

CARDIOVASCULAR SYSTEM

SUBJECT : Anatomy

LEC NO. : Lecture 3

DONE BY : Gaith & ATA

وَقُلْ رَبِّ زِدْنِي عِلْمًا



SCAN ME!



CVS....

Lecture (3)

Anatomy of the Heart

رَضِيحَةٌ أَهْوِيَّةٌ :- العَلَمَةُ
وَدَهَا كَمِثْرٍ مَغْطَا وَتَدَكِيْرُ بِالْكَفْظِ
وَالدَّكْتَوْرَةُ هَيْتَ مَاوَلِ تَبْصِيْمِ
الصُّوْرَةِ عَشَانِ تَحْفَفُ أُدْسَهْمَلِ عَلَيْكَ
الْكَفْظِ وَطَبَقًا لِأَخَافُوا مِنْهَا دَلَا تَسْمَعُوا
أَرَادَ الدَّفْعَةَ أَنْهَا مَا تَنْحَضُ
كَمَلِ وَآدِ سِيوَلْفِ عَلَى كَيْفِ
فَانْتِ حِدْبِ وَشَوْفِ .
مَثَلًا أَنَا مَكْتَبْتِ وَدَهَا مَغْطَا فَنَاءُ
عَلَى تَجْرِبَتِي فَشَوْفِ وَأَنْتِ قَرْرًا!!



Dr. Amany Allam

Assistant professor of Anatomy & Embryology



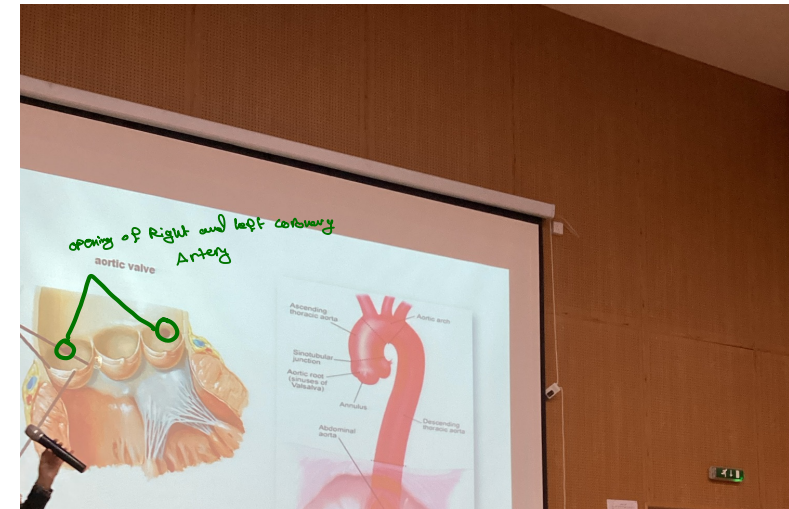
ILOs

1. To describe the arrangement of conductive system of the heart and their function within the myocardium.
2. To describe the origin of the coronary arteries and their course, branches, distribution & sites of anastomosis between branches of coronary arteries.
3. To describe the normal variation in the course of the coronary arteries and their branches.
4. To describe the venous drainage of the heart and cardiac veins (their names, location and drainage areas).
5. To describe the location and termination of the coronary sinus and its tributaries.
6. To describe innervations of the heart and the principal of cardiac referred pain.

Blood supply of the heart

الشريان التاجي

- The heart **is supplied by** two **coronary arteries** (right and left) which are branches of the **ascending aorta**.
- **It's drained by** cardiac veins & **Coronary sinus**.
- The **coronary arteries and their major branches** are **distributed over** the **surface of the heart**, lying within **subepicardial connective tissue**.



في هاي الصورة بس بوريك انه الثلاثة sinuses اسمهم sinuses of right sinuses وهم بقسموا الى right sinuses وراح تعطيك right sinuses والى left sinuses وراح تعطيك left sinuses ، واما الـ posterior sinuses احنا بنسميها non coronary artery coronary sinuses

Right coronary artery:

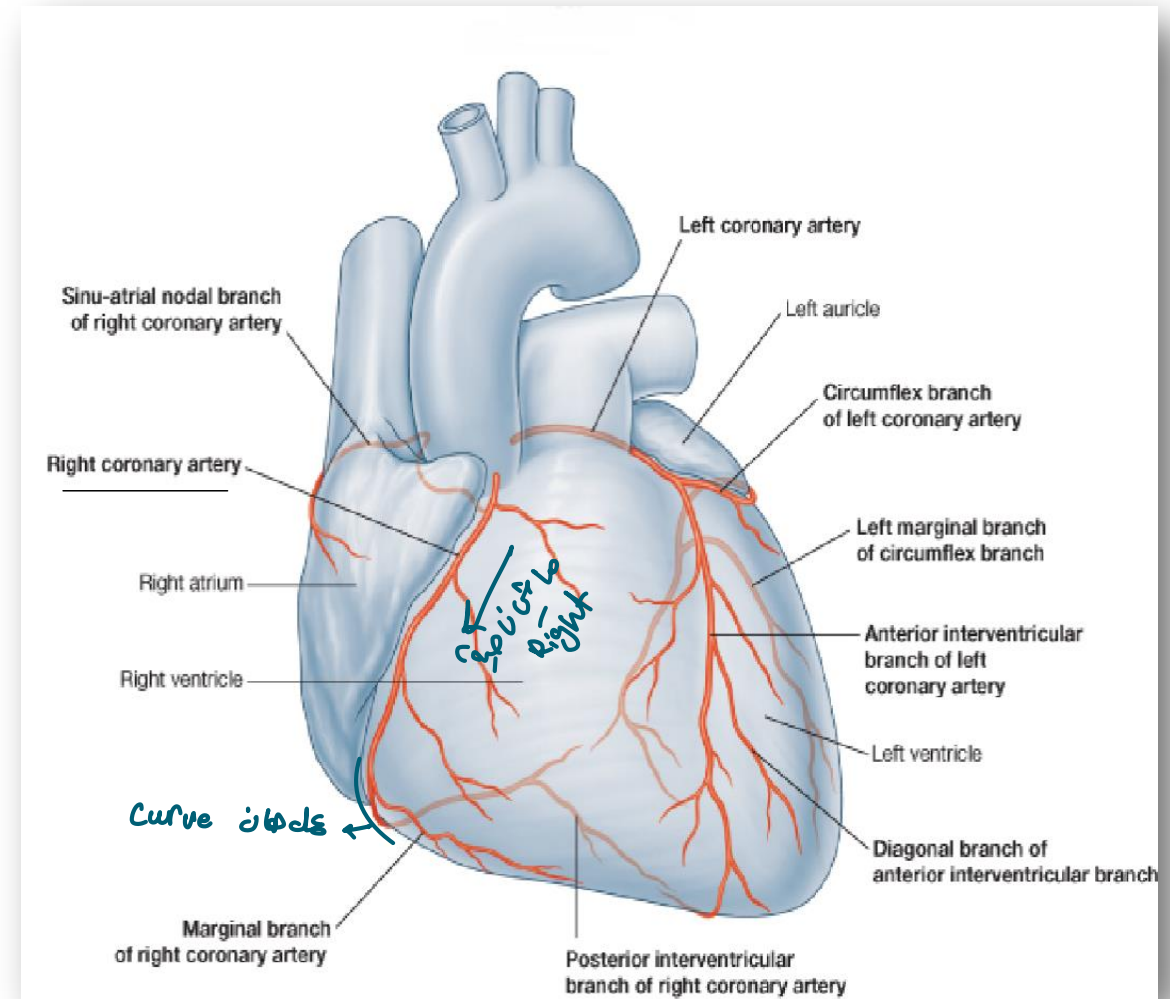
Origin: from the right aortic sinus of the ascending aorta.

Course:

- It runs to the right in the coronary groove (anterior part of atrioventricular groove).
- Then it curves backwards to run in the posterior part of atrioventricular groove. (Right)

Termination: by ^{→ connection} anastomosing with the circumflex branch of the left coronary artery in the posterior part of the coronary groove.

- ① Anastomosing
② end Artery
③ Branch
- دع يكون يا



Branches of the right coronary artery:

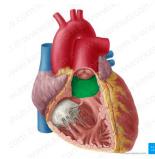
1- Right conus artery: It supplies the anterior surface of the pulmonary ^{cone in shape} conus. and the upper part of the anterior wall of the right ventricle.

2- Anterior ventricular branches: they supply the anterior part of the right ventricle.

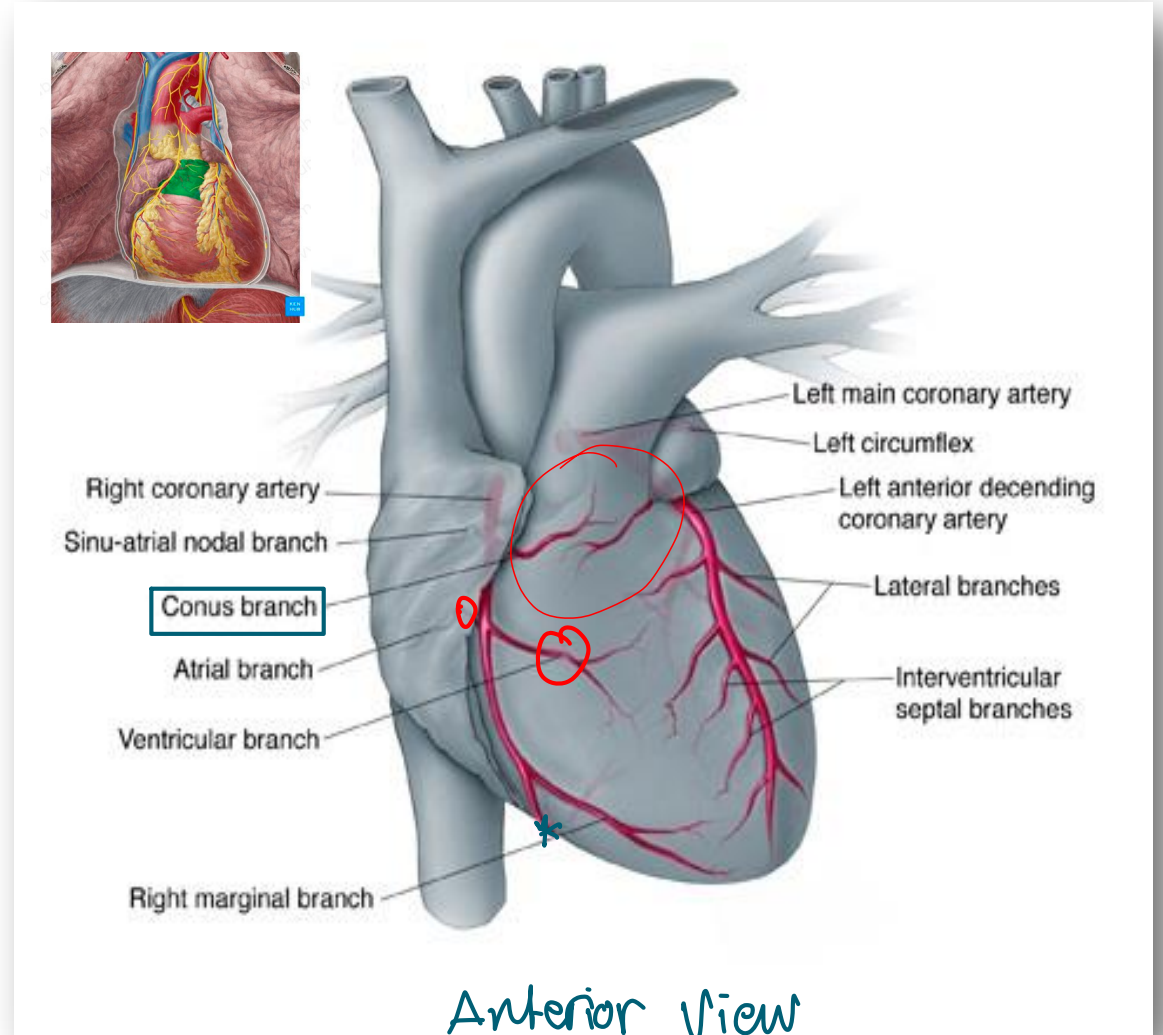
3- Atrial branches: they supply the right atrium.

4- S.A. nodal artery: it arises from right coronary artery in 60% of individuals. it supplies the sinoatrial node. 40% " " from left coronary Artery.

5- Right marginal branch: it runs along the lower margin of the heart.



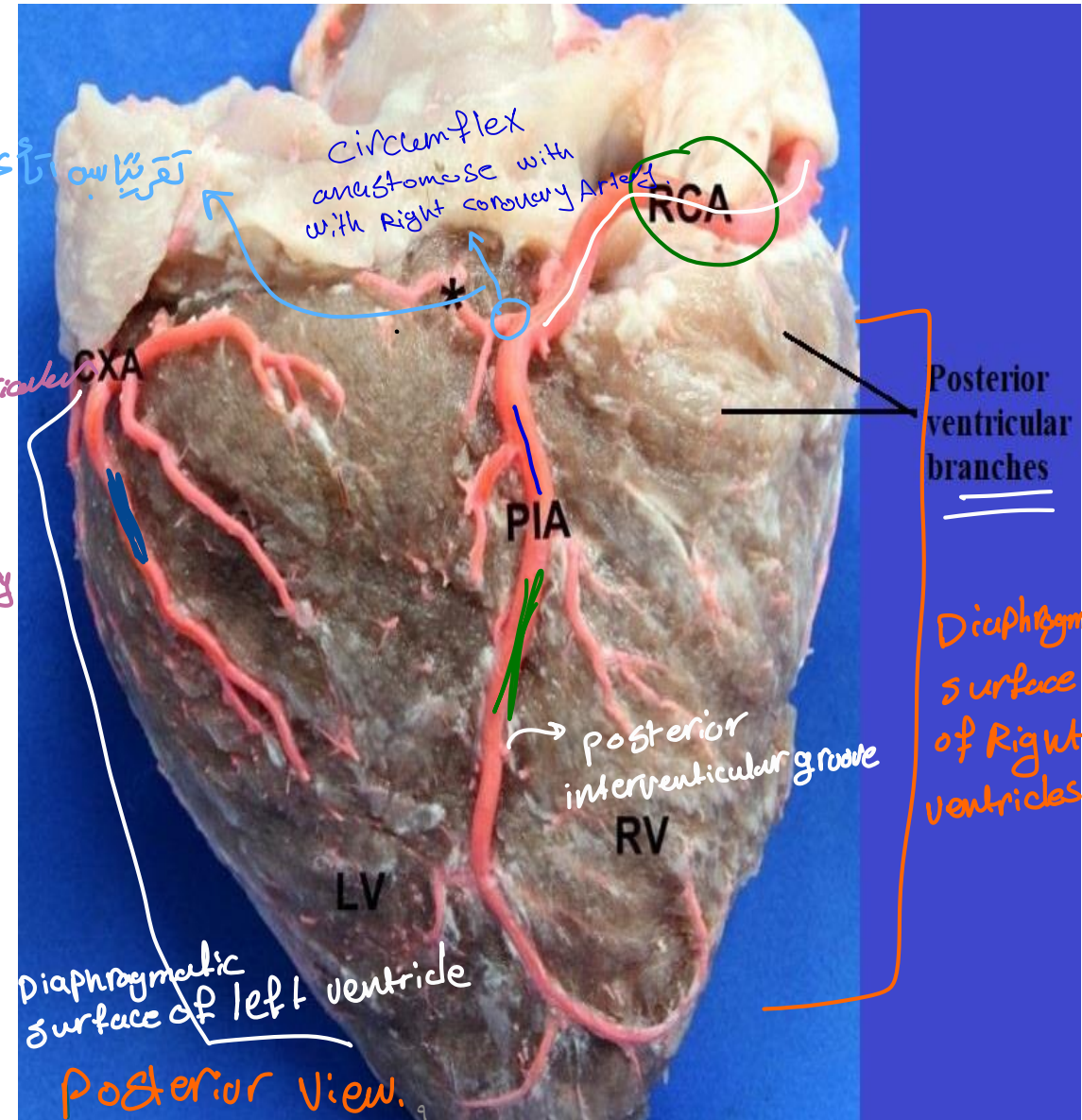
Right side of heart supply by R. Coronary A
left " " " " " " by Lt Coronary A



6- Posterior ventricular branches: they supply the diaphragmatic part of the right ventricle.

7- Posterior interventricular artery:

- In **90%** of individuals, arises from the right coronary artery. *10% " " rise from circumflex branch of left coronary artery. and also it pass through posterior interventricular groove*
- It **passes** in the posterior interventricular groove.
- It **anastomose with** anterior interventricular artery near apex of heart. *↳ Branch from left coronary artery.*
- It **supplies parts of diaphragmatic surface of both ventricles** and also supplies **the posterior 1/3 of interventricular septum.**
- It gives **AV nodal artery** supplies the **atrioventricular node.**



Left coronary artery:

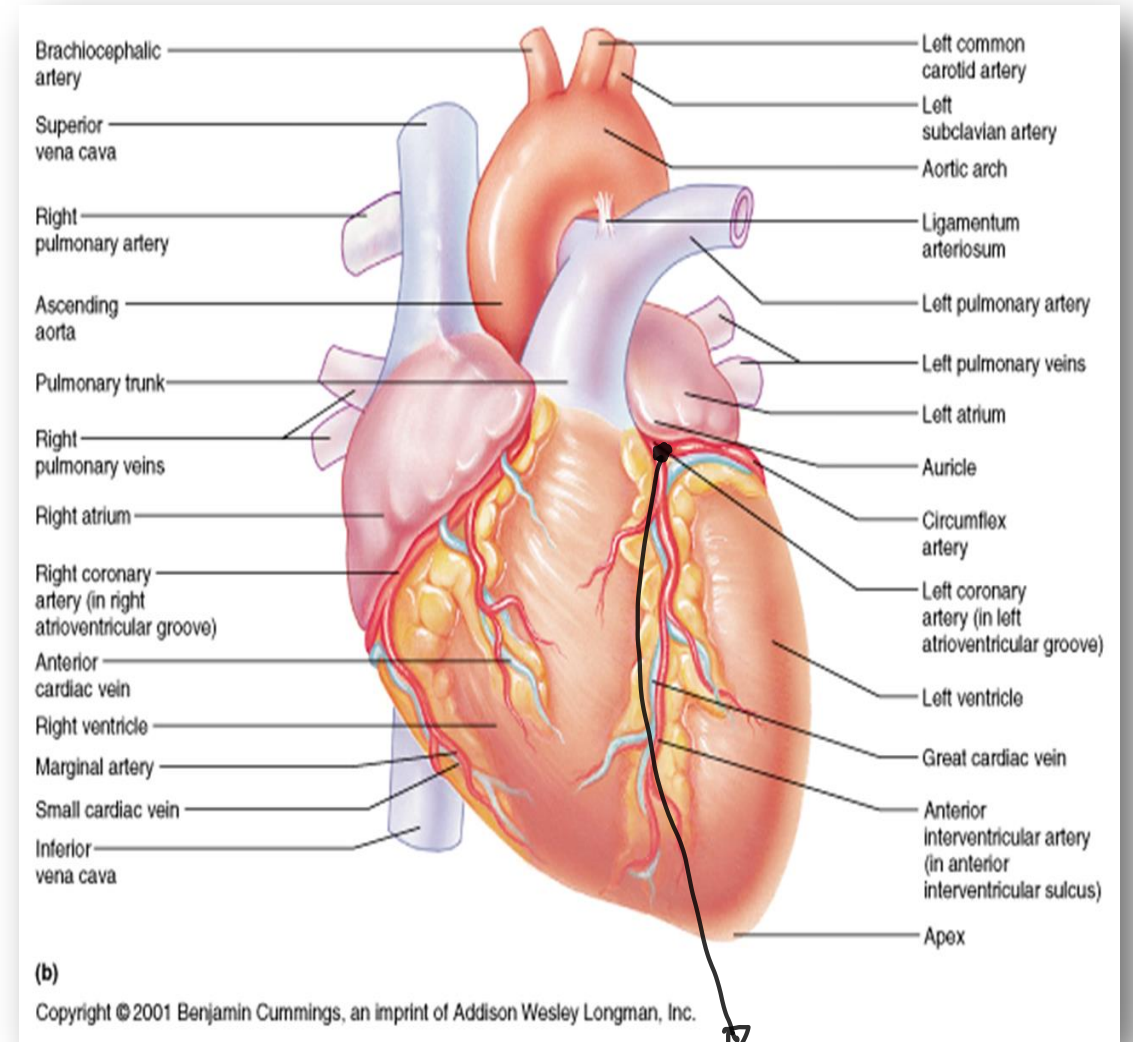
The left coronary artery is **larger than** the right coronary artery.

Origin: From the **left aortic sinus** of the ascending aorta.

Course:

- It **passes** forward between the pulmonary trunk and the left auricle.
- It then **runs to** the left in the atrioventricular groove and **divides** into an **anterior interventricular** branch and a **circumflex branch**.

↓
termination.

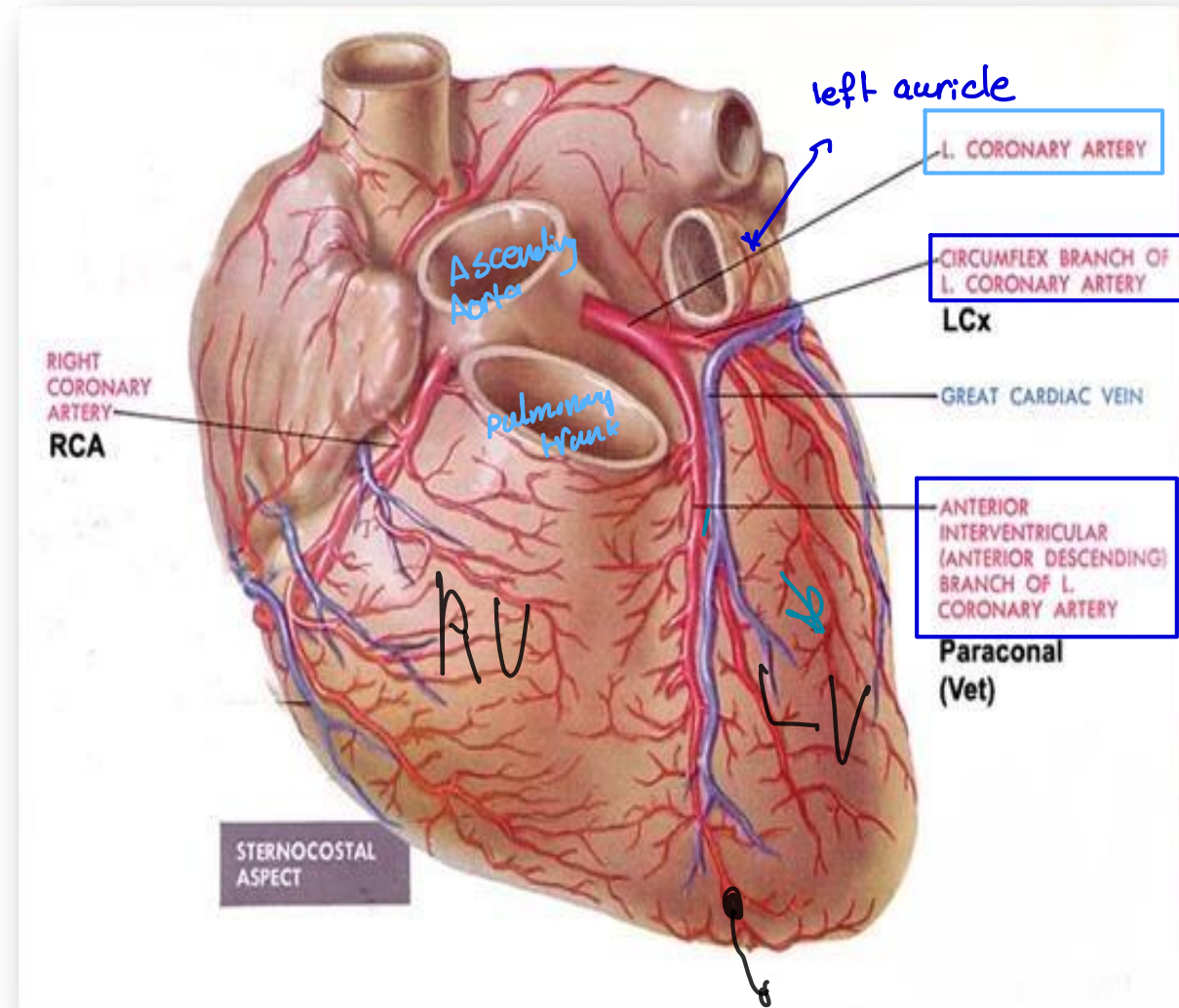


من هون ببلش left coronary artery وينقسم إلى interior interventricular branch and to circumflex branch

Branches of left coronary artery:

1-Anterior interventricular artery (AIA):

- It runs in the anterior interventricular groove.
- It ends by anastomosing with termination of (PIA) → *At the apex of heart*
- It supplies the **anterior area of both ventricles**, (adjacent to anterior interventricular groove) and **anterior 2/3 of the interventricular septum.**
- **It supplies the apex of the heart.**
- A small **left conus artery** from **anterior interventricular artery** supplies the pulmonary conus.



من هذه النقطة تنتهي ال anterior interventricular artery by anastomosing with termination of posterior interventricular artery

2- Circumflex artery:

→ left margin of heart
 curved separation

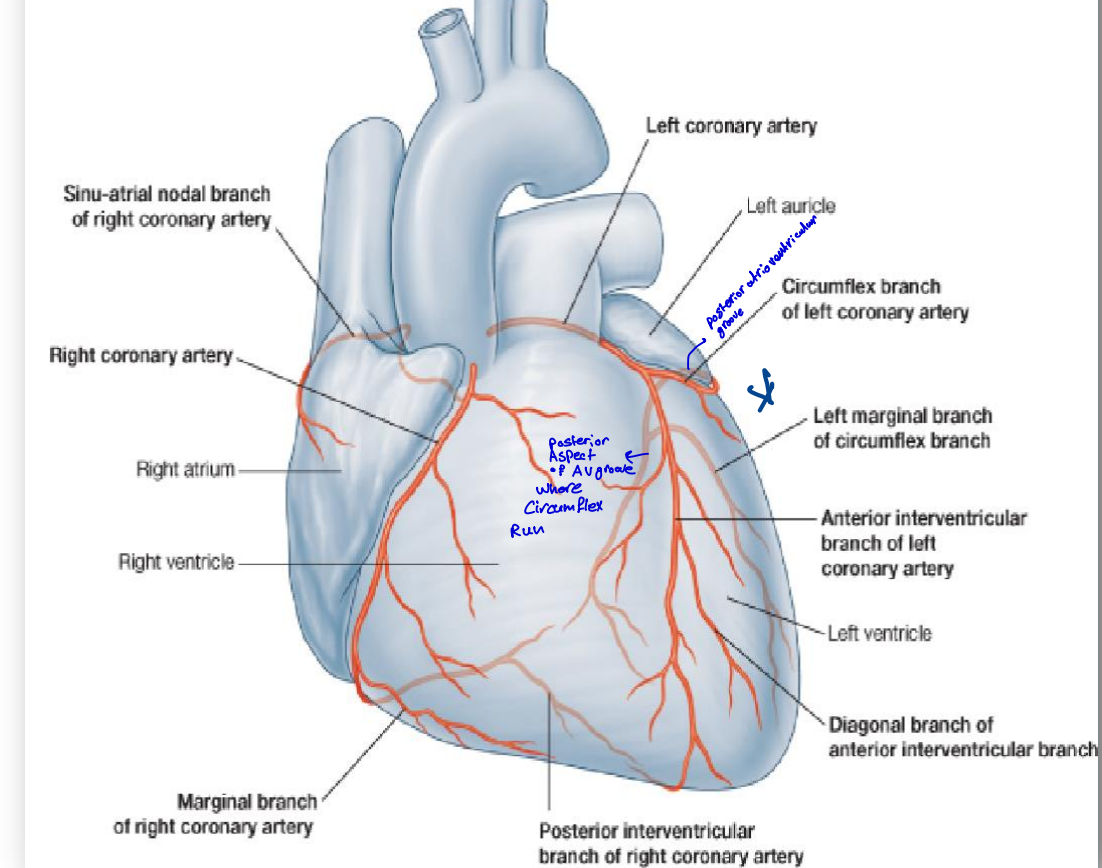
- It runs to the left in the atrioventricular groove, continuing round the left cardiac border and runs into the posterior part of the atrioventricular groove.
- It ending by anastomosing with the right coronary artery.

It gives the following branches:

- Left marginal artery:** supplies the left margin.
 ↳ descending along left margin of heart
- Posterior ventricular branches:** supply part at the diaphragmatic surface of left ventricle.
- Atrial branches:** Supply the left atrium. It give S.A nodal artery, supply SAN in 40% of individuals.
- Posterior interventricular artery:** in 10% of individuals (Lt coronary dominance) which give A.V. nodal artery, supply AVN.

Not completely supply by the branches of circumflex Artery, → left Ventricle & Diaphragmatic surface

left ventricle in Diaphragmatic surface is supplied by posterior interventricular artery. R. coronary A. is branches



R. coronary A. Branches supply R. Atrium *
 " " " " " " " " L Atrium *

Circumflex Branch.

Coronary artery distribution:

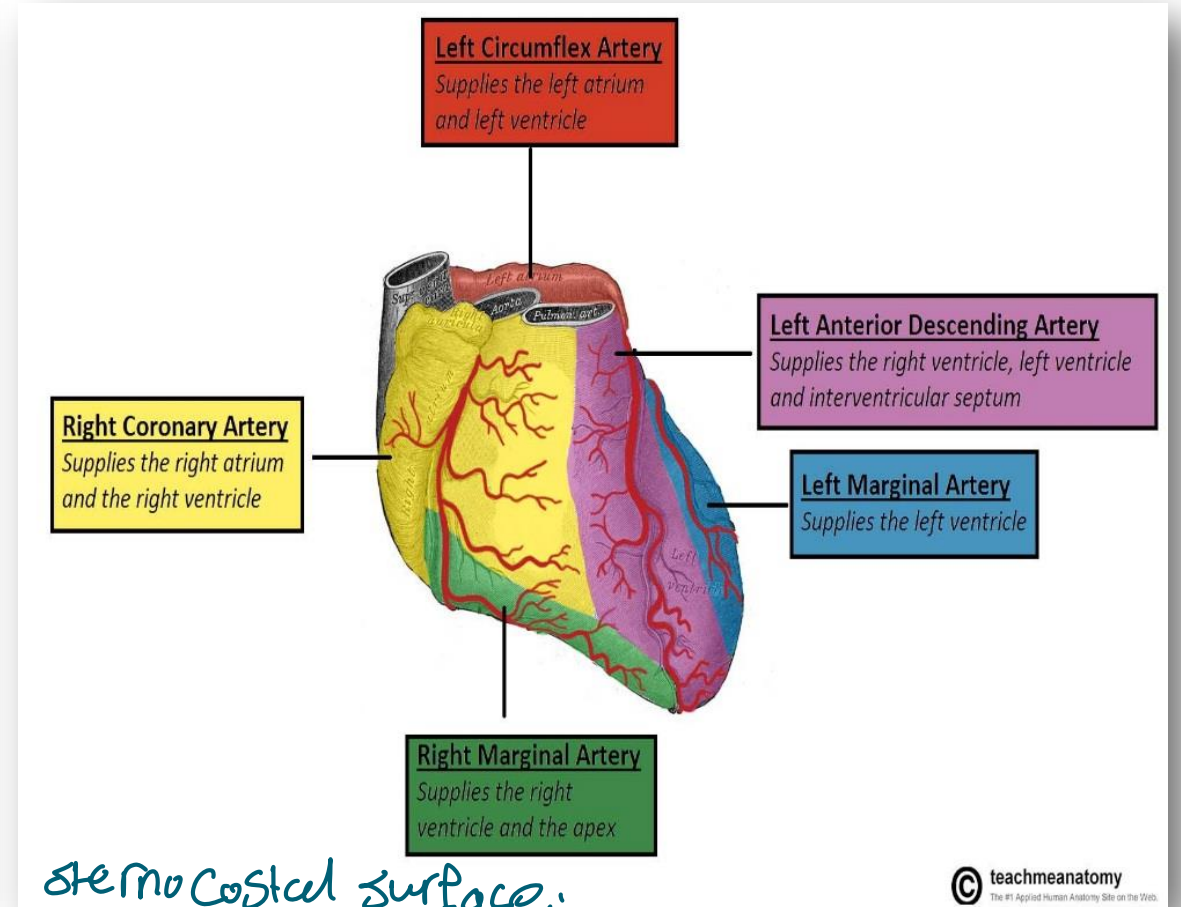
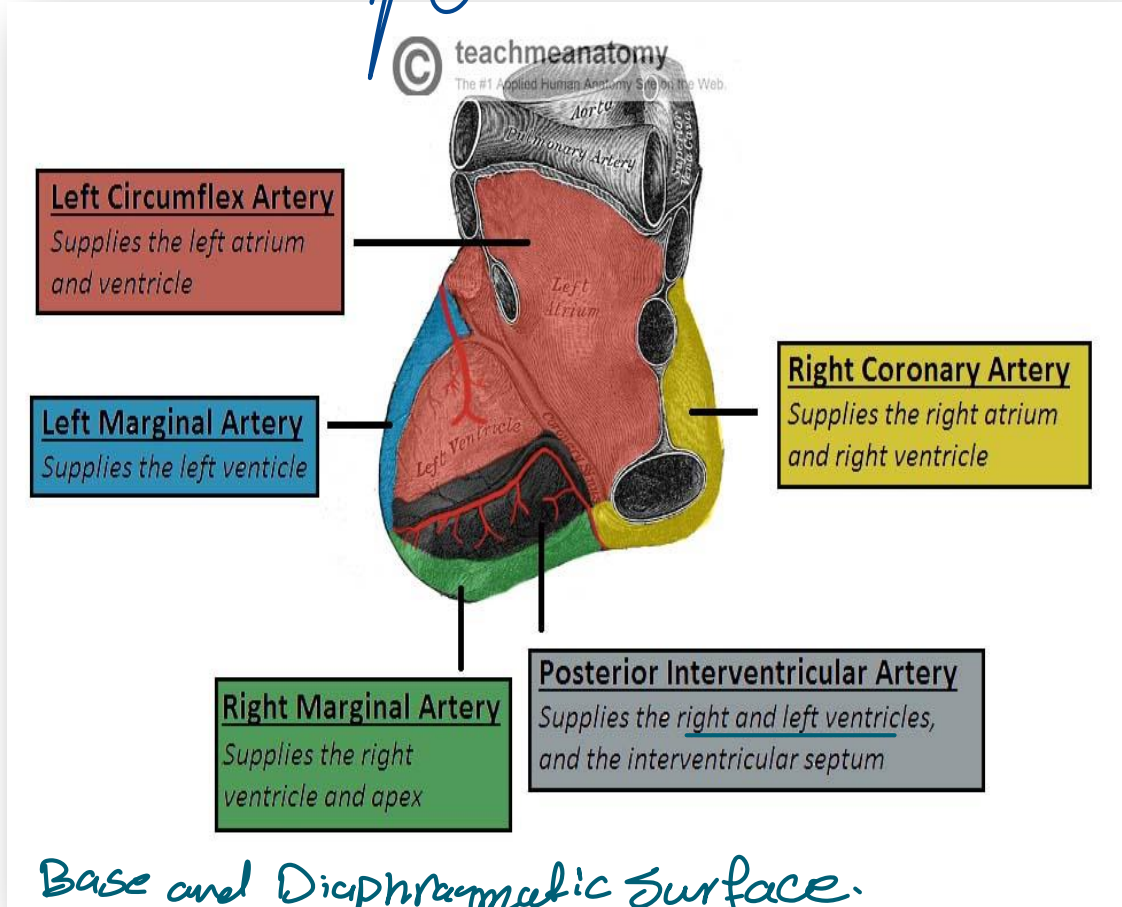
ترتيب افكار .

Right coronary artery	Left coronary artery
Right atrium	Left atrium
Right ventricle except small area to the right of the anterior interventricular groove	Left ventricle except small area at diaphragmatic surface.
Small area of diaphragmatic surface of left ventricle (to the left of posterior interventricular groove).	Small area of anterior surface of right ventricle to the right of the anterior interventricular groove.
Posterior 1/3 of interventricular septum.	Anterior 2/3 of interventricular septum.
SAN in 60%.	SAN in 40% of individuals
AVN in 90%	AVN in 10% of individuals
Right bundle branch.	Left bundle branch

Posterior interventricular →
90% Branch from R. coronary

هذان الشكلان يوضحان مبدأ الأسئلة اختصر على وعليكوا
 نفس الأسئلة الكونز الكينهاية العاصدة .

Handwritten signature



Variations in the Coronary Arteries:

The posterior interventricular artery are variable.

In right coronary dominance;

- Posterior interventricular artery is a branch of the right coronary artery.
- It is present in most individuals (90%).

In left coronary dominance;

- Posterior interventricular artery is a branch of the circumflex branch of the left coronary artery.
- It is present in (10%) of individuals.

circumflex ← Lt. coronary A to anastomose with R. Coronary Artery
 posterior interventricular A & anterior interventricular A
 apex of the heart is

Coronary Artery Anastomoses:

- Anastomoses between the terminal branches of the right and left coronary arteries allow collateral circulation.
- But cannot rapidly provide collateral routes sufficient to sudden coronary obstruction.
- A sudden block of one of the larger branches of either coronary artery usually leads to myocardial death (myocardial infarction).
- The functional value of such anastomoses appear to become more effective in slowly progressive pathological conditions (gradual block of one of the larger branches of either coronary artery).
- **Coronary arteries are essentially functional end arteries.** But anatomically speaking we have anastomoses

سudden انسداد
 من انسداد فروعها، Block أنما Anastomose ال Branches of Coronary A
 ما لفتح يفتح عشان بعد supply ال area ، انسداد ال anastomose
 سudden انسداد ال area ال supply ال انسداد ال anastomose
 انسداد ال area ال supply ال انسداد ال anastomose

incomplete Block

sudden انسداد ال area ال supply ال انسداد ال anastomose
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 انسداد ال area ال supply ال انسداد ال anastomose

Venous Drainage of the heart

*Most of venous drainage of heart through coronary sinus and tributaries

Most of the venous blood from the heart wall drains into the right atrium through **the coronary sinus**.

contain deoxygenated

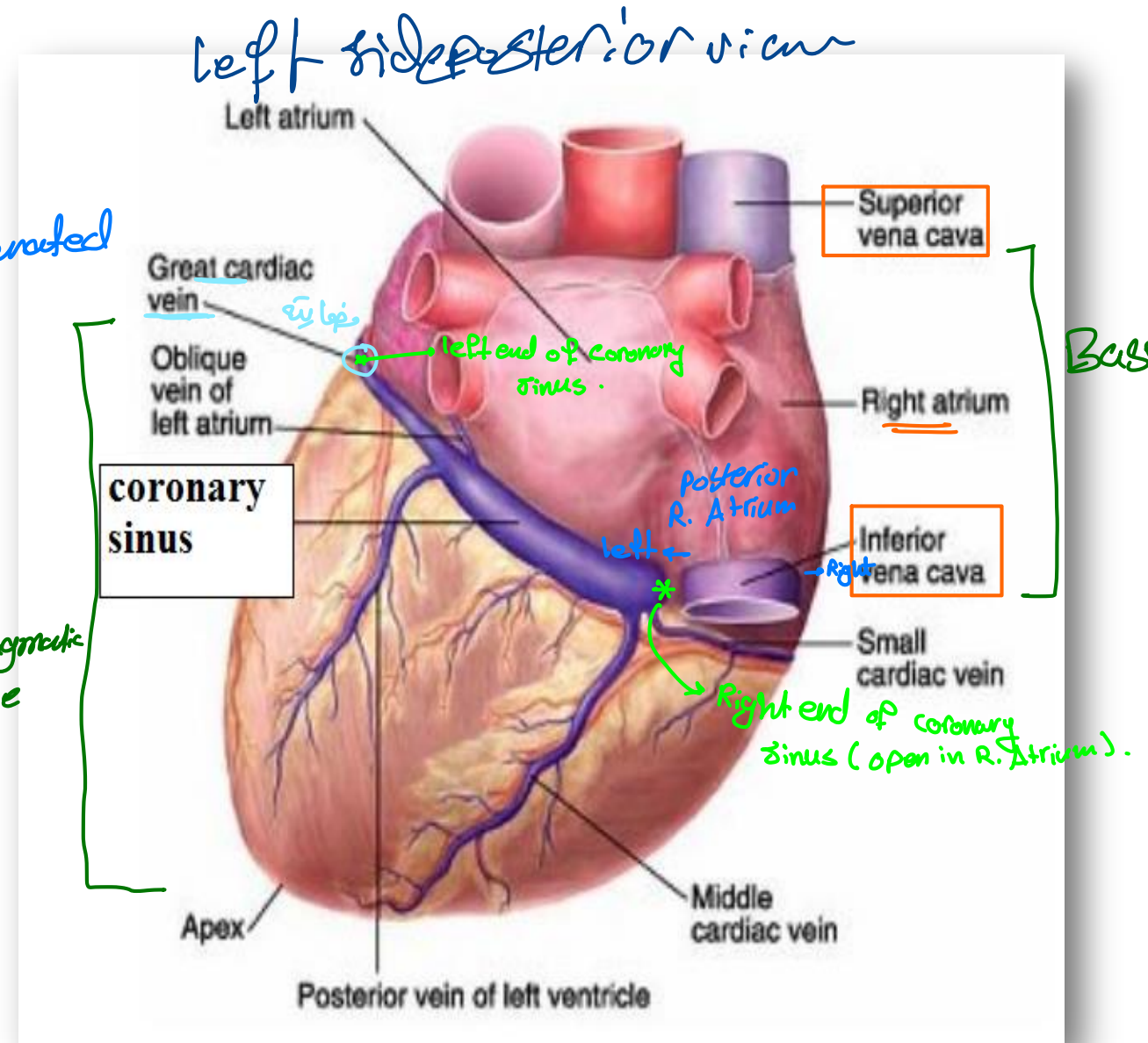
Remainder of the venous blood is drained by:

- 1- Anterior cardiac veins to the right atrium.
- 2- Small veins that open directly into the heart chambers.

Coronary sinus:

Site: Lies in left 1/2 of posterior coronary groove or AV groove.

End: It opens into the posterior wall of the right atrium to the left of the inferior vena cava.



tributaries" refer to smaller blood vessels or channels that merge or flow into a larger blood vessel or main channel.

Tributaries of the coronary sinus (6):

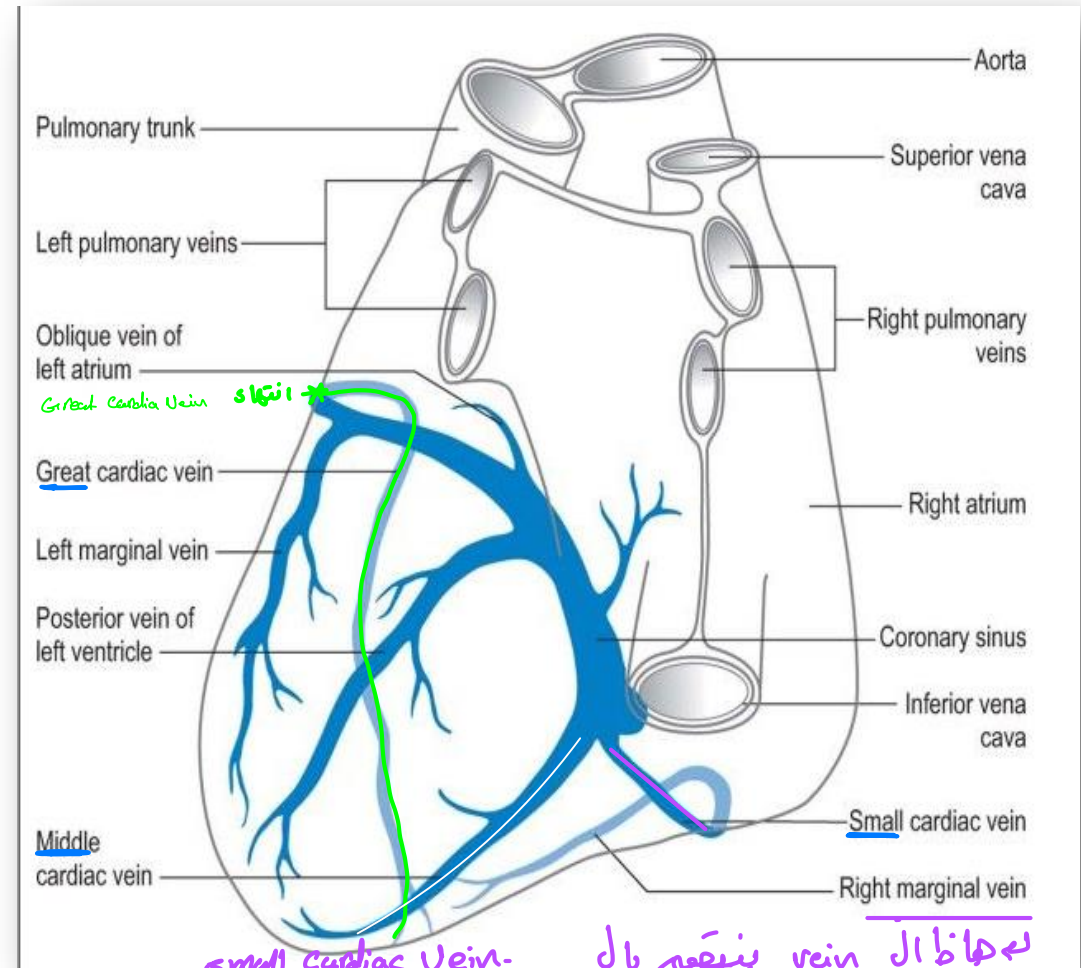
1- Great cardiac vein:

- It begins near the apex of heart and ascend in the anterior interventricular groove with (AIA).
- Ends in the left end of the coronary sinus.
- It receives tributaries from the left atrium and both ventricles.

2- Middle cardiac vein:

- It begins near apex of heart and runs in the posterior interventricular groove with (PIA).
- It ends in the coronary sinus near its termination.

it receives drainage of part of Diaphragmatic surface of Both ventricles



3- Small cardiac vein:

- **Lies in** the posterior part of coronary groove. *(Right)*
- It **receives** blood from the posterior part of the right atrium and ventricle.

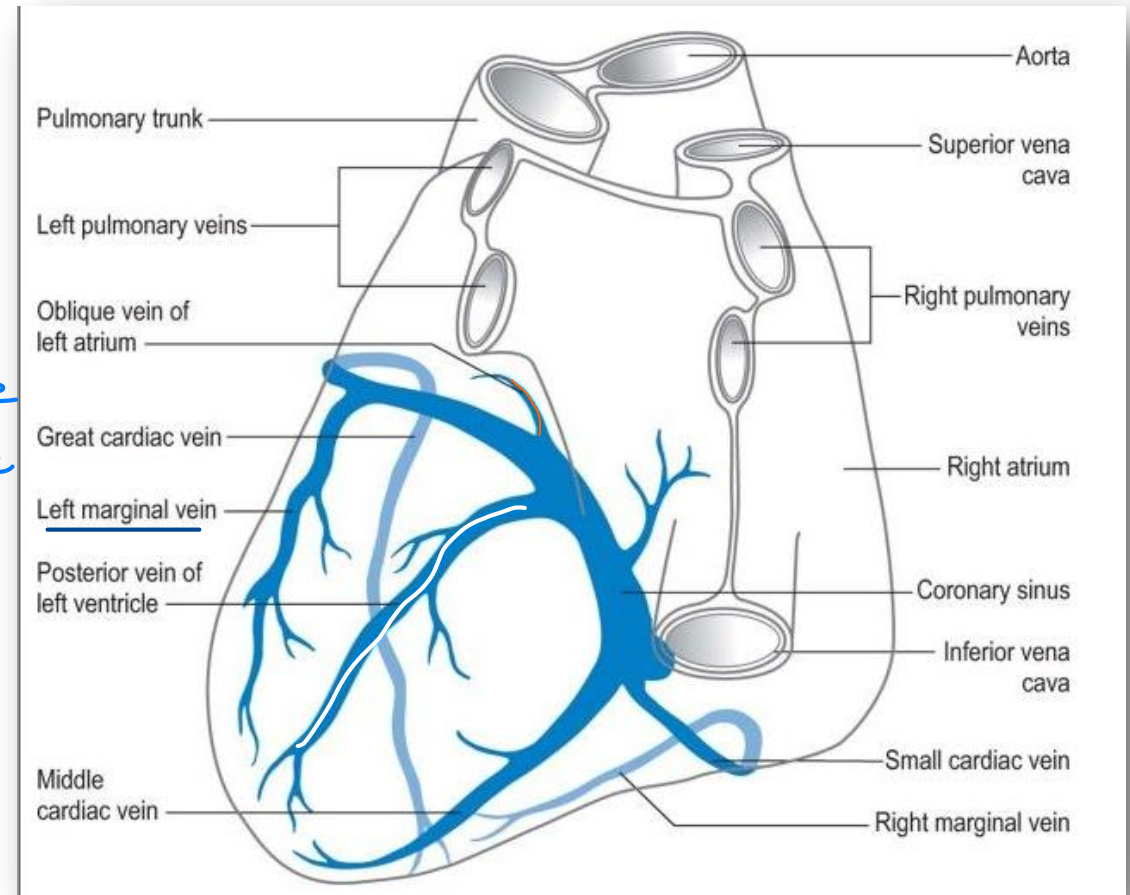
4- Oblique vein of the left atrium. *end in coronary sinus.*

(4-5) there name come from there site

5- Posterior vein of Left ventricle:

- It is **found on** the diaphragmatic surface of the left ventricle. *end on coronary sinus in its middle.*

6- left marginal nerve.



Anterior cardiac veins: → appear on the anterior aspect or sternocostal aspect of heart.

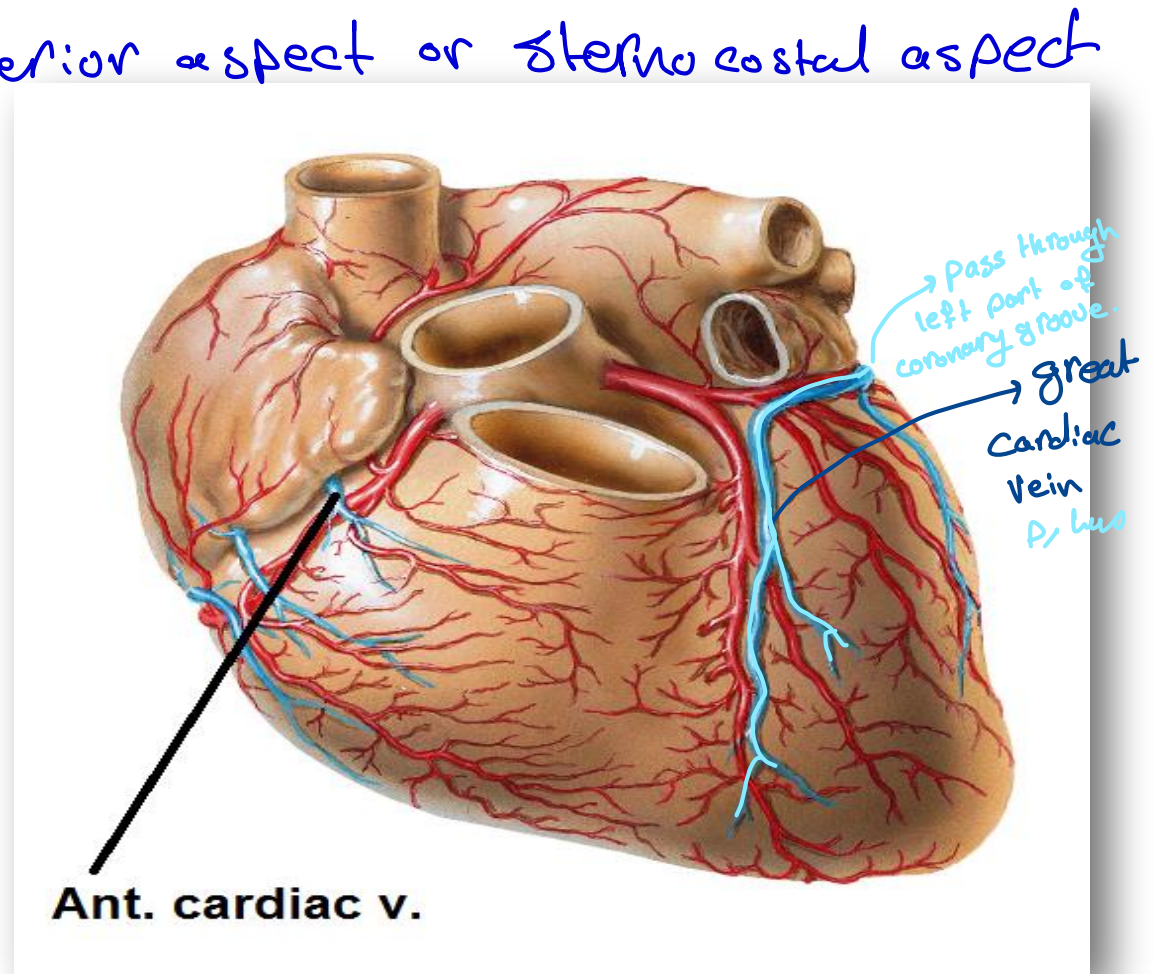
- Small veins run from the anterior surface of the right ventricle & right atrium to open directly in the right atrium.

من جدران حجرة

Venae cordis minimae:

- Small veins open in all chambers of the heart.

← ذلك يسهل على Drainage للchamber التي هو فيه

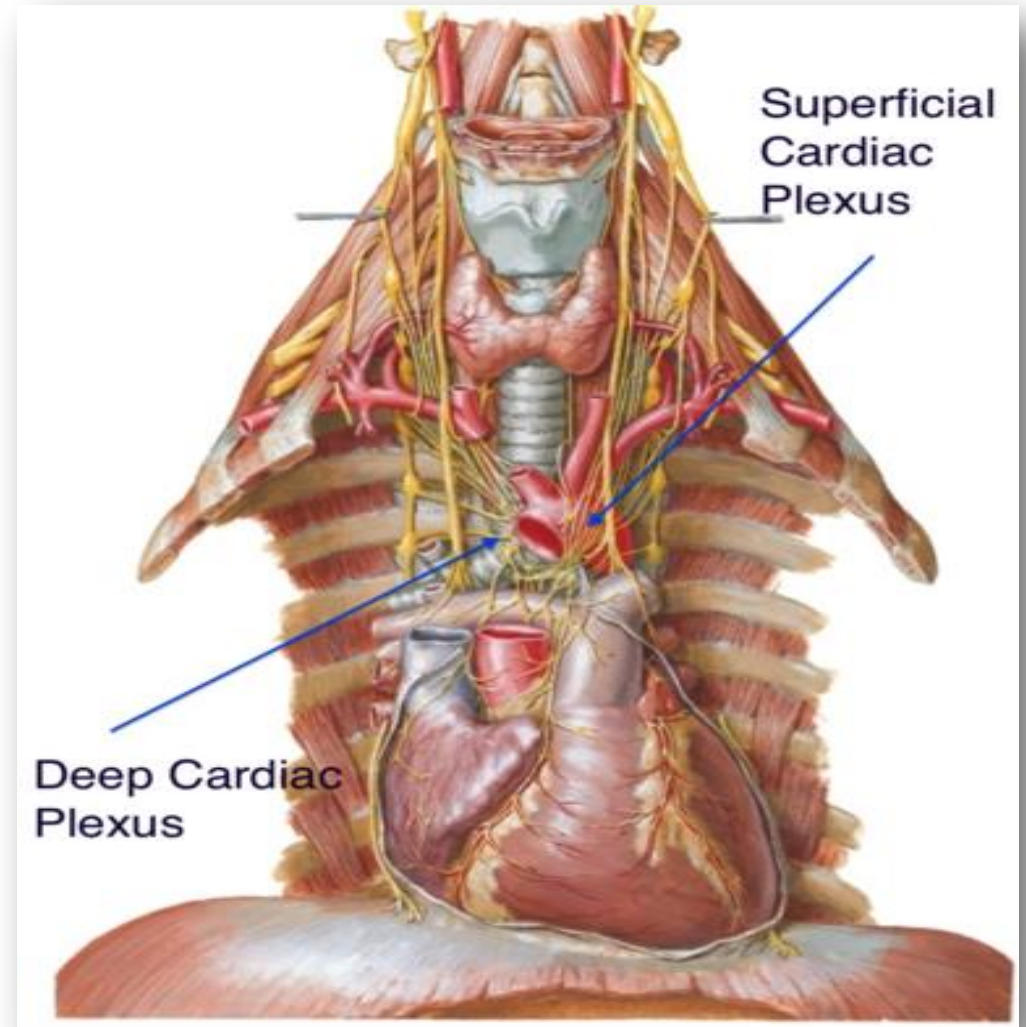


Nerve Supply of the Heart

- The heart is **innervated by sympathetic and parasympathetic fibers via the cardiac plexuses.**

Superficial Deep.

- **Sympathetic component of the cardiac plexus** comes from **cardiac nerves**, which originate from the cervical and upper thoracic portions of the sympathetic trunk.
- **Parasympathetic component of the cardiac plexus** originates from the **cardiac branches of the vagus nerve**.
Cranial nerve 10 ←
- **Sympathetic & parasympathetic fibers terminate on:** the sinuatrial and atrioventricular nodes, on cardiac muscle fibers, and on the coronary arteries.



Cardiac Pain:

- Afferent pain fibers run in the sympathetic fibers to enter spinal cord segment T1-T4 especially on left side.
- **Pain originating in the heart as the result of:** acute myocardial ischemia.

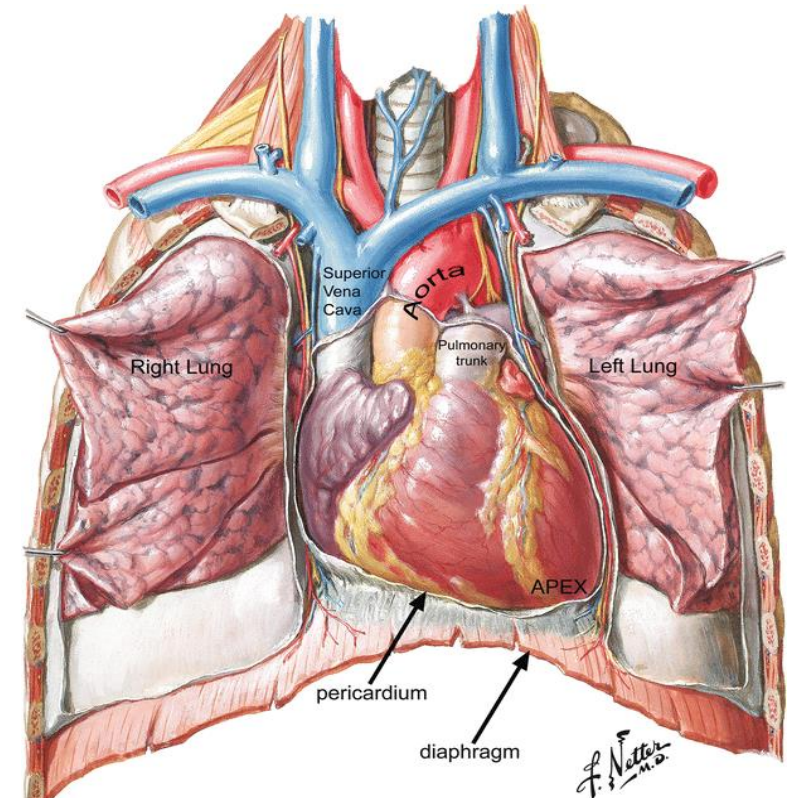
Referred cardiac pain

- It is referred to the skin areas that coincide with the dermatomes of somatic sensory fibers that enter the same spinal cord segment as afferent pain fibers coming from the heart.
- So cardiac pain is referred to the left side of chest (dermatome T3&T4) and medial aspect of left arm (dermatome T1&T2).

Great arteries of the heart

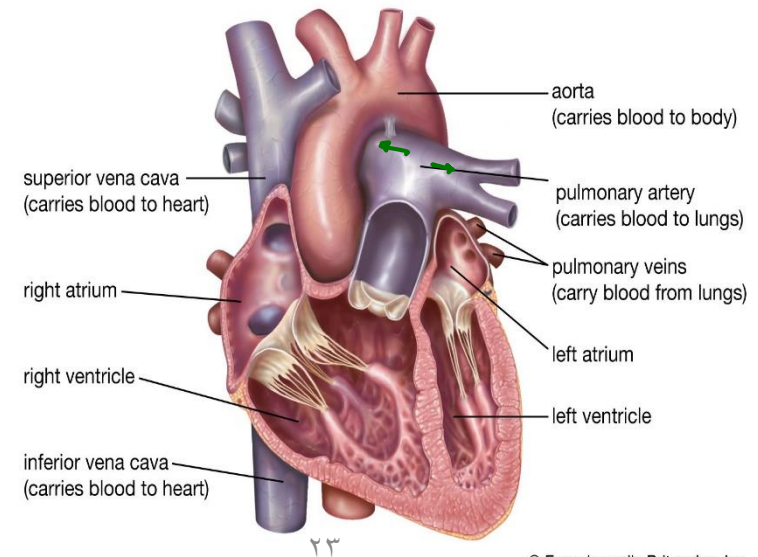
Pulmonary Trunk

- It leaves the upper part of the **right ventricle** and runs **upward, backward, and to the left**.
- It is about (5 cm) long.
- It **terminates in the concavity of the aortic arch by dividing into right and left pulmonary arteries**.
- Together with the ascending aorta, it is enclosed in the fibrous pericardium and a sheath of serous pericardium.



Branches

- **Right pulmonary artery;** Runs to the **right behind the ascending aorta and superior vena cava to enter the root of the right lung**.
- **Left pulmonary artery;** Runs to the **left in front of the descending aorta to enter the root of the left lung**.

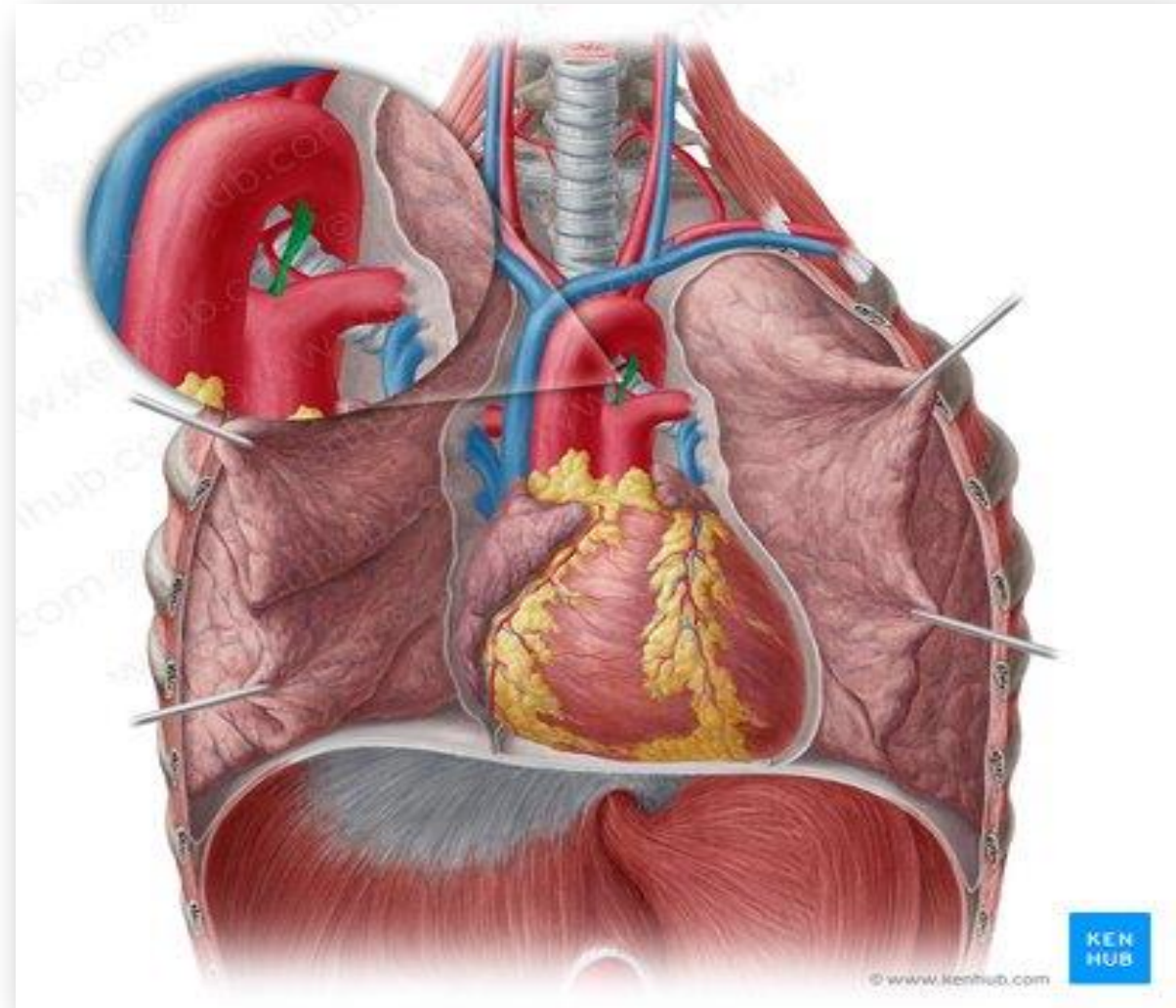


Ligamentum arteriosum:

- Is a short fibrous band that connects the bifurcation of pulmonary trunk with the arch of the aorta.
- It is the remnant of the ductus arteriosus.

Birth لا يزال ال ←
obliteration ال
ligaments ال

ductus arteriosus
↓
in the Development
of fetus.



Ascending aorta

Origin:

- From the **left ventricle** at the level of **left 3rd costal cartilage**.
- At its origin, there were three outward bulges (sinuses of Valsalva), posterior (non-coronary), left and right aortic sinuses.

start

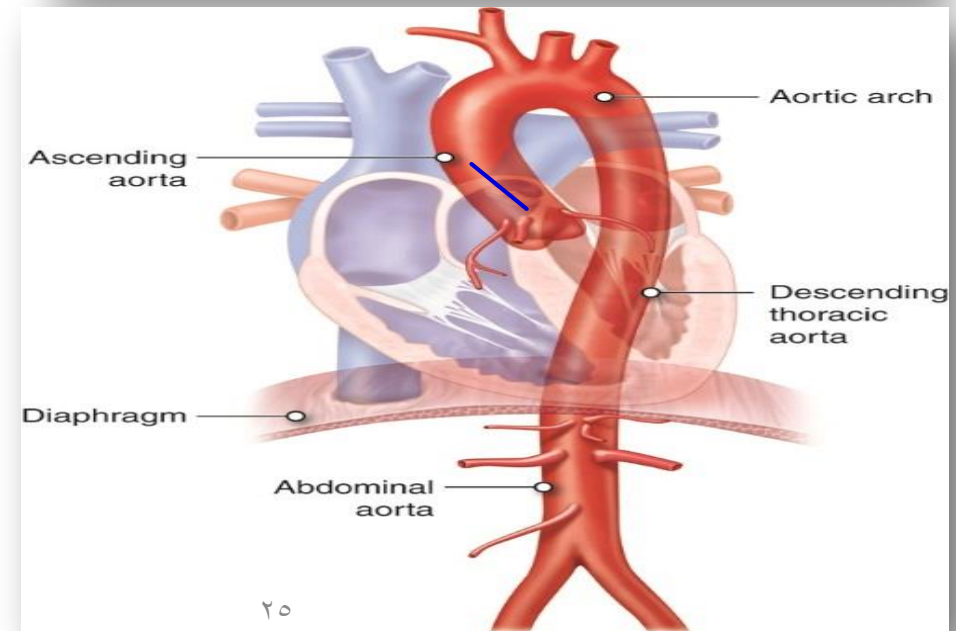
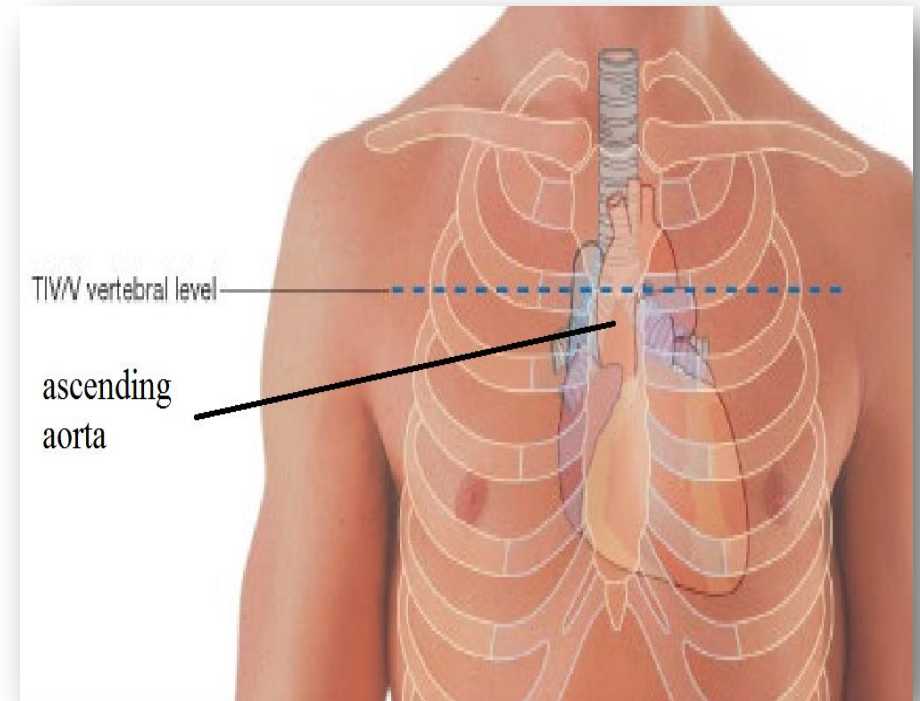
Course: It ascends obliquely to the right.

↳ upward to the Right

End:

- It ends at the level of the **right second costal cartilage**, where it becomes **continuous** with the arch of the aorta.

end



Relations of the ascending aorta

Anterior relations:

- Pulmonary trunk.
- Right auricle.
- Right pleura & lung. →

قسط
↳ impression on the Right lung.

Posterior relations:

- Right pulmonary artery.

Right to it:

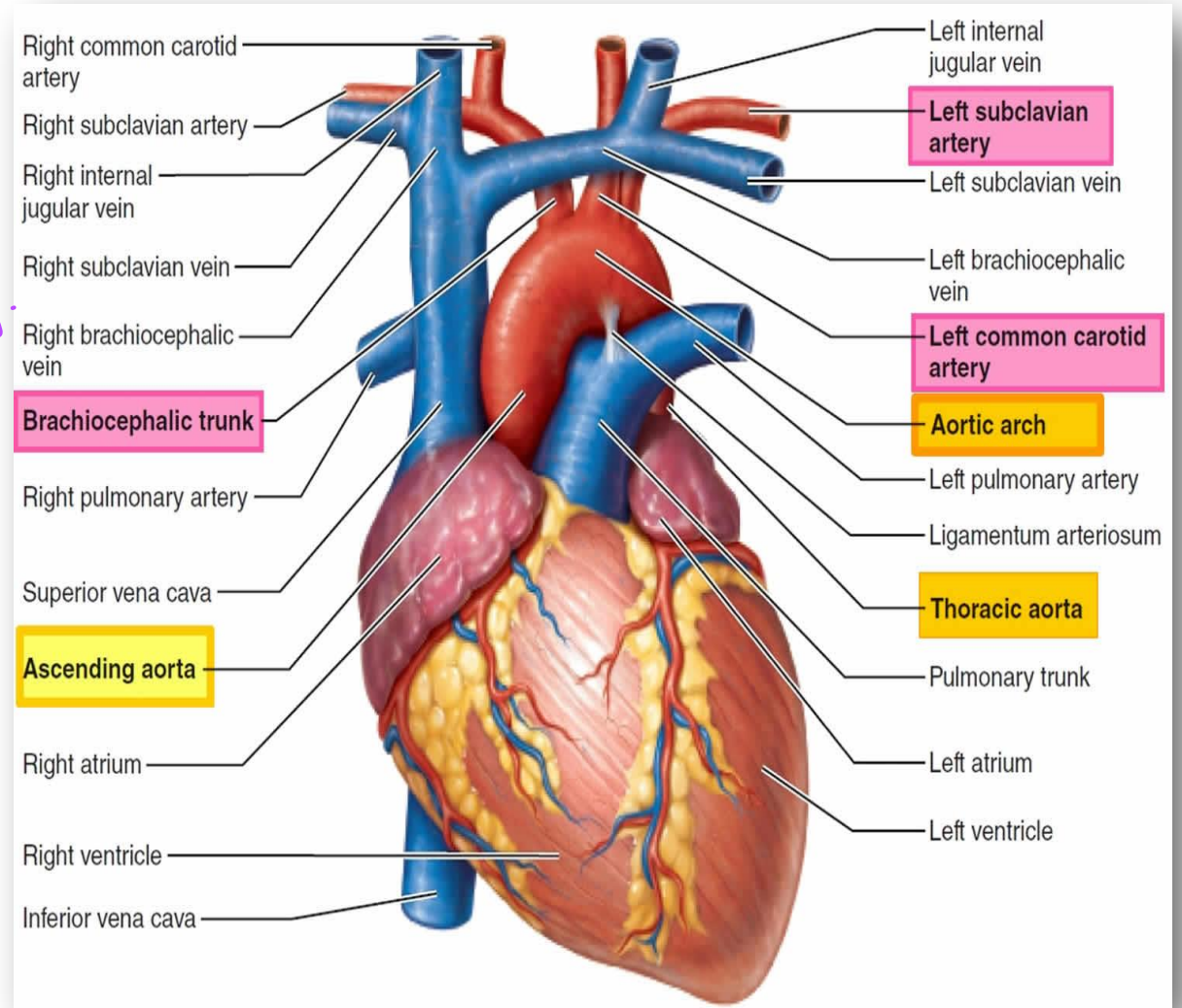
- Right atrium & SVC.

Left to it:

- Left atrium & Pulmonary trunk.

↳ anterior to the left

Branches: Right & Left coronary arteries.



Quiz

Coronary angiographs of a 44-year-old male patient reveal an occlusion of the anterior interventricular branch of the left coronary artery produces infarction in which one of the following areas?

- A) The entire diaphragmatic surface of the left ventricle X
- ~~B) The anterior part of the interventricular septum.~~
- C) The posterior wall of the left atrium. X
- D) The right auricle. X

supply by Circumflex of Left coronary A

R. coronary A →
R. Atrium →

near posterior interventricular groove supply by Branch posterior interventricular Artery

Rest; supply by circumflex

Which of the following veins accompanies the posterior interventricular artery. ^{→ go with.}

- (A) Great cardiac vein → AIA
- (B) Middle cardiac vein → PIA
- (C) Anterior cardiac vein
- (D) Small cardiac vein
- (E) Oblique veins of the left atrium

دعواتكم

Quiz

Coronary angiographs of a 44-year-old male patient reveal an occlusion of the anterior interventricular branch of the left coronary artery produces infarction in which one of the following areas?

- A) The entire diaphragmatic surface of the left ventricle
- B) The anterior part of the int
- C) The posterior wall of the l
- D) The right auricle.

Which of the following veins accompanies the posterior interventricular artery.

- (A) Great cardiac vein
- (B) Middle cardiac vein

Background image showing a table of video lectures and a Weebly logo.

المحاضرة	الفديوهات المطلوبة 1	الفديوهات المطلوبة 2	الفديوهات المطلوبة 3
Lecture 1	External features & relations	Pericardial and Sinuses Pericardium من اول الفيديو الى الدقيقة 13:16	ملاحظة: آخر المحاضرة في سلايدين شرحهم مع فيديوهات محاضرة 2
Lecture 2	Internal features & Valves	conducting system من الدقيقة 32:30 الى نهاية الفيديو	-
Lecture 3	conducting system cont.	Blood Supply and Nerve Supply of the Heart	-
-	-	Histology of Blood Vessels	Cardiovascular Revision Questions on Histology
-	-	1.Histology of general structure of blood vessels and large	Questions on Histology of The blood vessels

POWERED BY weebly

in
e left atrium

لأهمية مادة الأناطومي في هذا السيستم رح نفصل كل محاضرة و جنبها الفيديوهات المطلوبة من المصادر يلي رح نشوفها أحسن اشي ان شاء الله

المحاضرة	الفيديوهات المطلوبة 1	الفيديوهات المطلوبة 2	الفيديوهات المطلوبة 3
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Lecture 3	conducting system cont.	Blood Supply and Nerve Supply of the Heart	
		Histology of Blood Vessels 1.Histology of general structure of blood vessels and large	Cardiovascular Revision Questions on Histology Questions on Histology of the blood vessels