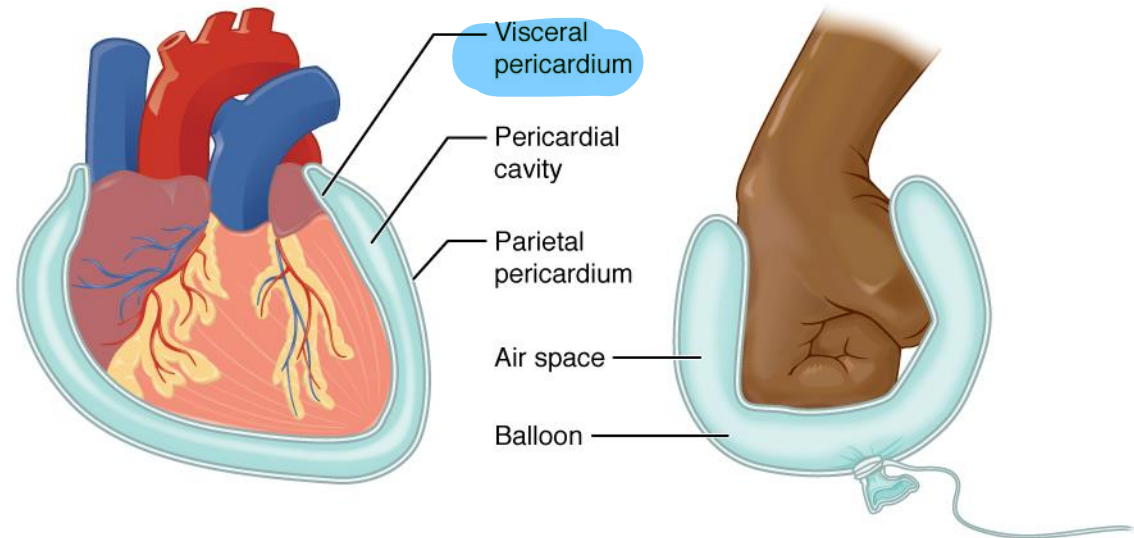
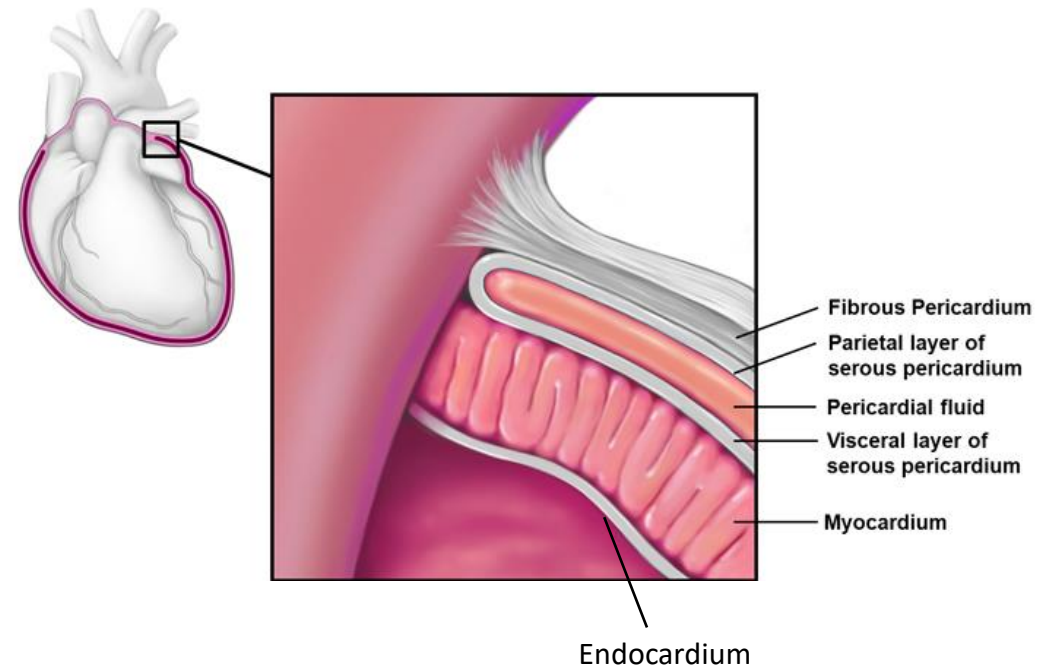
Between the parietal and visceral layers of the heart there is a thin film of fluid called **pericardial fluid** (50ml)

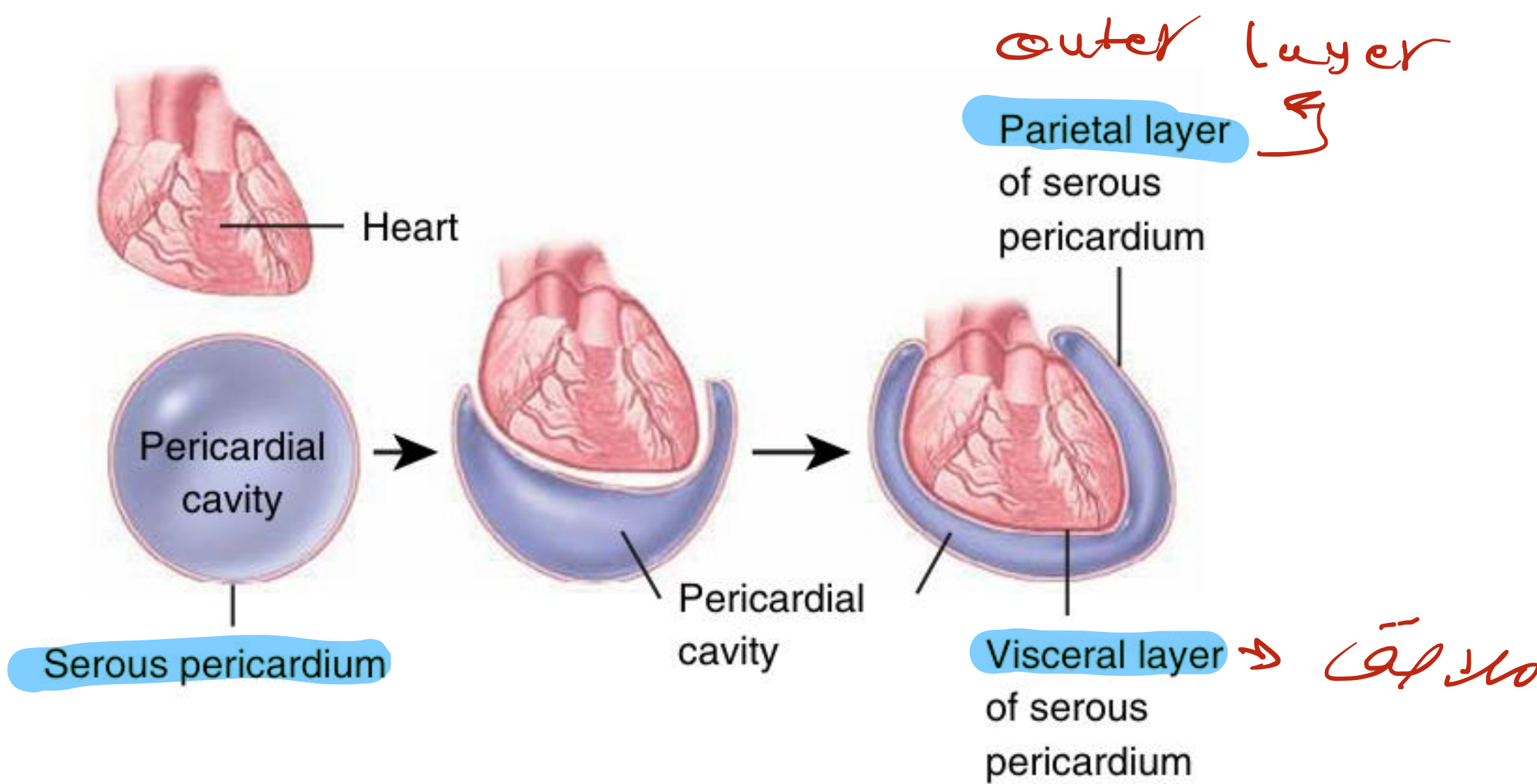


Pericardium

The pericardial fluid acts as a lubricant to facilitate the movements of the heart.

The parietal pericardium reflects around the roots of the large blood vessels to become continuous with the visceral pericardium that closely covers the heart.







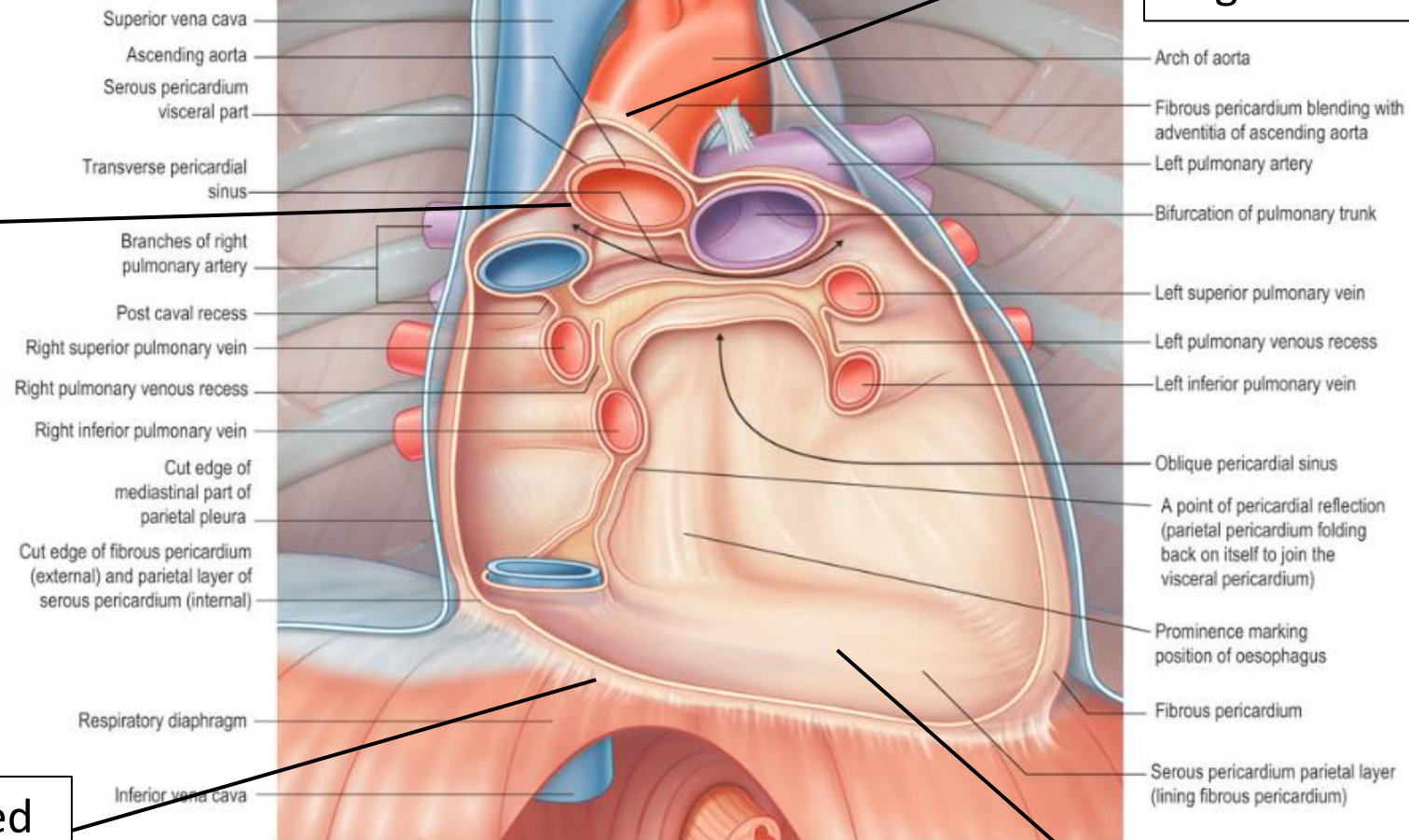
حذوف

Fibrous pericardium

Fibrous pericardium blends with the outer coat of great blood vessels

Visceral layer of serous pericardium

A



Fibrous pericardium attached to the diaphragm

Parietal layer of serous pericardium

حجرات

Chambers of the Heart

- The heart contains four chambers:

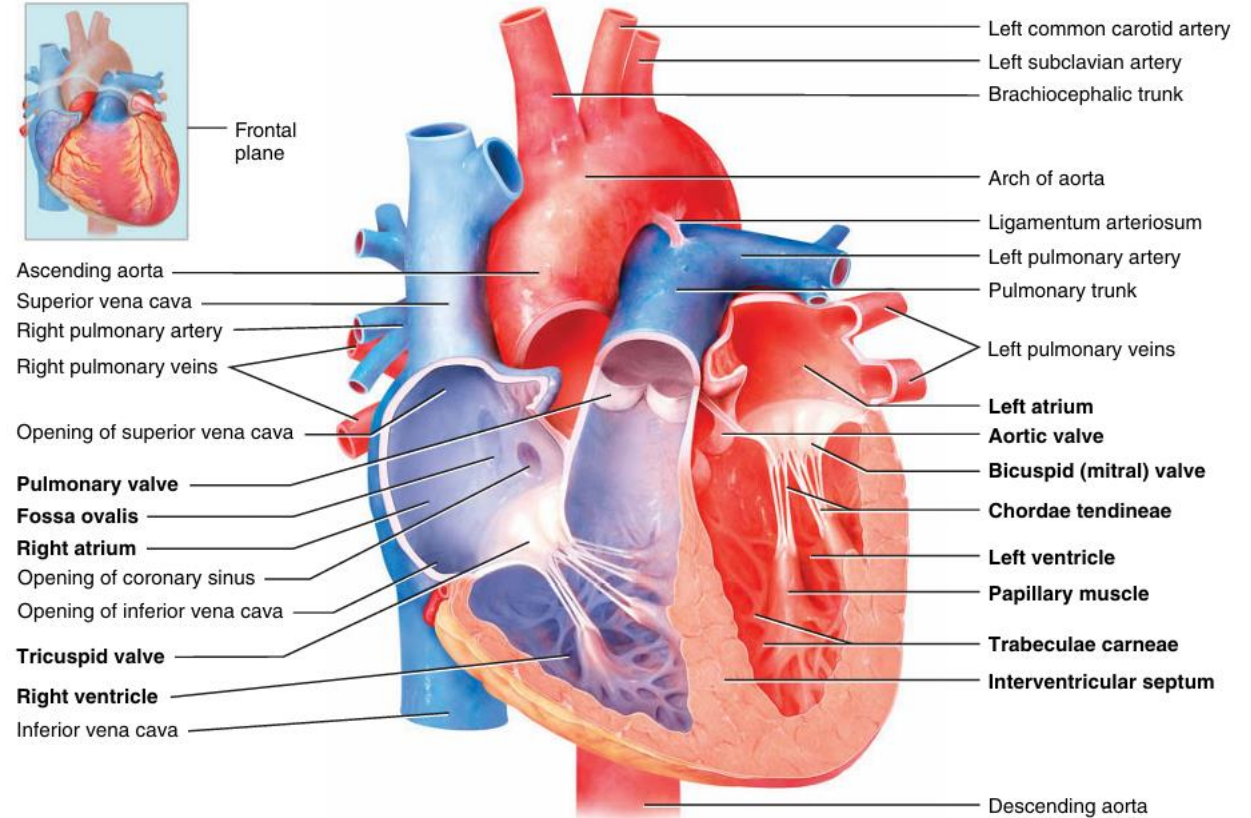
دائمين
➤ Two atria (atrium) and two ventricles بطيئين
Right → left

The blood flows from Rt and Lt atria to the Rt and Lt ventricles, respectively.

RA+ RV (Right pump) Right heart (or pulmonary circuit)

LA + LV (left pump) Left heart (or systematic circuit)

* there are no connections between 2 Atria or 2 ventricles



(a) Anterior view of frontal section showing internal anatomy

Chambers of the Heart

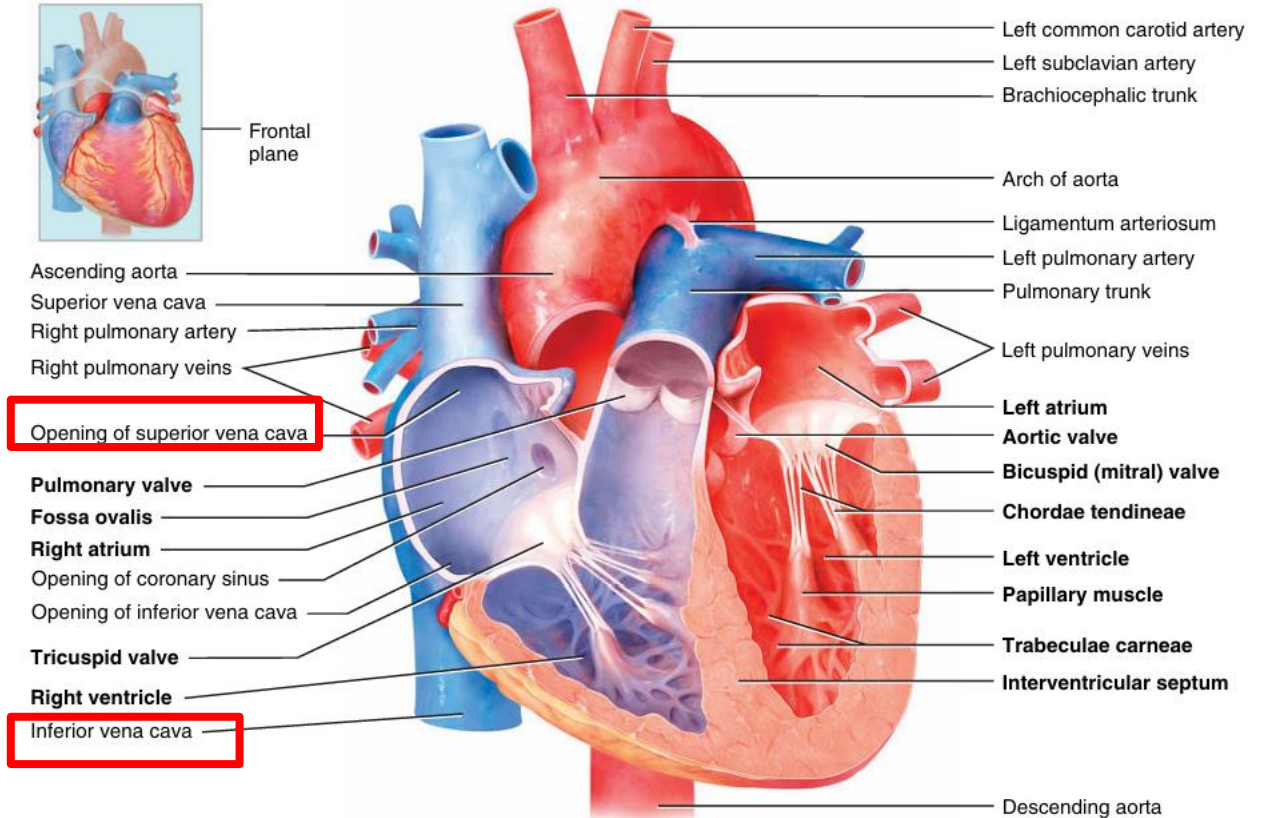
→ receives non oxygenated blood upper limb

- The **Rt atrium** receives the openings of superior vena cava and inferior vena cava.

↳ lower limb

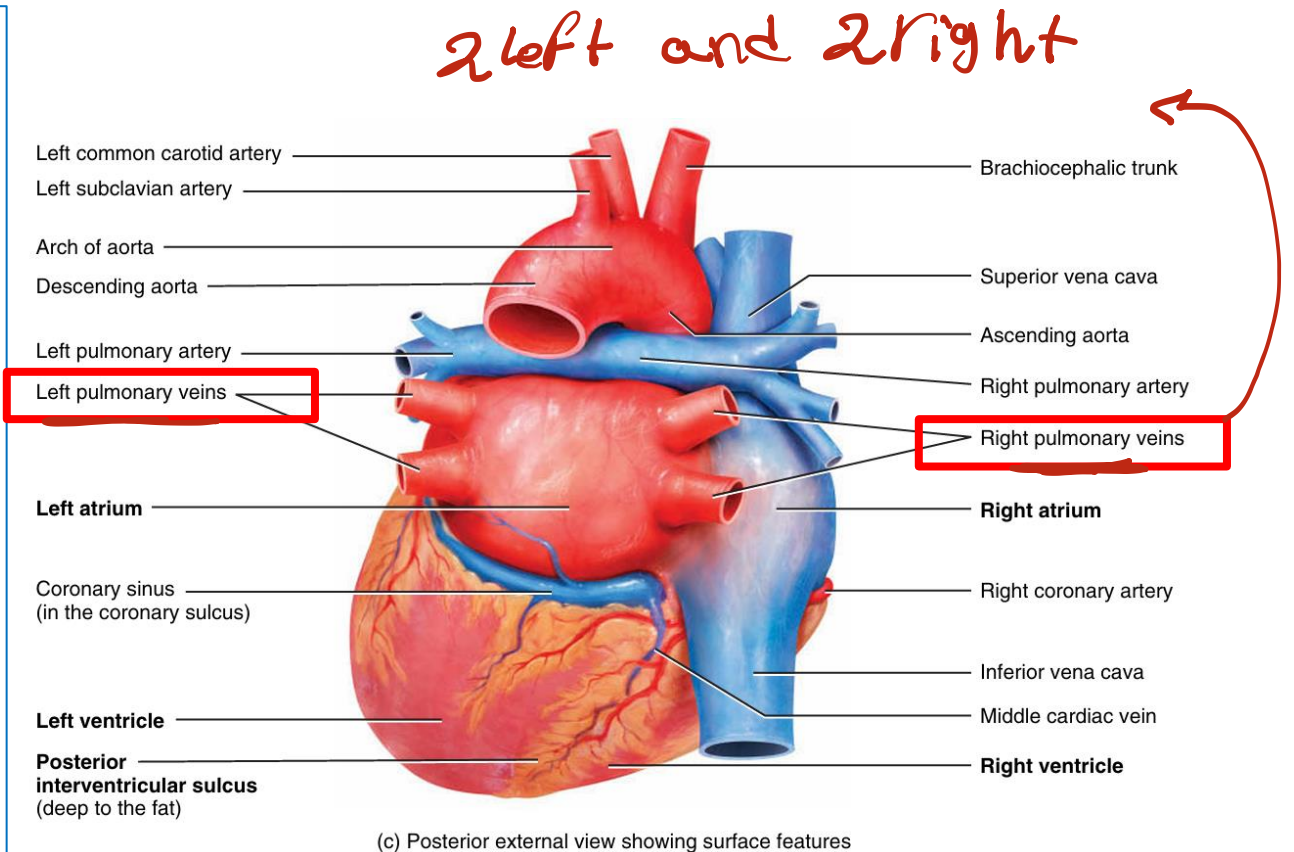
- The **Lt atrium** receives the openings of the four pulmonary veins.

→ oxygenated blood



(a) Anterior view of frontal section showing internal anatomy

- The **Rt atrium** receives the openings of superior vena cava and inferior vena cava.
- The **Lt atrium** receives the openings of the four pulmonary veins.
- The outflow tract of the RV is called the infundibulum. In LV, the outflow tract is the area just below the aortic arch is named vestibule.



any artery move away from heart

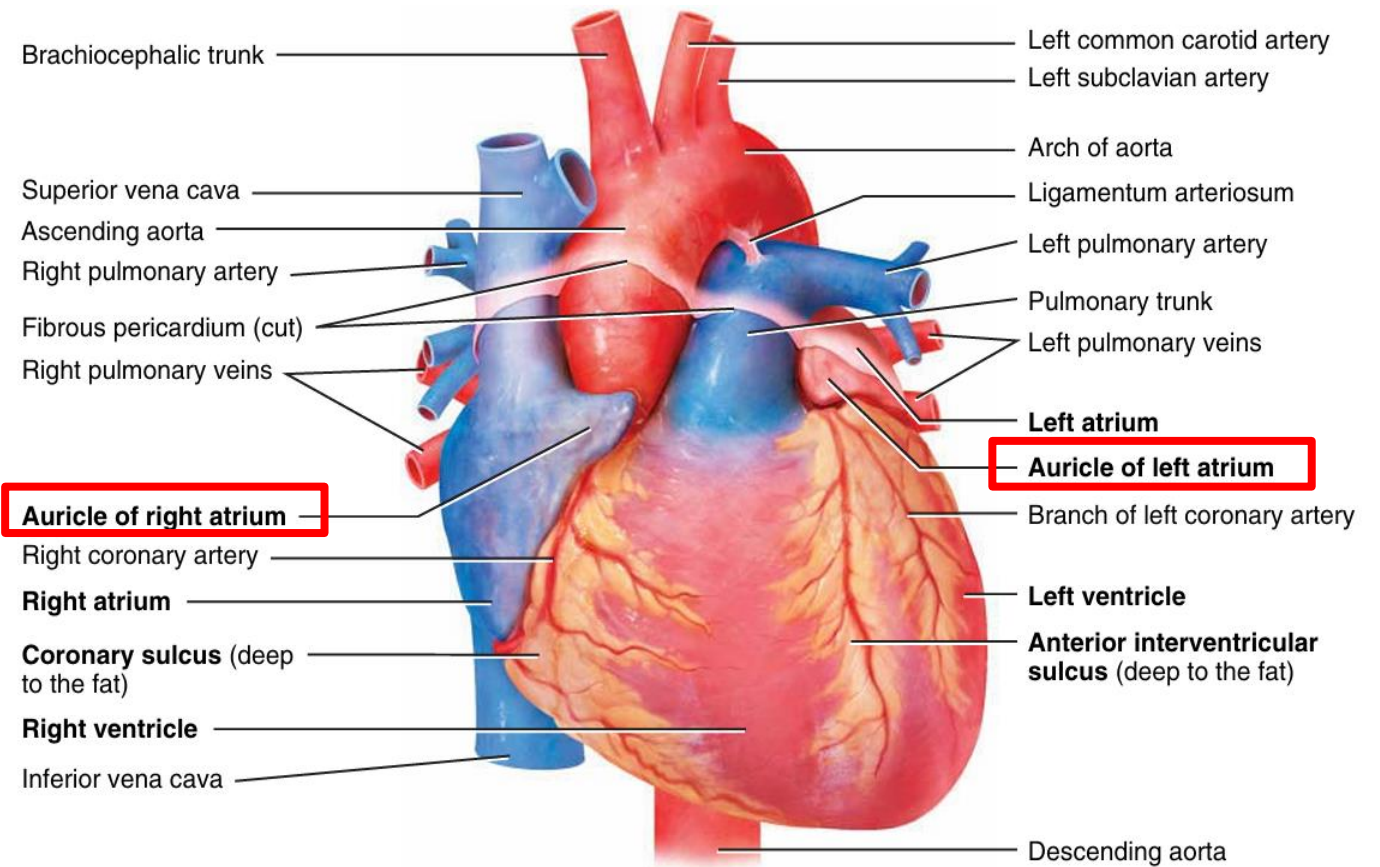
- On the anterior surface of each atrium is a wrinkled pouchlike structure called an **auricle**.

imp

- The anterior wall of the Rt atrium is rough and muscular while the posterior wall is smooth.

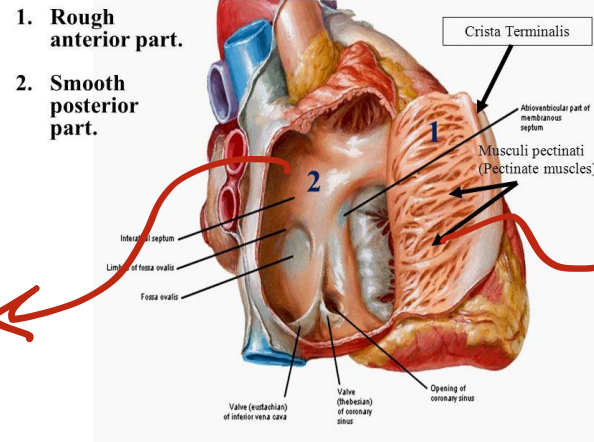
- Function:** increases the capacity of an atrium slightly so that it can hold a greater volume of blood.

Smooth



Right Atrium

or external view showing surface features



Rough

الدم يتحرك من Rt atrium إلى Lt ventricle

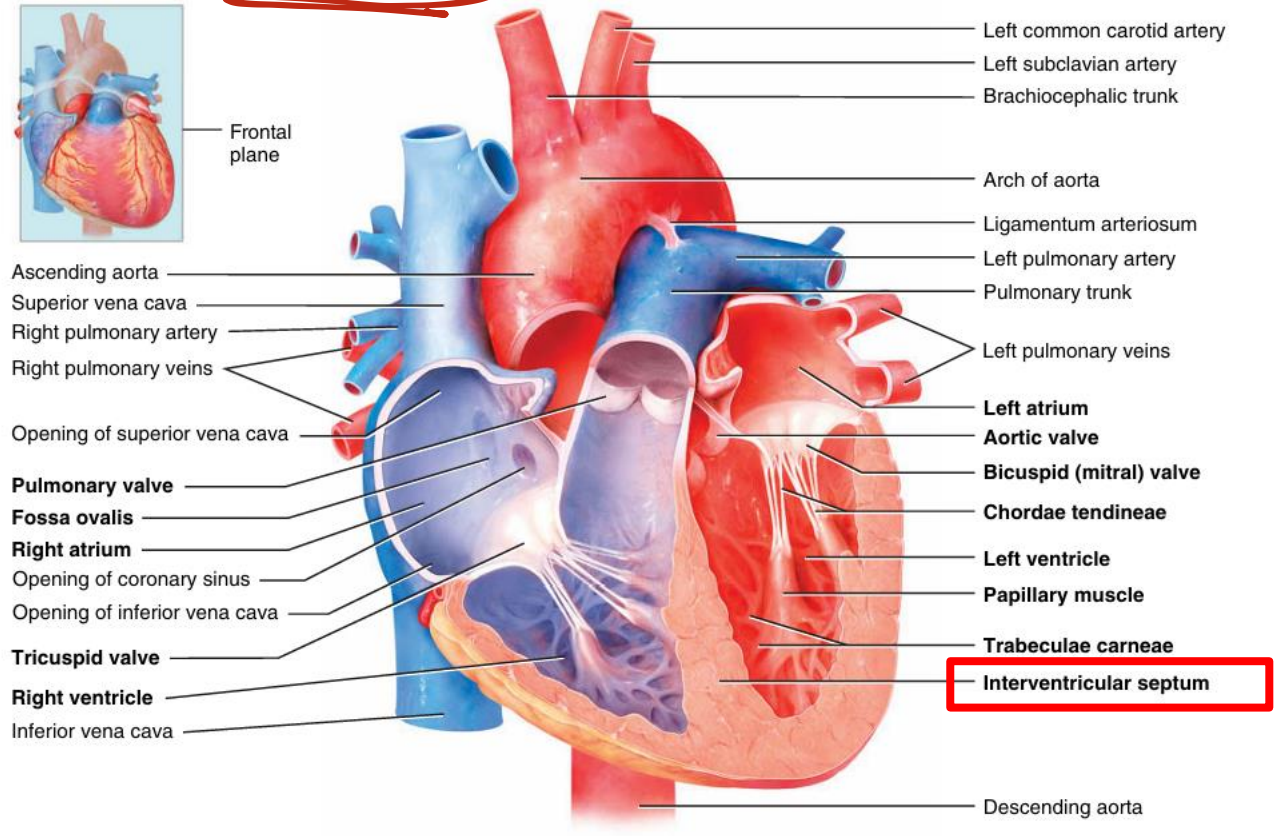
يذهب من Rt atrium إلى Lt ventricle
 طريقته ثم ينتقل إلى باقي الجسم عن طريق
 aorta

يذهب إلى lungs عن طريق pulmonary trunk
 arteries

• Blood passes from the right ventricle into a large vessel called the **pulmonary trunk**, and from left ventricle into the largest artery of the body, **the ascending aorta**

• The right ventricle is separated from the left ventricle by a partition called the **interventricular septum**.

• The outflow tract of the RV is called the **infundibulum**. In LV, the outflow tract is the area just below the aortic arch is named **vestibule**.

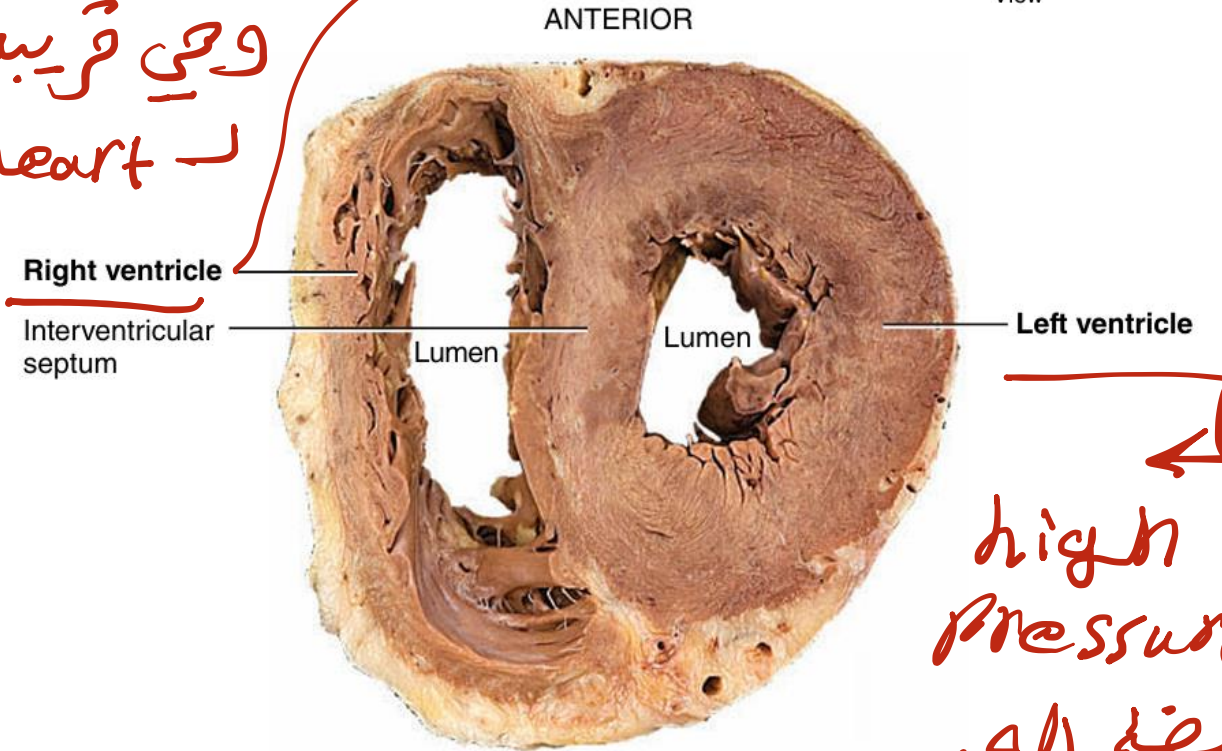
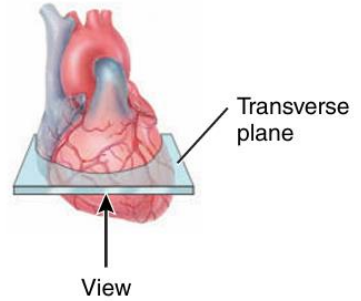


(a) Anterior view of frontal section showing internal anatomy

Anatomical differences between ventricles

- Left ventricle is longer and narrower than right ventricle
- Walls of left ventricle are three times thicker (8–12 mm) than those of right ventricle

Low pressure
ينفخ لـ Lungs
وحي قربه
heart



high pressure
ينفخ للجسم

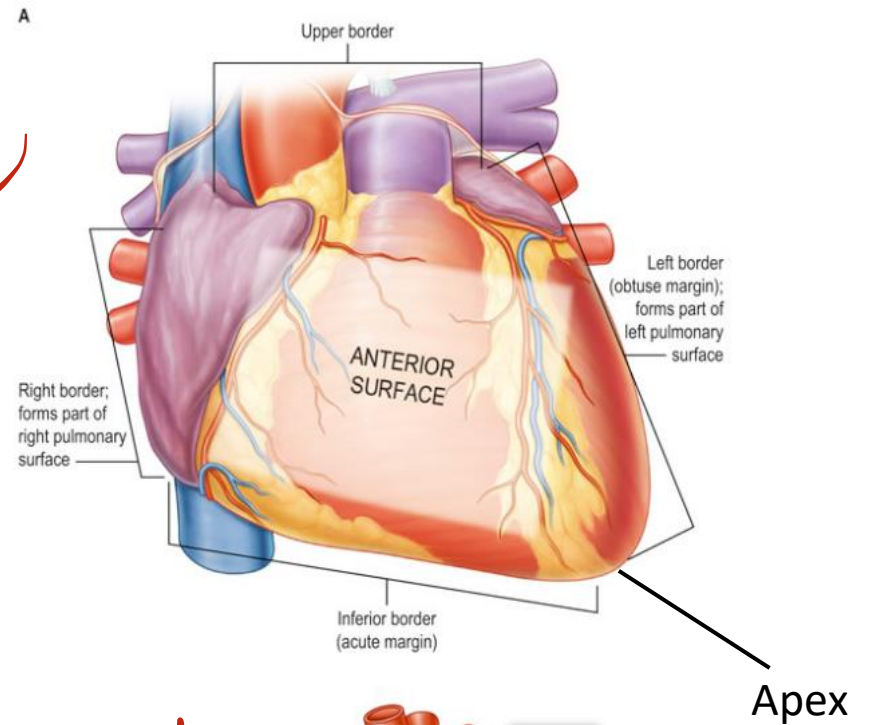
IMP

توجیه

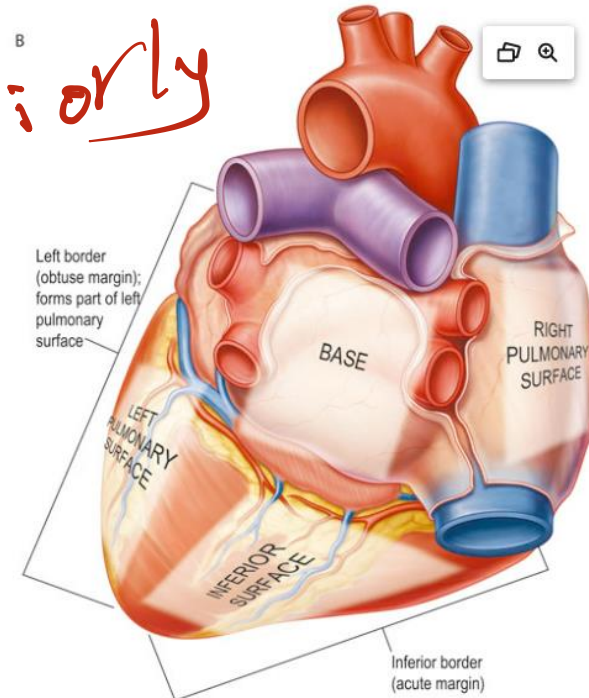
The orientation of heart

- About two-thirds of the mass of the heart lies to the left of the body's midline.
- The heart has apex and base
- **Apex**: the pointed tip of the heart directed downward, forward and to the left, and is formed of the left ventricle.
- **Base** of the heart (posterior aspect) is directed upward and posteriorly and is formed by the atria, mainly of the left atrium.

view



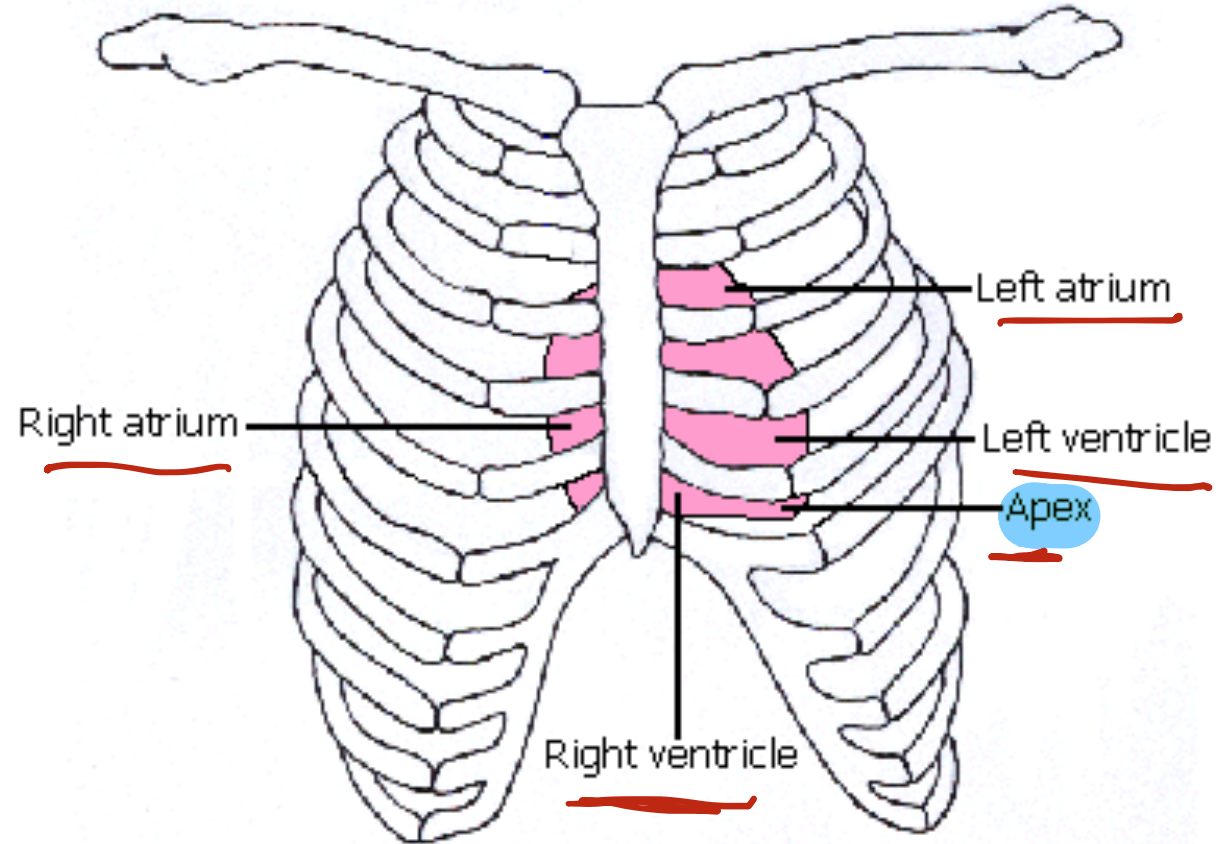
posteriorly



Apex of the heart

- Lies at the level of the **left fifth intercostal space**. 9cm from the **midline**.

قلوب الكبد



Surfaces and borders of the heart

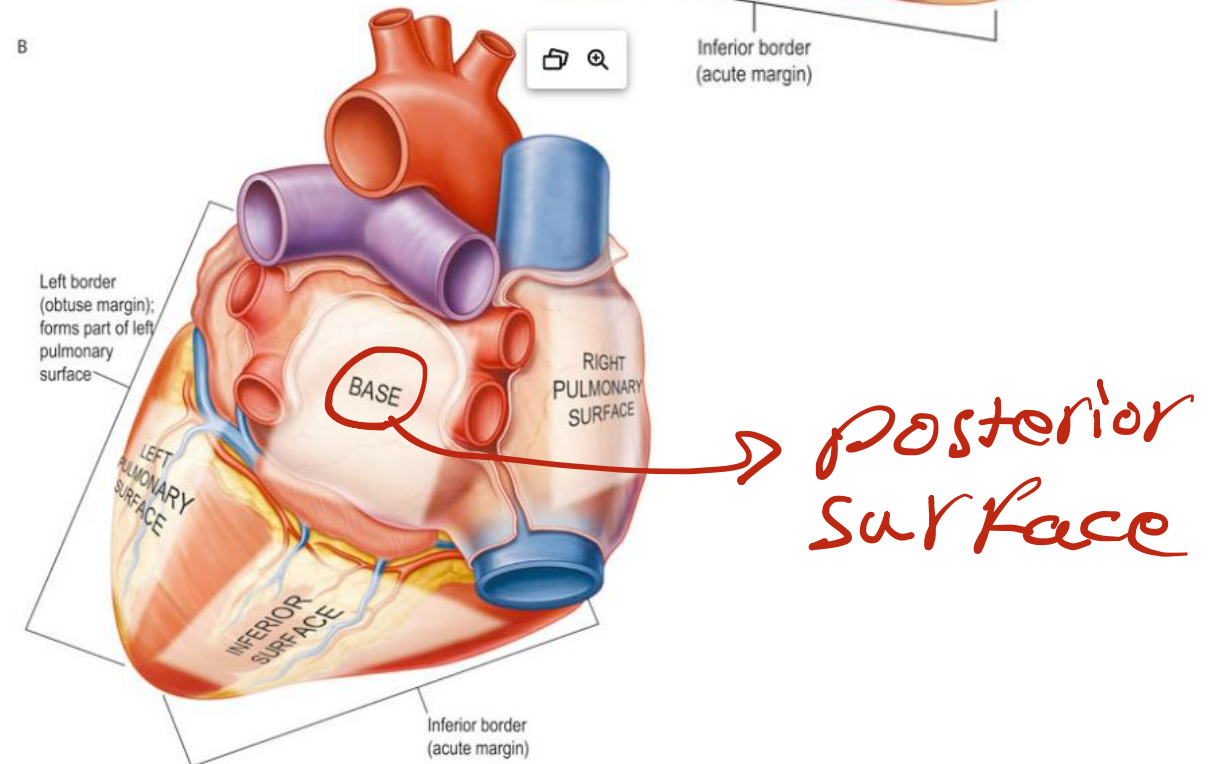
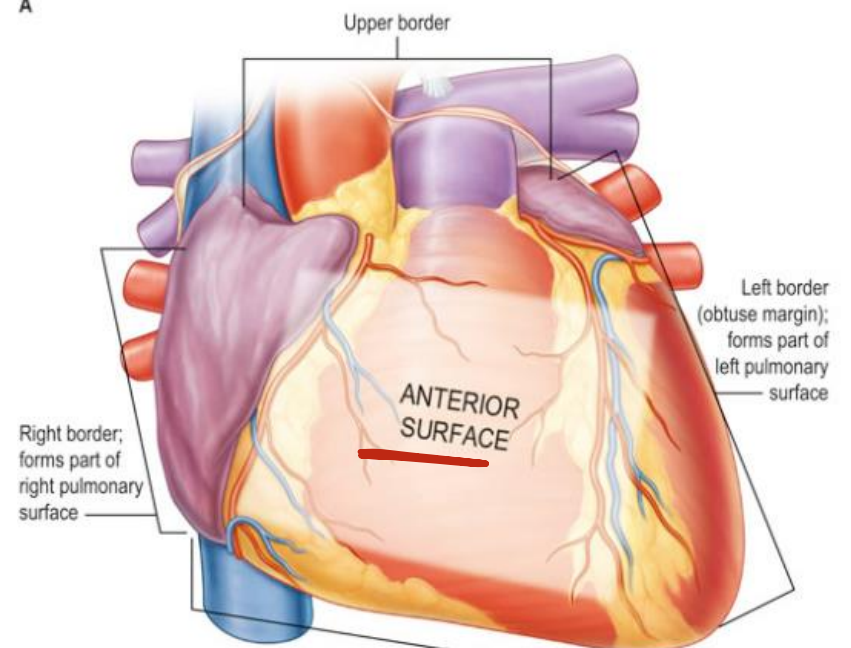
- The heart has several surfaces: **anterior (sternocostal)**, **inferior (diaphragmatic)**, and **right and left pulmonary**

1. Anterior (sternocostal) surface: formed mainly by **right ventricle** ~2/3rd

2. Inferior (diaphragmatic) surface is largely formed by **left ventricle**.
↳ *mainly*

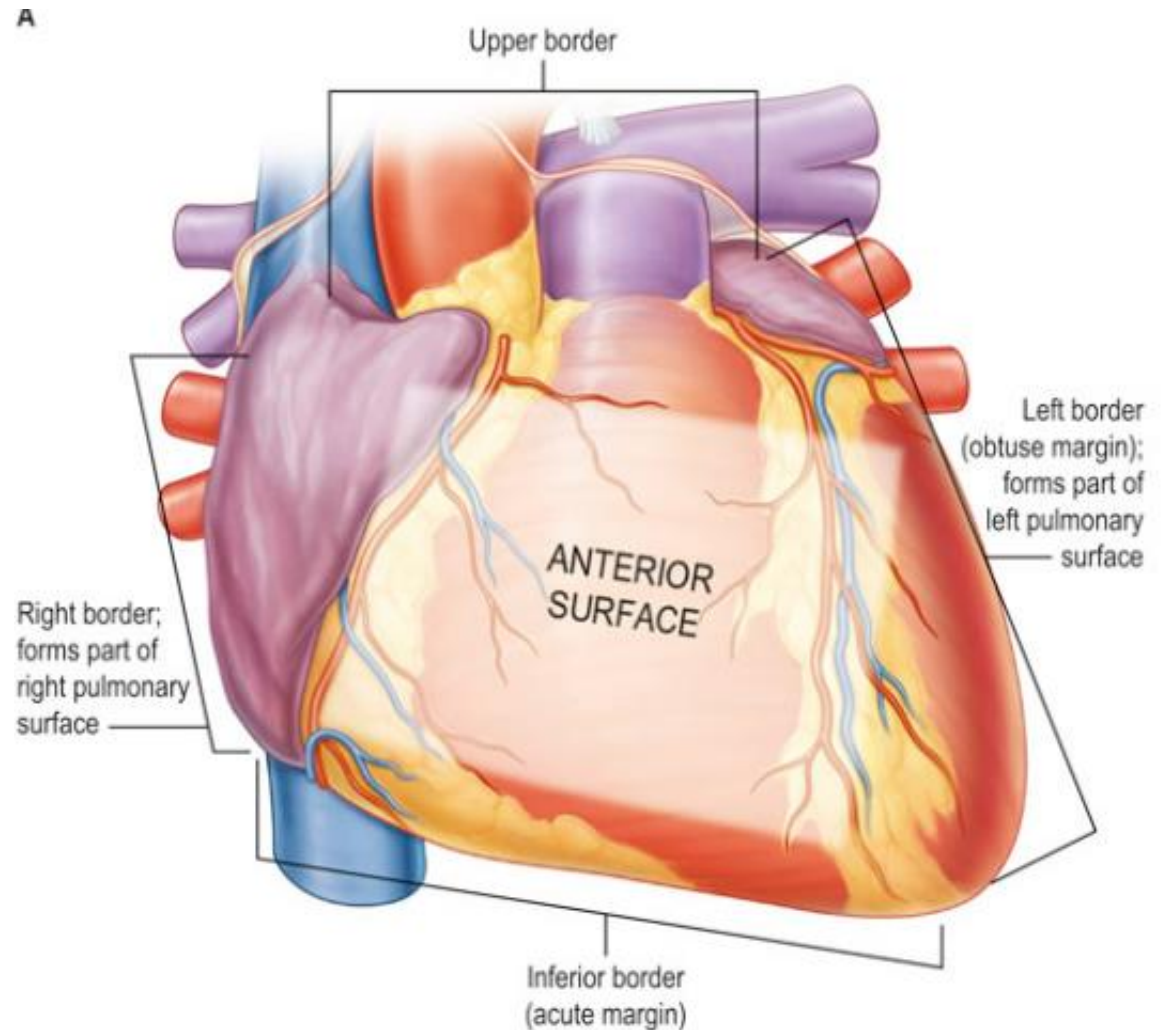
3. Right pulmonary faces right lung

4. Left pulmonary faces left lung



Surfaces and borders of the heart

- And four borders; **superior, inferior, right and left.**
 - **Sup. Border>>> the two atria**
 - **Inf. Border >>> two ventricles**
 - **RT border >>> right atrium**
 - **LT border >>> left ventricle and left auricle**



groove

Sulci on the cardiac surface

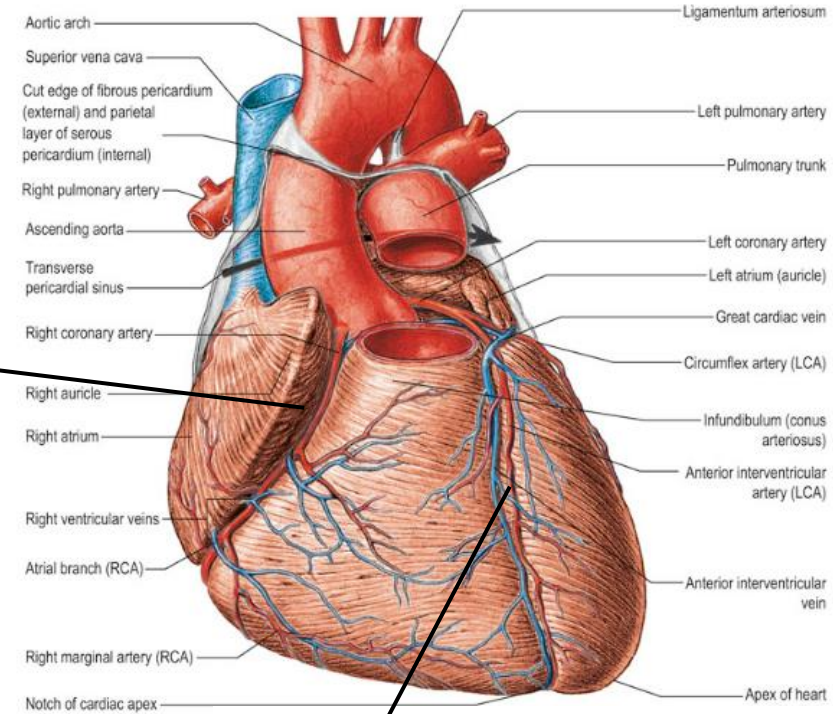
↳ contains
important structures

RT Atrioventricular
sulcus

- The atrioventricular (coronary) sulcus separates the atria from the ventricles and contains the main parts of the right and circumflex coronary arteries.

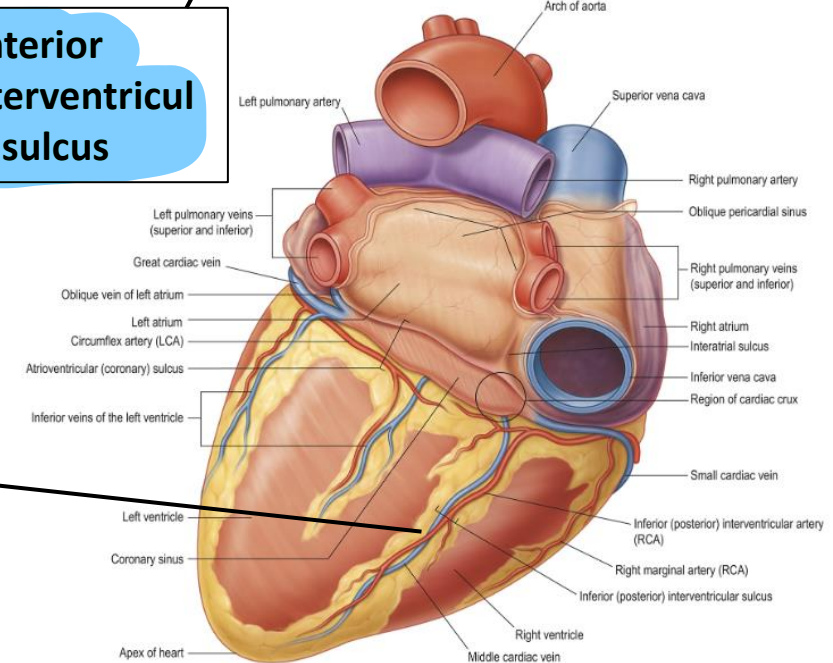
- The interventricular sulci extend from the atrioventricular sulcus to the notch of the cardiac apex on the inferior border.

لحوضه في اللباب



Anterior
interventricular
sulcus

Posterior
interventricular
sulcus



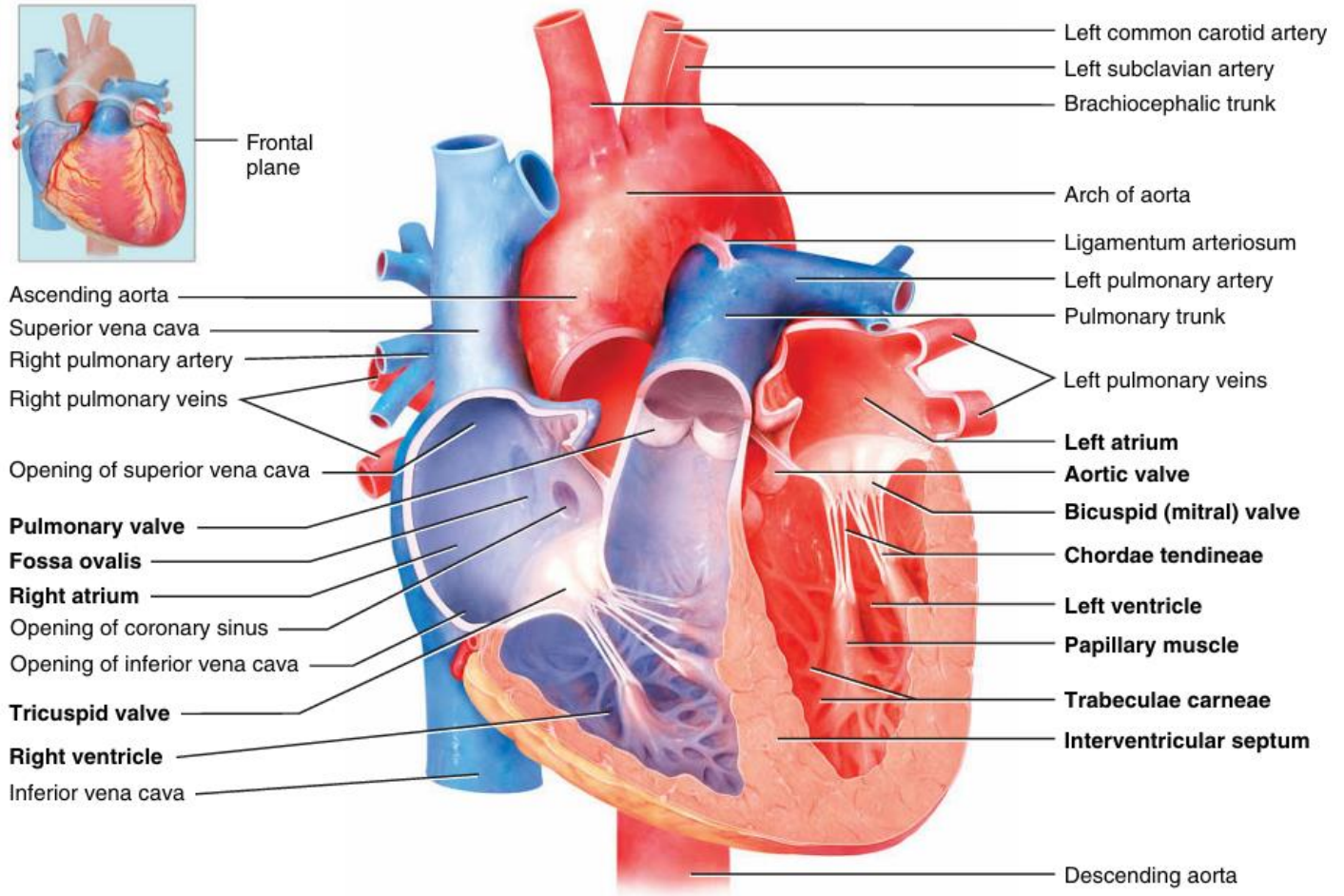
Valves of the heart

صفا صا ت

very imp for dentists

1. Atrioventricular valves

- Right and left
- The **right atrioventricular valve RAV** is tricuspid valve (has three cusps) *دريقات*
- The **left atrioventricular valve LAV** (Mitral valve) is bicuspid valve (has two cusps).

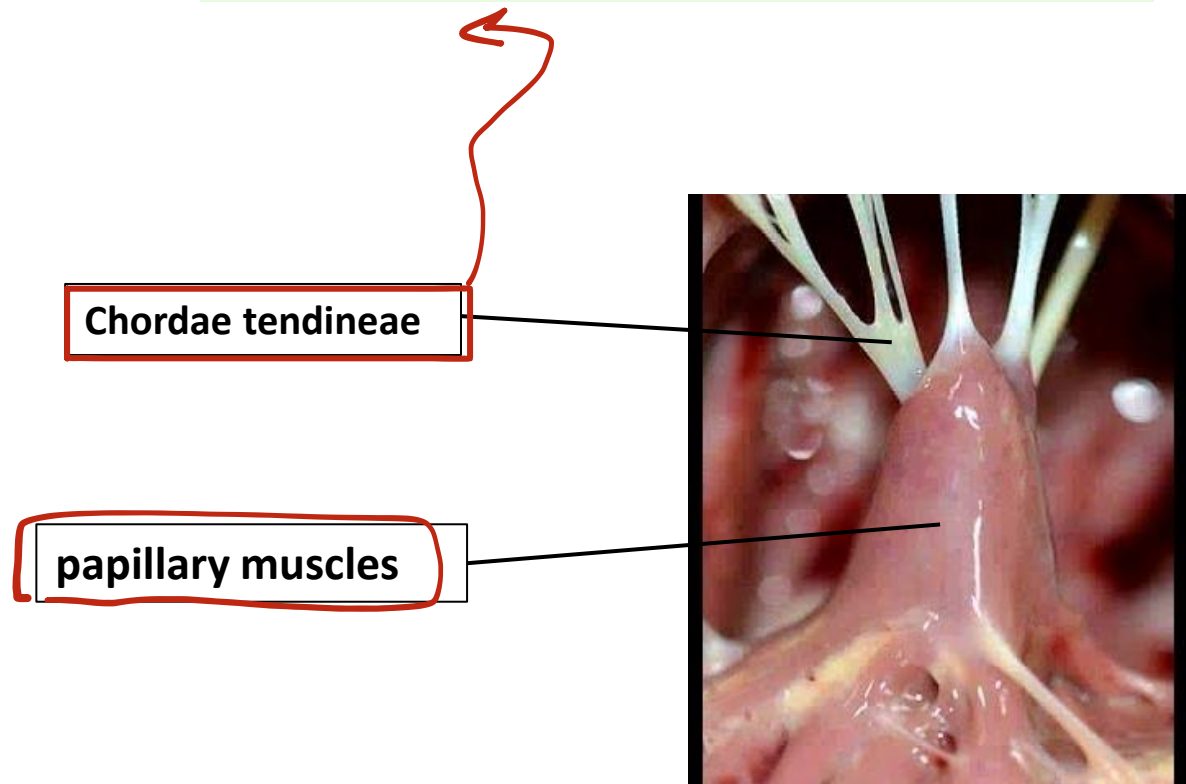


(a) Anterior view of frontal section showing internal anatomy

Chorda tendinea are fibrous collagenous structures that support the leaflets of the atrioventricular valves and connect them to the **papillary muscles**.

In most cases, the RAV valve has three papillary muscles while the LAV valve has two.

ترتبط ما بين ال cusps of the valve and floor of the ventricle



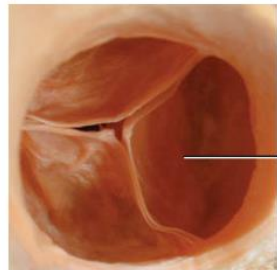
Valves of the heart

2. Semilunar valves

Formed of **three cusps**, with a hollow space above each cusp called **sinus**

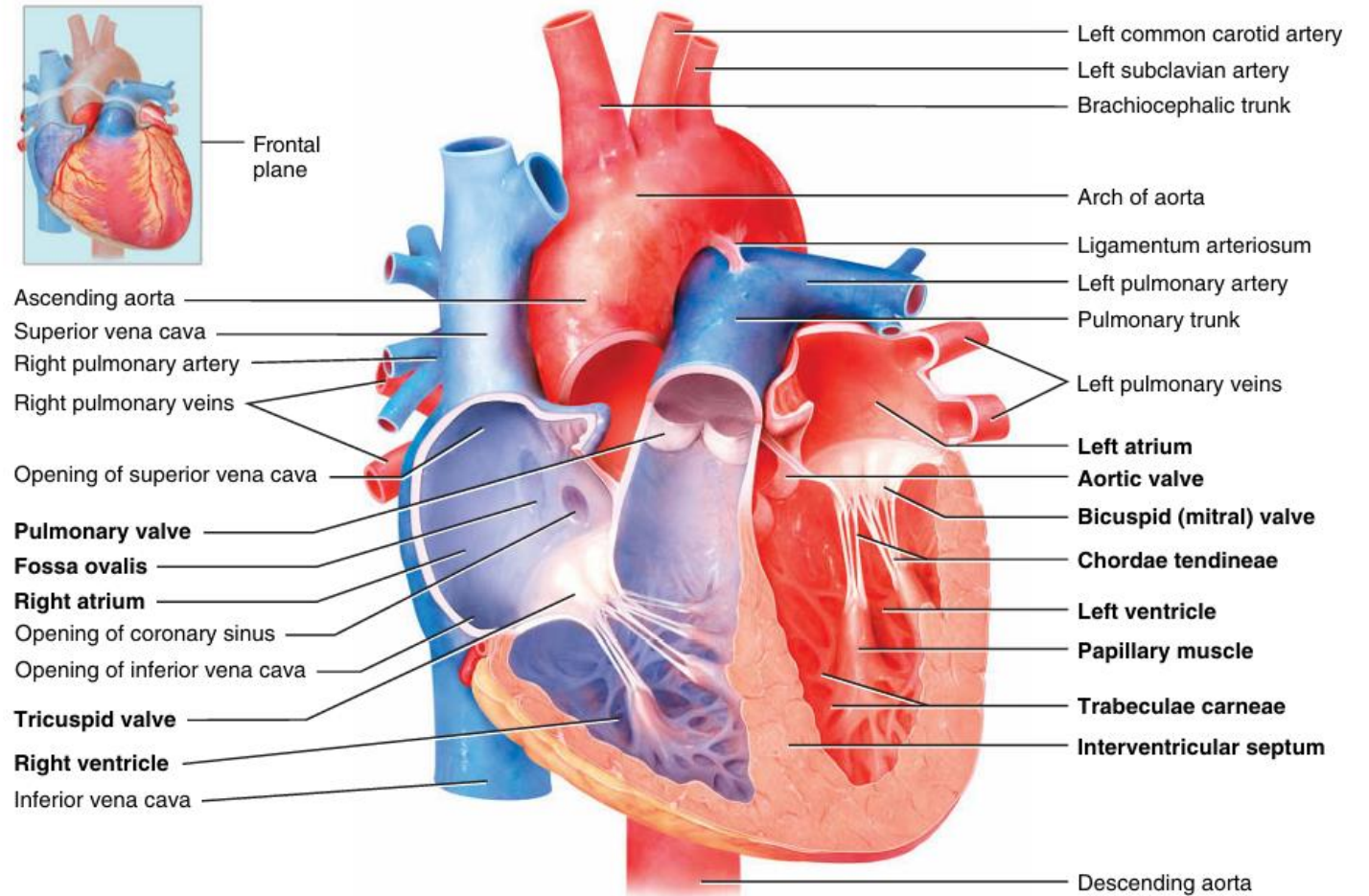
- **Aortic valve**
 - **Pulmonary valve**
- 3 cusps

No Chorda tendinea or papillary muscles are associated with semilunar valves.



Semilunar cusp of aortic valve

Dissection Shawn Miller, Photograph Mark Nielsen
(g) Superior view of aortic valve



(a) Anterior view of frontal section showing internal anatomy

ventricles إلى atrium من الدم يدخله حتى يدخل الـ Atrioventricular valves is open ①

lungs إلى ventricle من الدم ليطلع Semilunar valves is open ②

the ascending aorta

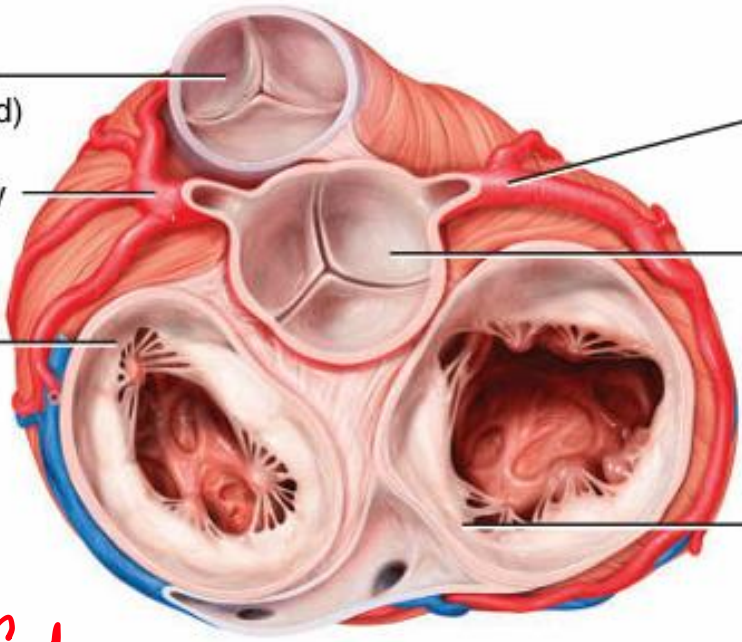
ANTERIOR

ANTERIOR

Pulmonary valve (closed)

Left coronary artery

Bicuspid valve (open)



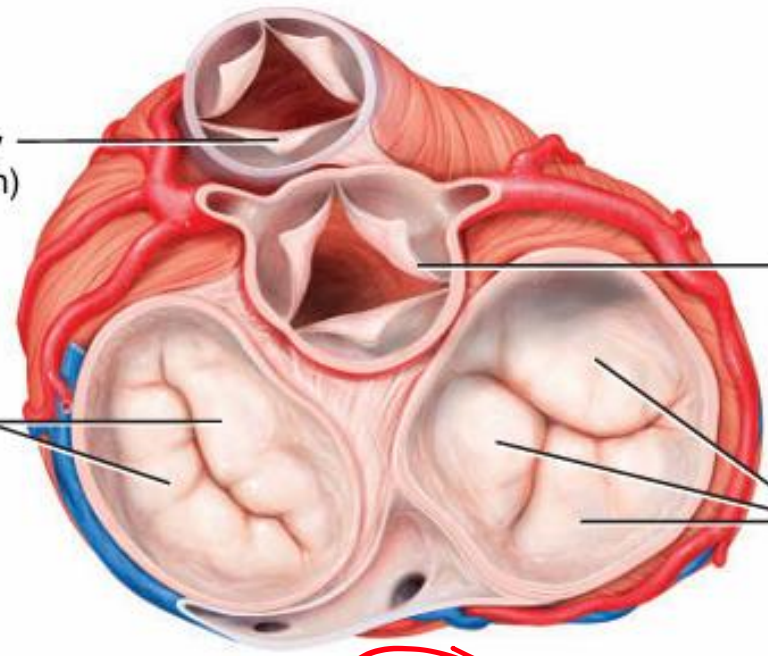
Right coronary artery

Aortic valve (closed)

Tricuspid valve (open)

Pulmonary valve (open)

Bicuspid valve (closed)



Aortic valve (open)

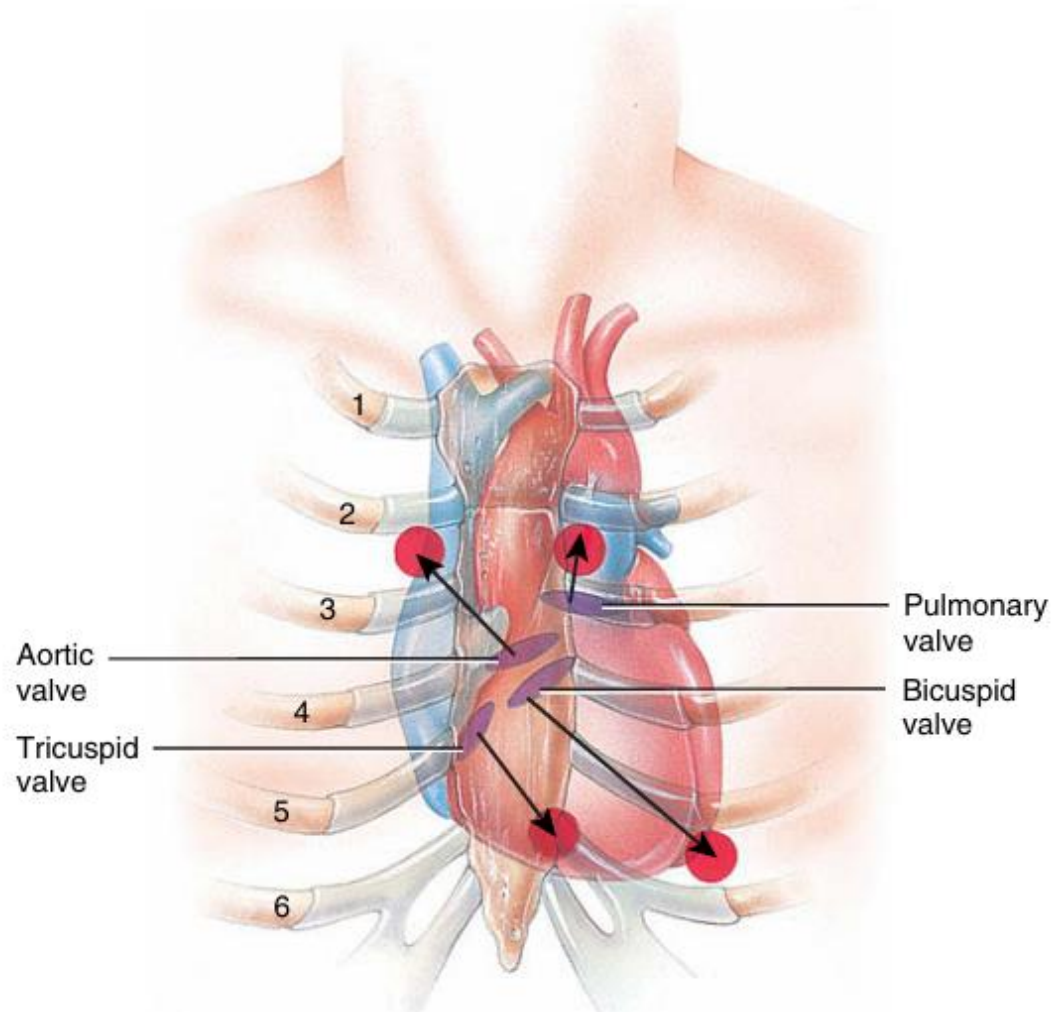
Tricuspid valve (closed)

left Atrioventricular valve (mitral valve) ①

②

READ ONLY

Listening to sounds within the body is called auscultation; it is usually done with a stethoscope.



Blood supply of the heart

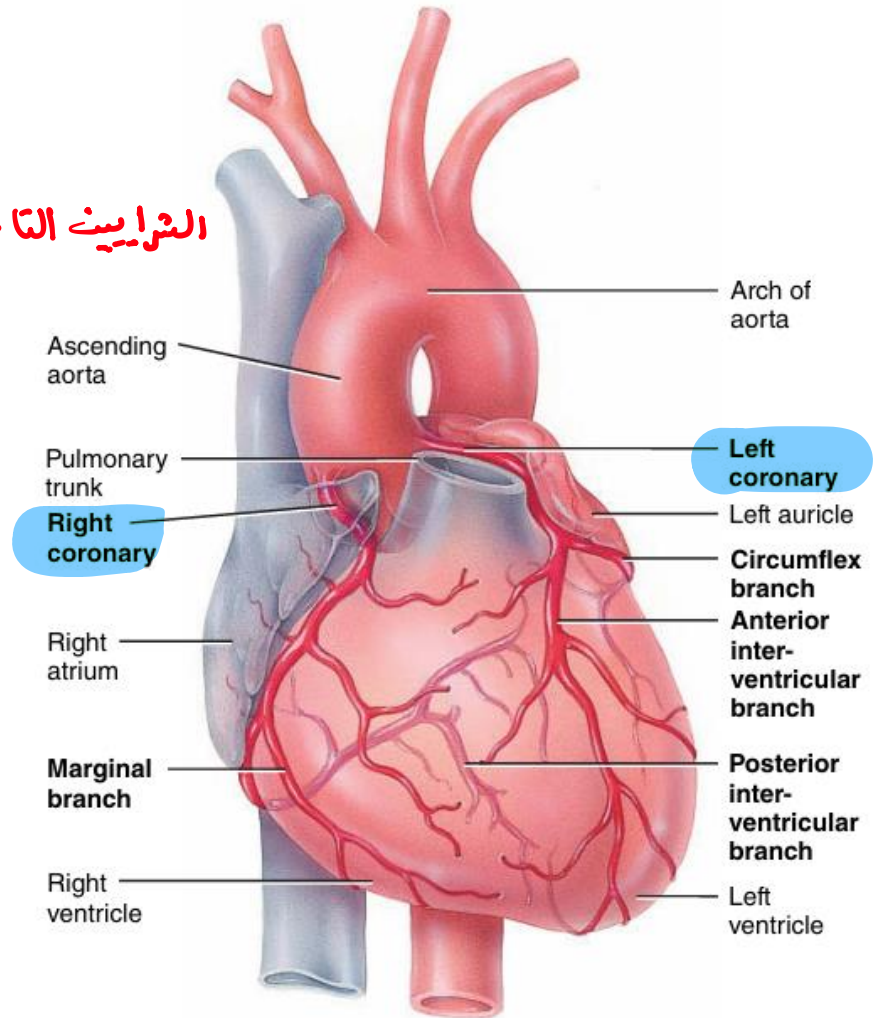
Arterial supply

By the **coronary arteries** (Rt and Lt). Arise from the beginning of the ascending aorta.

Venous drainage:

Through small veins that opens in the **coronary sinus** that empties in the right atrium

الشرايين التاجية



(a) Anterior view of coronary arteries

Blood supply of the heart

ما راجع تفسیر کنیہا بالی مقدمات

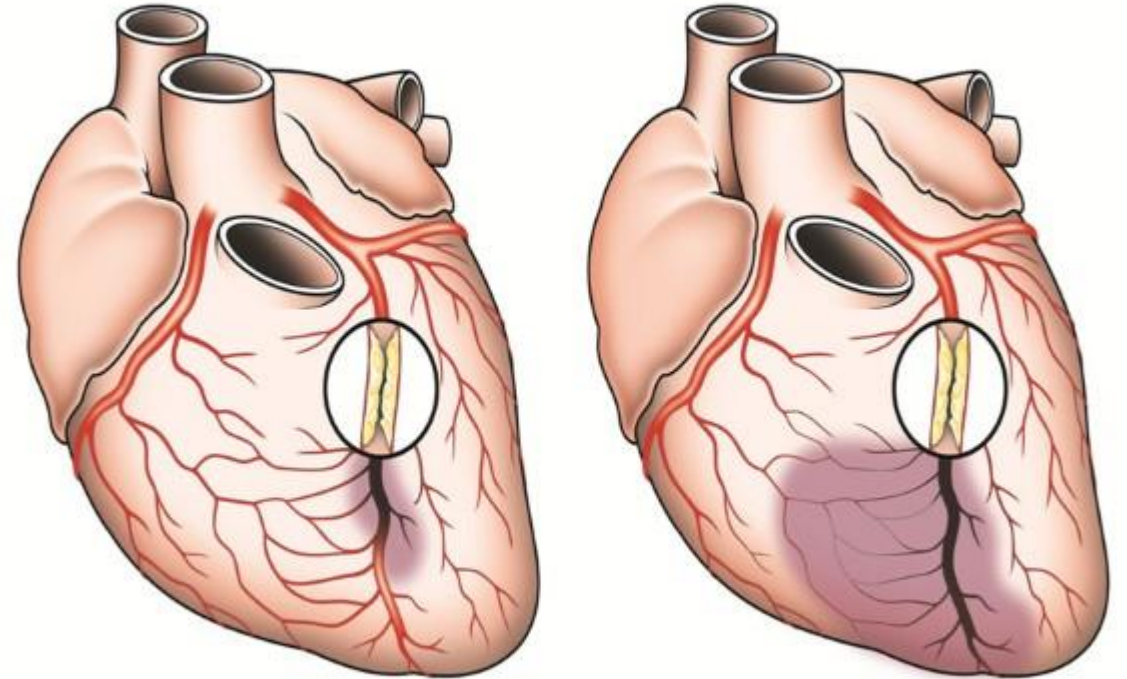
Collateral circulation is the anastomosis between the branches of the right and left coronary arteries.

Figure 1

The alternative route of blood flow to a body part through an anastomosis

لے انصاف

The age is a key determinant of the collateral circulation development.



2 > 1 ← اکیس کمرا

Thank you!

