REVISION OF CVS MODULE

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Pericardium & External features of the heart

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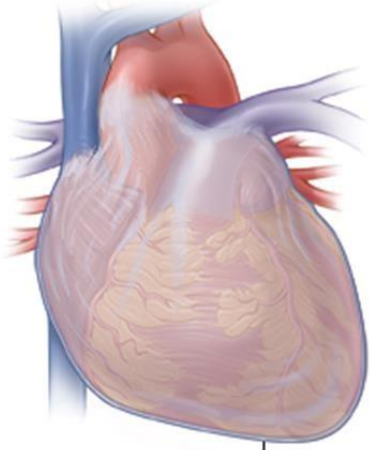
The Pericardium

Definition: fibro-serous sac that surrounds the heart and the beginning of the great vessels.

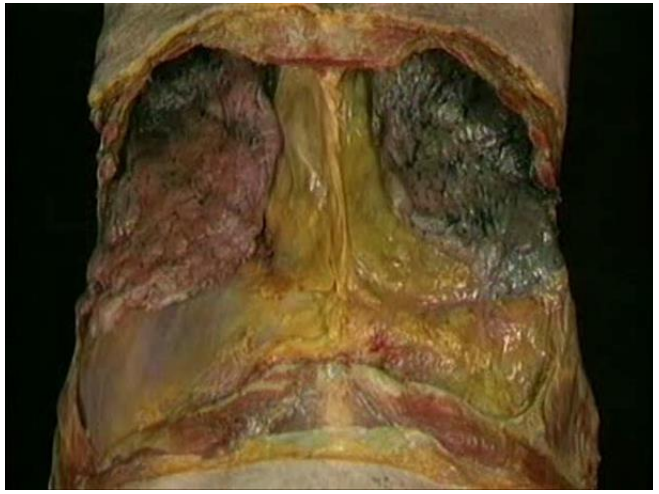
Parts:

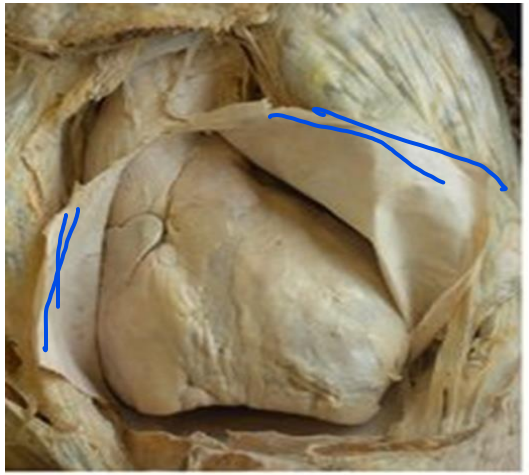
- **Fibrous pericardium:** the outer fibrous layer.
- **Serous pericardium:** the inner serous sac.

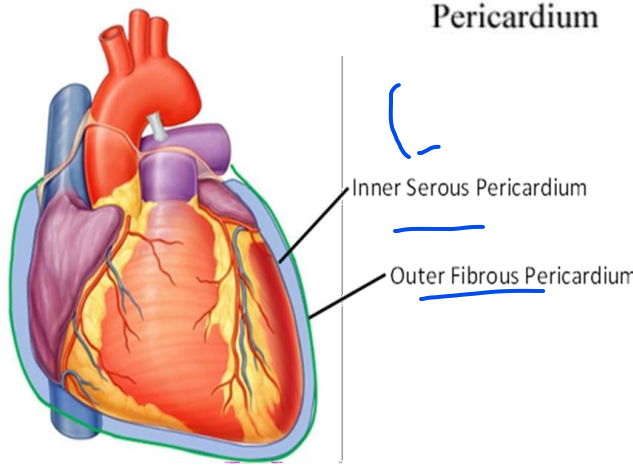
parietal
visceral



Pericardium



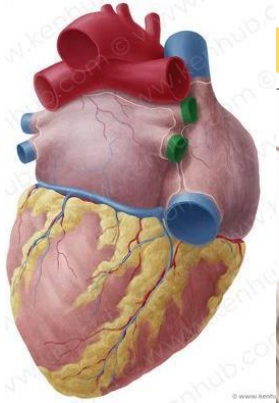


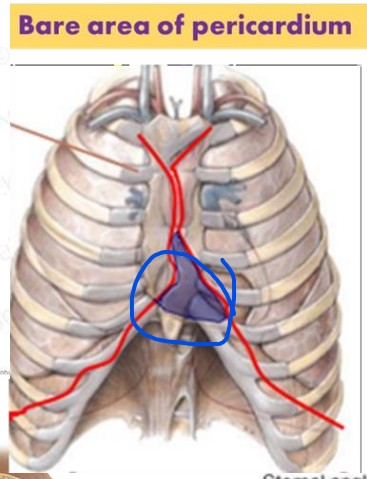


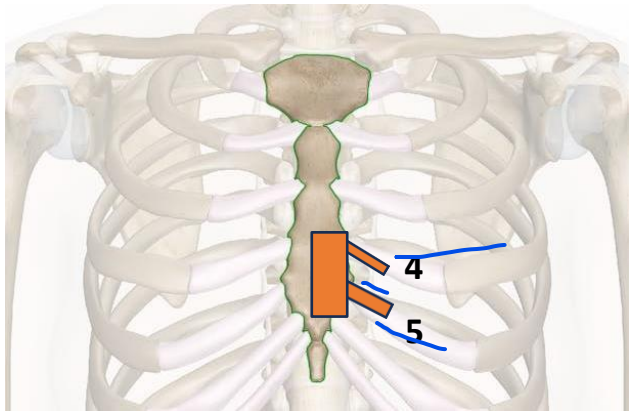
The Fibrous pericardium

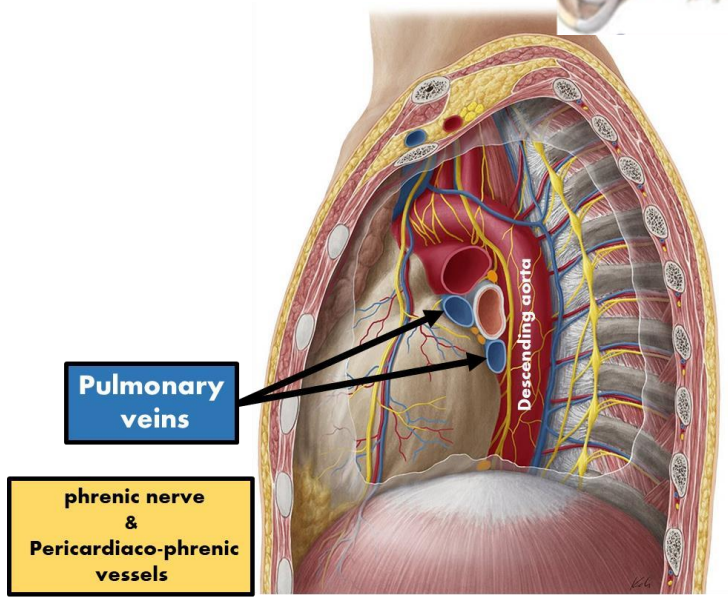
Bare area of pericardium:

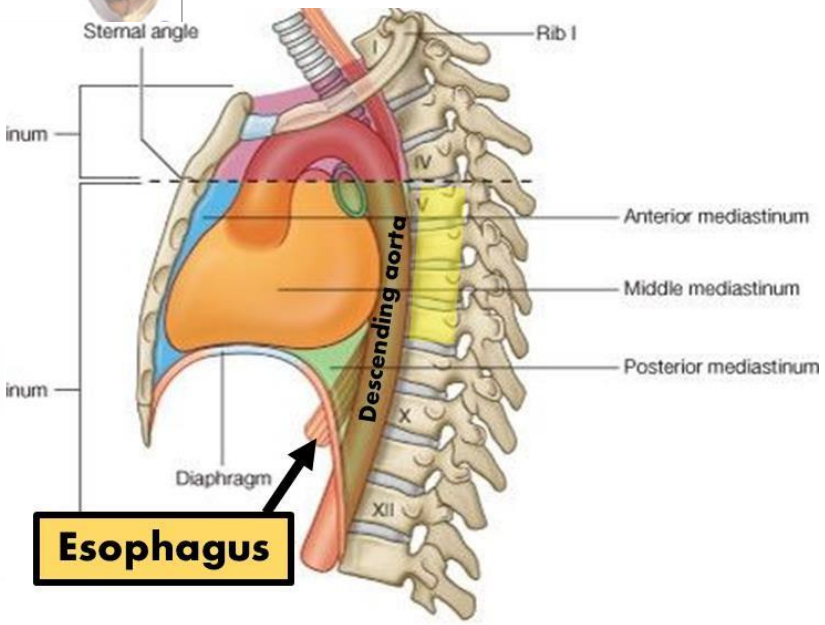
- This area of the pericardium is not covered by lungs and pleurae.
- It lies behind the left half of the lower part of the body of sternum and adjoining left 4th and 5th costal cartilages.











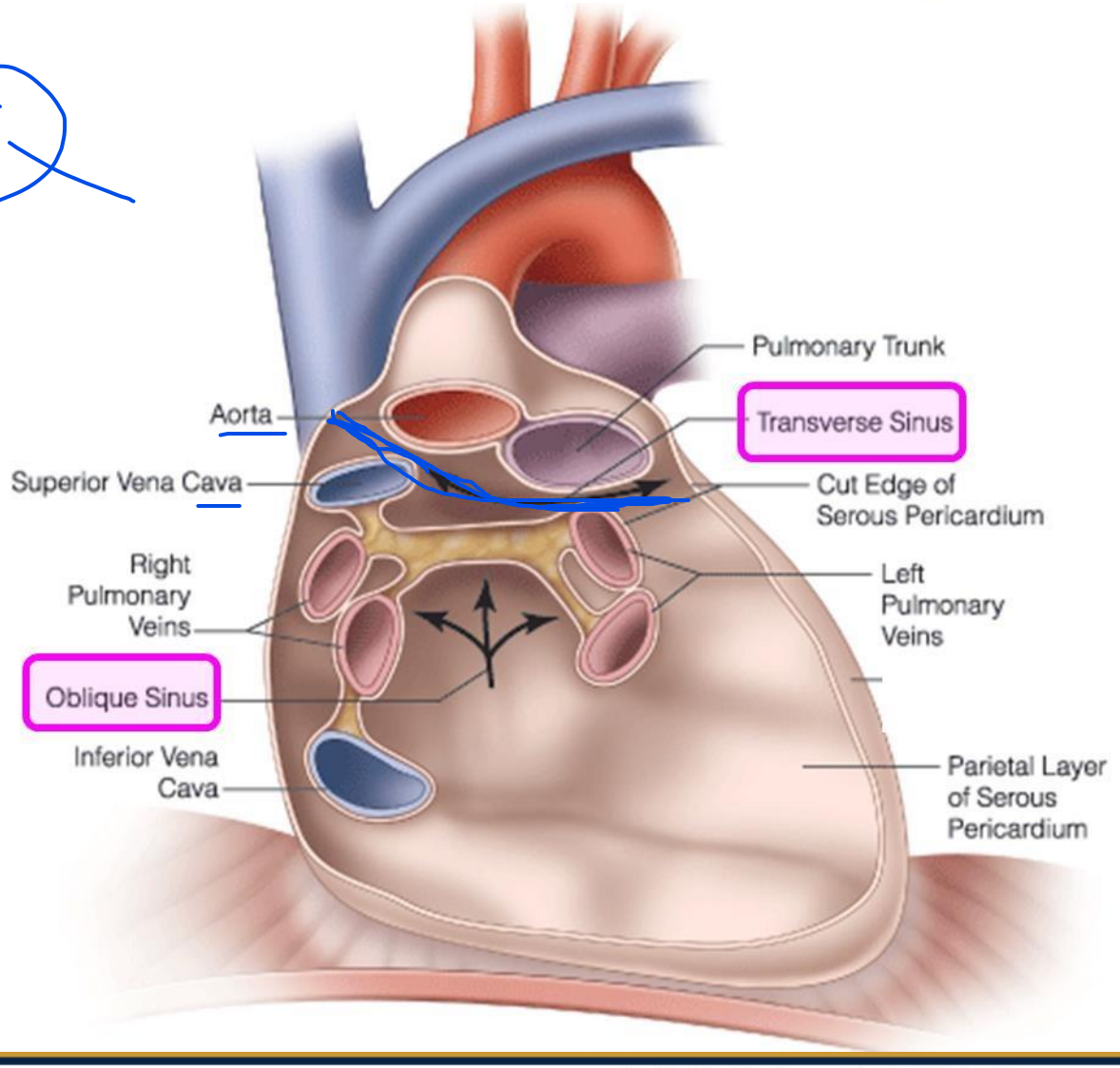
The serous pericardium

Sinuses of the pericardium:

Transverse sinus:

- **How to reach the transverse sinus:**

  pass your finger between the ascending aorta and S.V.C. it will come out between the pulmonary trunk and the left auricle. Your finger is now traversing the sinus.

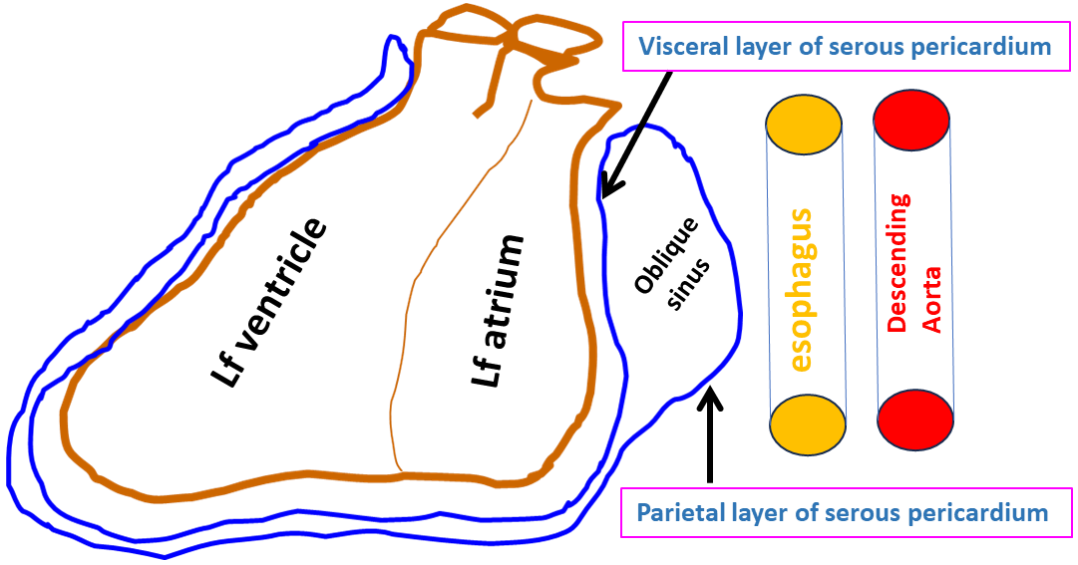


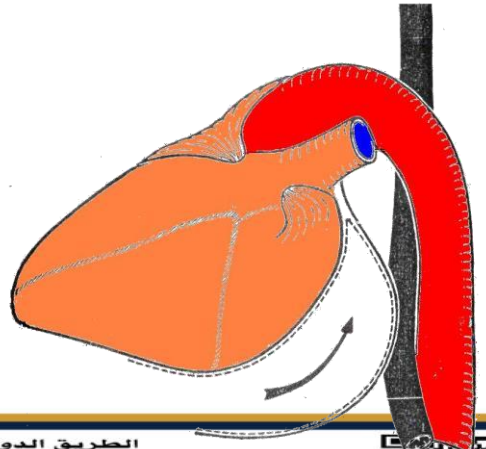
The serous pericardium

- Oblique sinus:
  - Definition & site:

recess of pericardial cavity behind the left atrium.

post





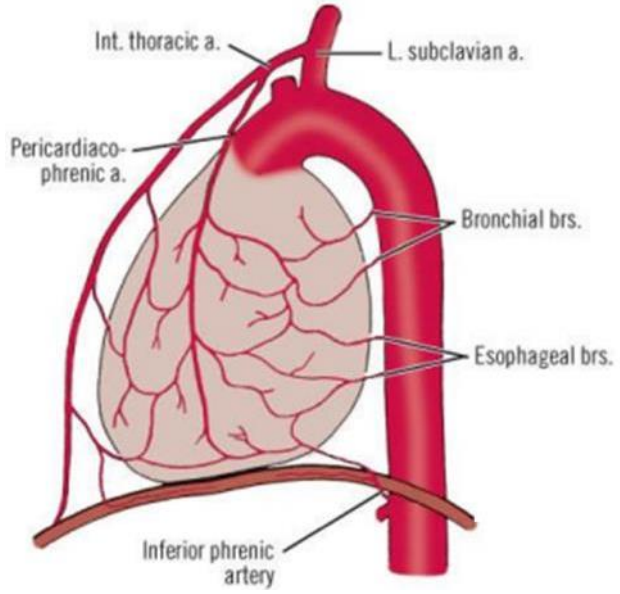
Pericardium (Arterial supply)

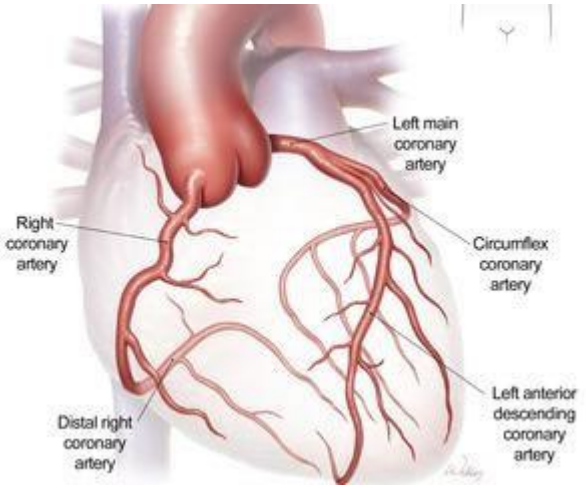
Arterial supply of the pericardium:

Visceral pericardium: right &left coronary arteries.

Fibrous & parietal pericardium:

- Pericardiaco-phrenic arteries.
- Musculo-phrenic.
- Descending Aorta.





External features of the heart

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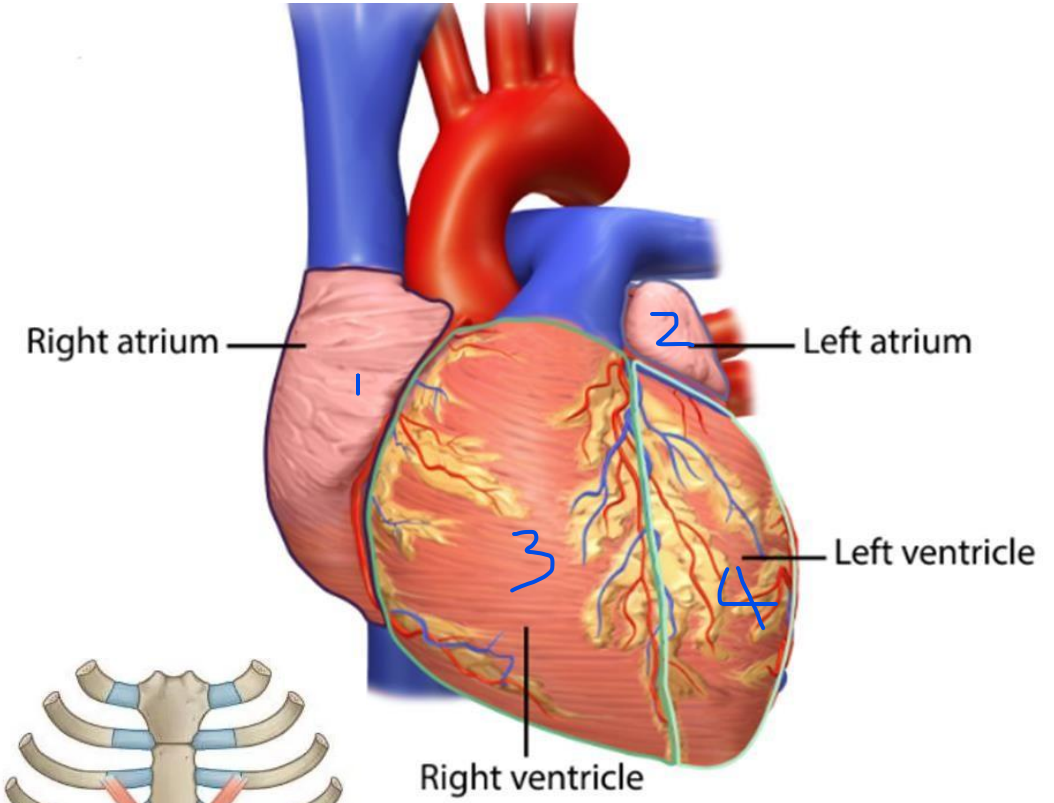
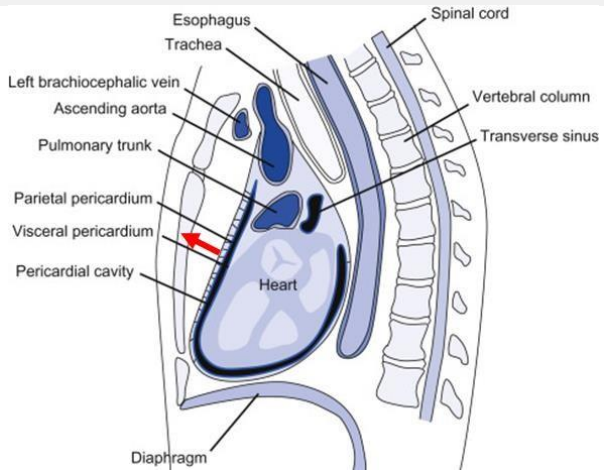
External features of the heart

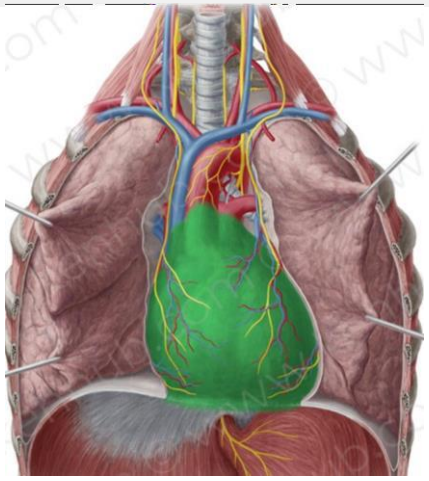
Surfaces of the heart:

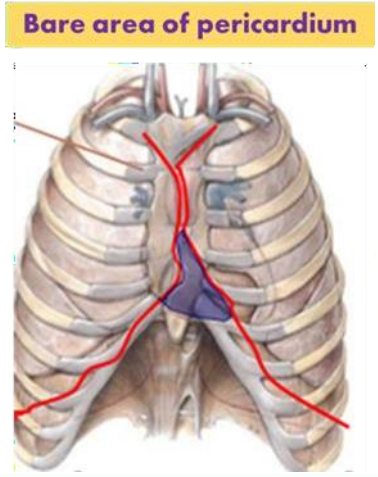
➢ Sternocostal (anterior) surface:

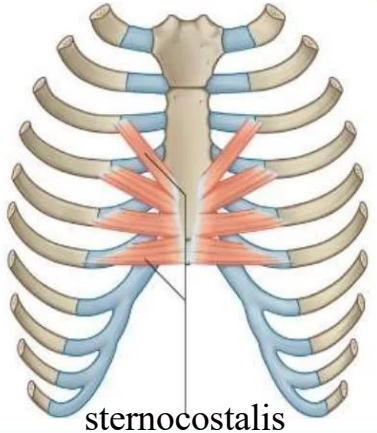
- Formed by the 2 atria and the 2 ventricles.









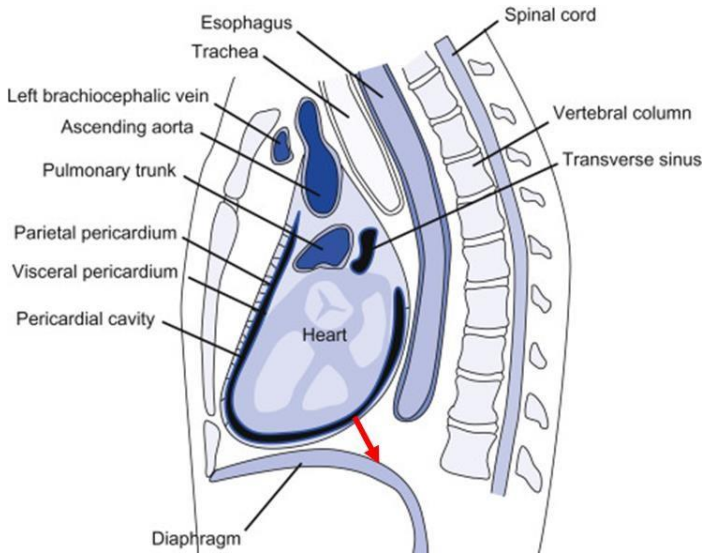


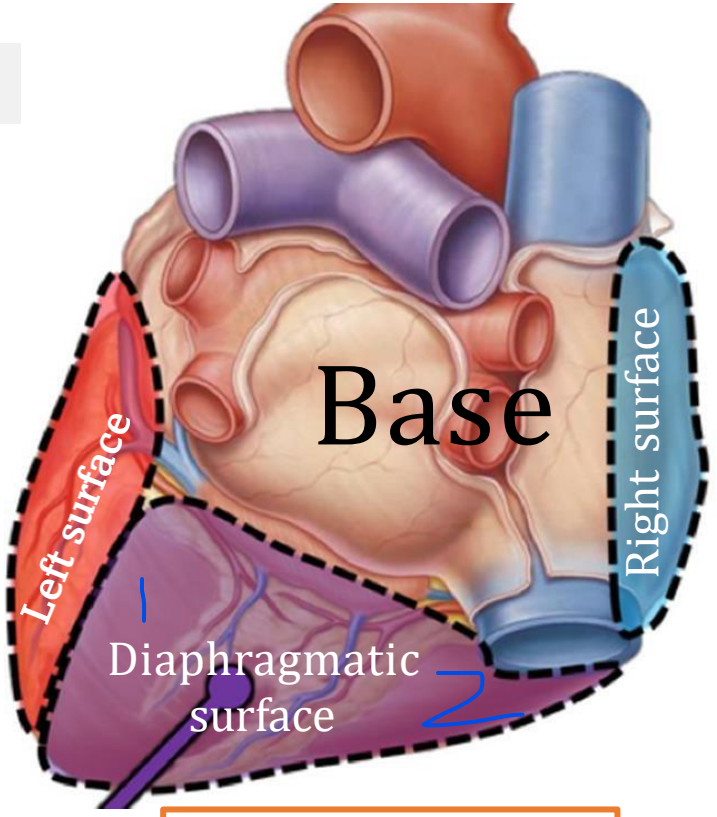
sternocostalis

External features of the heart

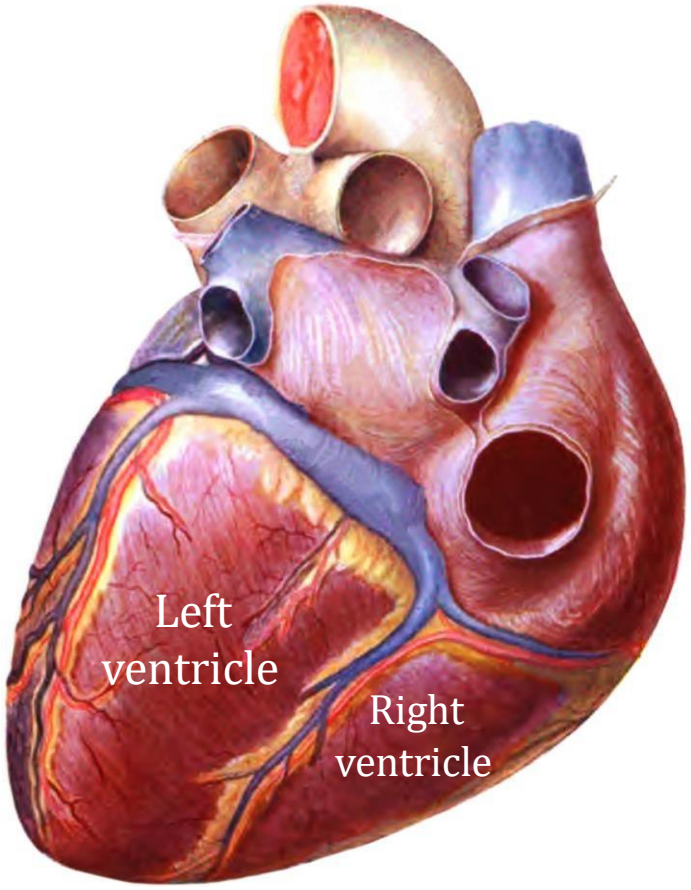
Diaphragmatic surface:

- Formed by the 2 ventricles (mainly the left).





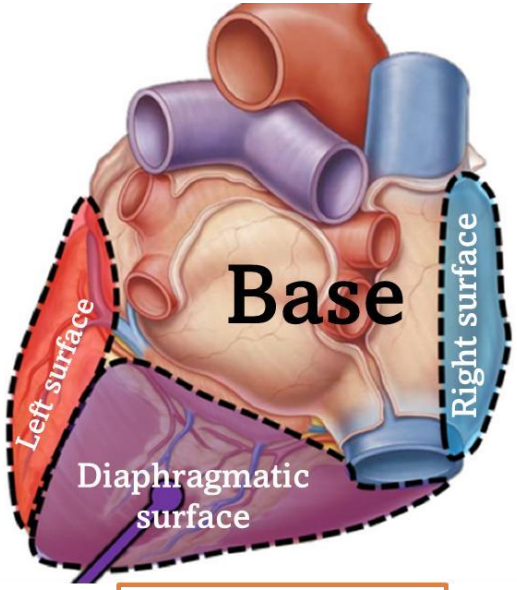
Posterior view



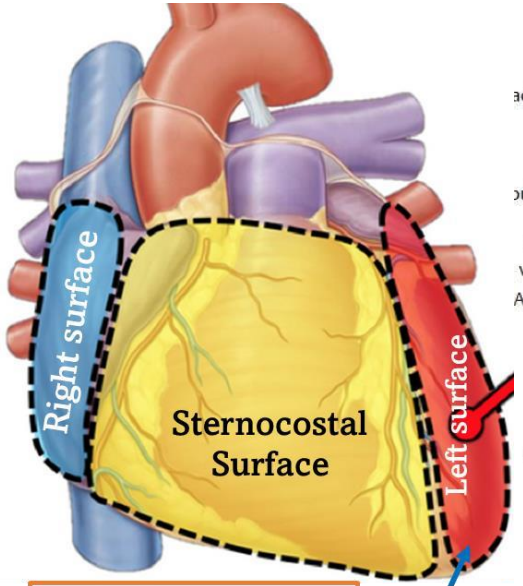
External features of the heart

Left surface:

- Formed by the left ventricle (mainly) and left auricle (small upper part)..

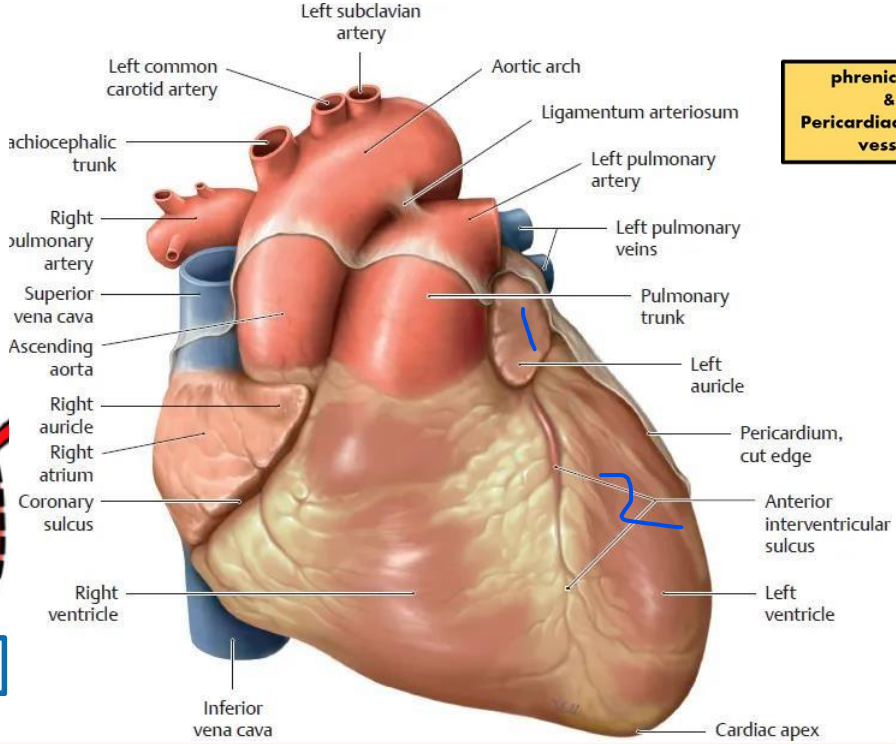


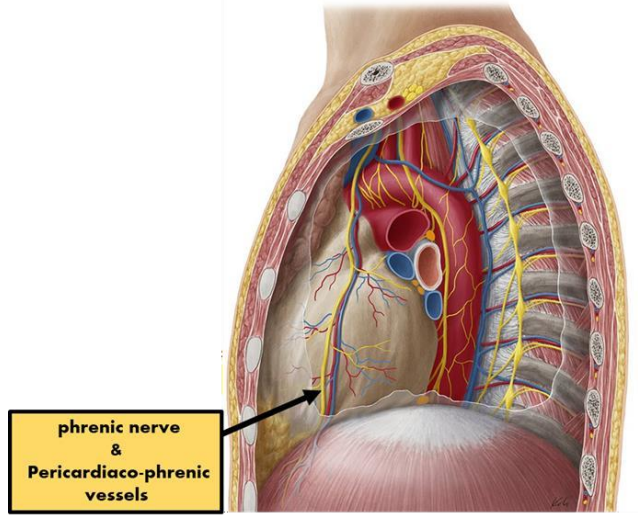
Posterior view



Anterior view

Apex

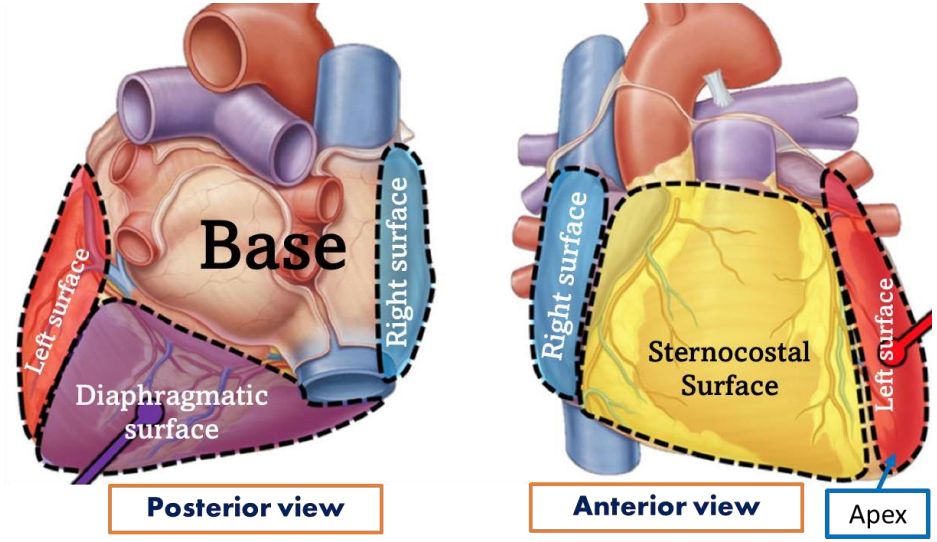


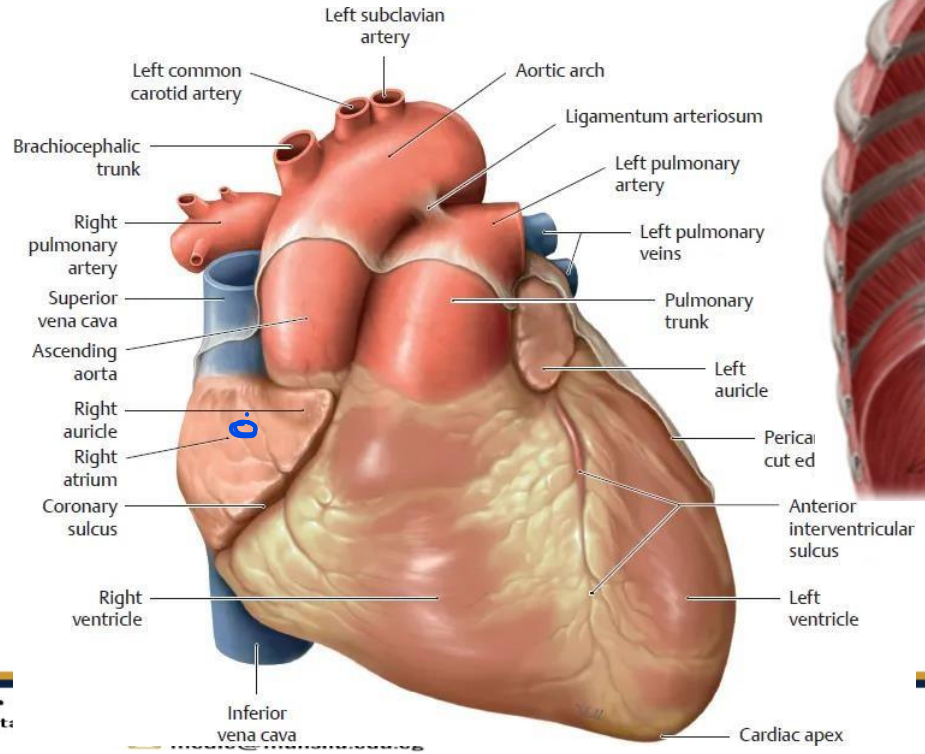


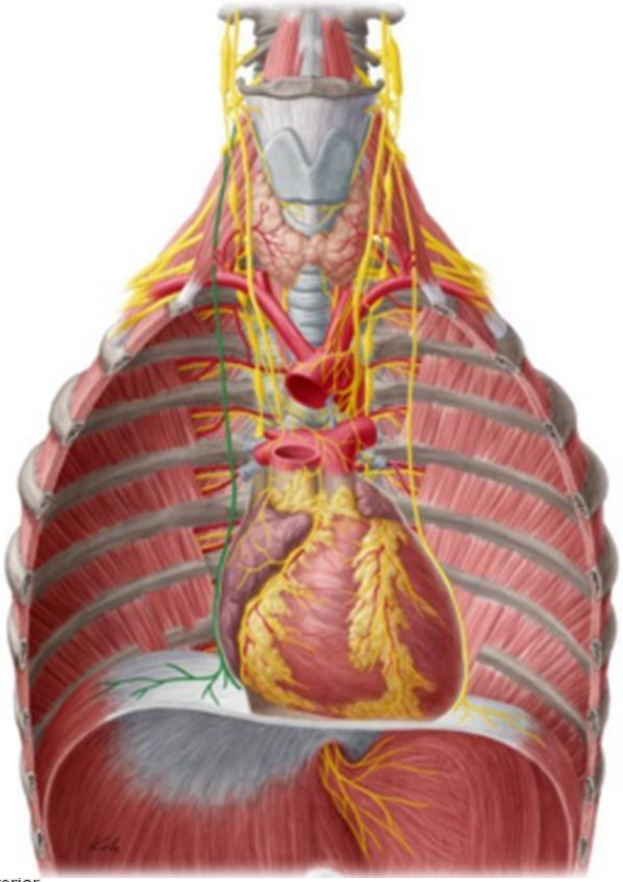
External features of the heart

Right surface:

- Formed by the right atrium.







External features of the heart

Grooves of the heart:

A. Coronary (atrio-ventricular) groove:

- Contains the right and left coronary arteries and coronary sinus..

right: rt coronary and small cardiac vein
left: lt coronary and great cardiac vein

B. Anterior interventricular groove:

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- Contains the anterior interventricular artery and great cardiac vein.

C. Posterior interventricular groove:

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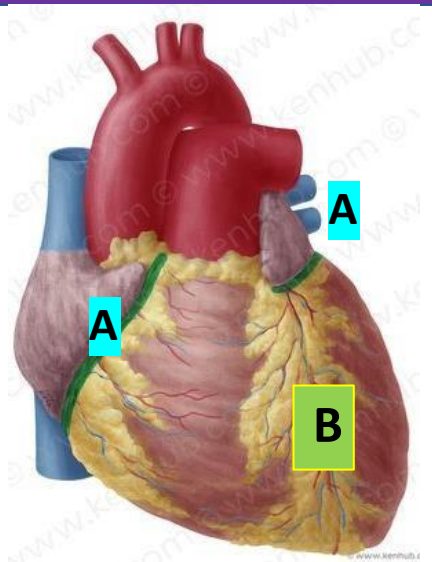
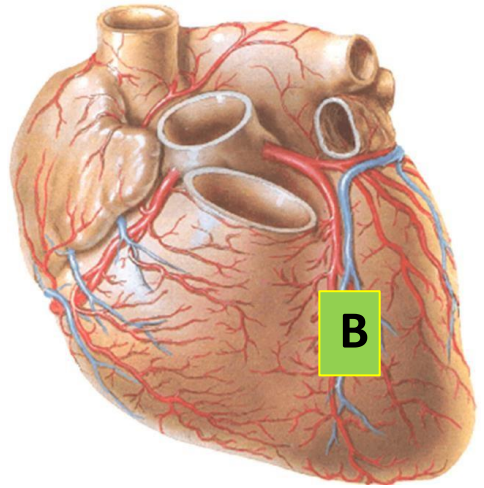
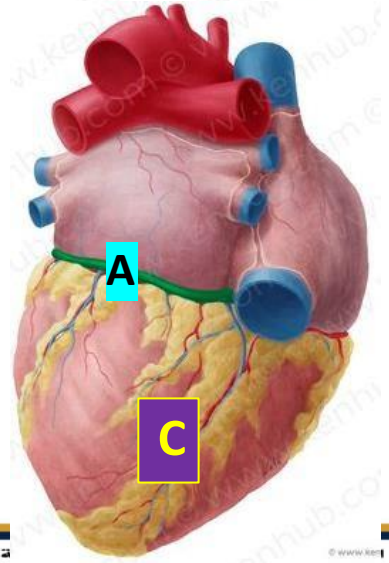
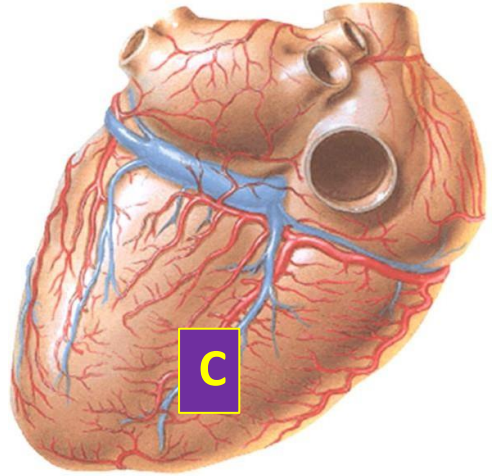
- Contains the posterior interventricular artery and middle cardiac vein.









Internal features of the heart

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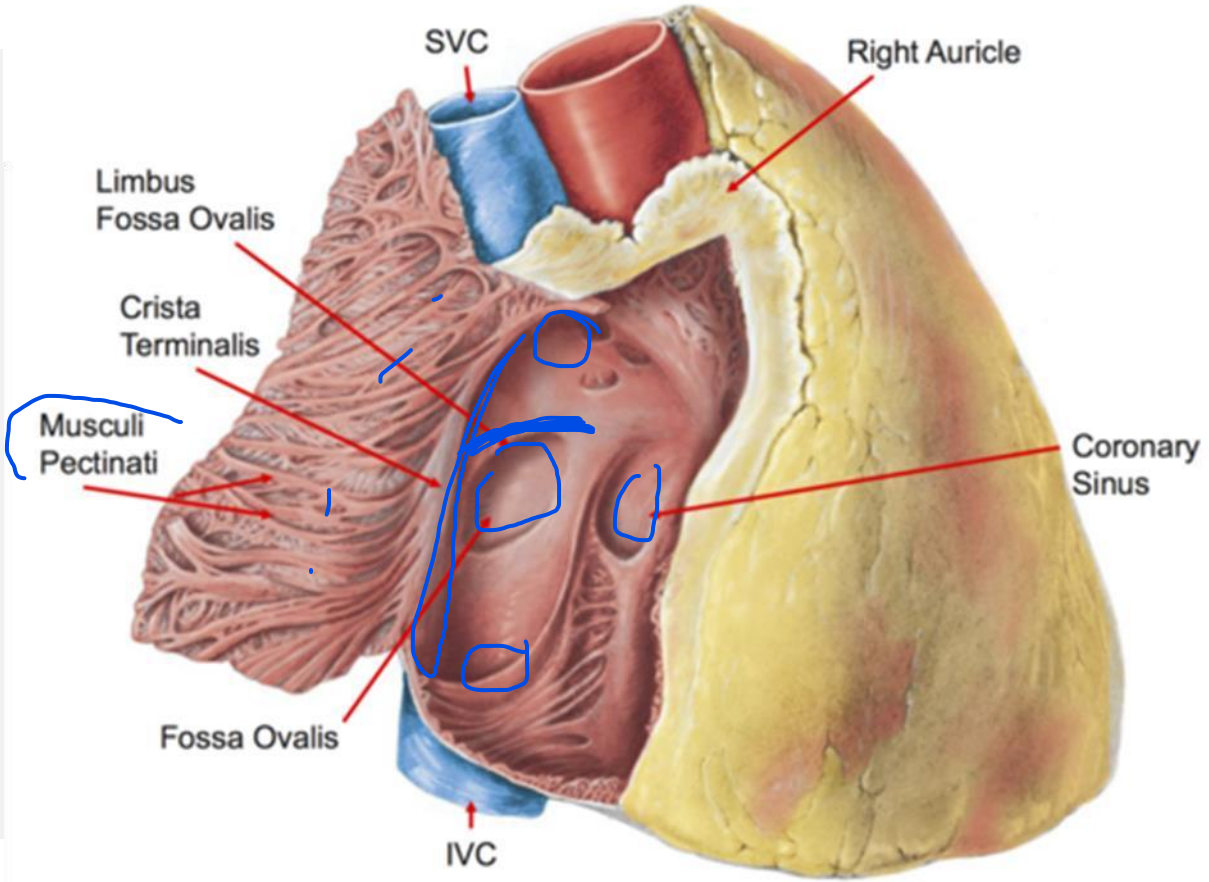
Internal Features of the heart

A. Right atrium: the interior of the right atrium shows: 3 walls, crista terminalis and orifices.

- **Crista terminalis:**
  - Vertical ridge on the lateral wall of the atrium extending from the opening of SVC to IVC.
  - Corresponds to the sulcus terminalis on the outer surface.
  - Separates the rough anterior part from the smooth posterior part.



Internal Features of the heart

- **Walls:**

✓ **Anterior wall:** rough due to presence of musculi pectinati (muscular ridges extending from the crista terminalis).

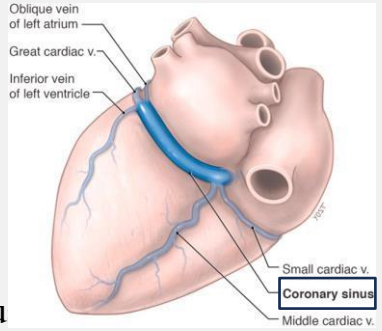
✓ **Posterior wall (sinus venarum):** smooth and receives the following orifices:

- **SVC:** in the upper part of the posterior wall. Has no valve.
- **IVC:** in the lower part of the posterior wall. Has a valve.
- **Coronary sinus:** lies between the orifice of IVC and the tricuspid orifice. Has a valve.

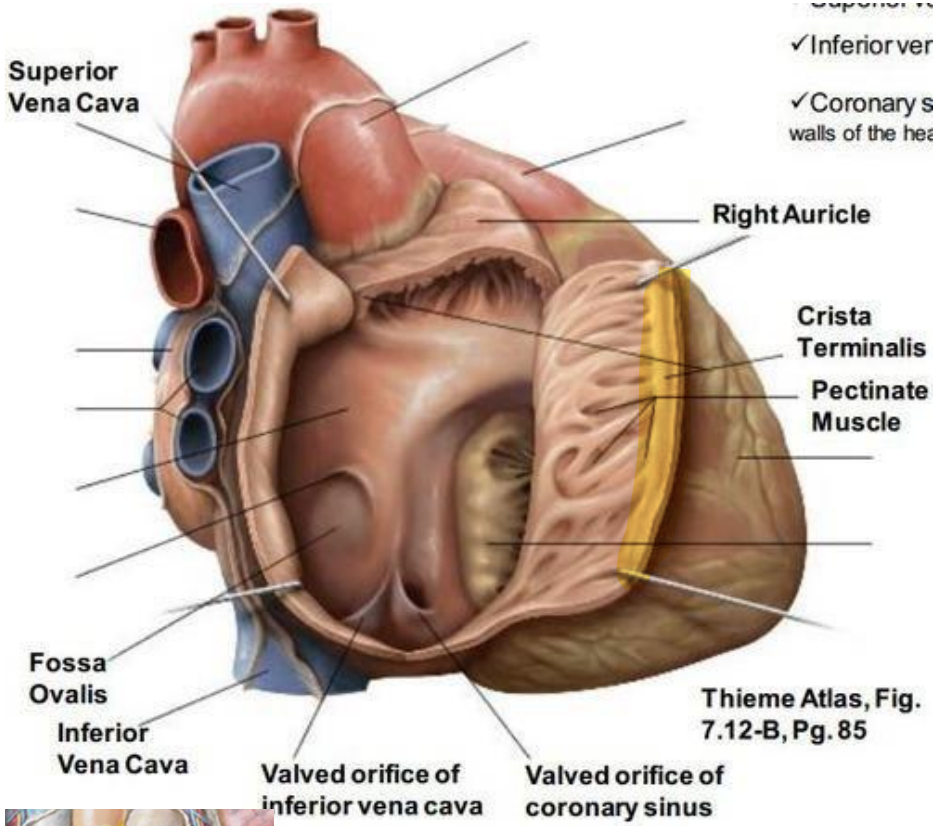
✓ **Septal wall:** formed by the interatrial septum and shows:

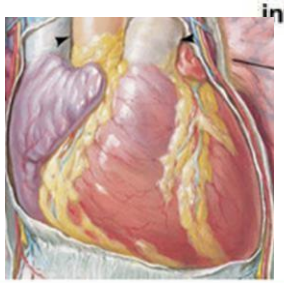
- **Fossa ovalis:**
  - ✓ oval depression in the lower part of the wall.
  - ✓ Represents the septum primum of the fetus.
- **Annulus ovalis:**
  - ✓ The crescentic margin of the fossa ovalis.
  - ✓ Represents the lower margin of septum secundum of the fetu

MCQ



N.B. The right auricle is a conical projection from the anterior wall to increase the capacity of the atrium.

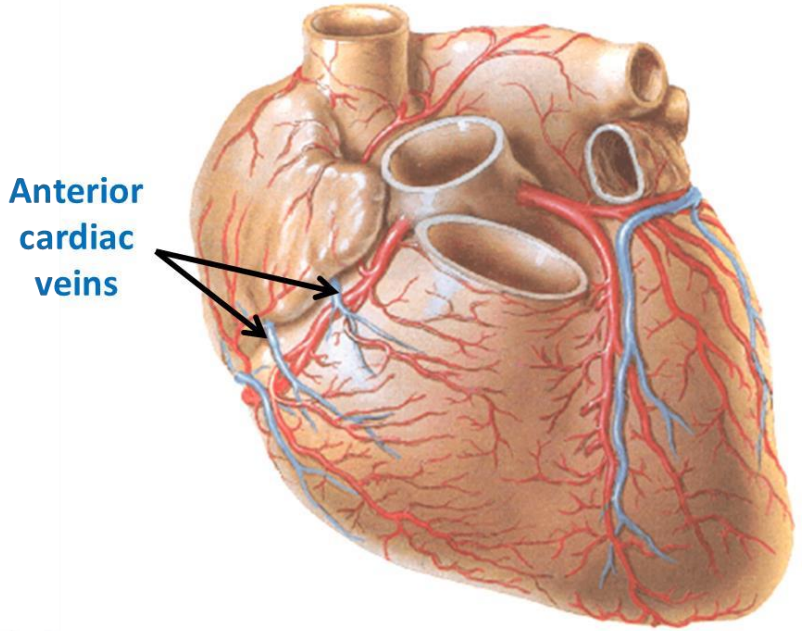


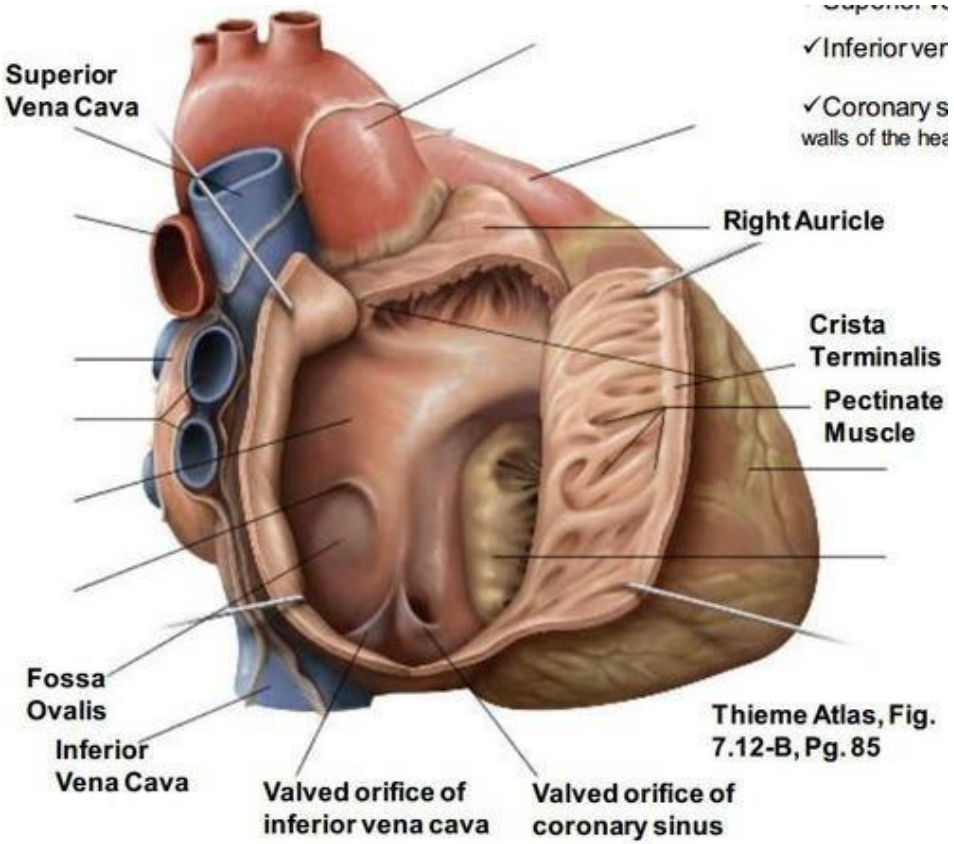


Internal Features of the heart

Orifices:

- **Orifices in the posterior wall:** SVC, IVC & coronary sinus.
- **Openings of anterior cardiac veins.**
- **Right atrio-ventricular (A-V) orifice:** lies between the right atrium and right ventricle.



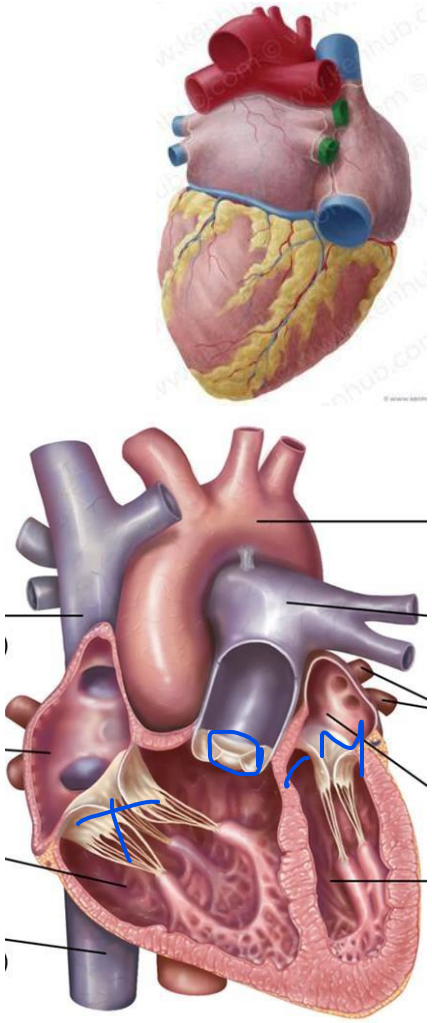


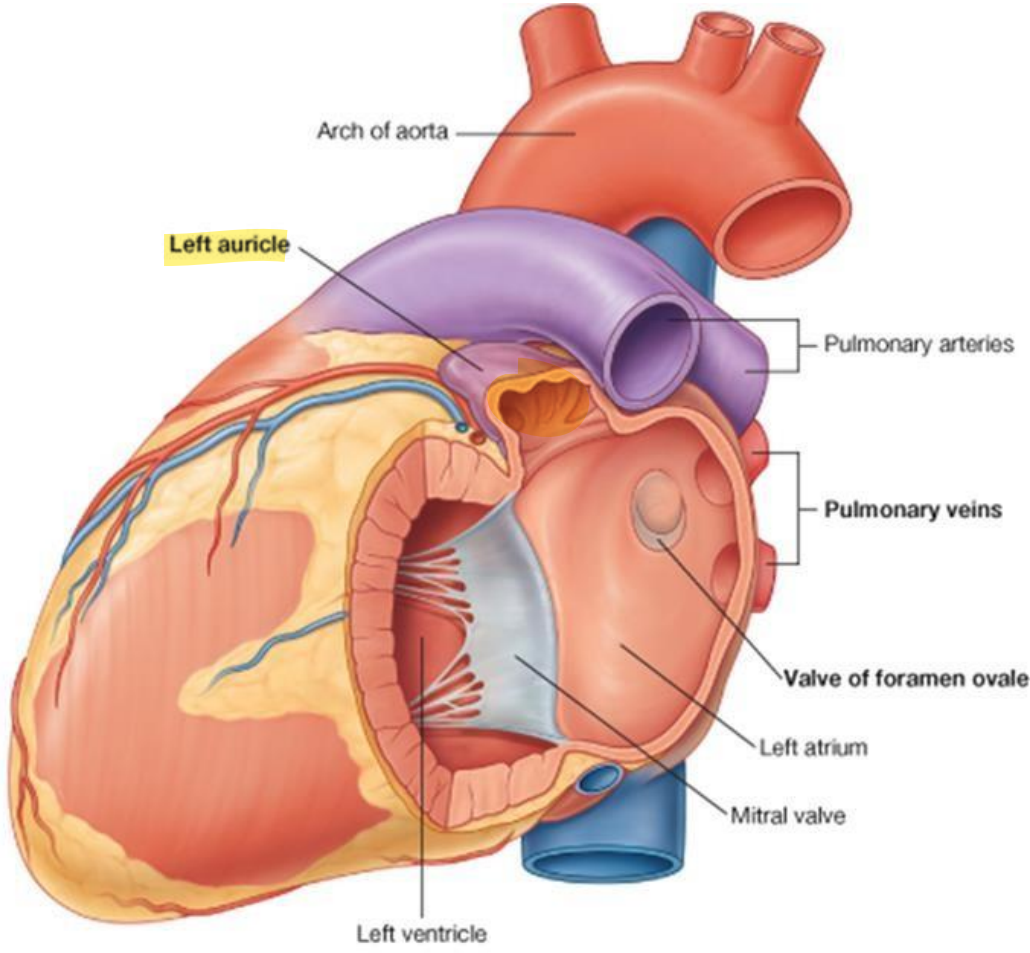
Internal Features of the heart

the left atrium

differs from the right atrium in the following features:

- **Crista terminalis:** absent. MCQ
- **Musculi pectinati** are confined only to the auricle.
- **The posterior wall** shows the orifices of the four pulmonary veins (has no valves).
- **The septal wall** has no fossa ovalis or annulus ovalis.
- **The mitral orifice** connects the left atrium to the left ventricle.



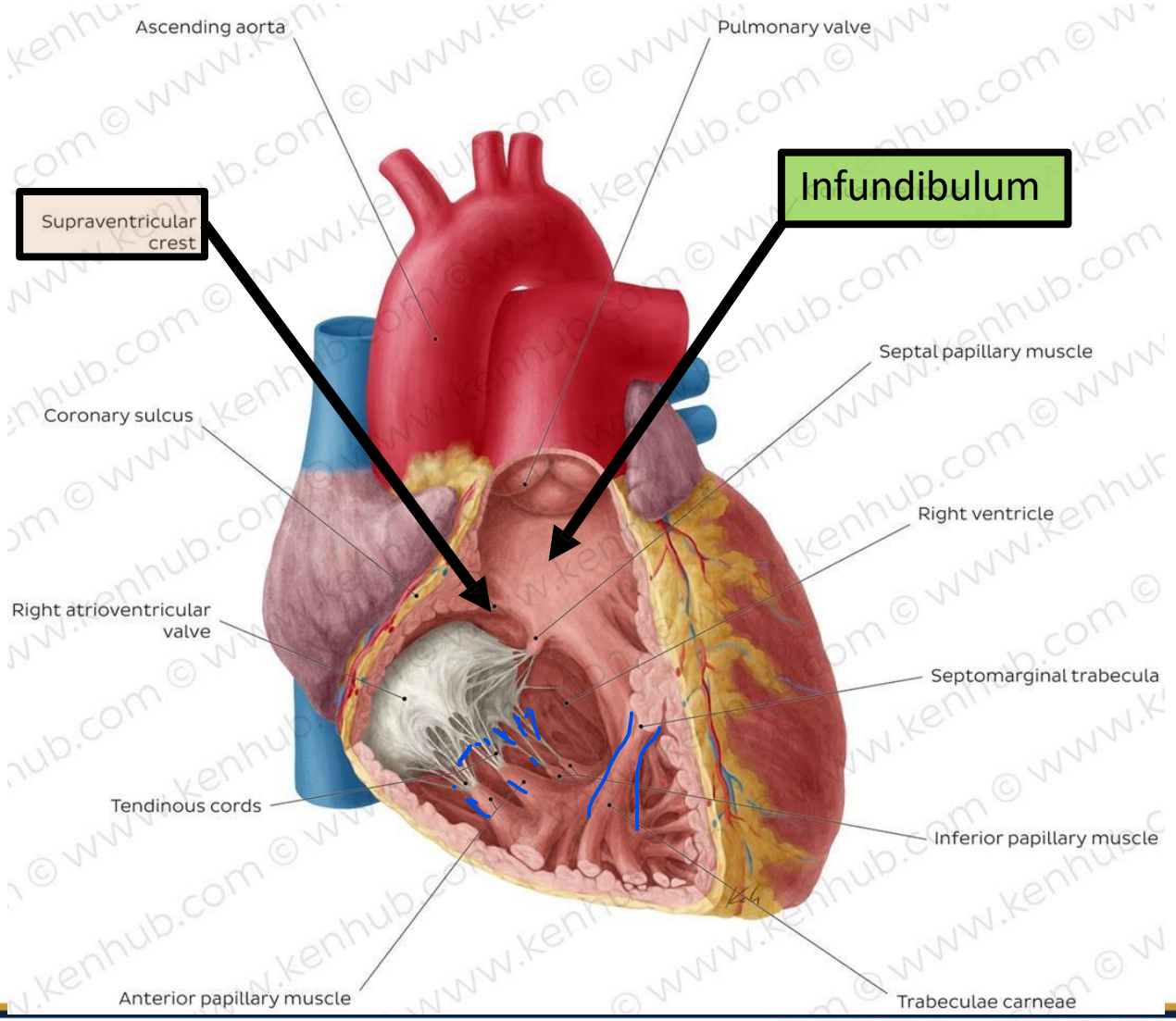


Internal Features of the heart

C. Right ventricle: the interior of the right ventricle is divided into 2 parts (inflowing and outflowing) separated by supraventricular crest.

Outflowing part (infundibulum):

- Lies above the supraventricular crest.
- Smooth.
- Leads to the pulmonary trunk.



Internal Features of the heart

Inflowing part:

- Lies below the supraventricular crest.
- Rough.
- Shows the following features:

➢ **Trabeculae carneae:** irregular muscular projections.

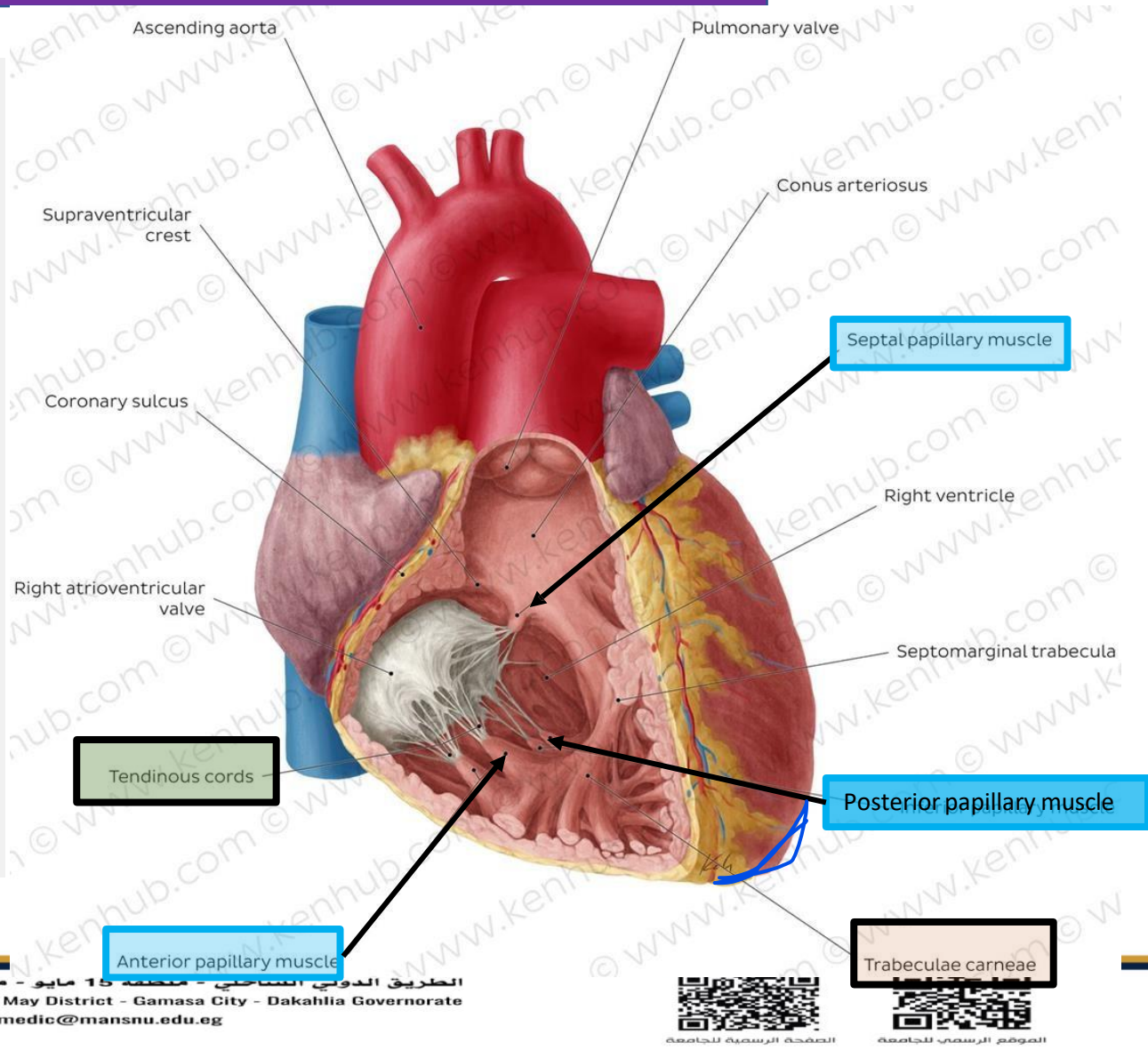
➢ **Papillary muscles**: they have the following features:

✓ **Number:** three.

✓ **Arrangement:** anterior, posterior and septal.

✓ **Shape:** each muscle is conical in shape having:

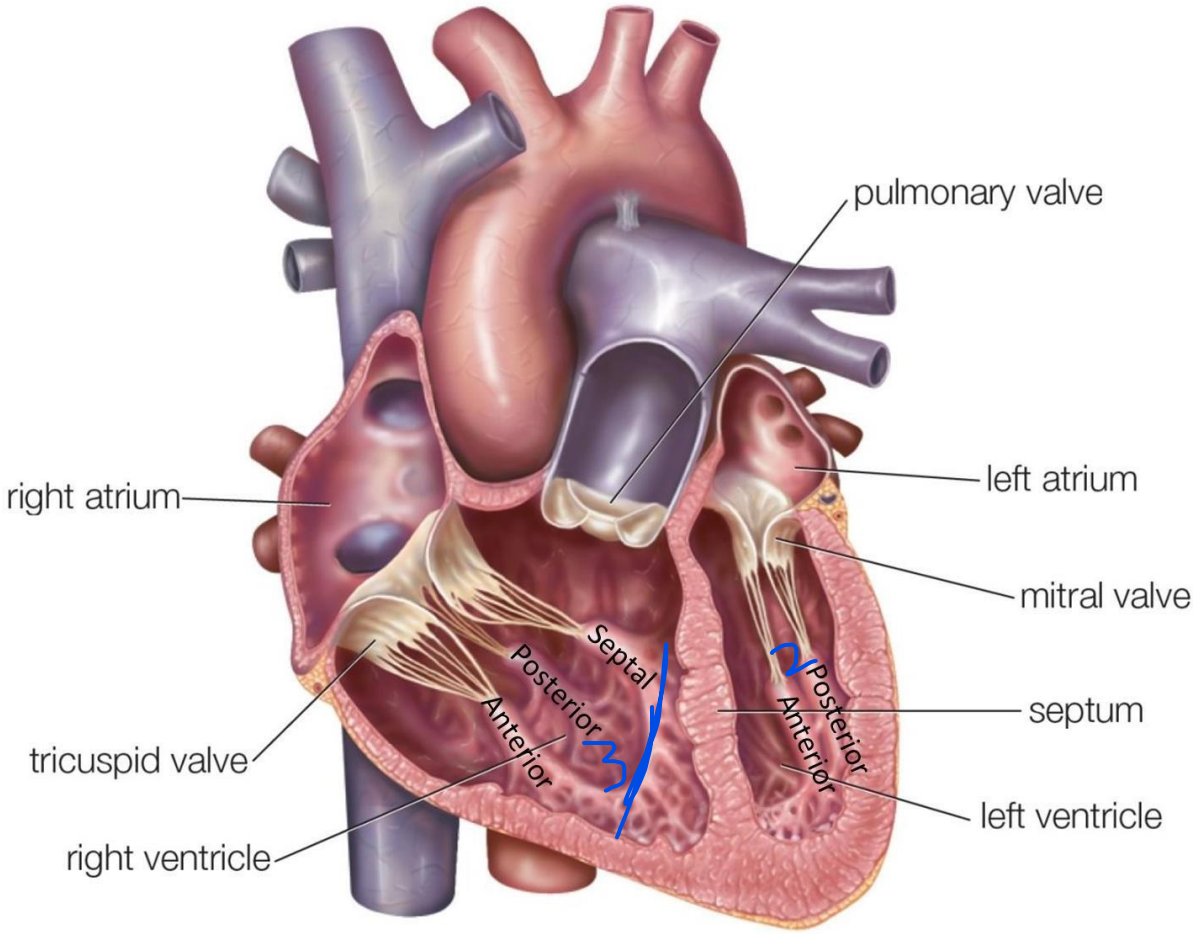
* **Base:** attached to the corresponding wall of the ventricle.
* **Apex:** projects to the lumen of the ventricle and attached to the cusps of tricuspid valve by chordae tendinae.



Internal Features of the heart

- **Anterior papillary muscle:**
  - It is the largest.
  - Arises from the anterior wall.
- **Posterior papillary muscle:**
  - It is smaller than the anterior.
  - Arises from the posterior wall.
- **Septal papillary muscle:**
  - It is the smallest.
  - Arises from the interventricular septum.

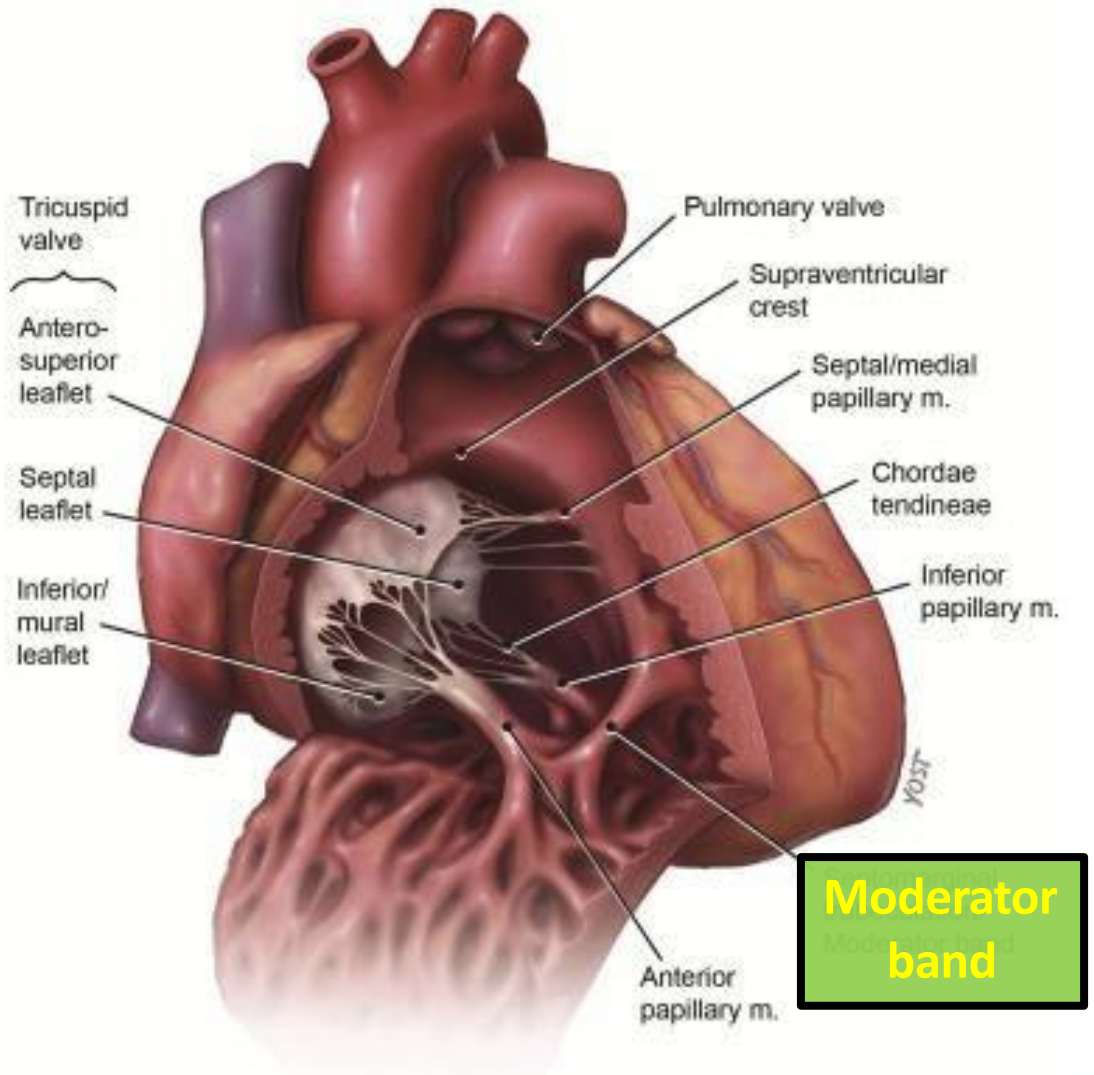
Function: papillary muscles prevent eversion of the cusps of tricuspid valve into the atrium during ventricular systole (prevents tricuspid regurge).



Internal Features of the heart

- **Moderator band:**
  - Muscular band that extends from the lower part of the interventricular septum to the base of anterior papillary muscle.
  - It prevents overdistention of the right ventricle and carries the right branch of AV bundle.

Orifices: the right ventricle has 2 major orifices; tricuspid (right AV orifice) and pulmonary orifice.

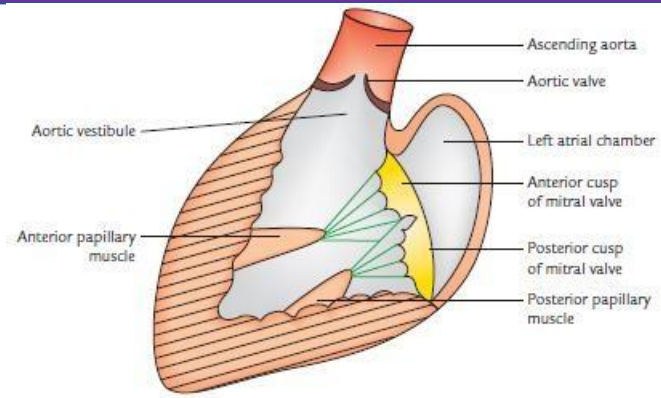


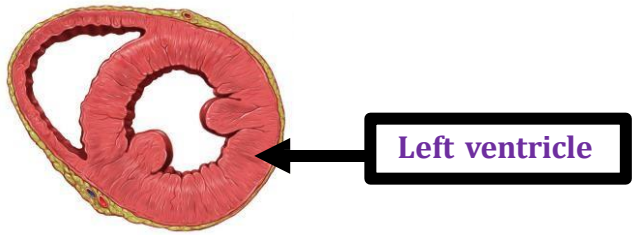
Internal Features of the heart

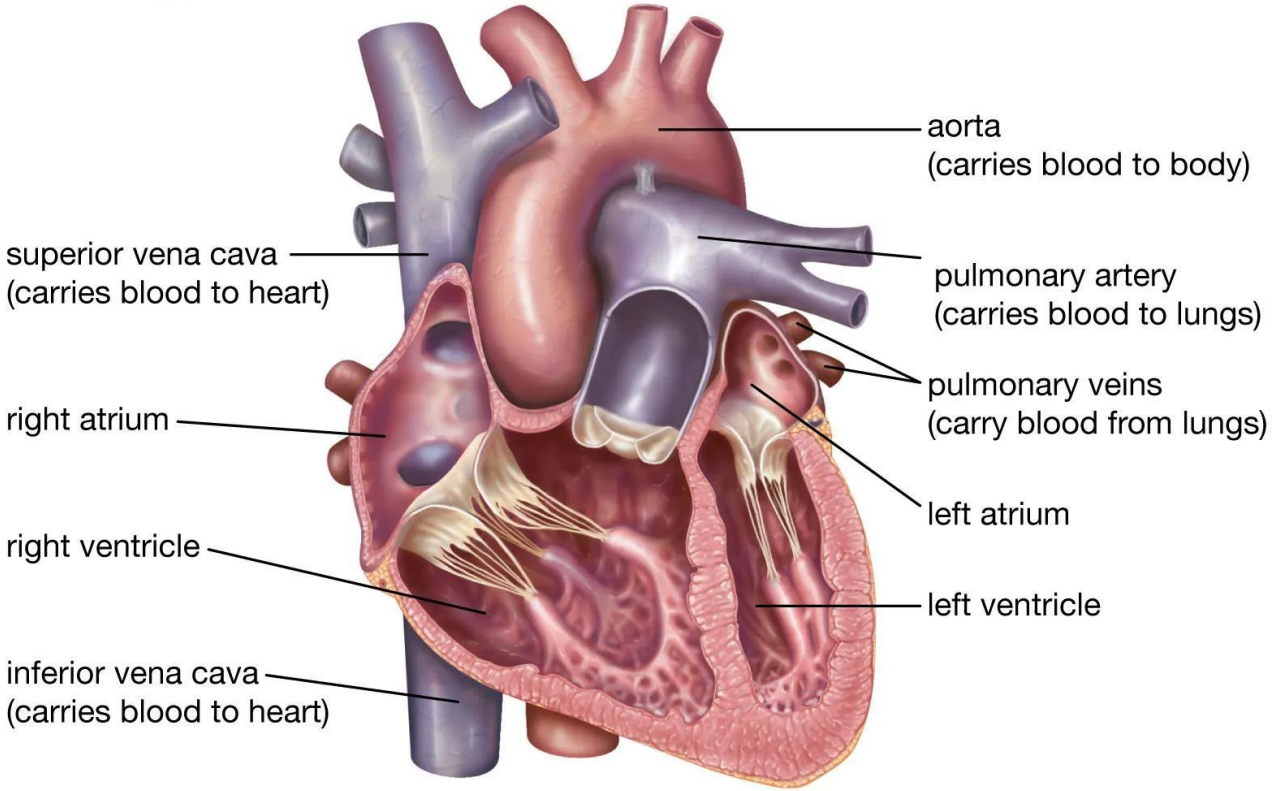
D. Left ventricle: the interior of the left ventricle differs from the right ventricle in the following features:

- **The wall of the left ventricle is** 3 times thicker than that of the right ventricle.
- **The outflowing part (aortic vestibule)** is smooth and leads to the ascending aorta.
- Has **no moderator band.**
- **Papillary muscles:**
  - They are 2 (anterior and posterior).
  - They are larger and thicker than those of the right ventricle.
  - Their chordae tendinae are attached to both cusps of the mitral valve.

- **Orifices:** The left ventricle has 2 major orifices; mitral (left AV orifice) and aortic orifice.



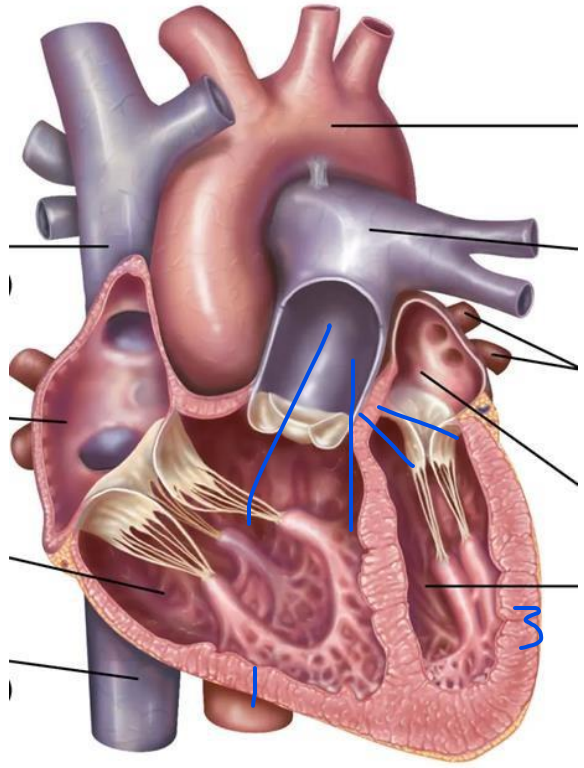




Internal Features of the heart

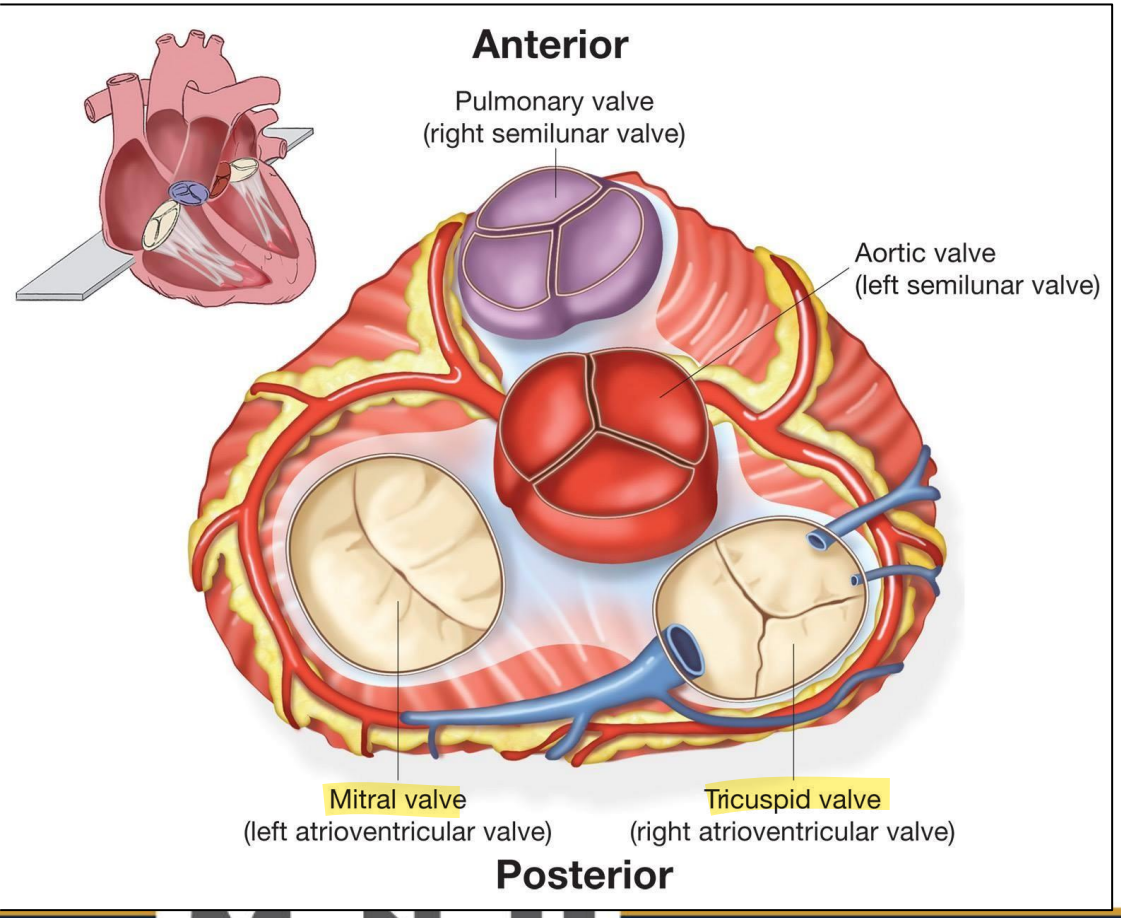
Compare between right & left ventricles

	Right ventricle	Left ventricle
Wall	thinner	3 times thicker
Cross section	Semilunar	Circular
Outflow part	Infundibulum	Aortic vestibule
Papillary muscles	3 (Anterior, posterior, septal)	2 (Anterior, posterior)
Moderator band	Present	Absent (No moderator band)
Valves	2 (Tricuspid, pulmonary)	2 (Mitral, aortic)

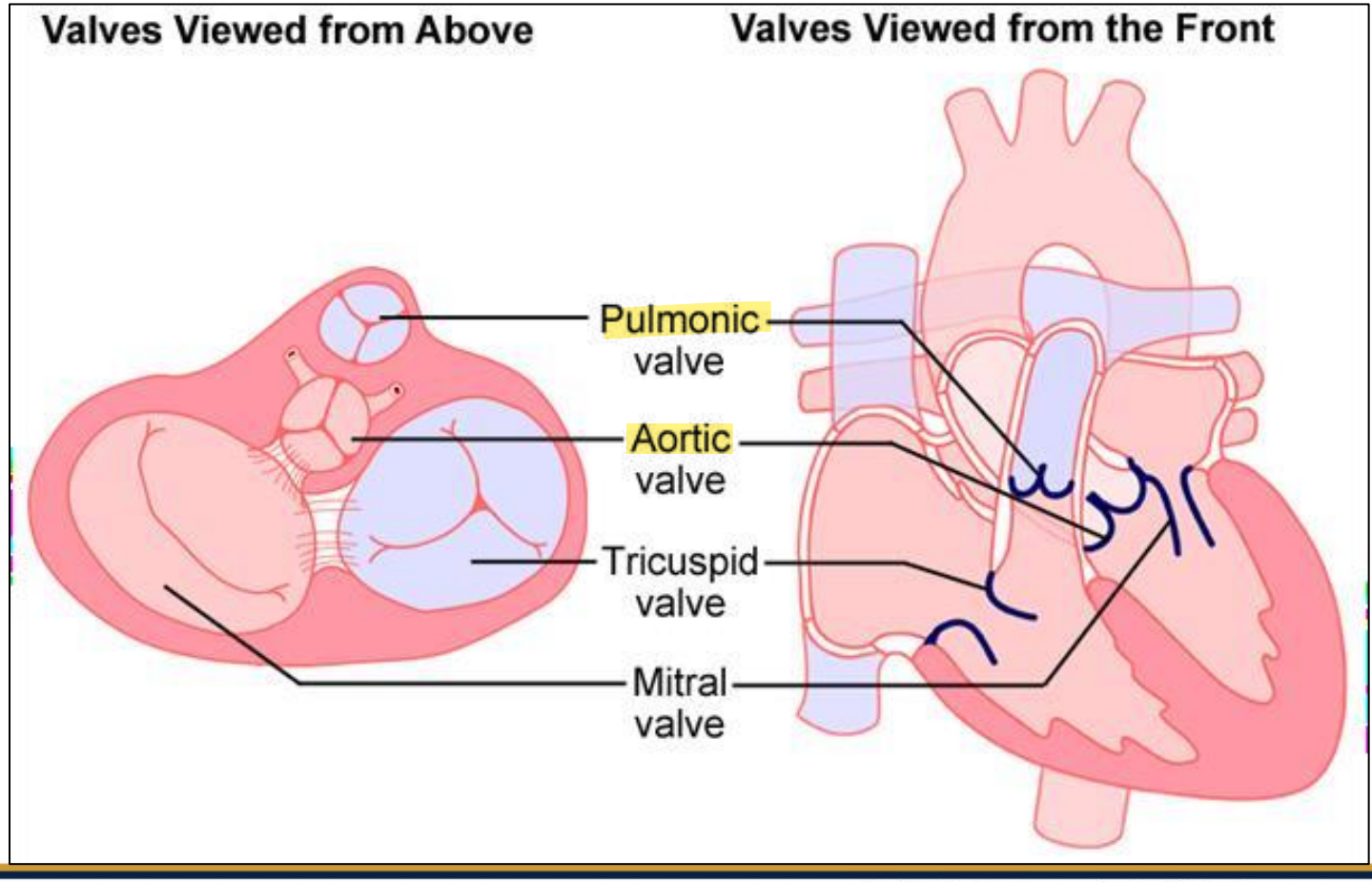


Valves of the heart

Atrioventricular valves



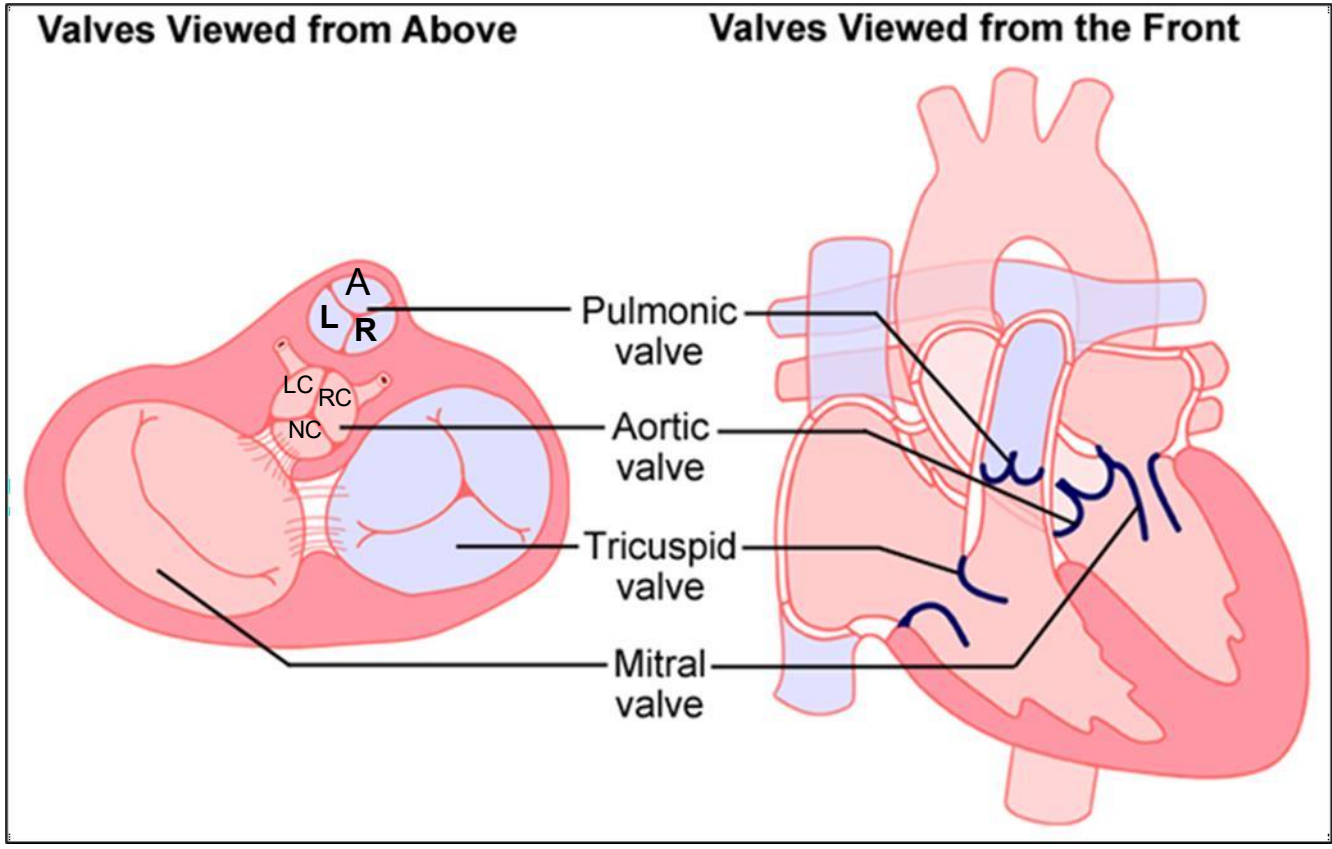
Semilunar valves



Valves of the heart

Comparison between the semilunar valves

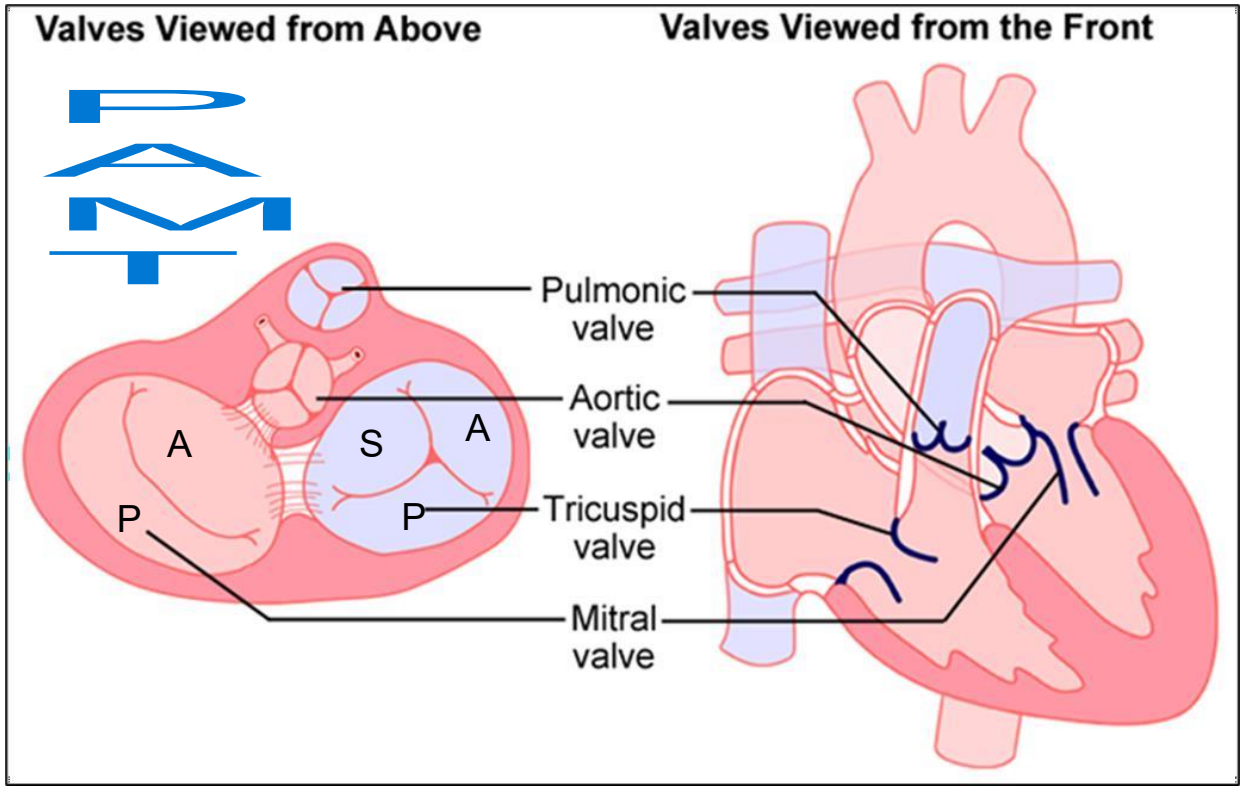
Pulmonary valve	Aortic valve
Between the right ventricle and pulmonary trunk	Between the left ventricle and ascending aorta.
Has 3 cusps: anterior, right and left	Has 3 cusps: right coronary, left coronary and non-coronary
Size of the orifice: 3 cm	Size of the orifice: 2 cm
Surface anatomy: left 3rd sternocostal junction	Surface anatomy: at the left margin of sternum opposite the 3rd intercostal space



Valves of the heart

Comparison between the atrioventricular valves

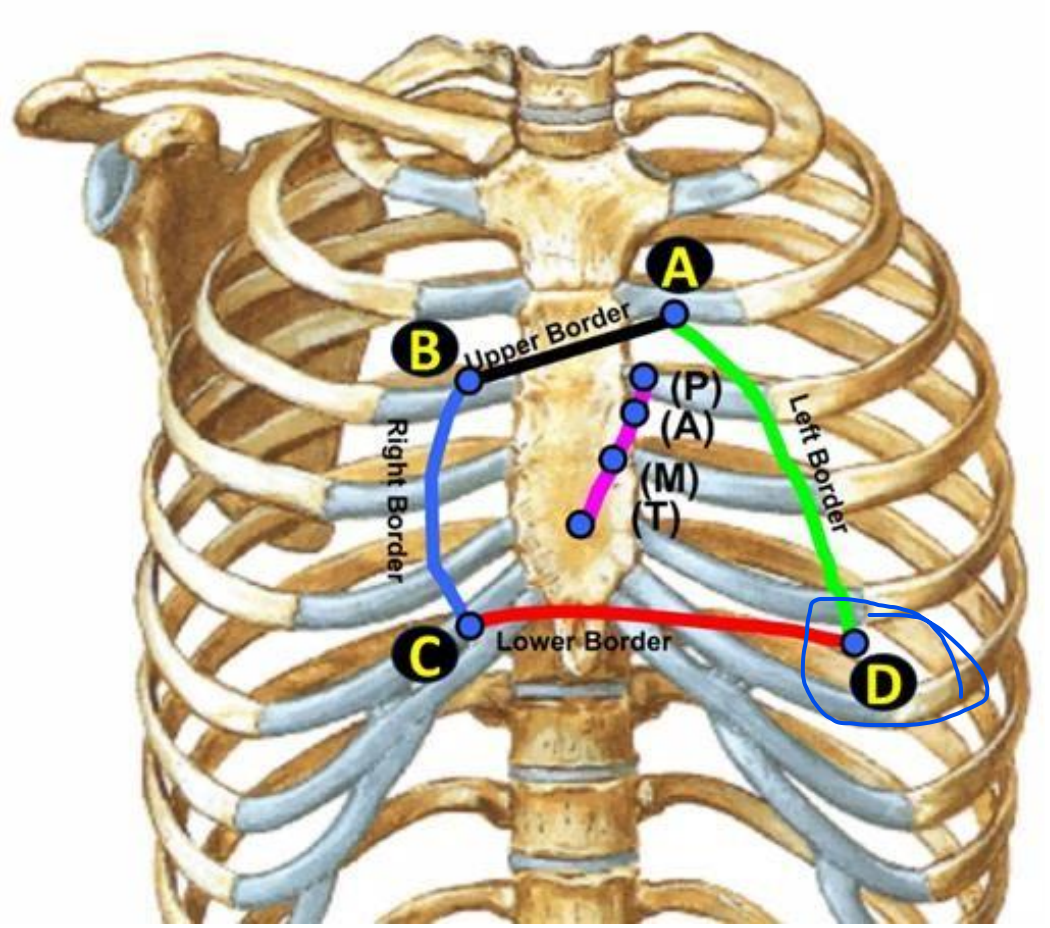
Tricuspid valve	Mitral valve
Between the right atrium and right ventricle	Between the left atrium and left ventricle
Has 3 cusps: anterior, posterior and septal	Has 2 cusps: anterior and posterior
Admits 3 fingers	Admits 2 fingers
Surface anatomy: lies at the midline of the sternum opposite the 4th intercostal space	lies behind the left half of sternum opposite the 4th costal cartilage.



Surface anatomy of the heart

Draw 4 points on the thoracic wall as follow:

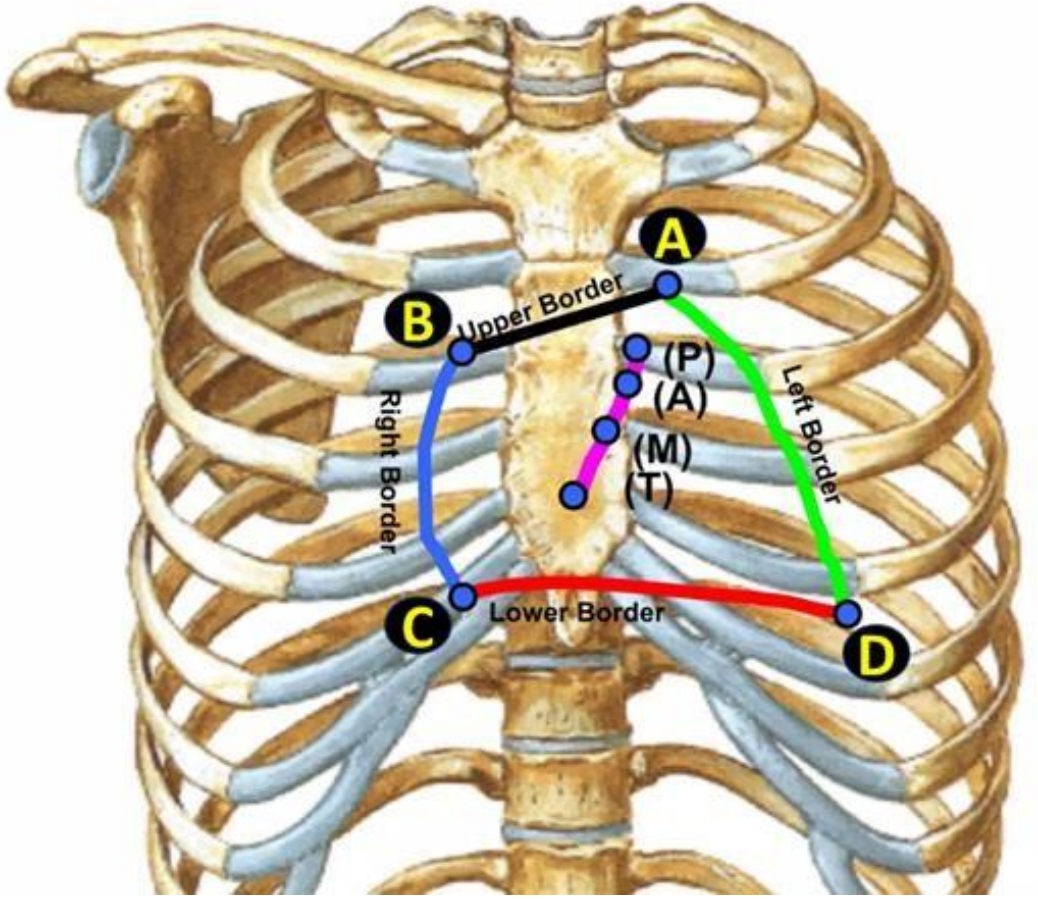
- **Point A:** at the lower border of left 2nd costal cartilage 1.5 cm from the sternal margin.
- **Point B:** at the upper border of the right 3rd costal cartilage 1.5 cm from the sternal margin).
- **Point C:** at the right 6th costal cartilage 2 cm from the sternal margin.
- **Point D:** at the apex of the heart (left 5th intercostal space 3.5 inch (9 cm) from the midline.



Surface anatomy of the heart

Borders of the heart are drawn as follow:

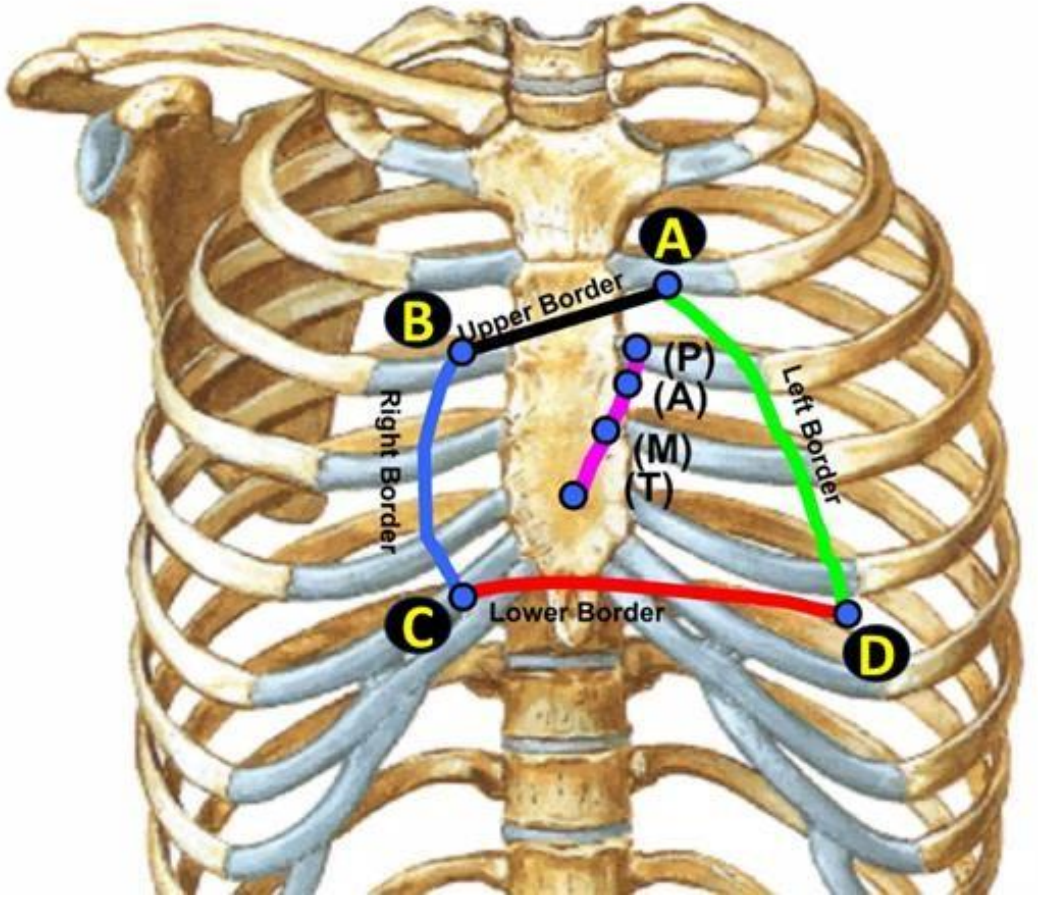
- **Upper border:** straight line connecting points A and B.
- **Right border:** curved line convex to the right connecting points B and C.
- **Lower border:** straight line connecting points C and D.
- **Left border:** curved line convex to the left connecting points D and A.



Surface anatomy of the heart

Surface markings of cardiac valves:

- **Pulmonary valve:** at the left 3rd costal cartilage at its junction with sternum.
- **Aortic valve:** opposite the 3rd intercostal space at the left margin of sternum.
- **Mitral valve:** opposite the left 4th costal cartilage behind left half of sternum.
- **Tricuspid valve:** opposite the 4th intercostal space at the midline of the sternum.



Blood supply of the heart

- Department of human Anatomy and Embryology Faculty of Medicine
- Mansoura National University, Egypt

Blood supply of the heart

Arterial Supply

- **Right coronary artery.**
  - RT SINUS
  - LT SINUS
- **Left coronary artery.**

Venous Drainage

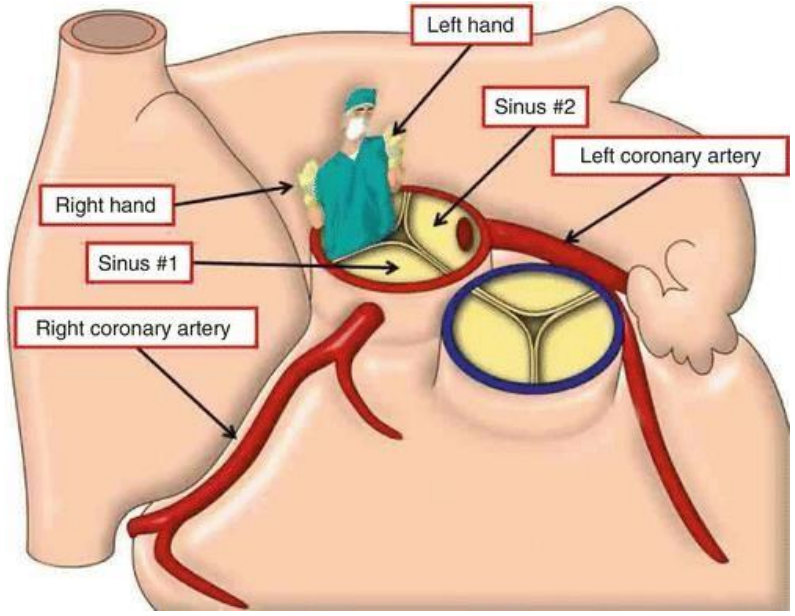
- **Venae cordis minimi.**
- **Anterior cardiac veins.**
- **Coronary sinus.**

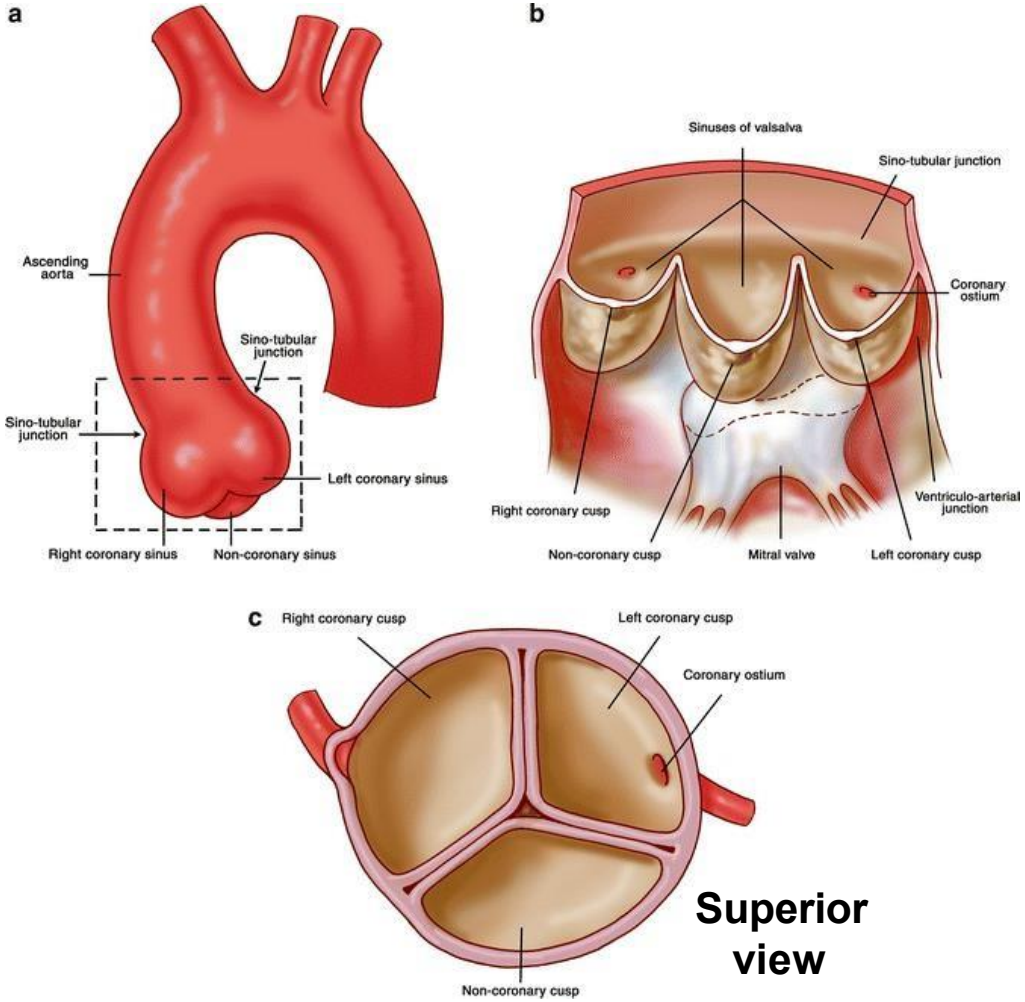
Arterial supply of the heart

Right coronary artery:

Origin:

Right coronary sinus of ascending aorta.





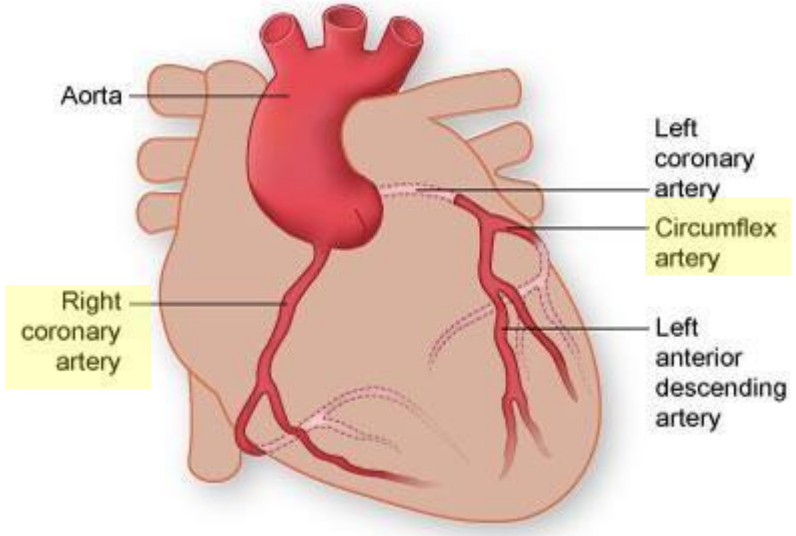
Superior view

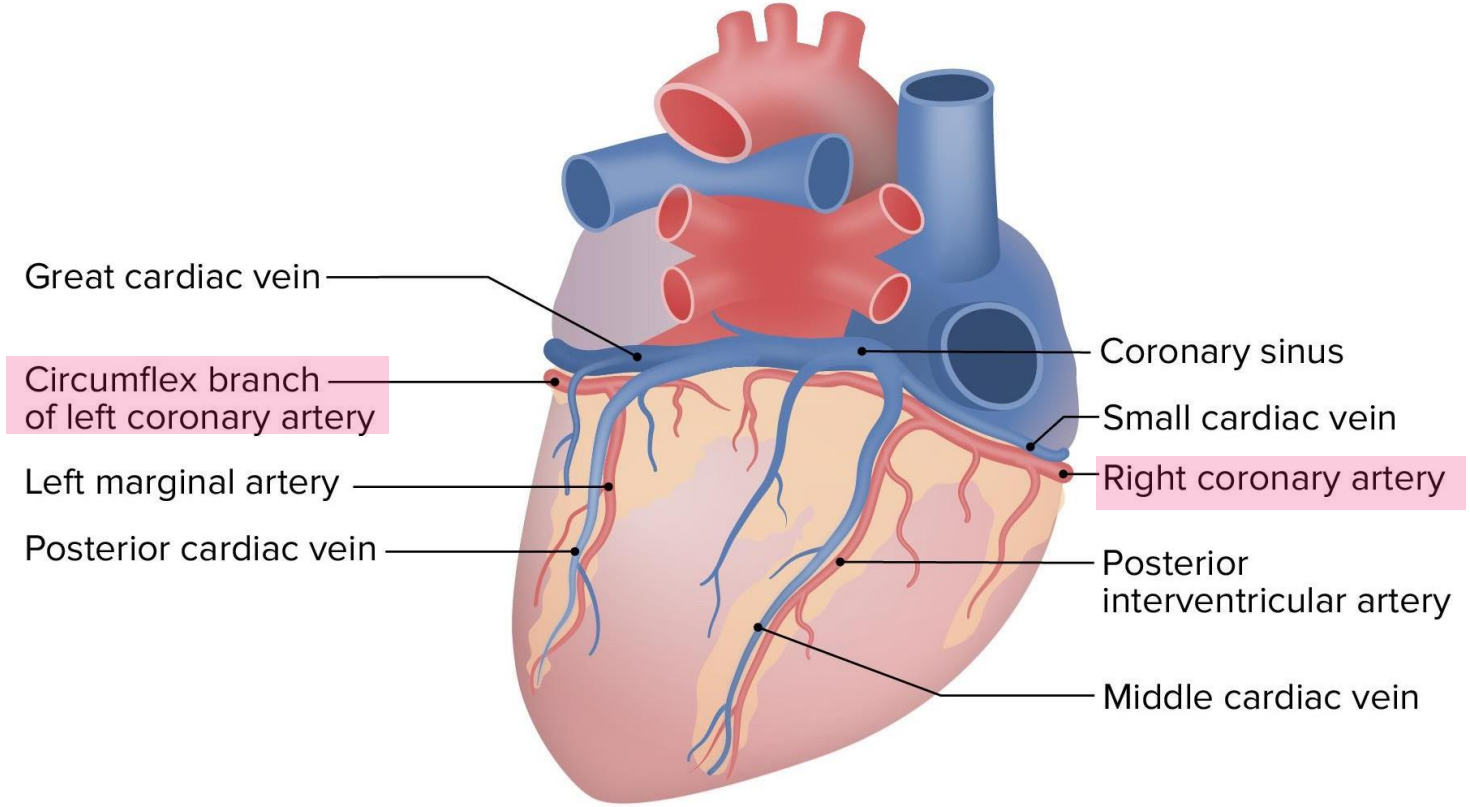
Arterial supply of the heart

Right coronary artery:

Termination:

In the posterior part of coronary sulcus by anastomosing with the circumflex artery.



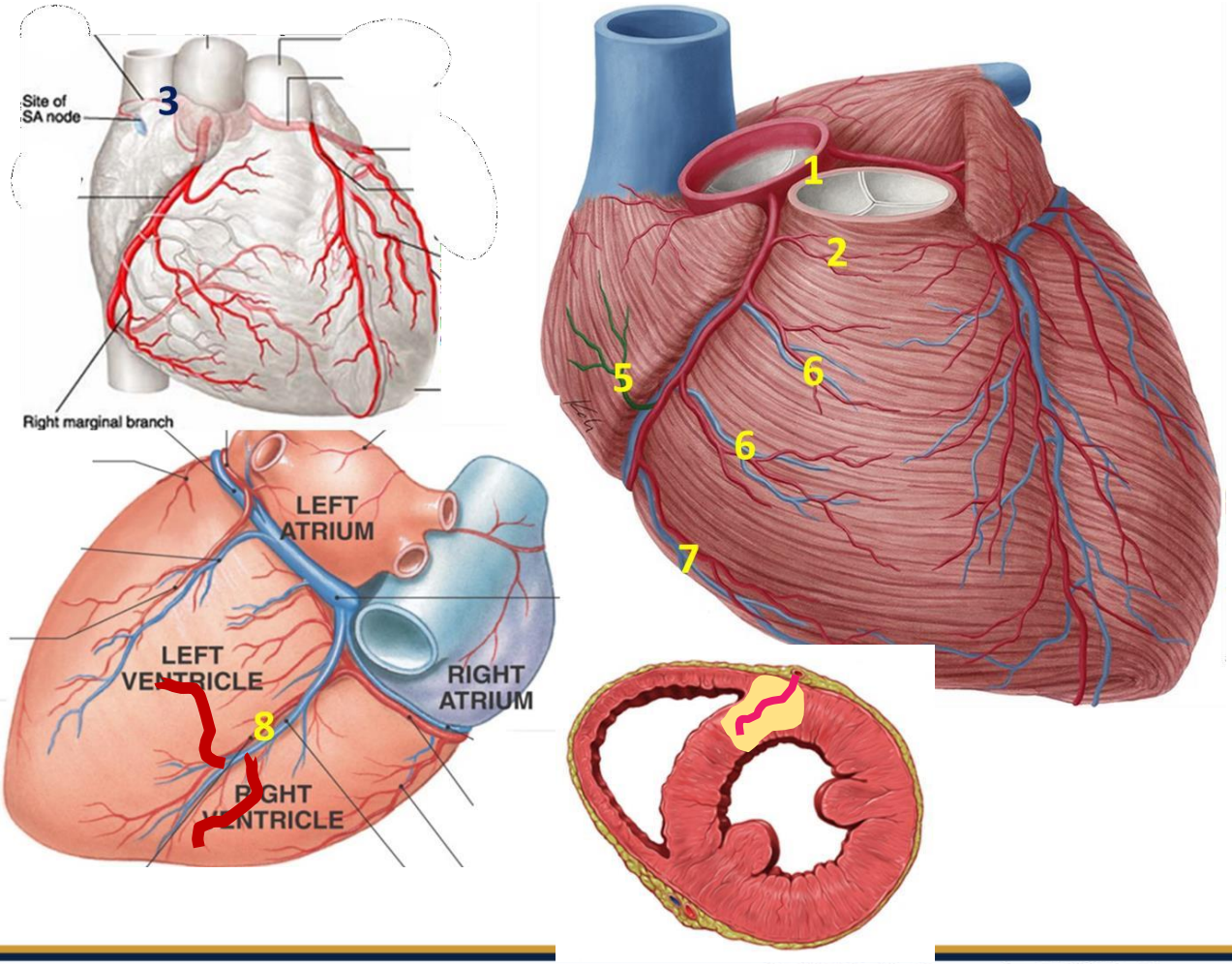


Arterial supply of the heart

Right coronary artery:

Branches (Distribution):

1. **Twigs** to the ascending aorta and pulmonary trunk.
2. **Right Conus artery:** supplies the infundibulum.
3. **Artery to SA node** in 60 % of people.
4. **Branch to AV node and bundle of Hiss** in 90 % of people.
5. **Right atrial** branches.
6. **Right ventricular** branches.
7. **Right marginal artery:** runs along the inferior border of the heart to supply both anterior and posterior walls of right ventricle.
8. **Posterior interventricular artery:**
   - ✓ Passes in the posterior interventricular groove.
   - ✓ Ends by anastomosing with the anterior interventricular artery.
   - ✓ Supplies the diaphragmatic surface of both ventricles and posterior 1/3 of interventricular septum.

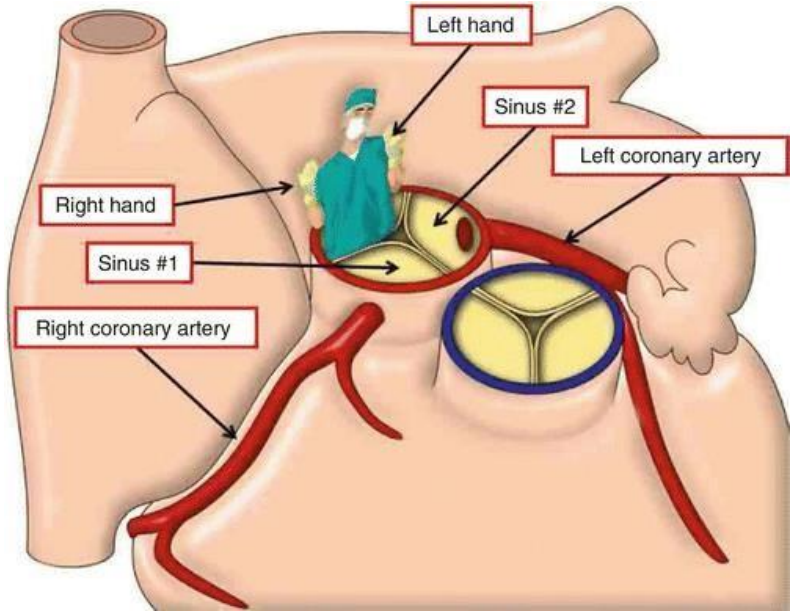


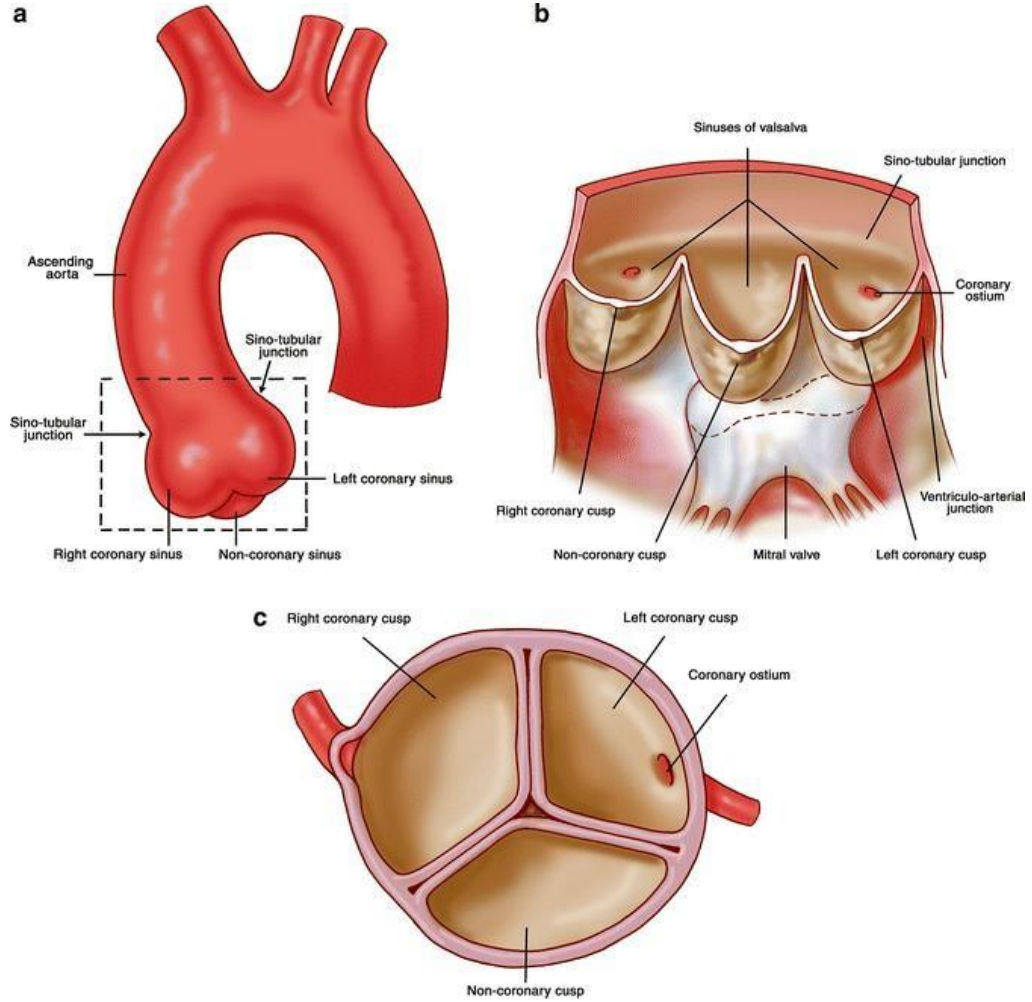
Arterial supply of the heart

Left coronary artery:

Origin:

Left coronary sinus of ascending aorta.



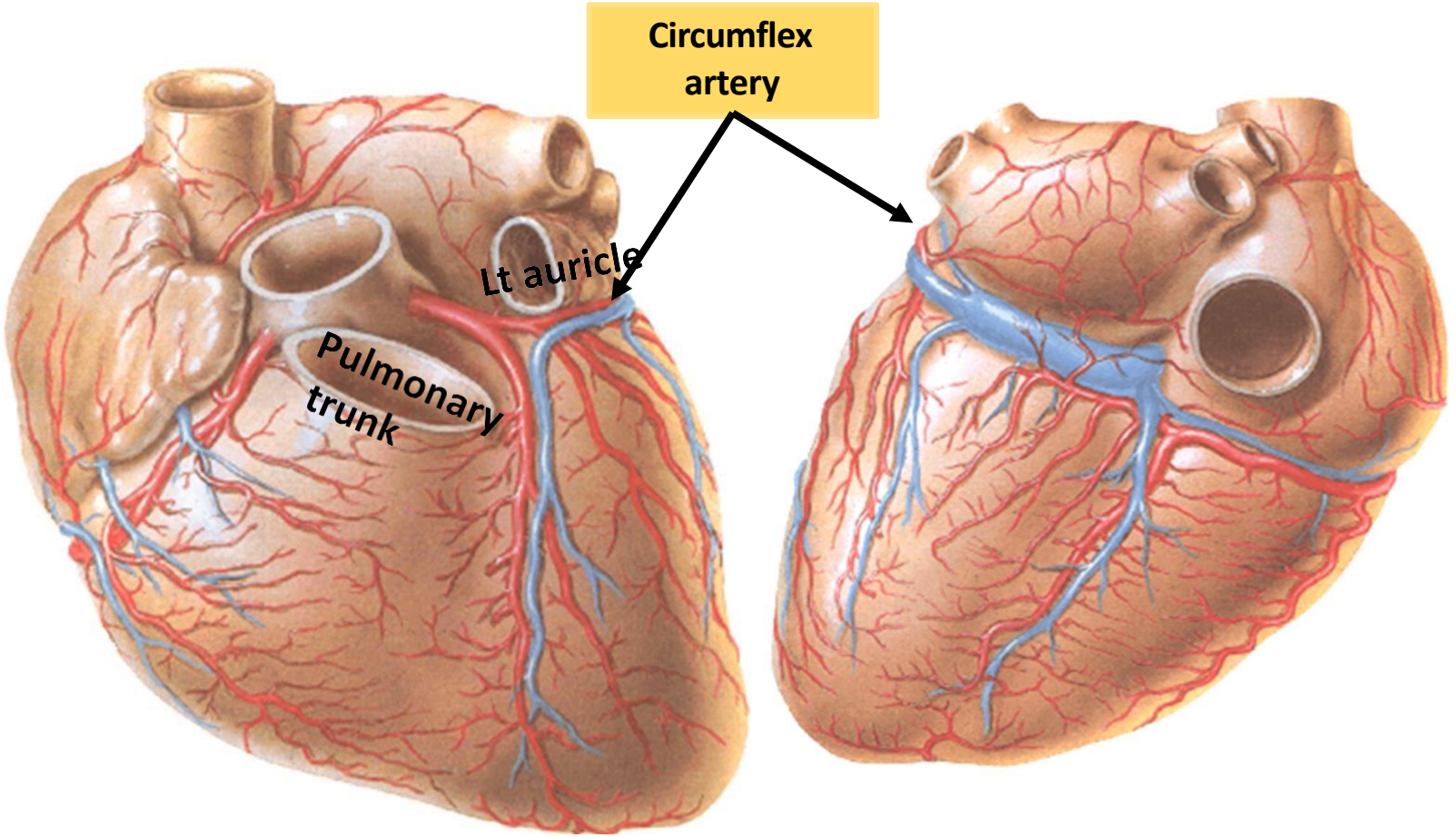


Arterial supply of the heart

Left coronary artery:

Course:

- It curves around the left margin of the heart where it is known as the circumflex artery.

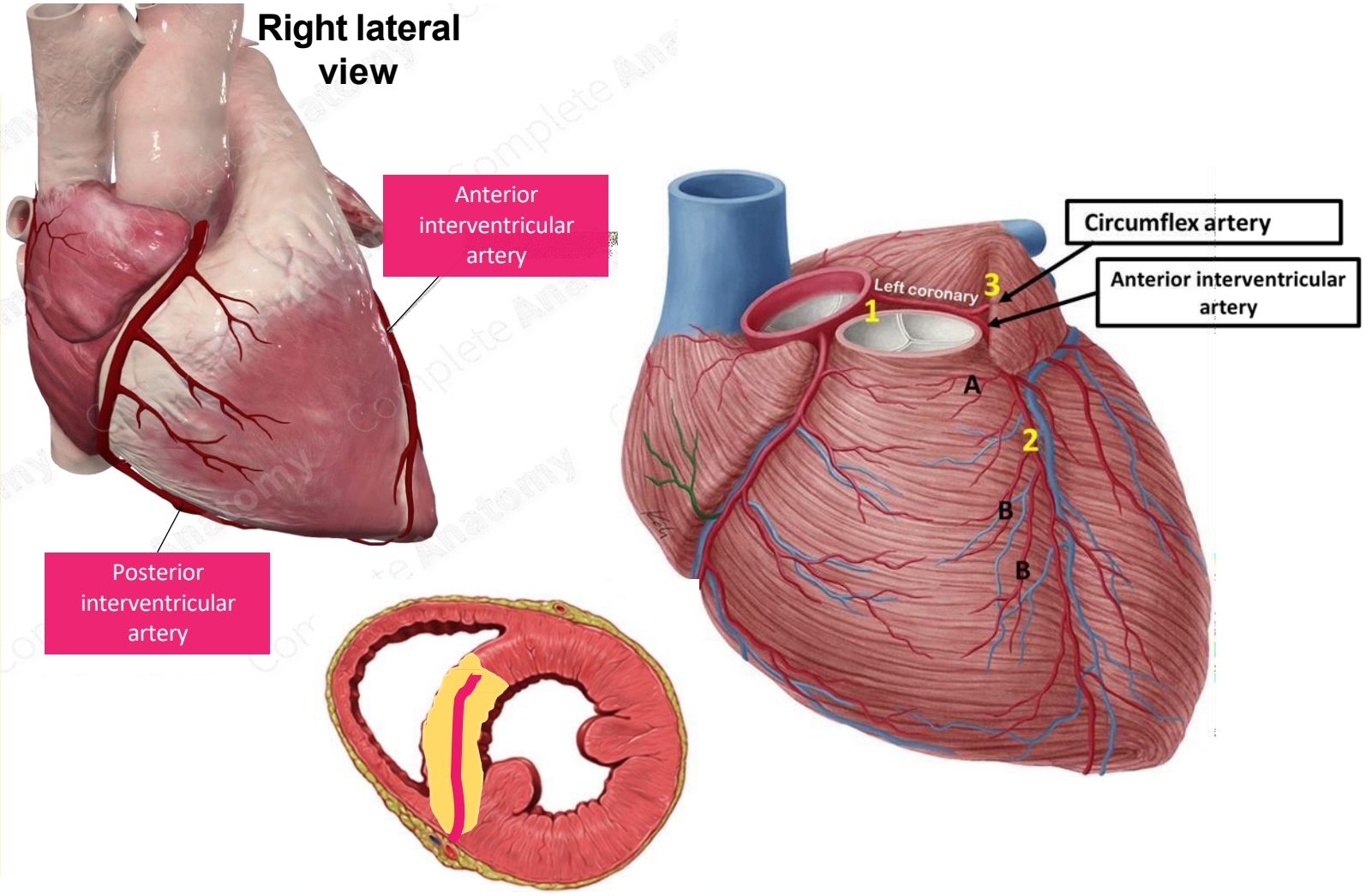


Arterial supply of the heart

Left coronary artery:

Branches (Distribution):

1. **Twigs** to the ascending aorta and pulmonary trunk.
2. **Anterior interventricular artery:**
   - descends in the anterior interventricular groove.
   - Ends at the apex by anastomosing with the posterior interventricular artery.
   - Gives the following branches:
     - ***Left conus artery (A):*** supplies the infundibulum
     - ***Ventricular branches (B):*** supply the ventricles.
     - ***Septal branches:*** supply anterior 2/3 of interventricular septum.
3. **Circumflex artery:**



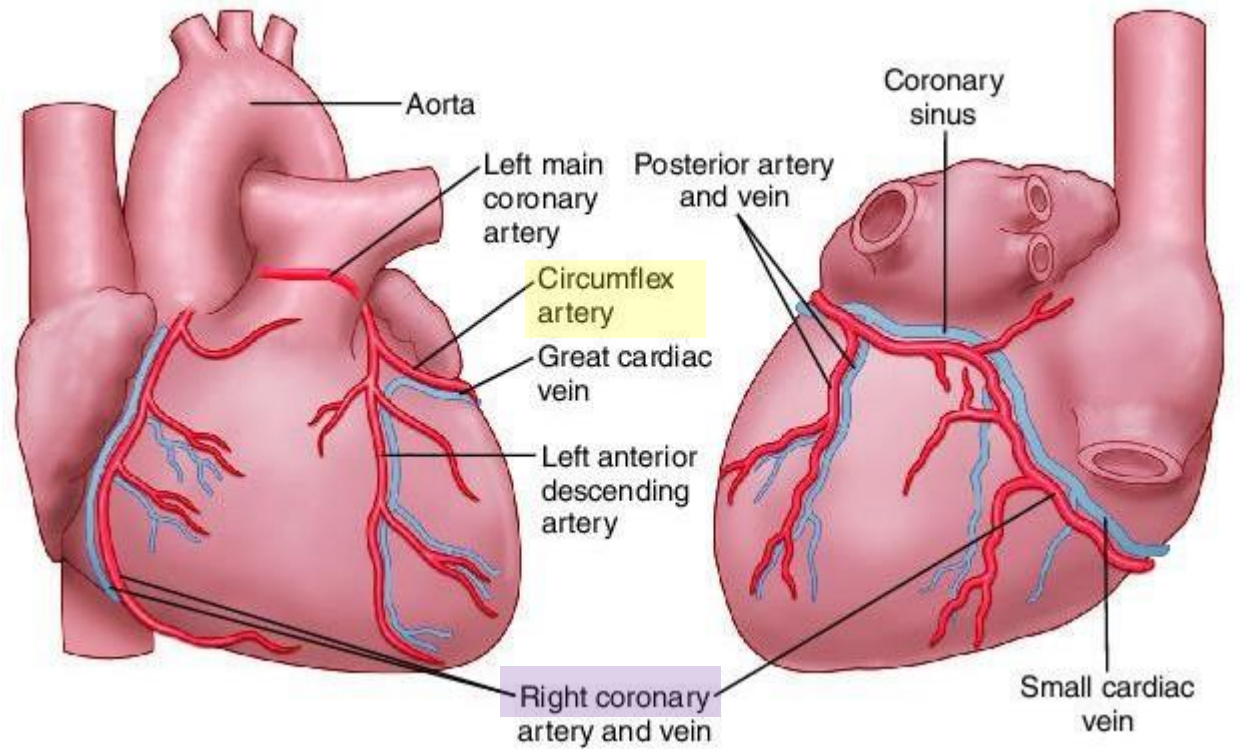
Arterial supply of the heart

Left coronary artery:

Branches (Distribution):

3. Circumflex artery:

- The continuation of the left coronary artery.
- Turns backward around the left border of the heart to reach the posterior part of coronary sulcus.
- Ends by anastomosing with the right coronary artery.



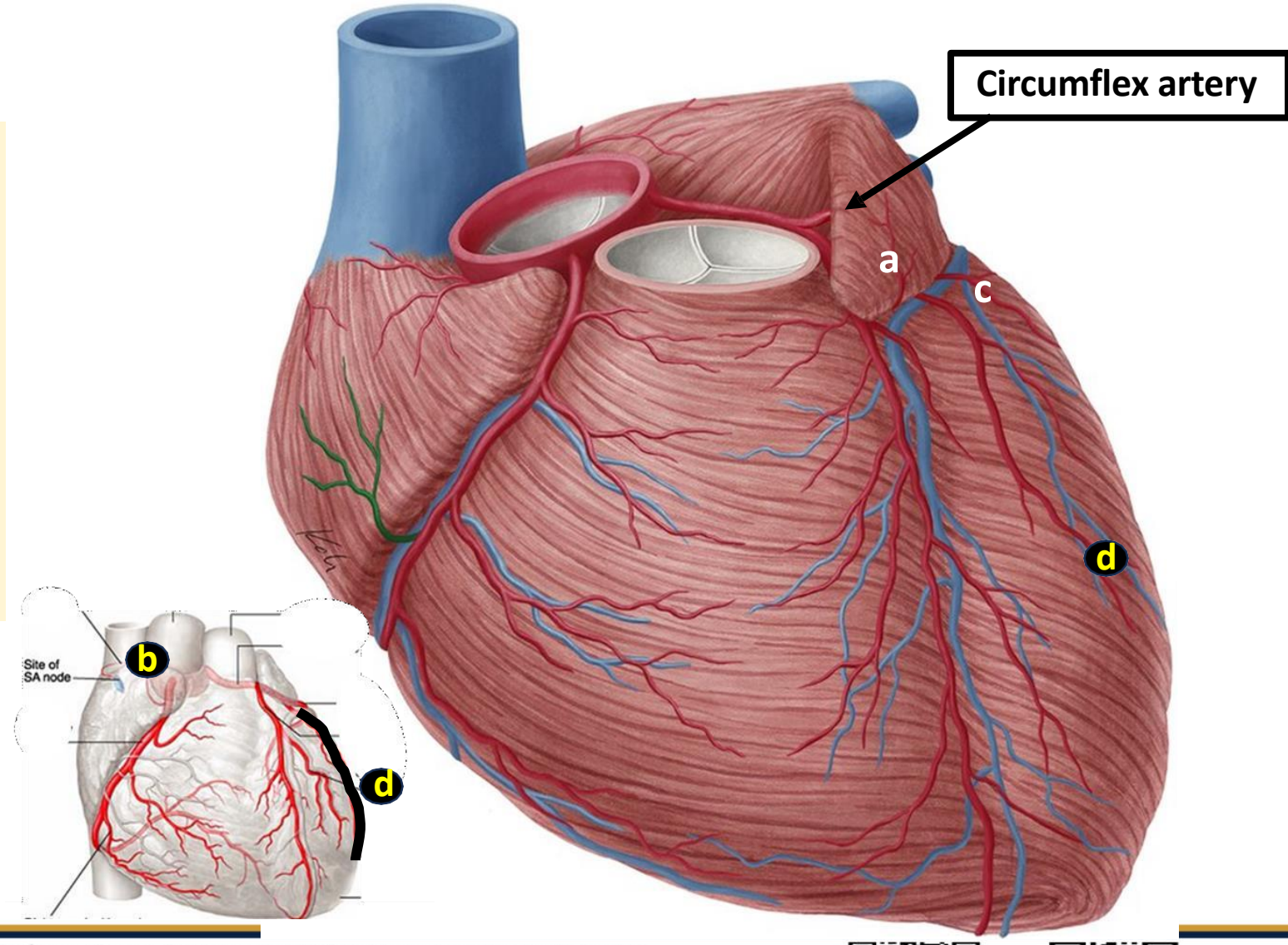
Arterial supply of the heart

Left coronary artery:

Branches (Distribution):

3. Circumflex artery:

- Gives the following branches:
  - *a) Atrial branches:* to the left atrium.
  - *b) Artery to SA node:* in 40 % of people.
  - *c) Ventricular branches:* to the left ventricle.
  - *d) Left marginal artery*: supplies the left ventricle.



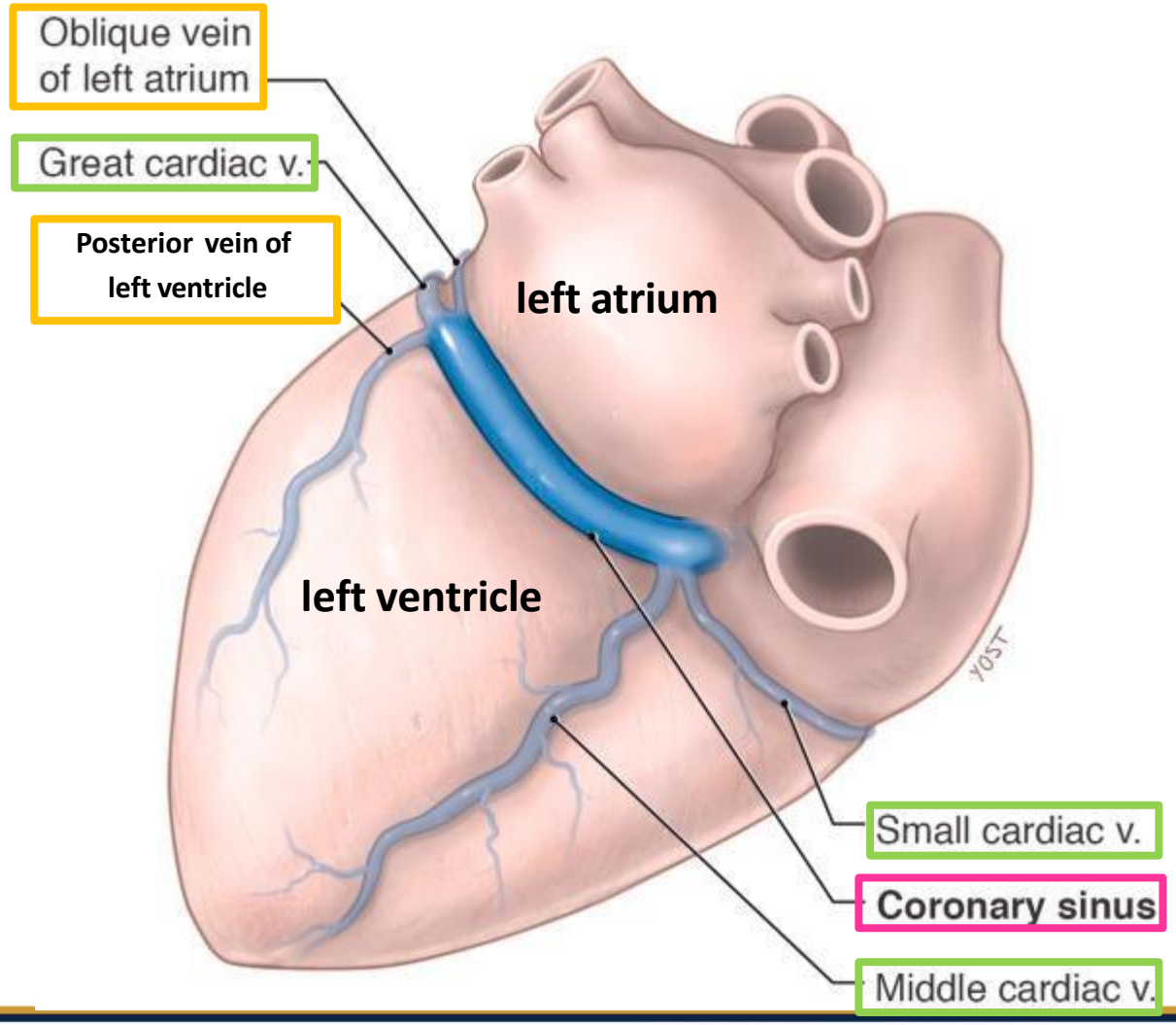
Venous drainage of the Heart

1.Coronary sinus:

- It is a short dilated venous channel 2-3 cm long.
- The largest vein draining the heart.

- Runs in the posterior part of coronary sulcus between the back of left atrium above and diaphragmatic surface of left ventricle below.

its right end opens in the posterior wall of right atrium.



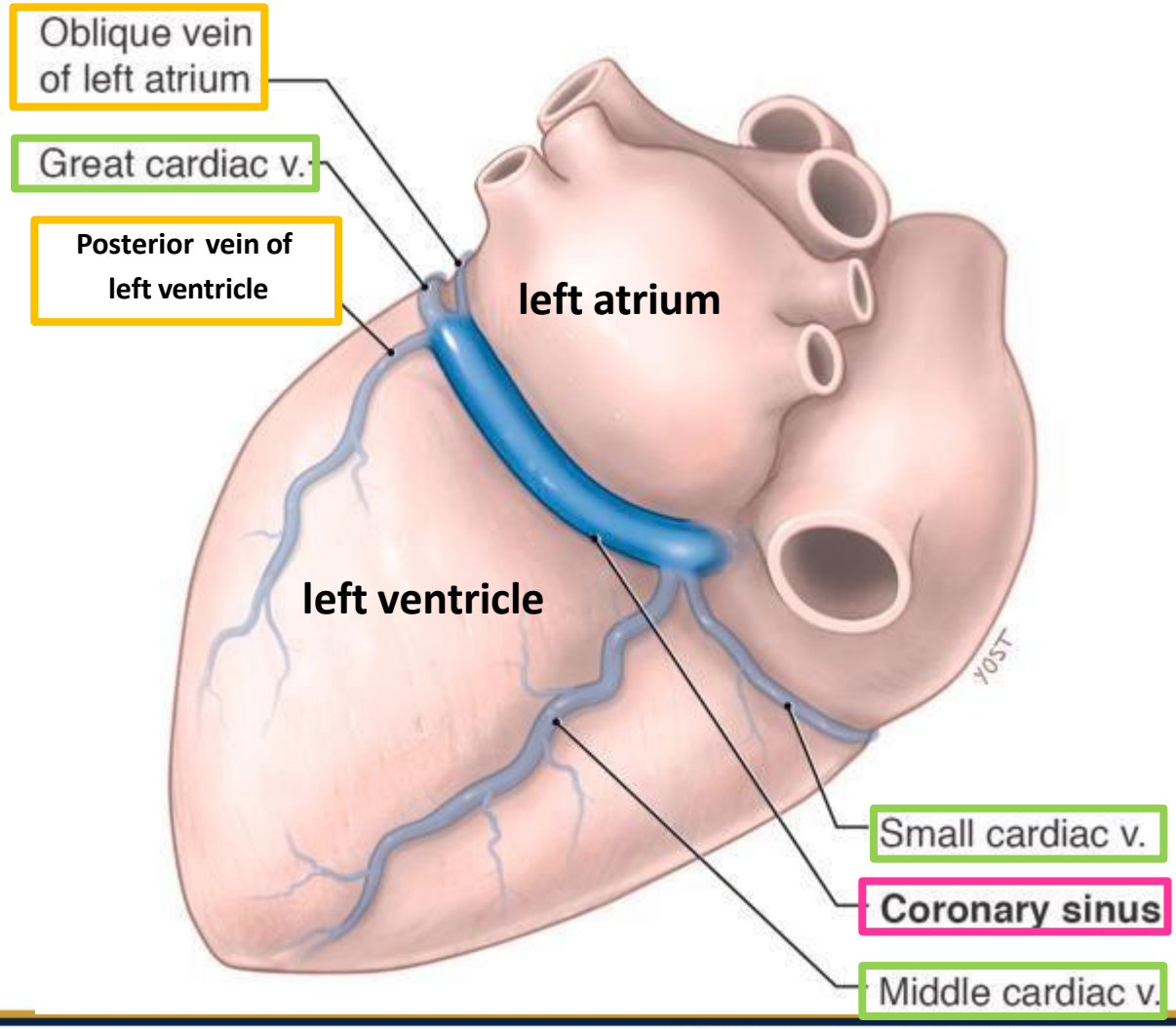
Venous drainage of the Heart

1.Coronary sinus:

SAQ

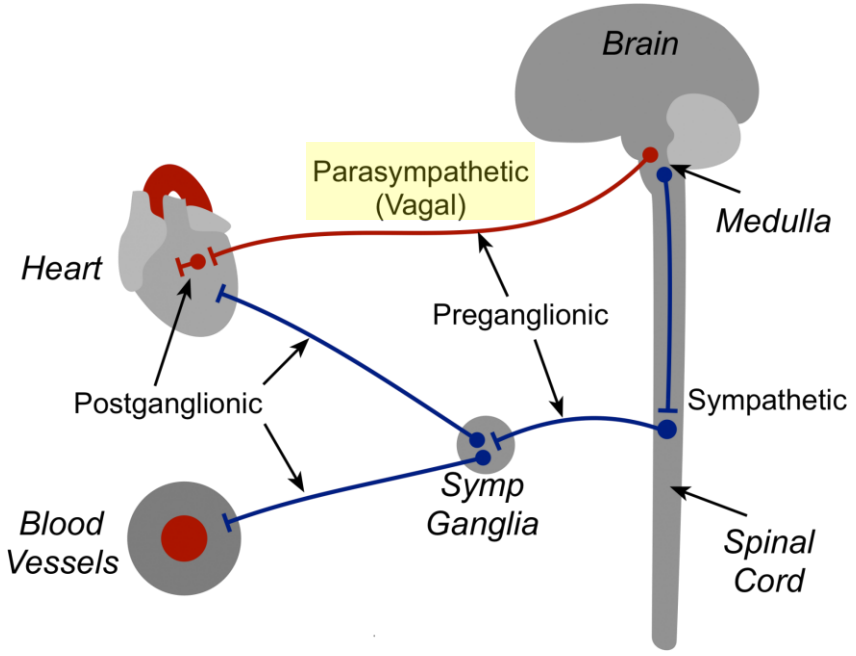
Tributaries:

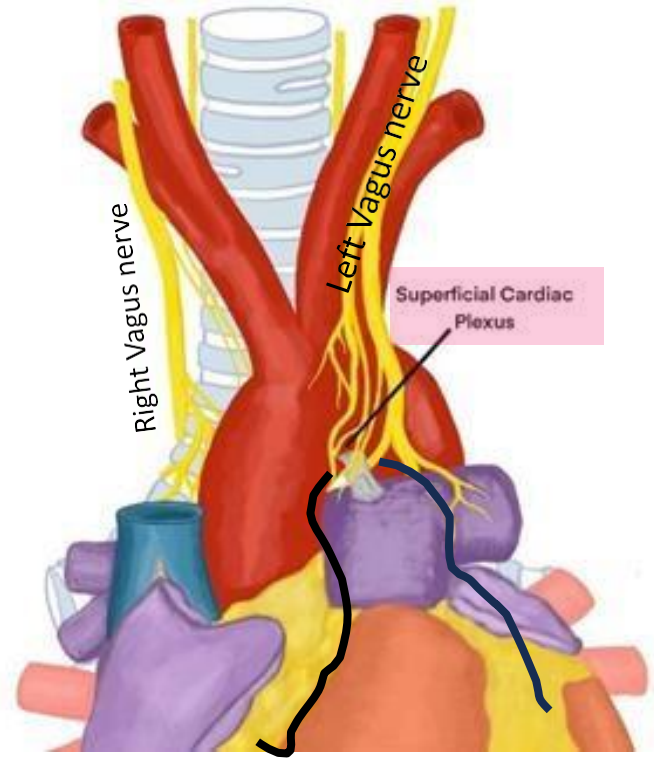
1. Great cardiac vein.
2. Middle cardiac vein.
3. Small cardiac vein.
4. Oblique vein of left atrium.
5. Posterior vein of left ventricle.



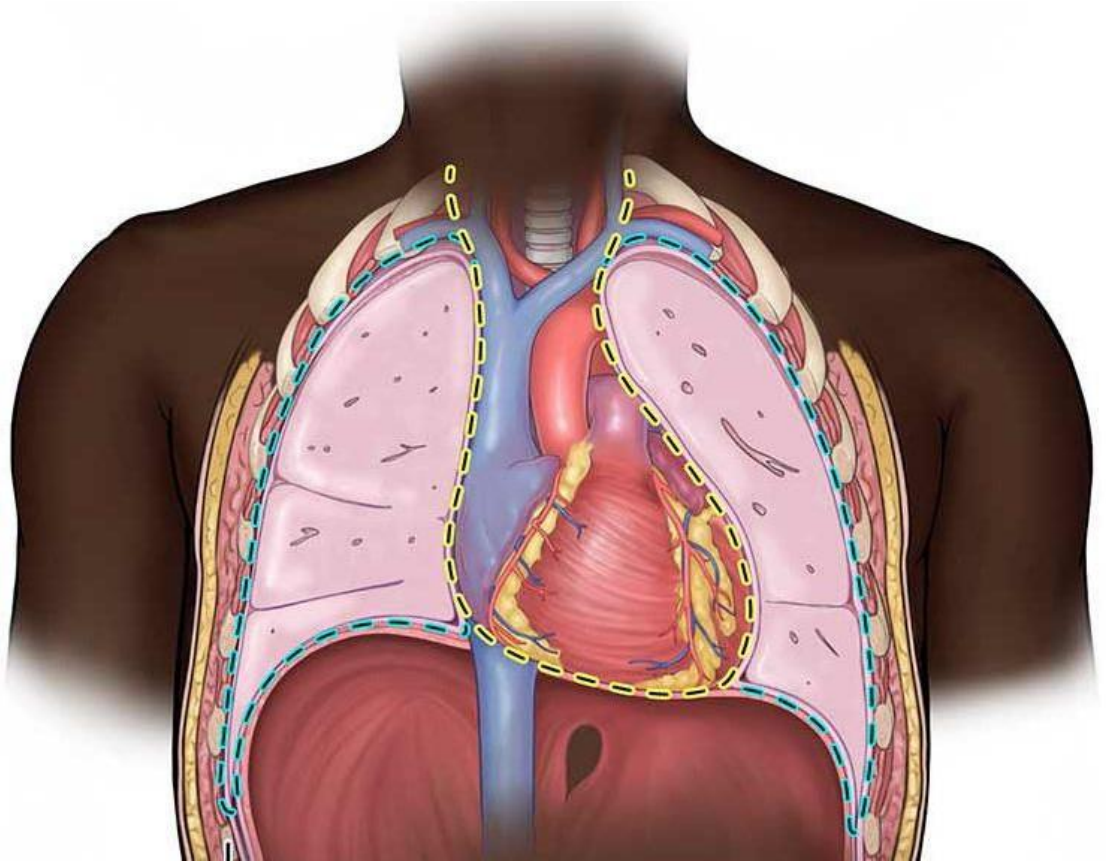
Nerve supply of the heart

- **Parasympathetic fibers:** from both vagi mainly the left.
- **Sympathetic fibers:** from the upper 3-5 thoracic segments of the spinal cord.
- **Both types of fibers:** share in the formation of superficial and deep cardiac plexuses.
  - The superficial cardiac plexus: lies below the aortic arch.
  - The deep cardiac plexus: lies deep to it.
- **The branches of these cardiac plexuses** reach the heart along the coronary arteries and their branches.





Mediastinum



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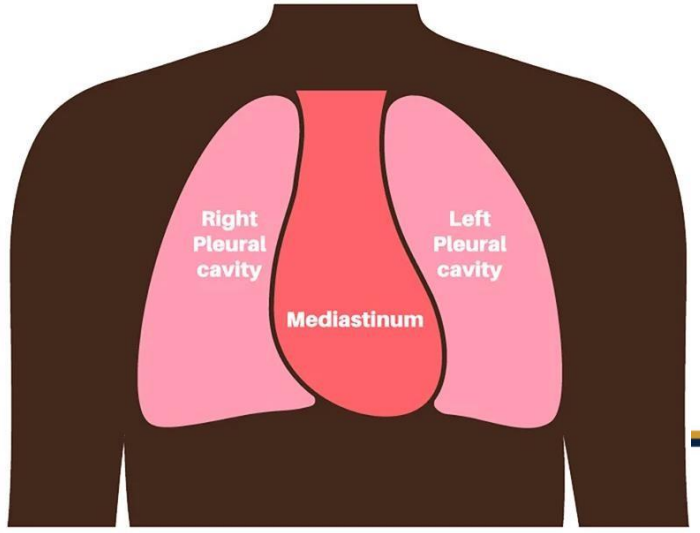
Mansoura National University, Egypt

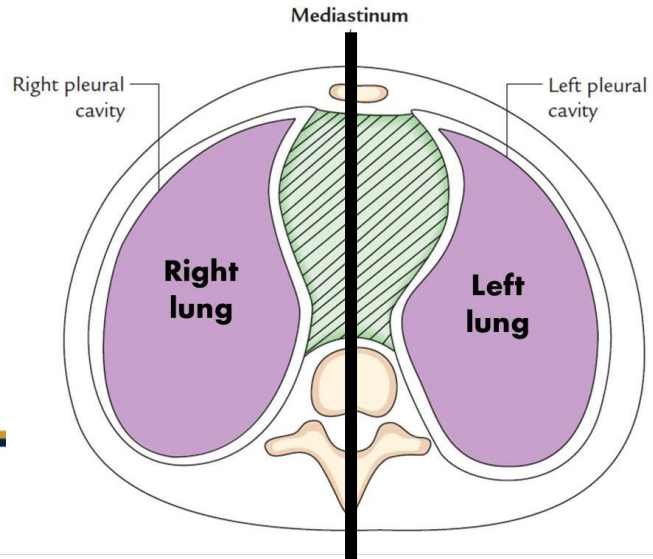
Mediastinum

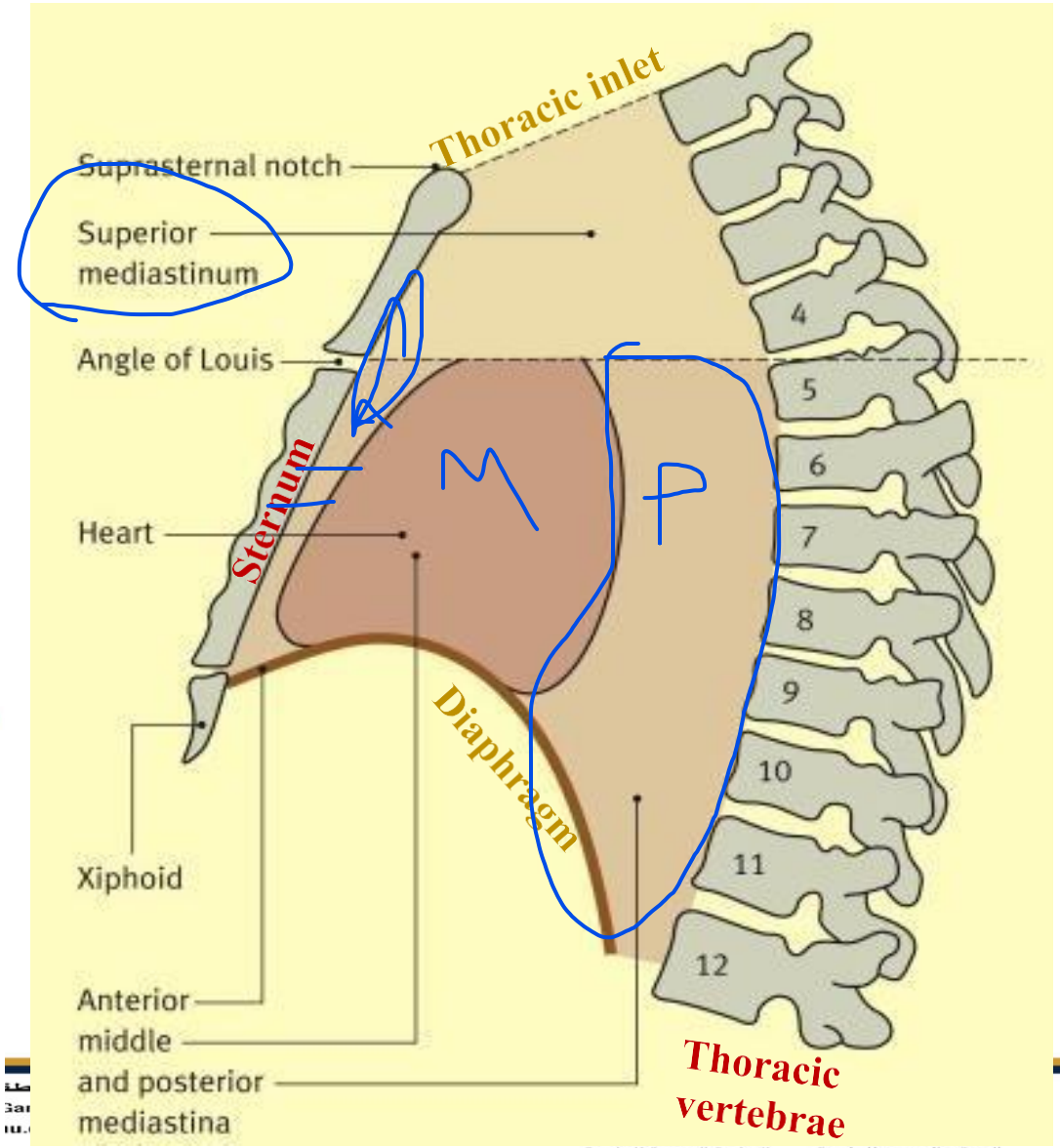
Definition: The median partition of the thoracic cavity between the two lungs and pleurae.

Boundaries (extent):

- **Anterior:** sternum.
- **Posterior:** thoracic vertebrae.
- **Superior:** thoracic inlet.
- **Inferior:** diaphragm.
- **On both sides:** pleura and lung.



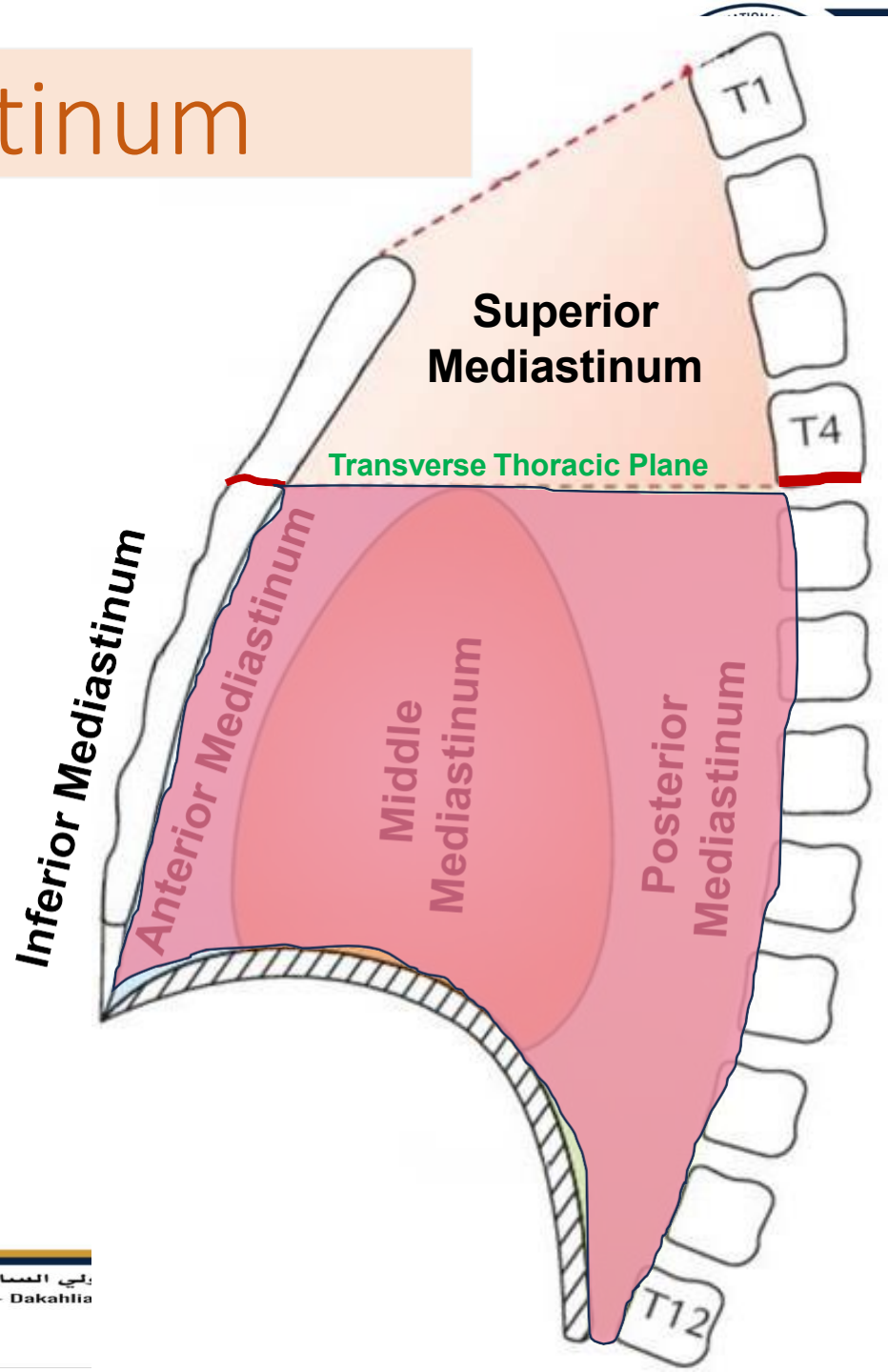




Division of the mediastinum

It is divided by an imaginary plane called **Transverse Thoracic plane** (extending from the sternal angle anteriorly to the lower border of the 4th thoracic vertebra posteriorly) into:

- **Superior mediastinum:** above this plane.
- **Inferior mediastinum:** below this plane. It is subdivided by the pericardium into:
  - **Anterior mediastinum**: lies between the body of sternum and xiphoid process (anteriorly) and the pericardium (posteriorly).
  - **Middle mediastinum:** Occupied by the pericardium.
  - **Posterior mediastinum:** lies between the pericardium (anteriorly) and the lower 8 thoracic vertebrae (posteriorly).



Each part of Mediastinum

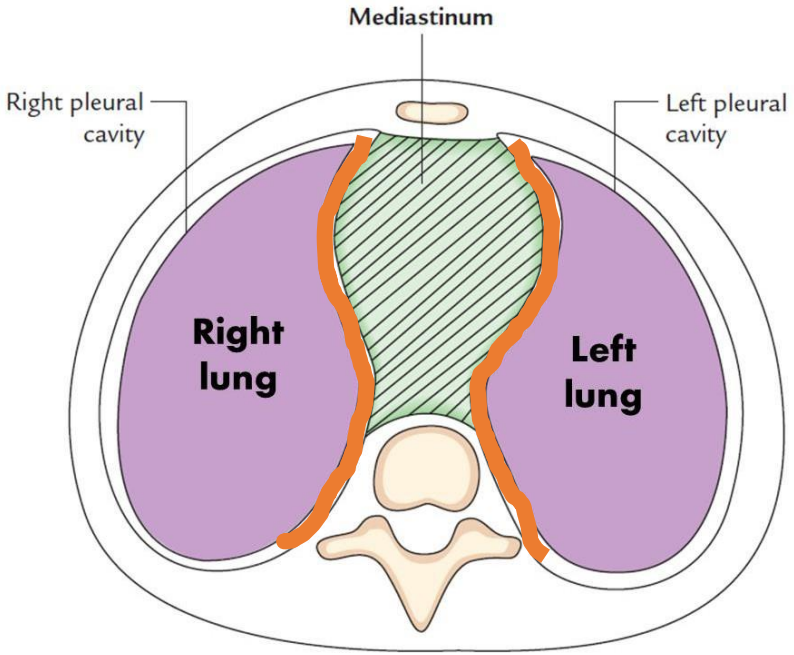
Boundaries

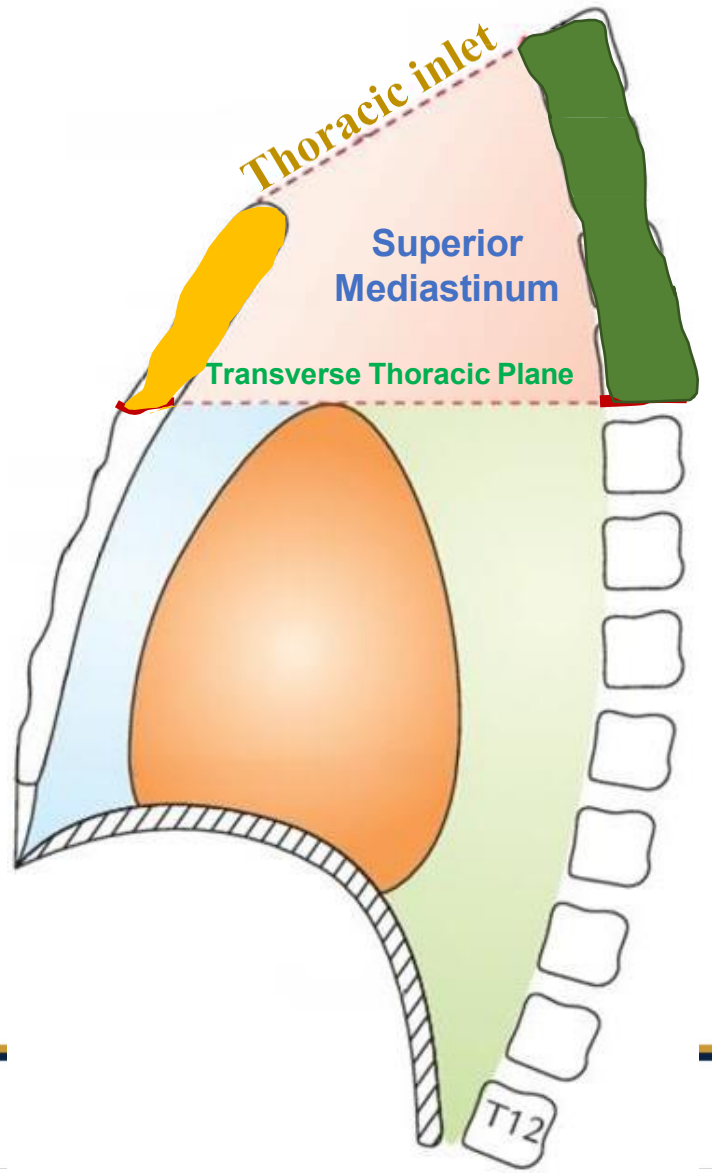
Content

Superior Mediastinum

Boundaries:

- **Anterior:** manubrium sterni.
- **Posterior:** upper 4 thoracic vertebrae.
- **Superior:** thoracic inlet.
- **Inferior:** Transverse thoracic plane
- **On both sides:** pleurae and lungs.





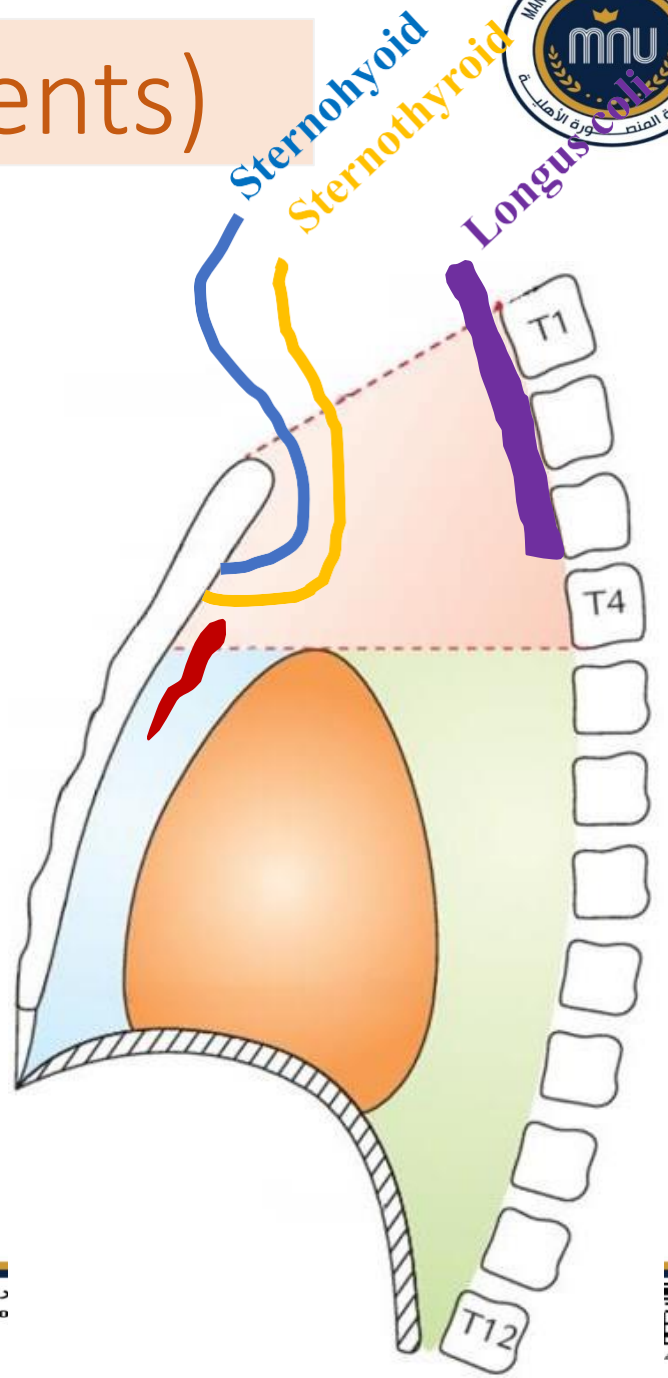
Superior Mediastinum (contents)

Muscles & remnants of thymus gland

Muscles:

- **Longus coli muscle:** in front of the vertebral column.
- **Sternohyoid & sternothyroid muscles:** attached to the manubrium posteriorly.

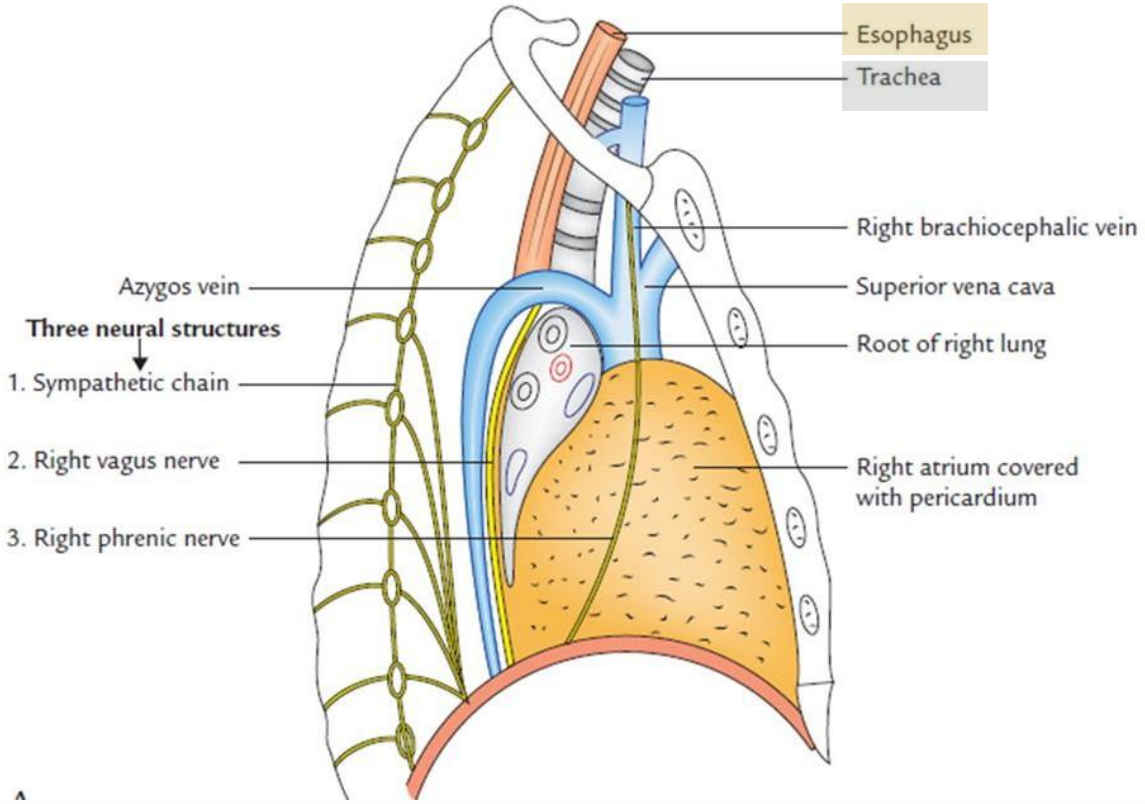
Remnants of thymus gland: behind the manubrium sterni.

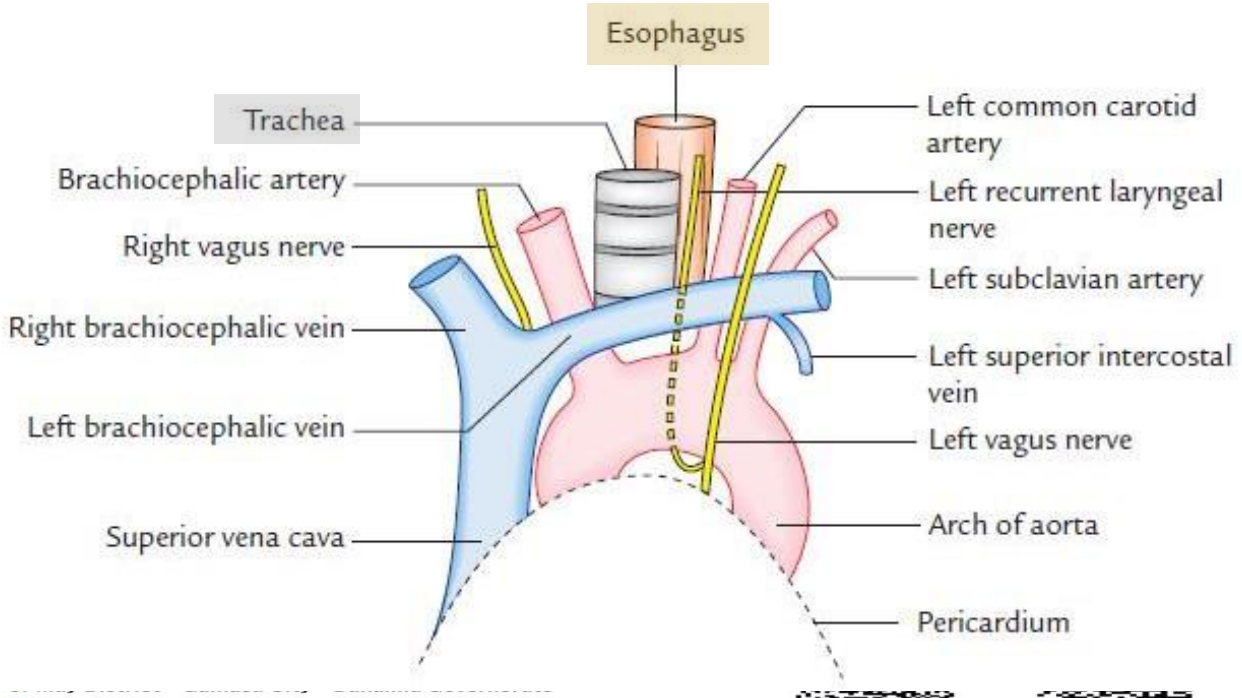


Superior Mediastinum (contents)

Viscera

-
  - The most posterior structure in superior mediastinum.
  - Lies behind trachea and in front of the vertebral column.
-
  - Lies in the midline.
  - Posterior to the major vessels.
  - In front of the esophagus.
-
  - behind & to the left side of the esophagus.





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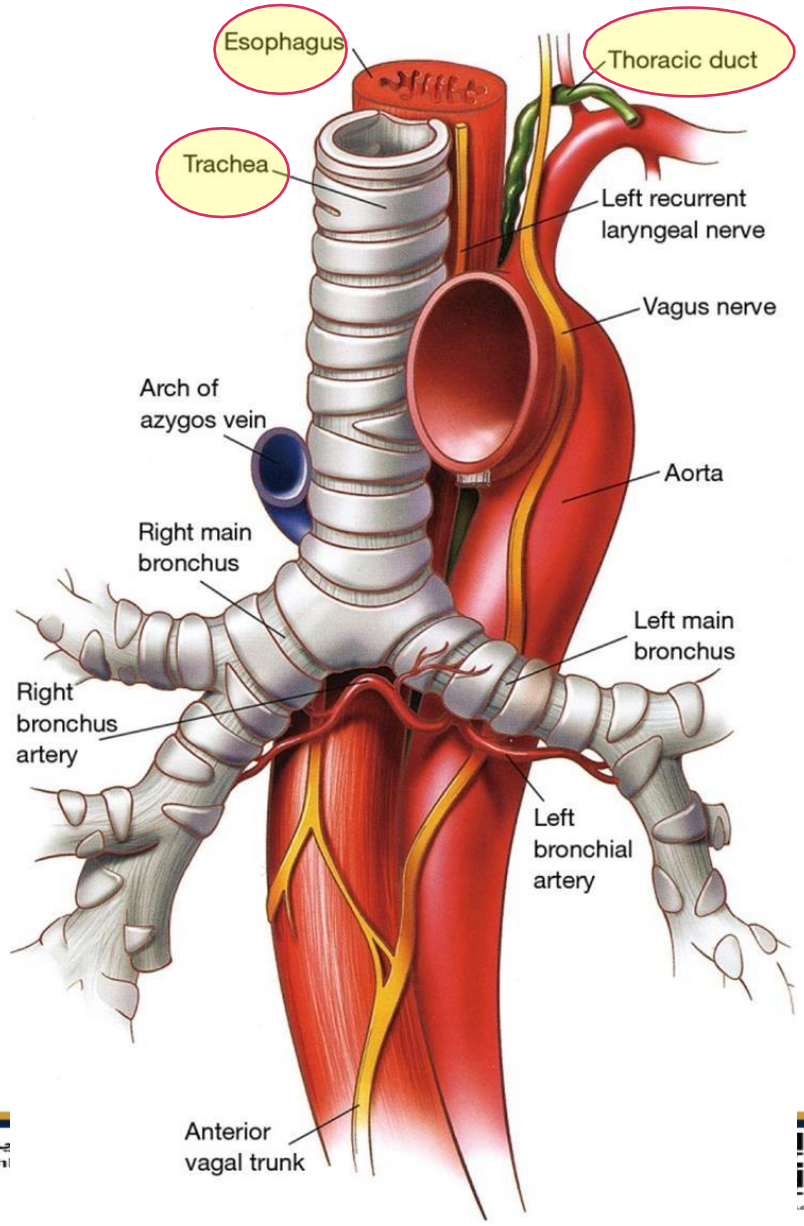
Superior Mediastinum (contents)

Viscera
3 tubes

- **Thoracic duct**
- **Esophagus**
- **Trachea**



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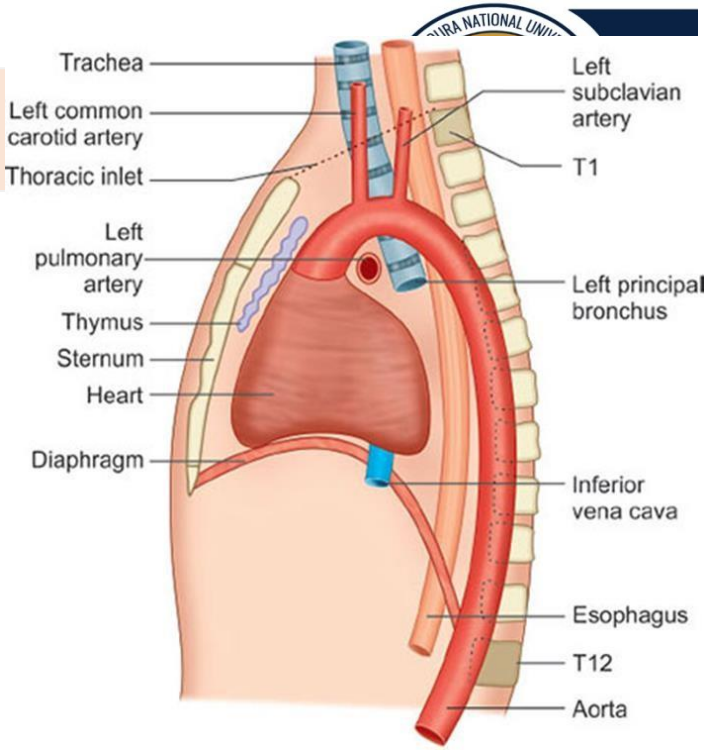
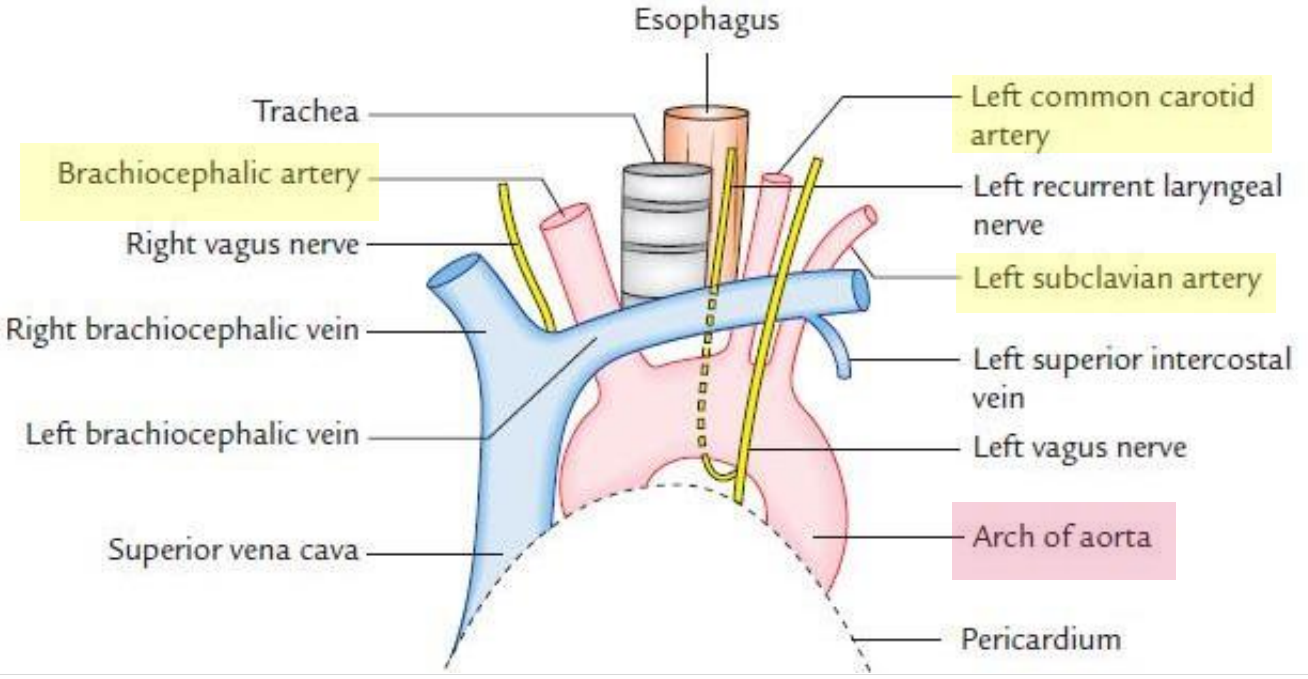
Superior Mediastinum (contents)

Arteries

Aortic arch & its branches



- **Aortic arch:**
  - behind lower half of manubrium sterni
  - in front of the lower part of the trachea.
- **Branches of the arch:** behind upper part of manubrium sterni:
  - **Brachiocephalic artery:** ascends on the right side of the trachea.
  - **Left common carotid & left subclavian arteries:** ascend on the left side of the trachea.



Superior Mediastinum (contents)

Veins

Right Brachiocephalic vein:

descends on the right side of Brachiocephalic artery.

Left Brachiocephalic vein:

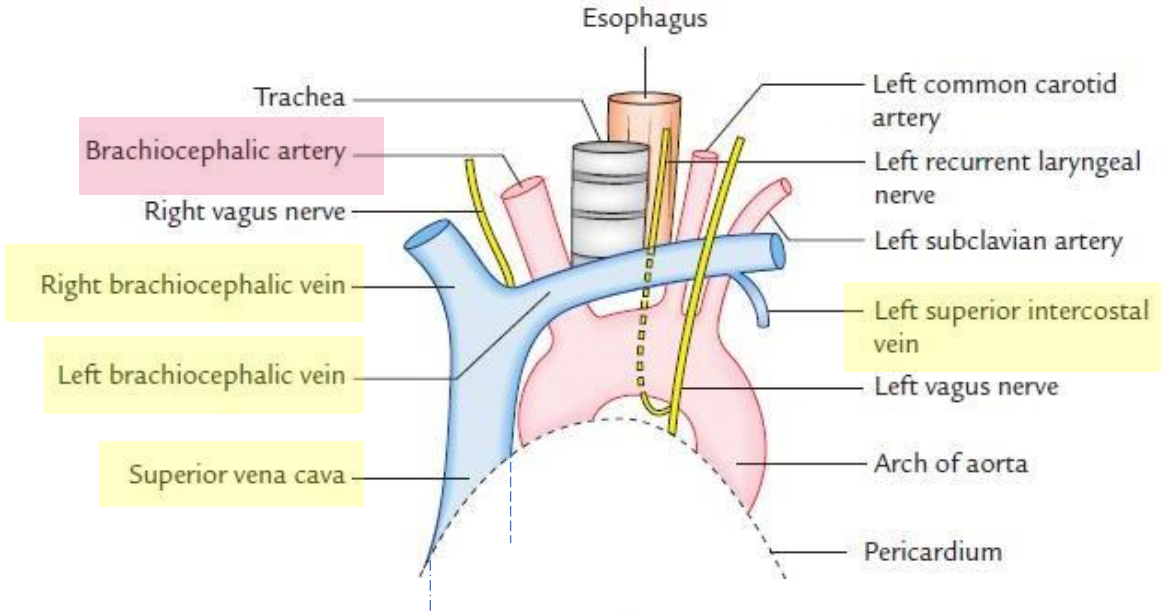
passes obliquely above the aortic arch and in front of its branches.

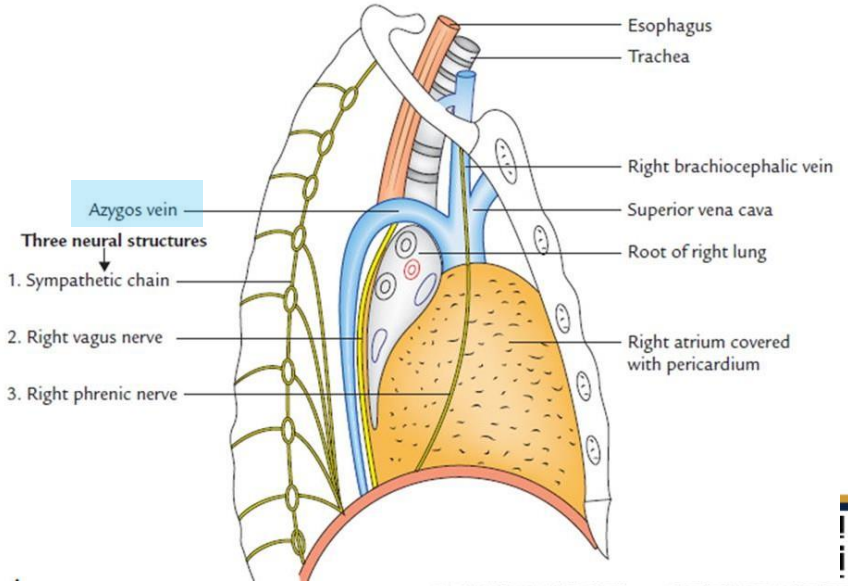
Upper half of Superior Vena Cava:

On the right side of aortic arch in line with right brachiocephalic vein.
Receives arch of azygos vein.

Left superior intercostal vein:

on the left side of aortic arch.





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Superior Mediastinum (contents)

Nerves

Right vagus nerve:

descends on the right side of the trachea.

Left vagus nerve:

on the left side of the trachea and aortic arch.

Left recurrent laryngeal nerve:

arises from left vagus and hooks below the aortic arch then ascends on the left side between the trachea and esophagus.

Right phrenic nerve:

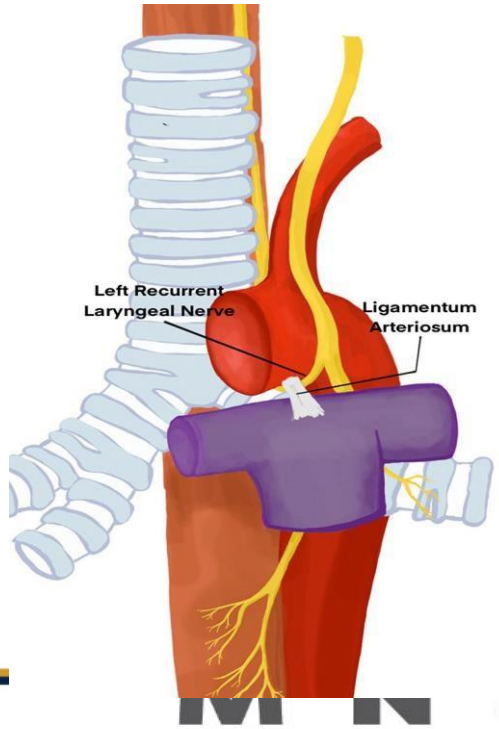
descends on the right side of the right brachiocephalic vein and SVC.

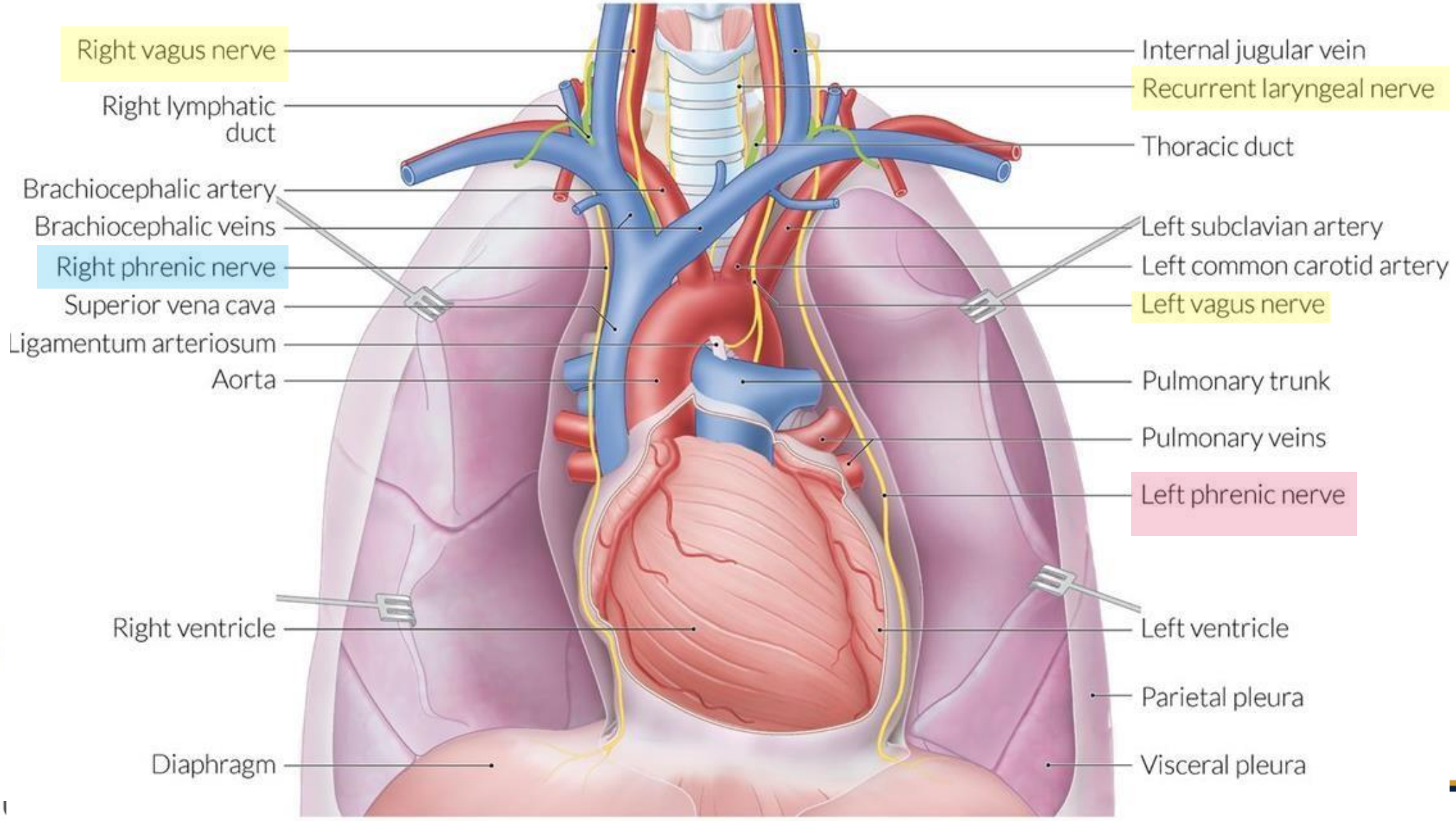
Left phrenic nerve:

descends on the left side of the left common carotid artery and aortic arch.

Superior Mediastinum (contents)

Nerves

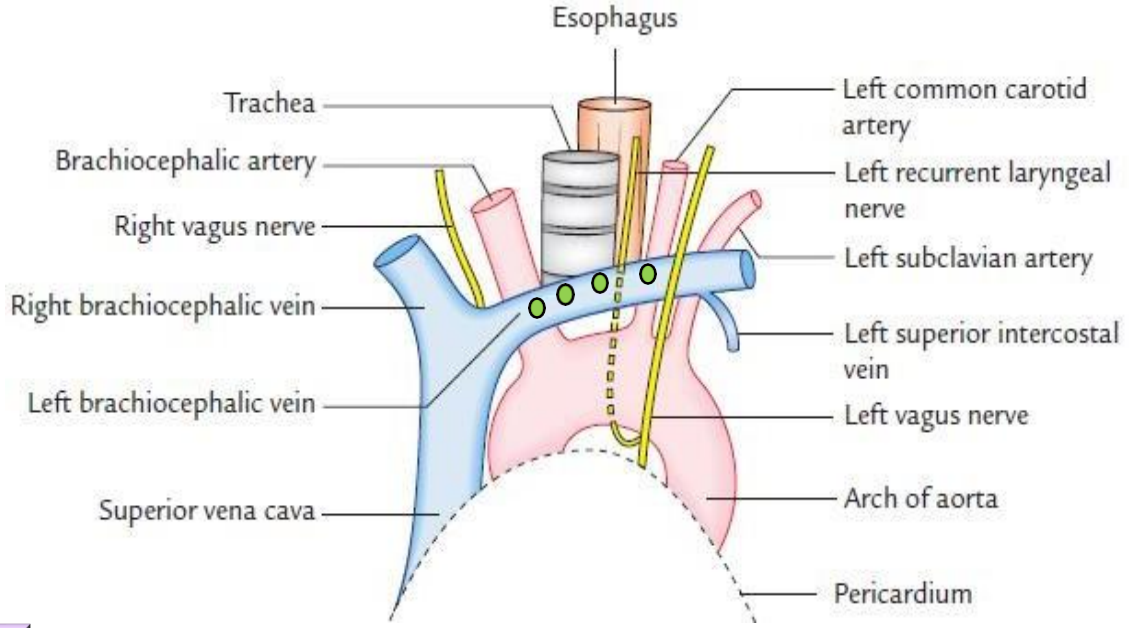


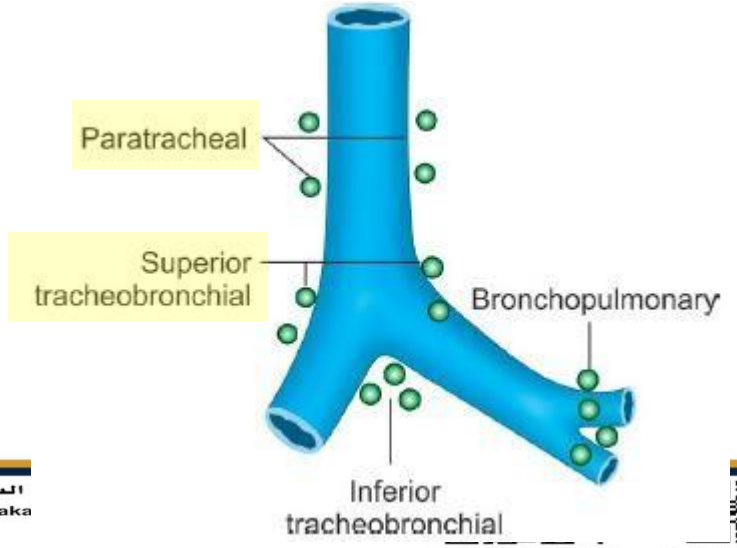


Superior Mediastinum (contents)

Lymph nodes

- **Brachiocephalic lymph nodes.**
- **Para-tracheal lymph nodes.**
- **Superior trachea-bronchial lymph nodes.**

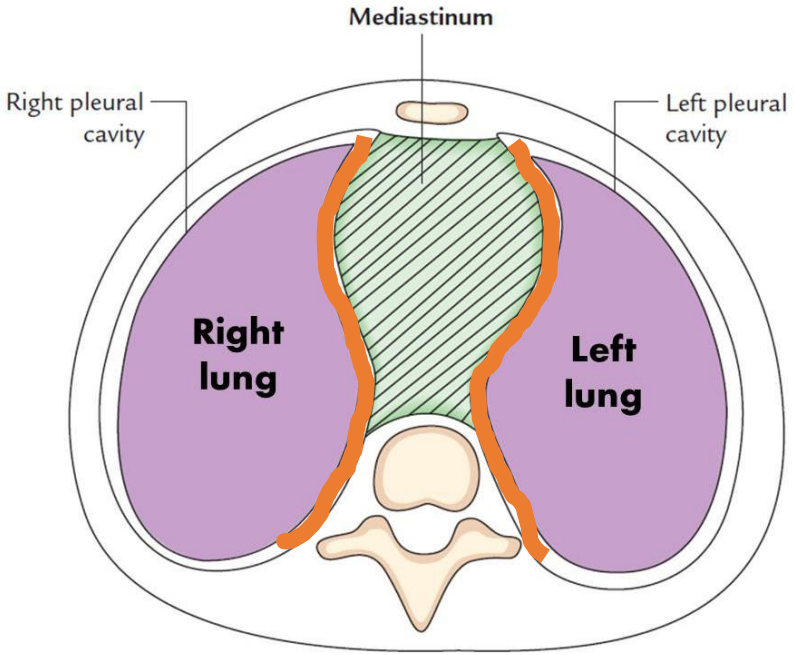


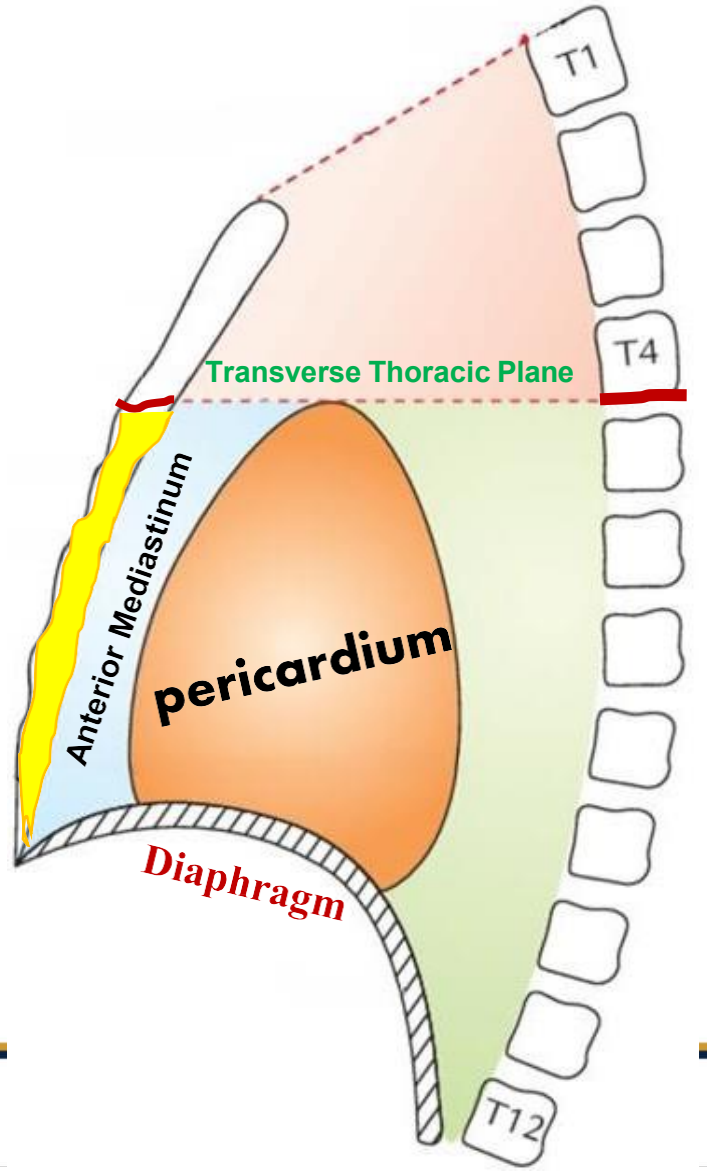


Anterior Mediastinum

Boundaries:

- **Anterior:** body of sternum.
- **Posterior:** pericardium.
- **Superior:** Transverse thoracic plane
- **Inferior:** diaphragm
- **On both sides:** pleurae and lungs.

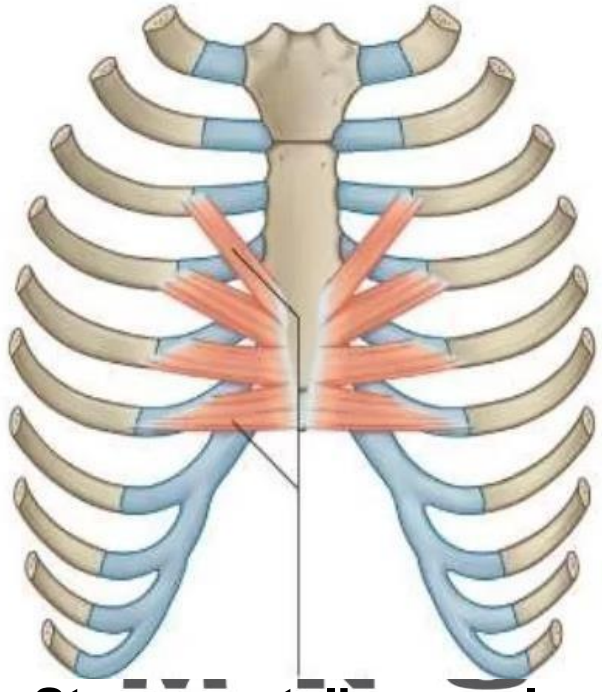




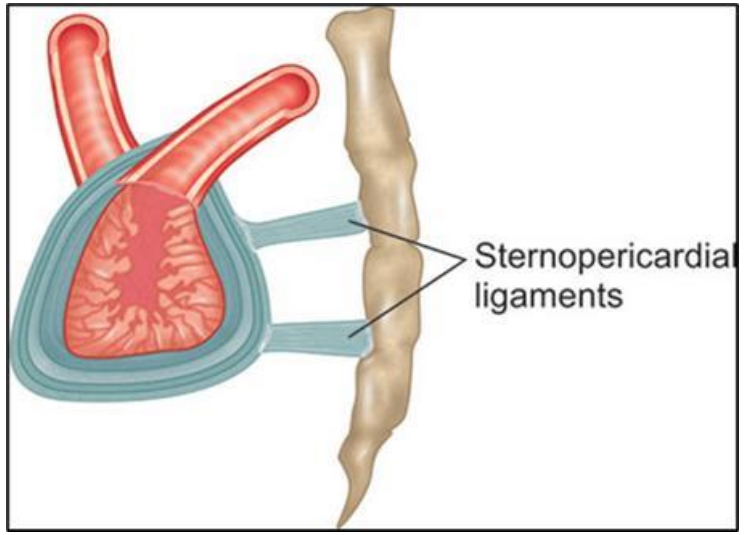
Anterior Mediastinum

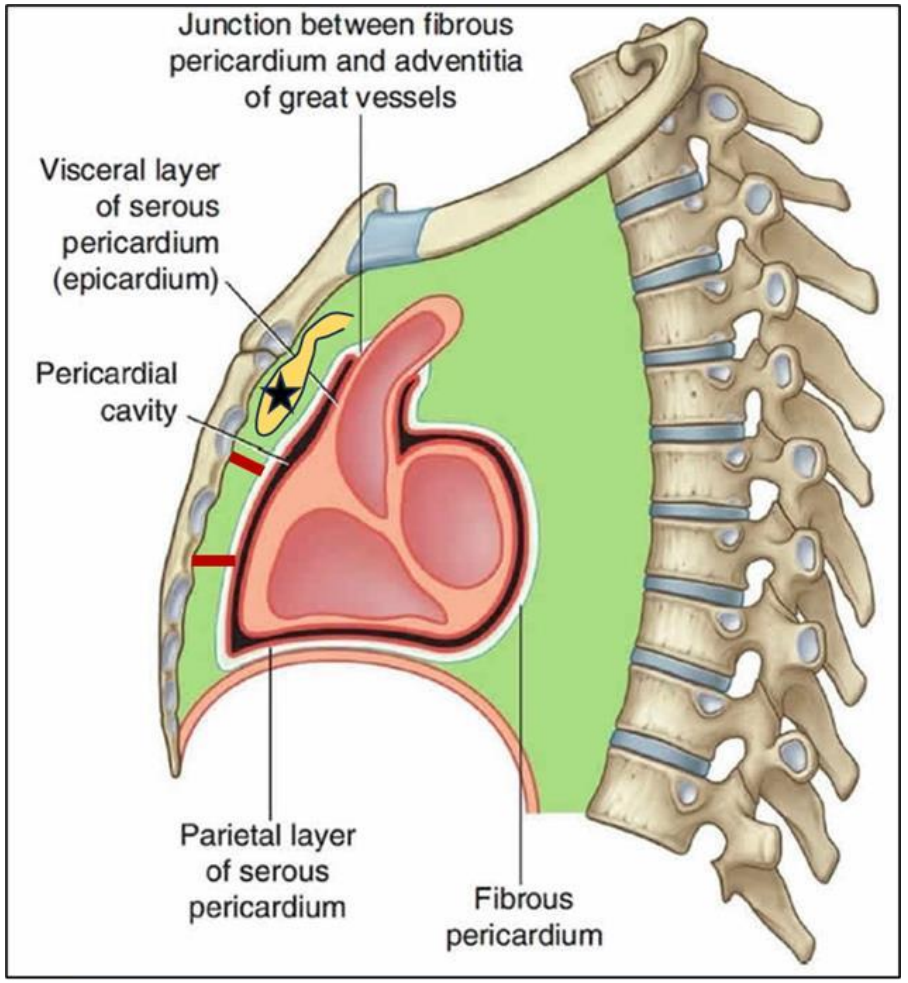
Contents:

- Remnant of thymus gland.
- **S**ternopericardial ligaments (Superior & inferior).
- **S**ternocostalis muscle.
- **L**ymph nodes.
- **L**oose areolar tissue.



Sternocostalis muscle



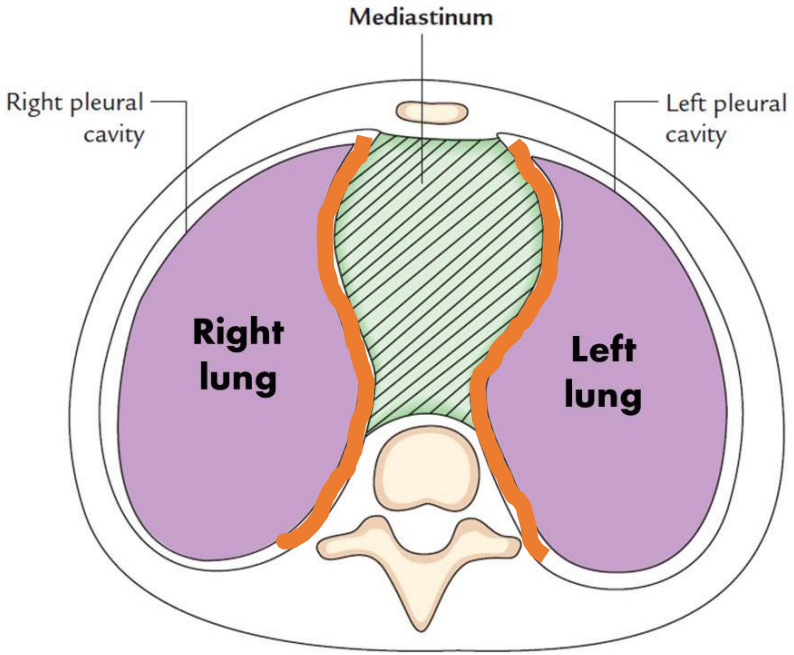


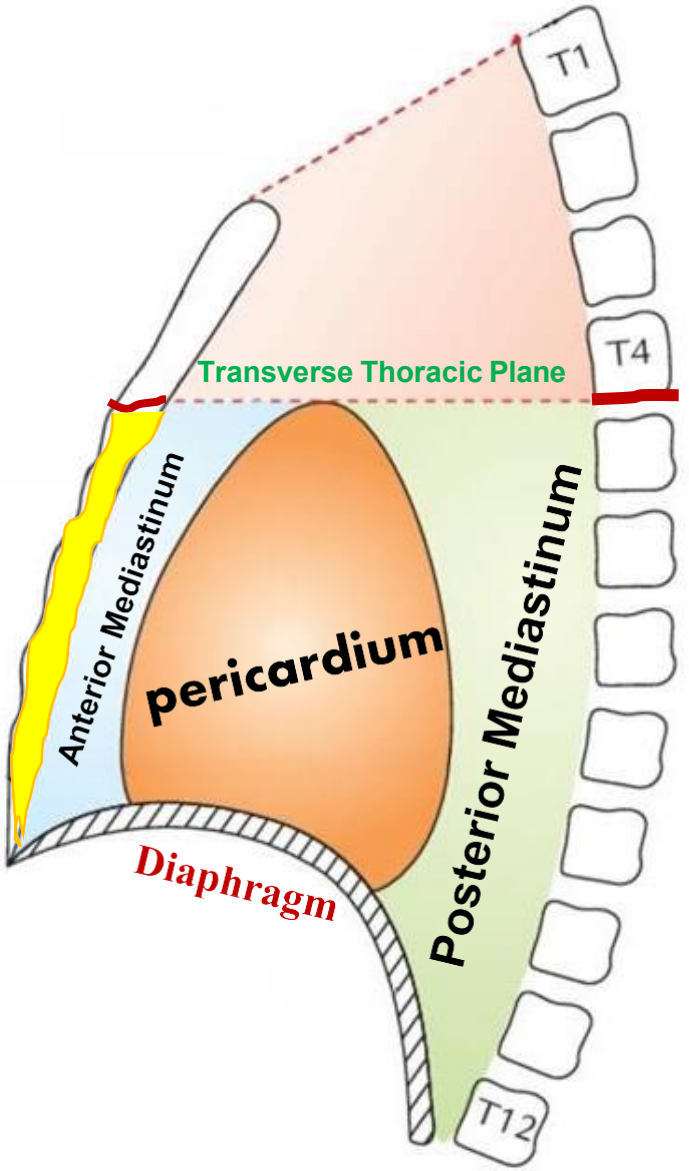
- Sternopericardial ligaments.
- ★ Remnants of thymus gland

Middle Mediastinum

Boundaries:

- **Superior:** transverse thoracic plane.
- **Inferior:** diaphragm
- **Anterior:** anterior mediastinum.
- **Posterior:** posterior mediastinum.
- **On both sides**: pleurae and lungs.

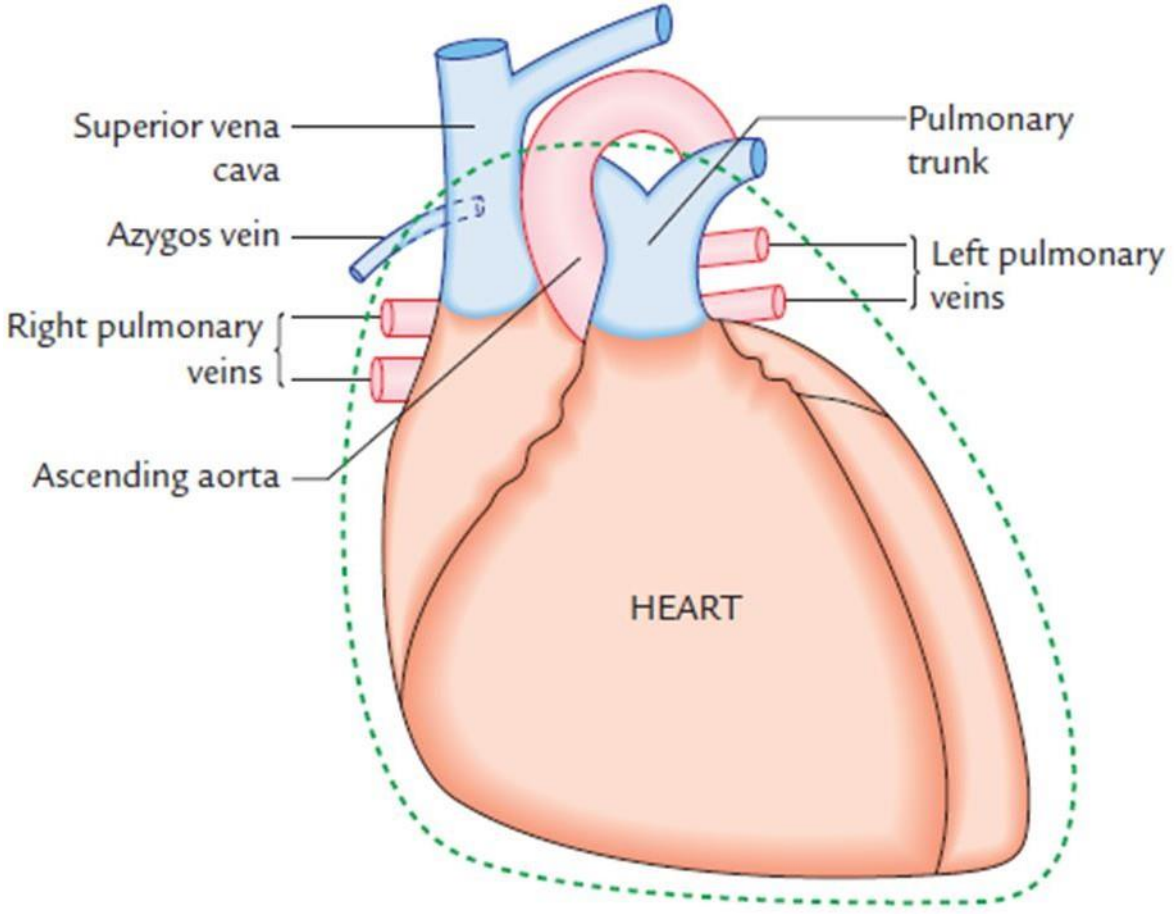




Middle Mediastinum

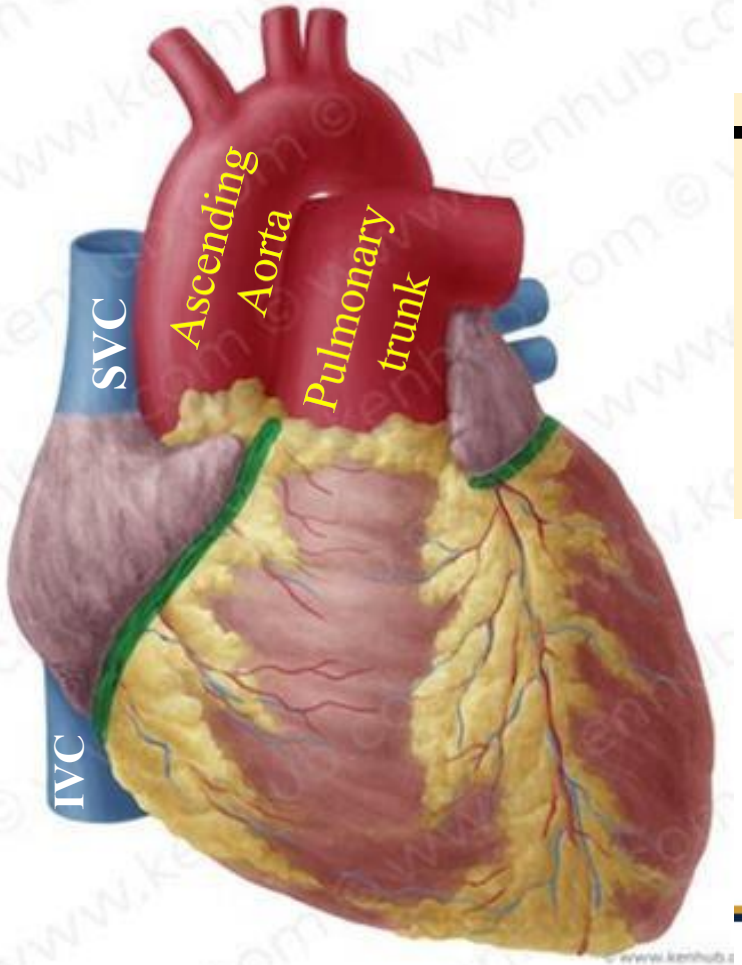
Contents

- The pericardium
- The heart (inside the pericardium)
- Structures piercing the pericardium
- Structures outside the pericardium

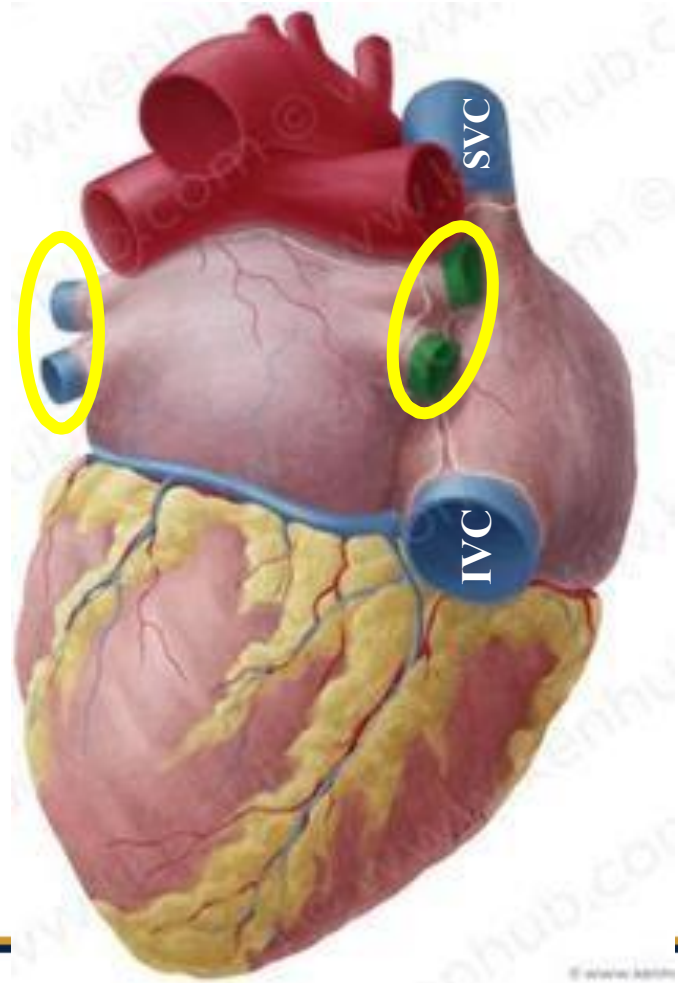


Middle Mediastinum (contents)

Structures Piercing the pericardium

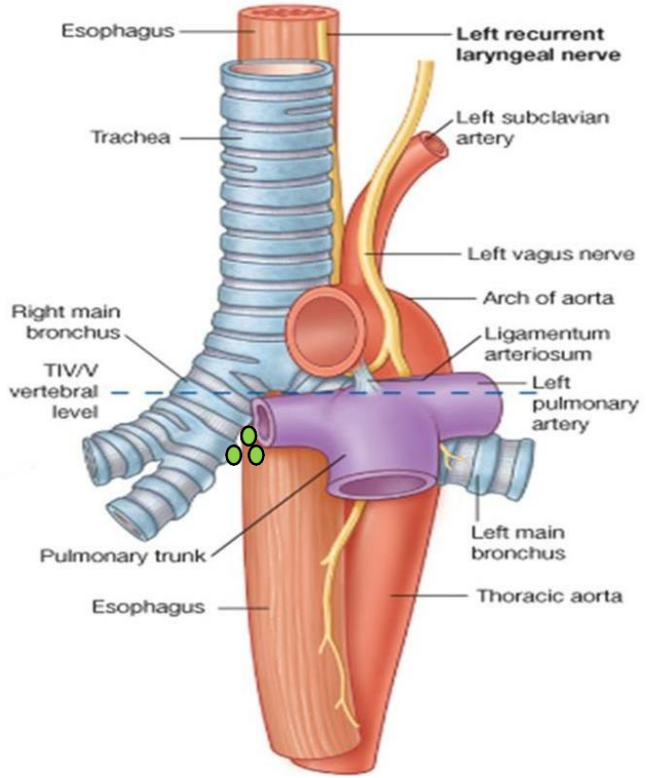


- **8 major vessels entering or leaving the heart:**
  - Superior Vena Cava (SVC) & Inferior Vena Cava (IVC) (entering).
  - 4 pulmonary veins (entering).
  - Pulmonary trunk &Ascending Aorta (leaving).



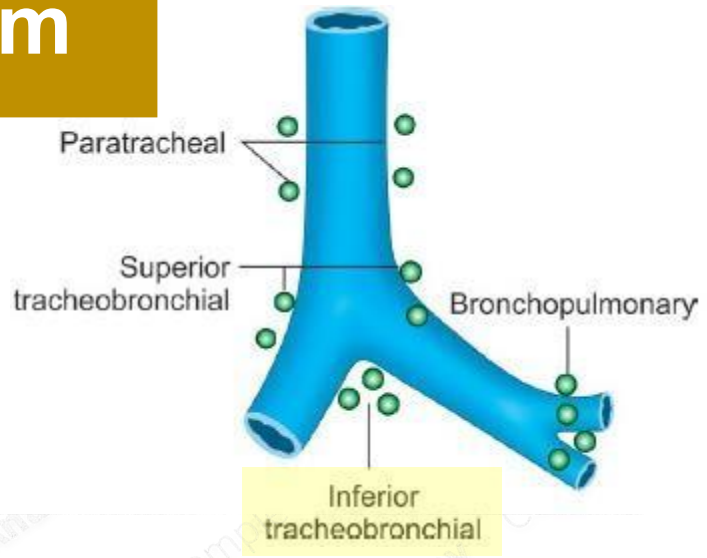
Middle Mediastinum (contents)

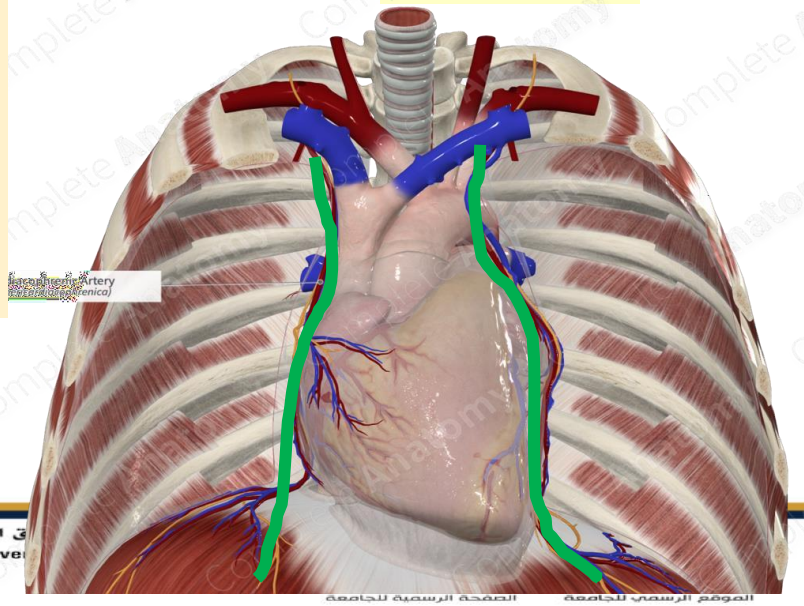
Structures outside the pericardium



- 1. **Bifurcation of the trachea** into two main bronchi (right and left).
- 2. **Inferior tracheobronchial LN** (below the Bifurcation of trachea).
- 3. **Bifurcation of the pulmonary trunk** into right & left pulmonary arteries.

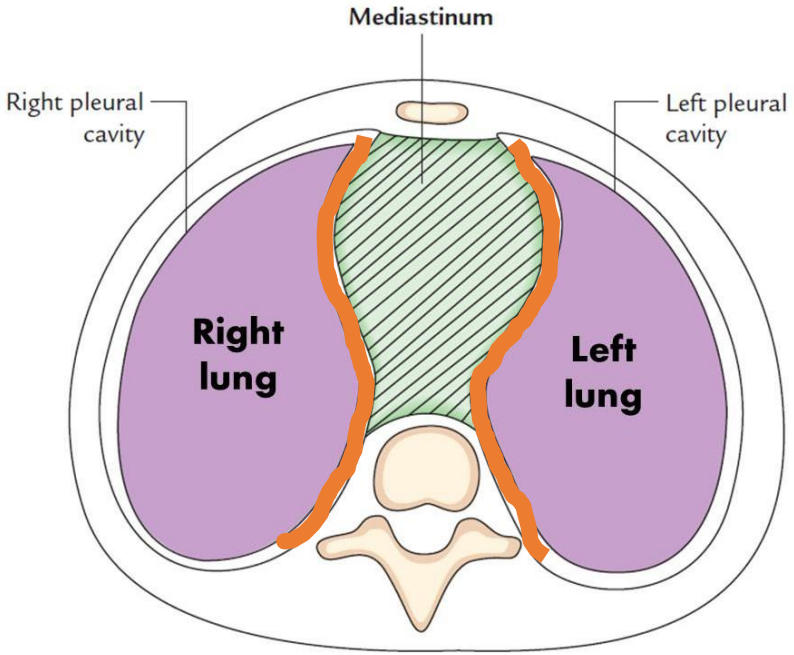
- 1. **Phrenic nerve.**
- 2. **Pericardiophrenic vessels.**

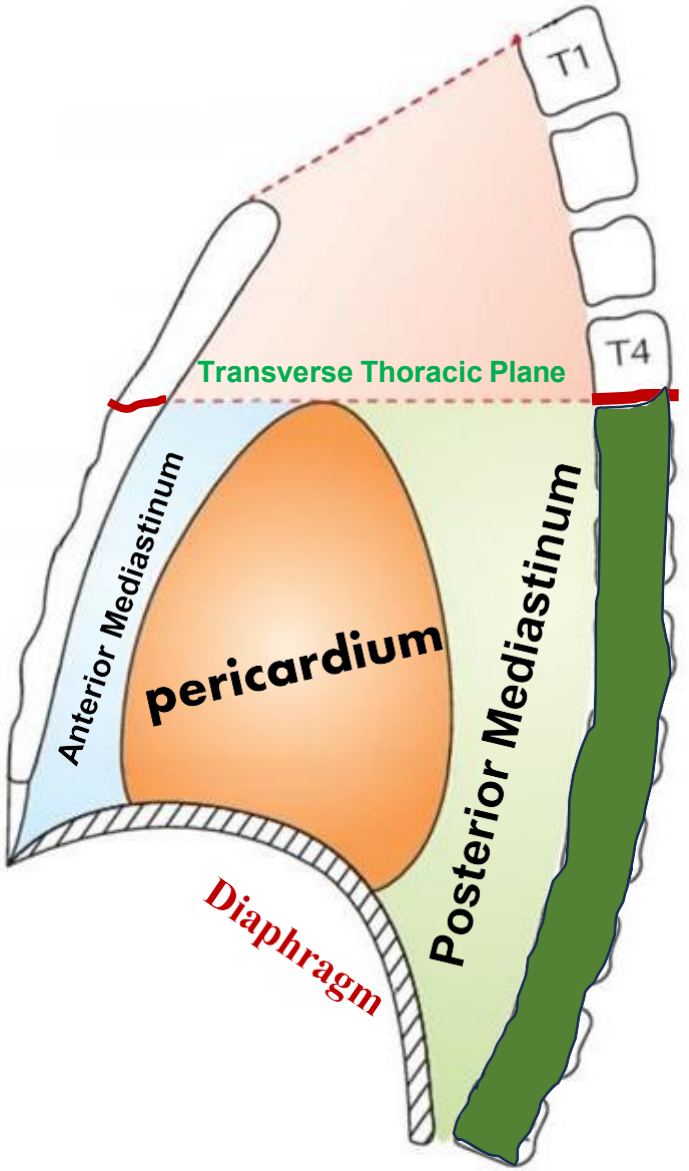




Posterior Mediastinum

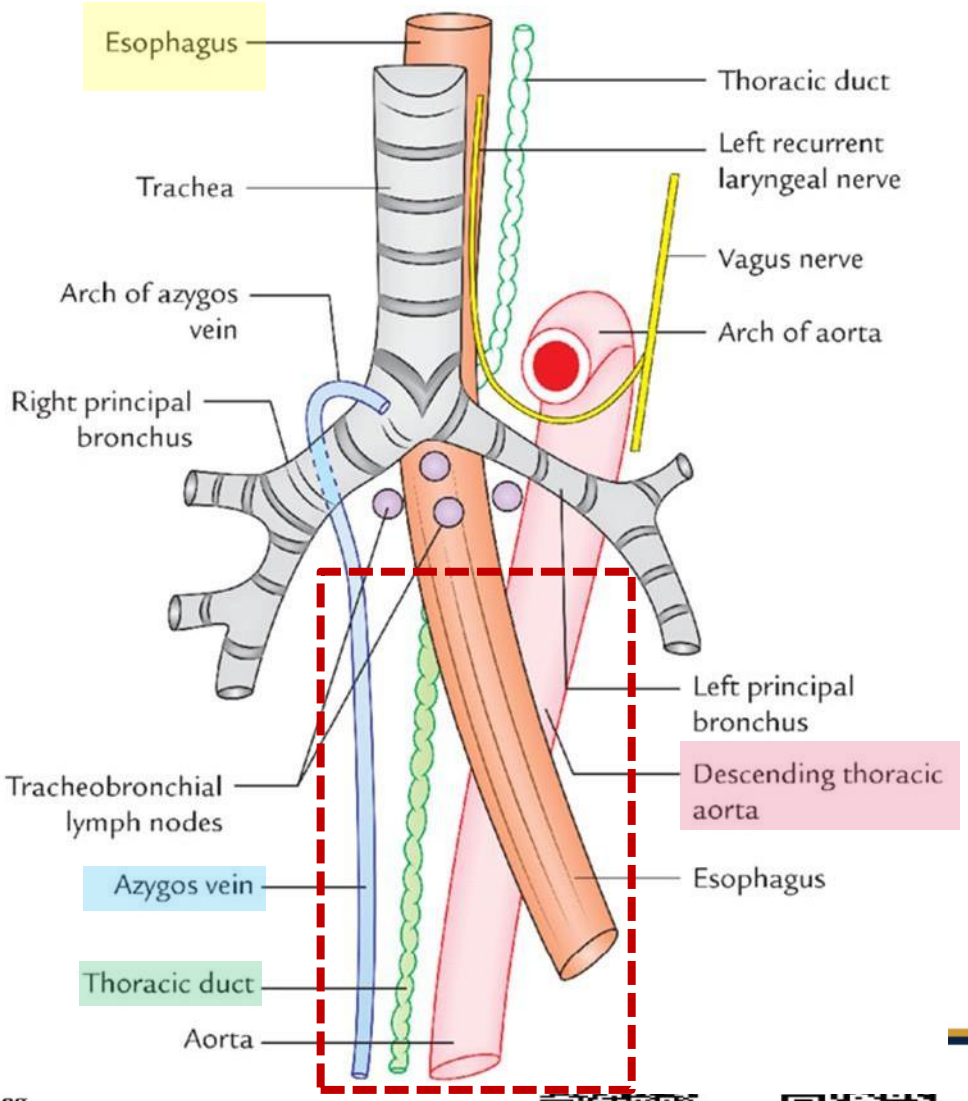
- **Anterior:** pericardium & diaphragm.
- **Posterior:** lower 8 thoracic vertebrae.
- **Superior:** Transverse thoracic plane.
- **Inferior:** diaphragm
- **On both sides:** pleurae and lungs.





Posterior Mediastinum (contents)

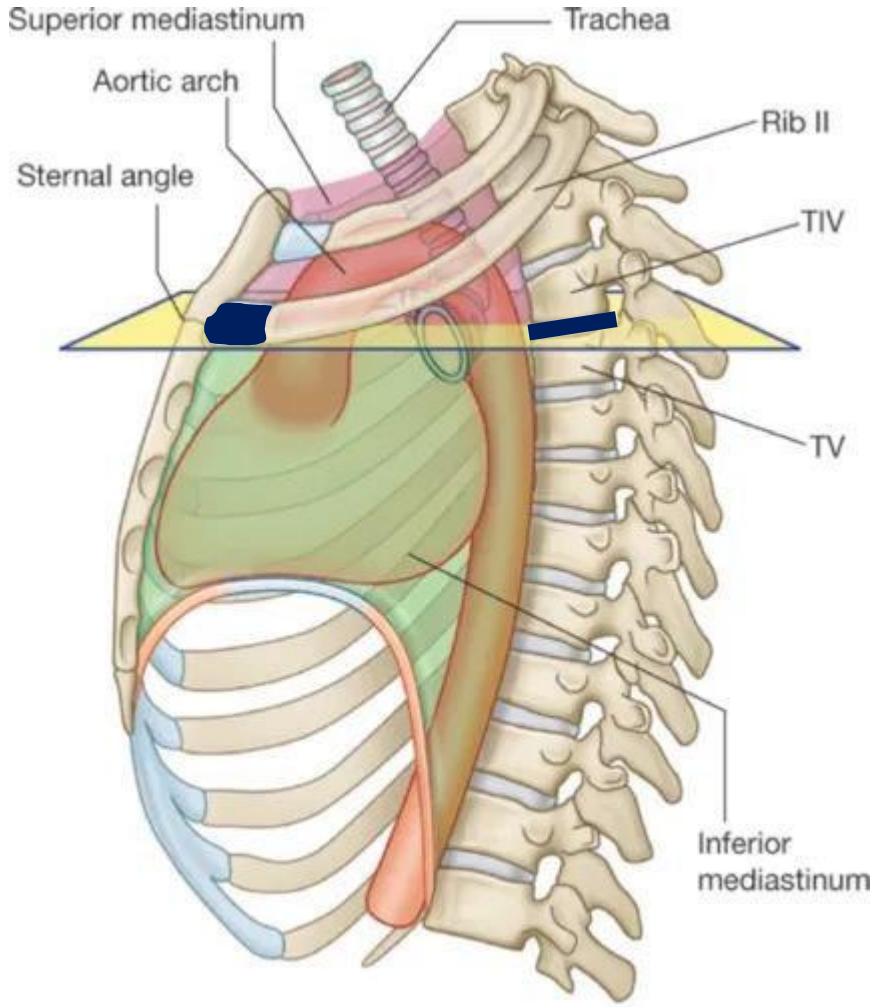
- Descending thoracic aorta.
- Esophagus: on the right side of the aorta then becomes anterior to it.
- Right & left vagi: form esophageal plexuses.
- Thoracic duct: on the right side of the esophagus.
- Azygos & hemiazygos veins (superior (accessory) & inferior).
- Splanchnic nerves: branches of the sympathetic chain.
- Posterior mediastinal lymph nodes.



Structures at the level of sternal angle

Skeleton

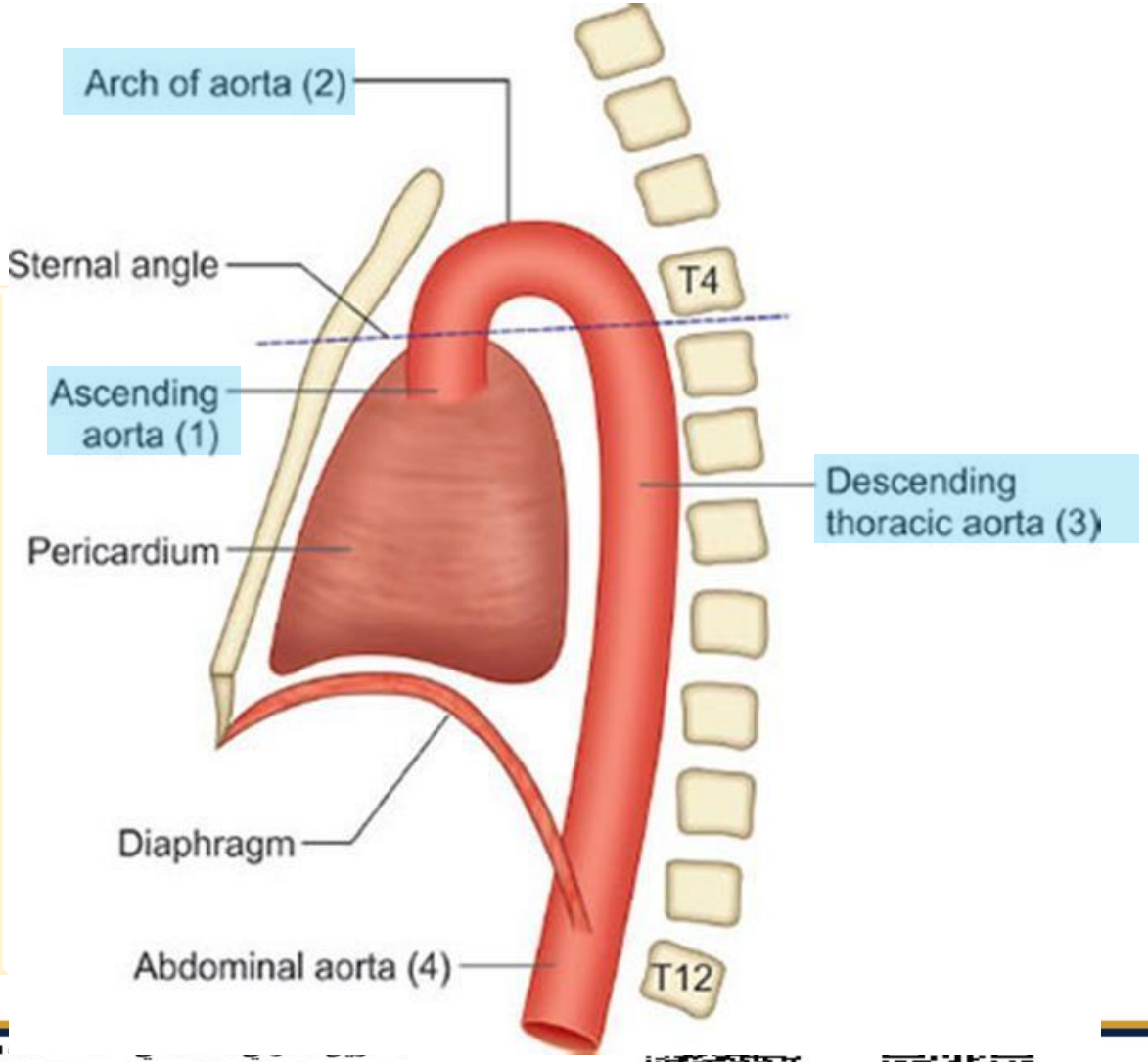
1. 2nd costal cartilage.
2. T4/T5 disc or Lower border of T4 or upper border of T 5



Structures at the level of sternal angle

Vessels

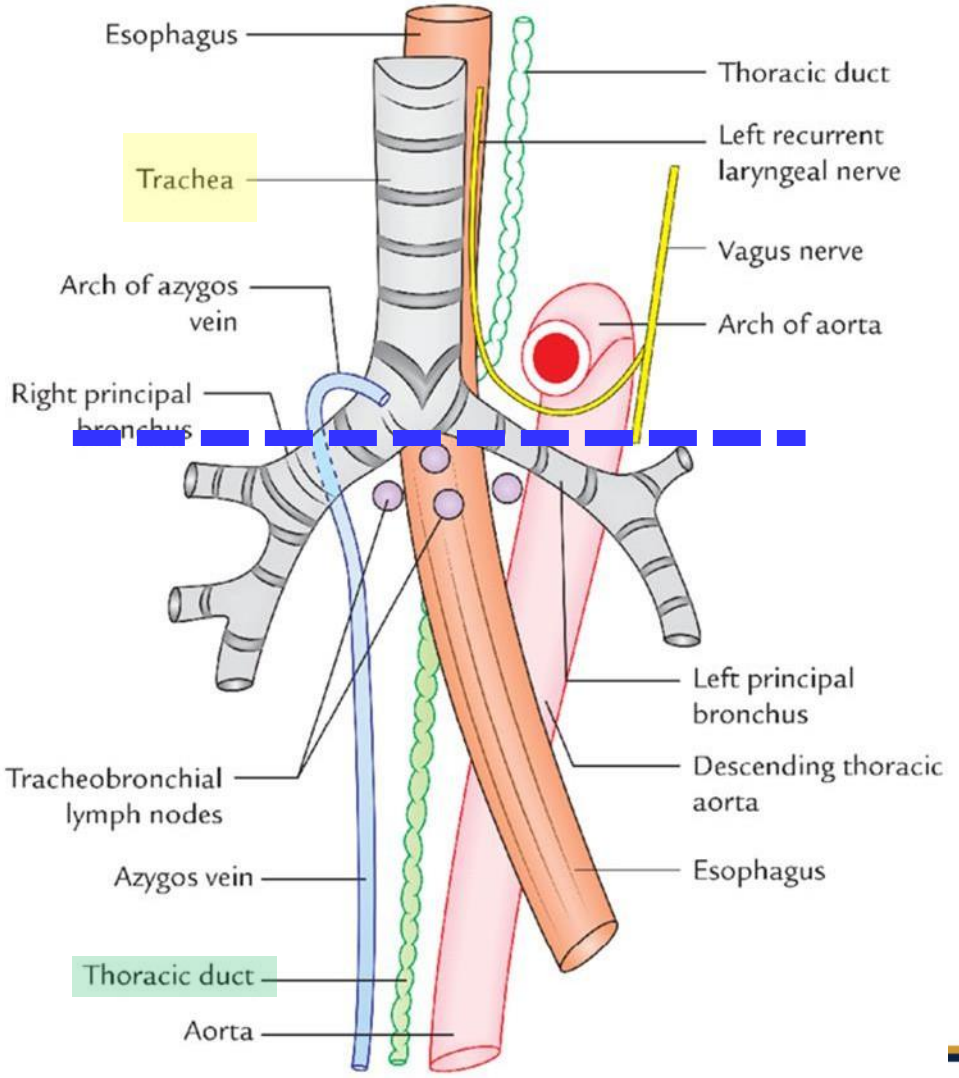
1. Termination of the ascending aorta.
2. Beginning & termination of the aortic arch.
3. Beginning of the descending thoracic aorta.
4. Bifurcation of pulmonary trunk
5. The azygos vein opens in the SVC & SVC pierces the pericardium.



Structures at the level of sternal angle

Viscera

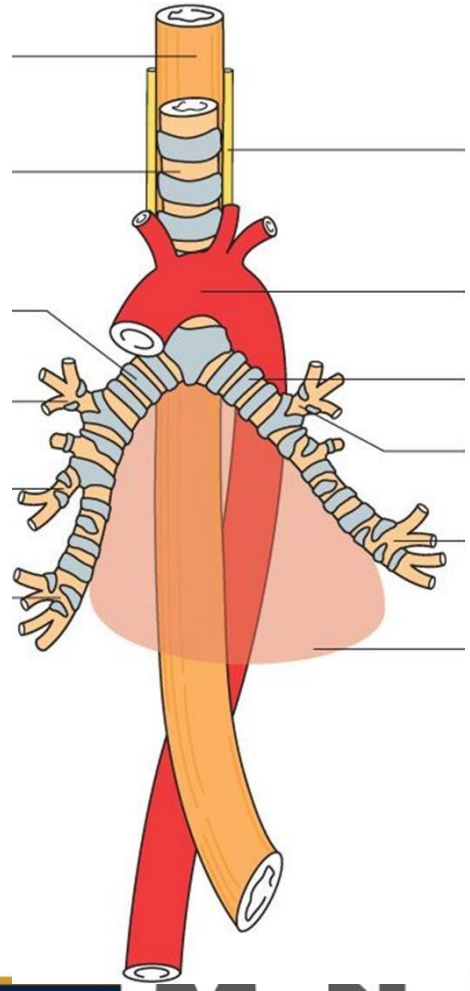
1. Bifurcation of the trachea at the carina.
2. Thoracic duct crosses behind the esophagus to become on its left side.
3. The anterior borders of the lungs & pleurae meet each other in the midline.



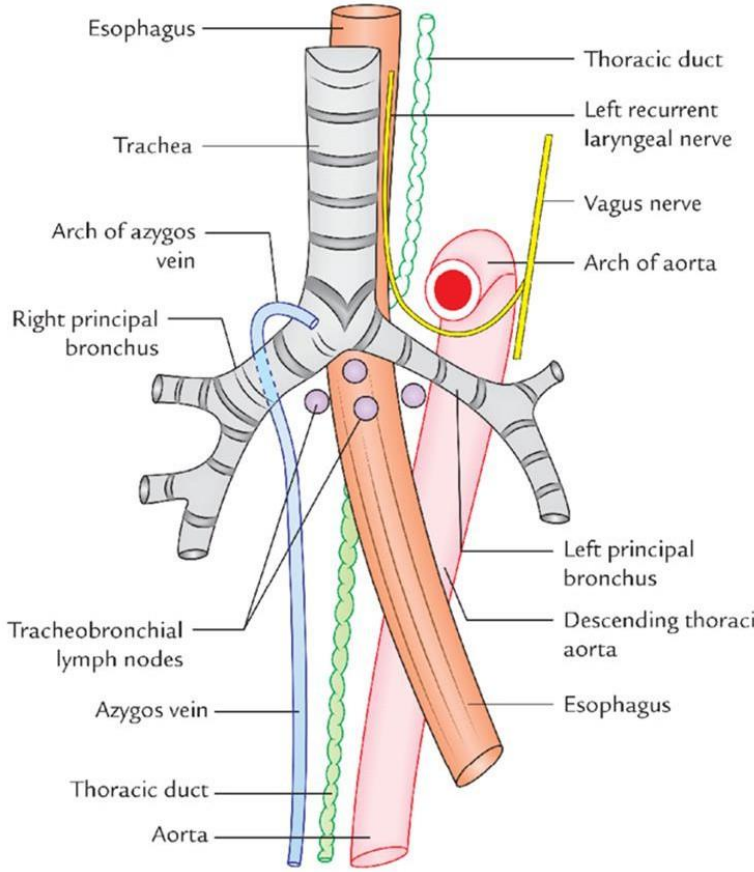
International Coastal Road - 15th of May District - Gamasa City - Dakahlia Governorate
medic@mansnu.edu.eg

Structures present in more than 1 mediastinum

MCQ



Structure	Mediastina
1. Thymus Gland	Superior & Anterior mediastina
2. Phrenic nerve	Superior & middle mediastina
3. Trachea	Superior & middle mediastina
4. Thoracic duct	Superior & posterior mediastina
5. Esophagus	Superior & posterior mediastina
6. Vagus nerve	Superior & posterior mediastina
7. Aorta	• Ascending aorta in the middle mediastinum • Arch is in the superior mediastinum. • Descending aorta is in the posterior mediastinum.



Development of the heart (part 1)

Department of human Anatomy and Embryology
Faculty of Medicine
Mansoura National University, Egypt

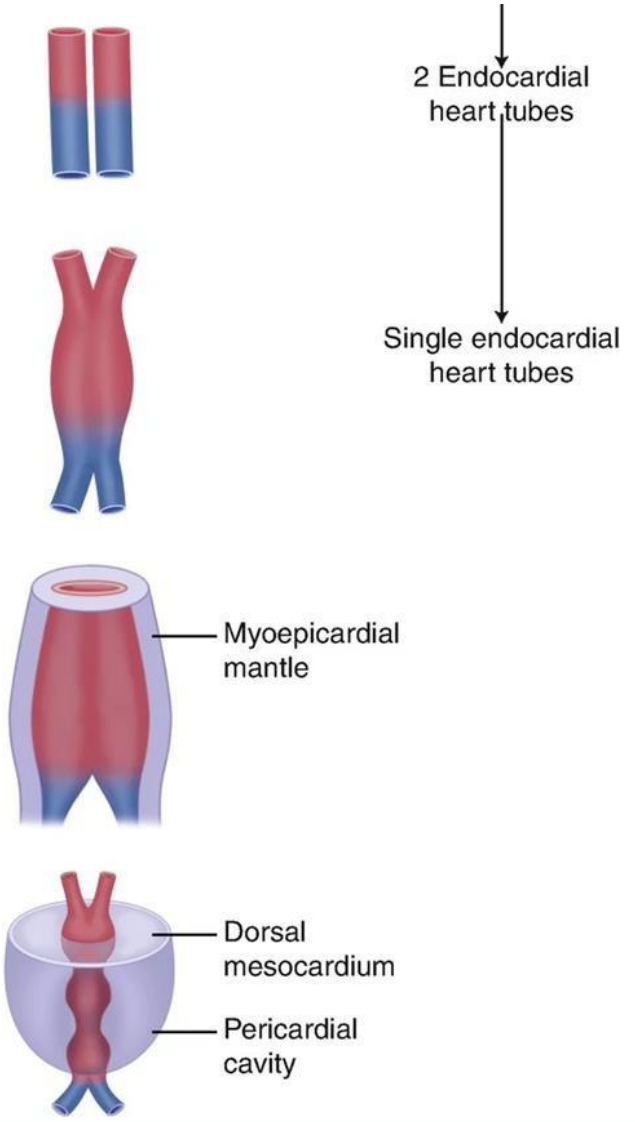
Development of the Heart

At the beginning of the 4th week.

2 sources:

- Angioblastic cells.
- Myo-epicardial mantle.

- The heart starts as 2 heart tubes.
- The 2 tubes fuse with each other to form a single tube.
- This tube has 2 ends:
  - ✓ Venous end: where the blood enters the heart.
  - ✓ Arterial end: where the blood leaves the heart.

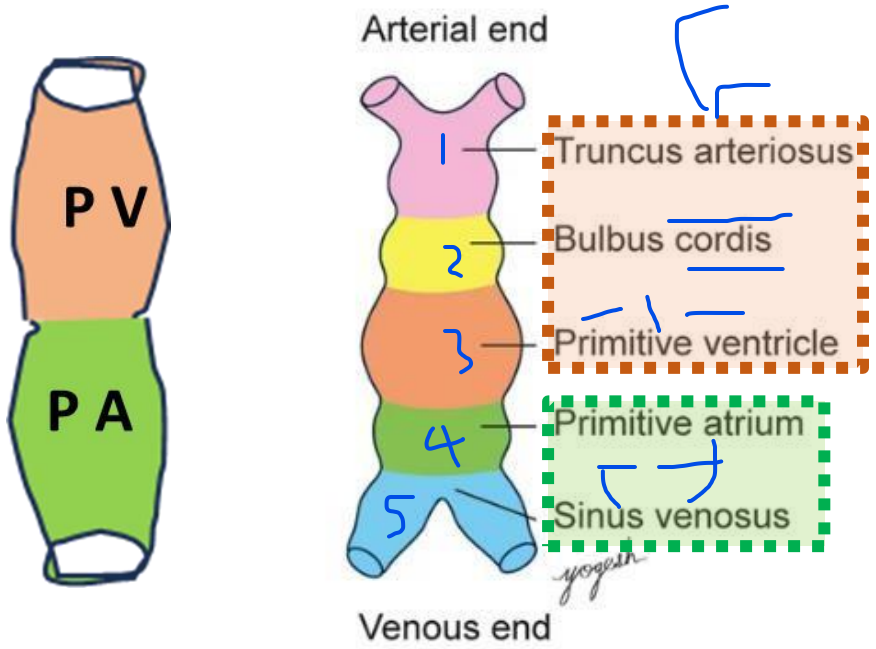


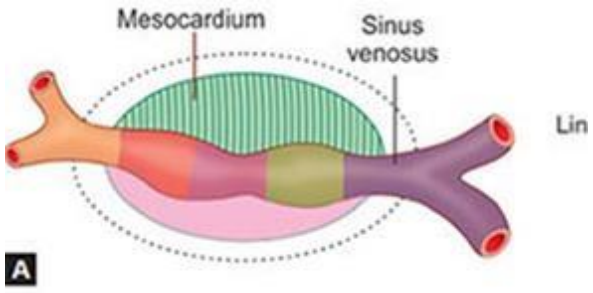
Development of the Heart

- **A constriction** appears in the heart tube dividing it into 2 parts:
  - Primitive atrium.
  - Primitive ventricle.
- **Another 2 constrictions** appear in the primitive ventricle dividing it into 3 chambers:
  - Primitive ventricle.
  - Bulbus cordis.
  - Truncus arteriosus.
- **Another dilatation appears in the primitive atrium called sinus venosus.**

- Truncus arteriosus.
- Bulbus cordis
- Primitve ventricle
- Primitive atrium
- Sinus venosus

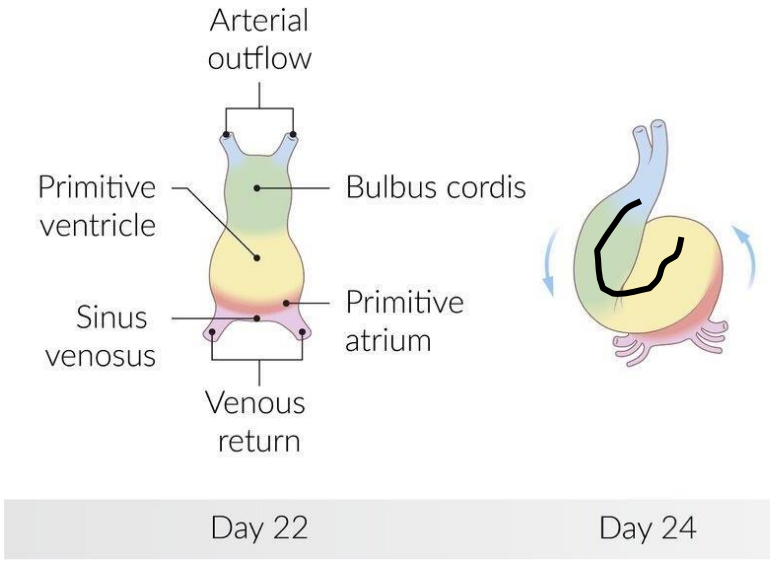
At this stage the heart tube is connected to the esophagus by a dorsal mesocardium.

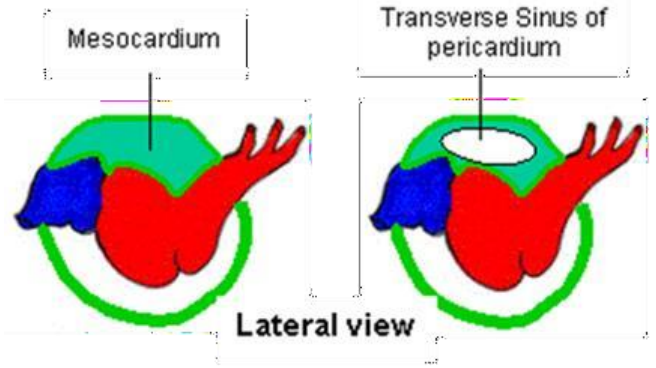


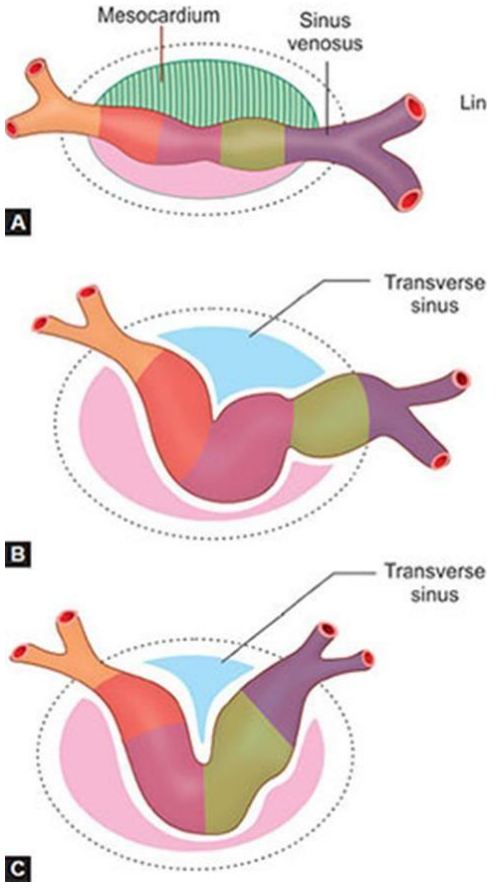


Development of the Heart

- **Elongation of the heart tube** results in its folding to become U-shaped.
- **The dorsal mesocardium** becomes absorbed giving a passage between the arterial and the venous ends of the heart called **transverse Sinus of pericardium.**

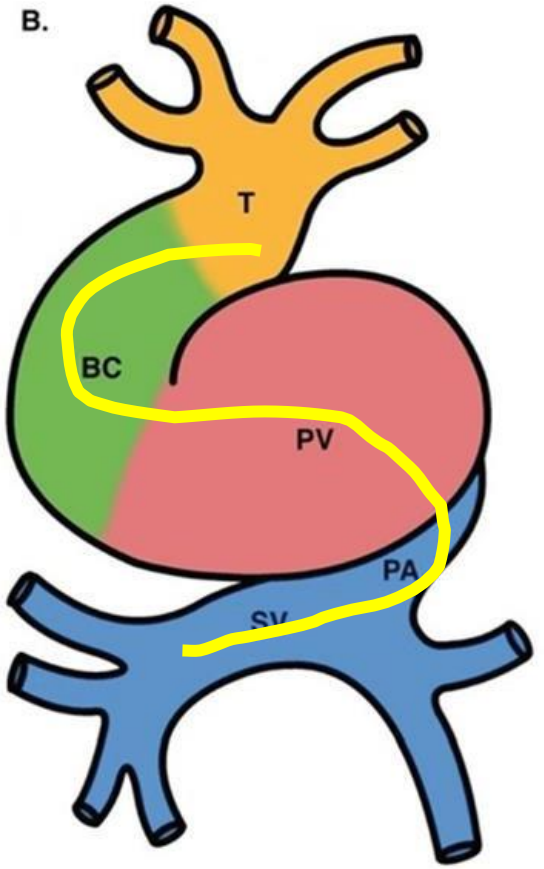






Development of the Heart

- **Further elongation of the heart tube** to become S-shaped and consists of:
  - Ventral limb: the truncus arteriosus and the bulbus cordis.
  - Transverse limb: the primitive ventricle.
  - Dorsal limb: the primitive atrium and the sinus venosus.



Sinus venosus

Development of sinus venosus:

The sinus venosus lies in the mesoderm of septum transversum (future diaphragm).

At an early stage it is formed of:

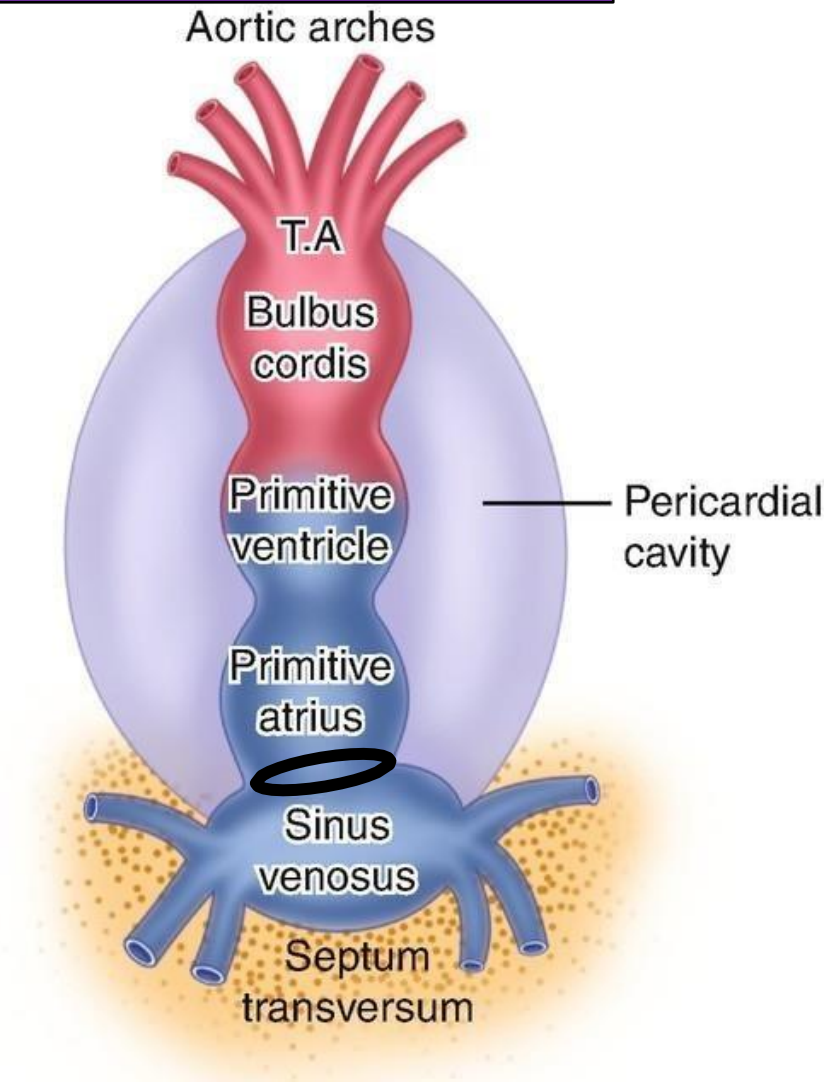
- **Body:** which opens in the primitive atrium by Sino-Atrial orifice which lies transversely.
- **2 horns (right and left):** each horn receives 3 veins:

- **Vitelline vein:** carries un-oxygenated blood from the yolk sac.
- **Umbilical vein:** carries oxygenated blood from the placenta.
- **Common cardinal vein:**

✓ Carries un-oxygenated blood from the body wall.

✓ It is formed by union of anterior and posterior cardinal veins.

Q: VEINS W` OPEN IN SINUS VENOSUS



Sinus venosus

Fate of sinus venosus:

The right horn: forms the smooth posterior part of right atrium.

The left horn &the body: form the **coronary sinus**.

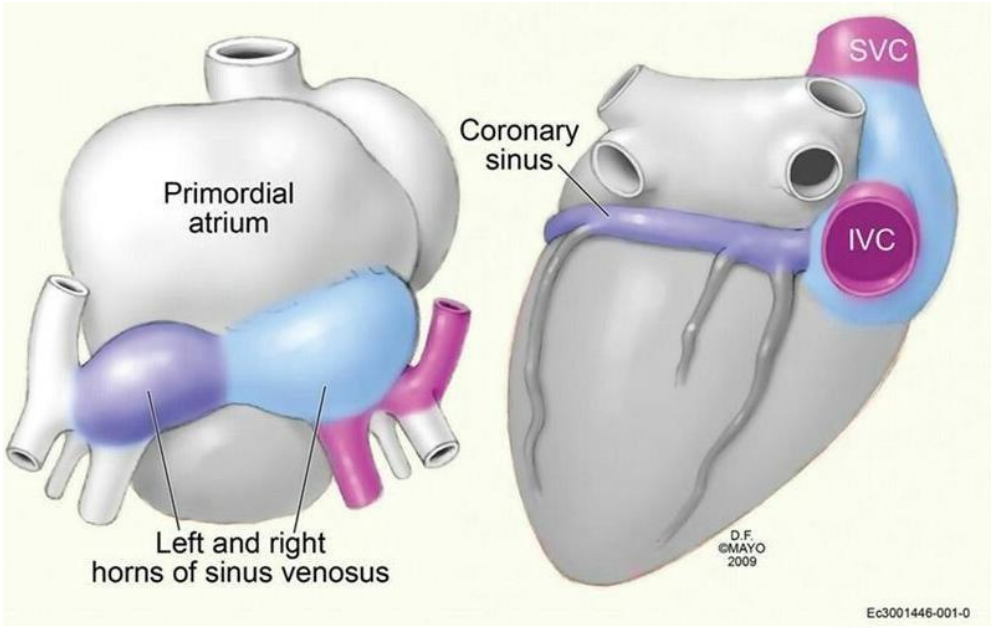
The Sino-Atrial valves:

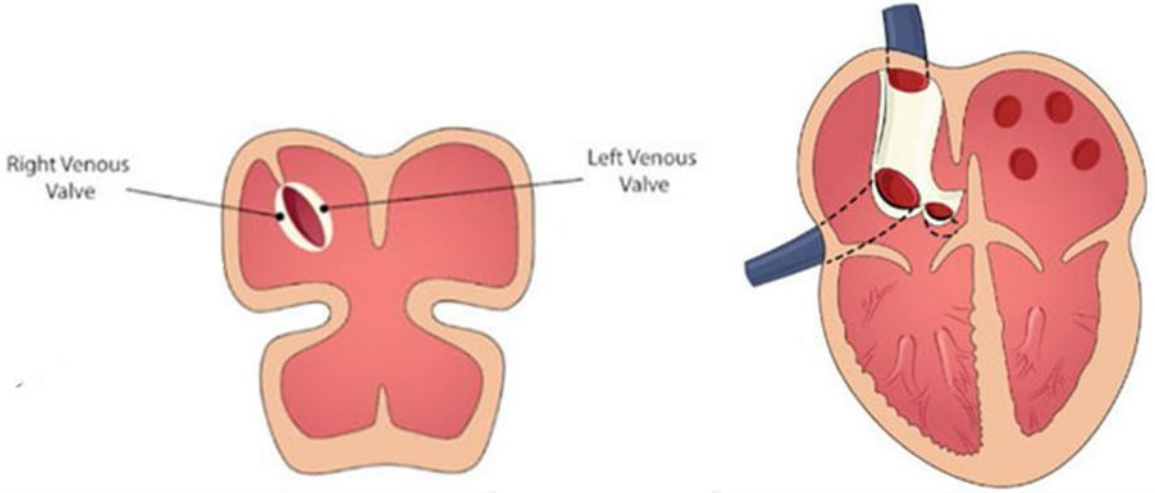
- **The upper end of the right and left valves:** fuse together to form Septum Spurium.
- **The left venous valve:** forms part of inter-atrial septum.
- **The right venous valve:**

  The upper 1/3 with the septum spurium: gives the crista terminalis.

  The middle 1/3: will give the valve of inferior vena cava.

  The lower 1/3: will give the valve of the coronary sinus.



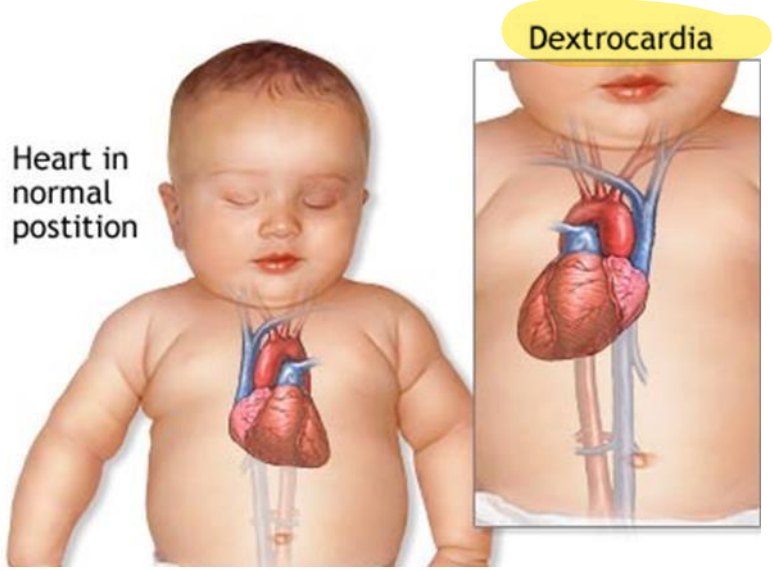


Anomalies in position of the heart

Cause: the heart tube bends to the opposite direction.

Features:

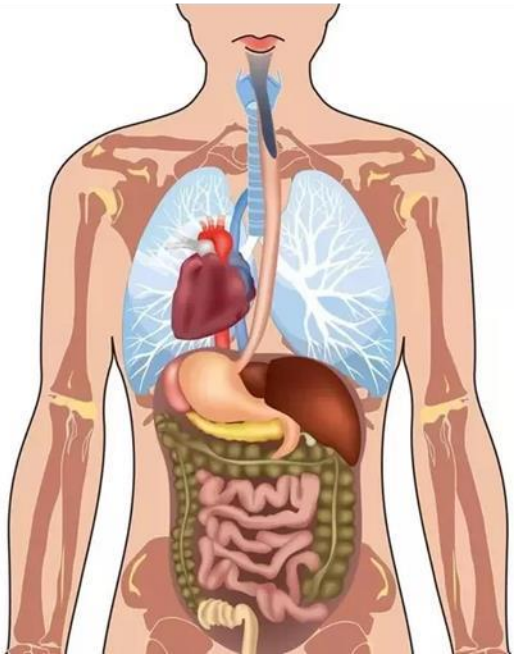
- The heart is displaced to the right.
- The heart chambers are reversed as in mirror image.



Cause: genetic factor.

Features: all body organs are reversed.

Situs inversus



Cause: failure of formation of thoracic wall.

Features:

- The sternum is separated into 2 halves.
- The pericardium is opened.
- Partial or complete exposure of the heart.

Ectopia cordis

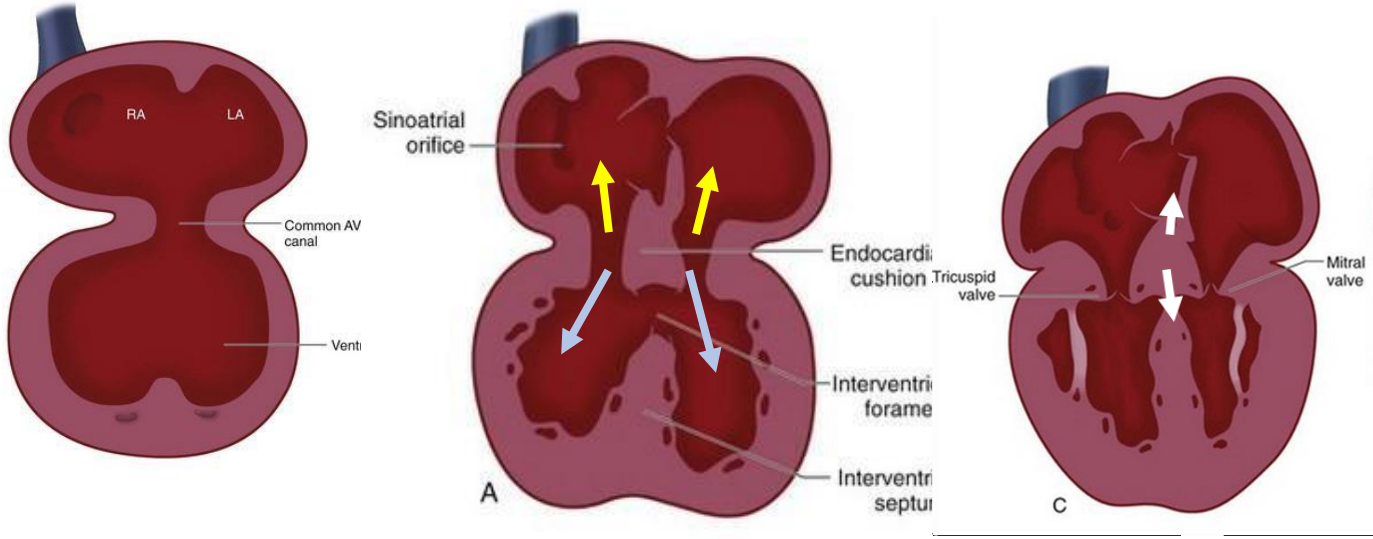
Atrio-Ventricular canal

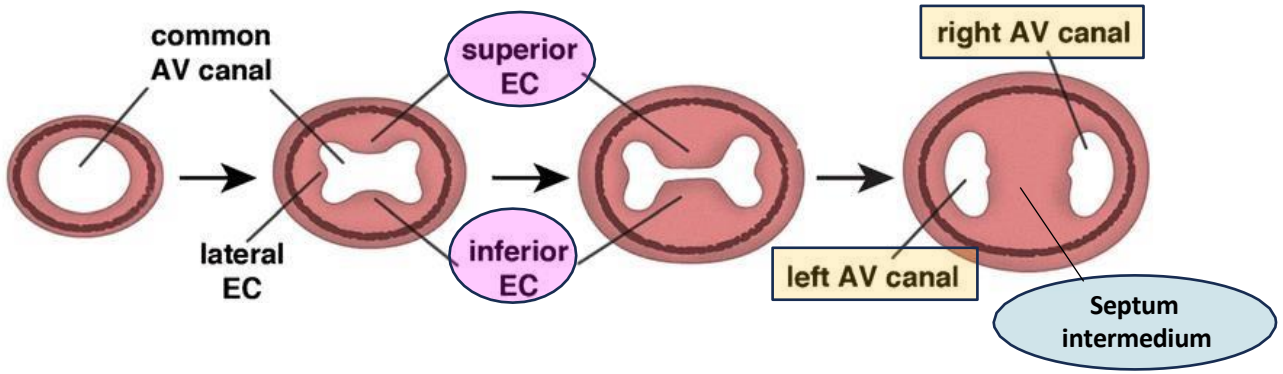
Division of A-V canal:

- At the end of the 4th week: dorsal (superior) and ventral (inferior) endocardial cushions appear in the A-V canal.
- The 2 cushions grow and fuse together to form septum intermedium which divides the A-V canal into right and left halves.

Fate of A-V canal

- **The upper part:** forms part of the corresponding atrium (Rt and Lt).
- **The lower half:** forms part of the corresponding ventricle (Rt and Lt).
- **The septum intermedium:** shares in the formation of inter-atrial septum and membranous part of the inter-ventricular septum.





Anomalies of Atrio-Ventricular canal

A. Persistent A-V canal:

Cause: failure of development of septum intermedium.

Features:

- There is a single channel between the 2 atria and the 2 ventricles.
- It is potential cyanotic heart disease.

B. Unequal division of A-V canal:

1. Mitral Stenosis &/or tricuspid regurgitation:

Cause: deviation of septum intermedium to the left.

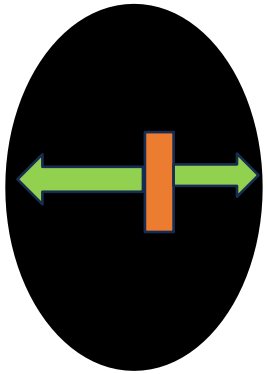
Features: narrow mitral orifice and wide tricuspid. There is ASD and VSD.

2. Tricuspid Stenosis &/or mitral regurgitation:

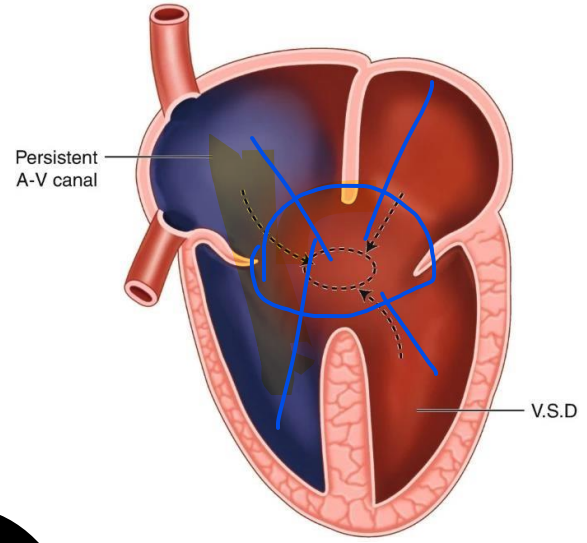
Cause: deviation of septum intermedium to the right.

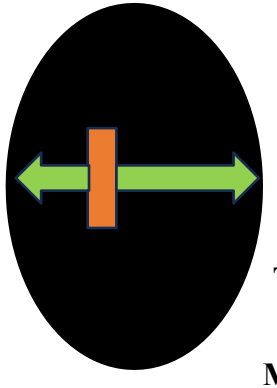
Features: narrow tricuspid orifice and wide mitral. There is ASD and VSD.

Mitral Stenosis &/or Tricuspid regurgitation



Persistent atrioventricular canal





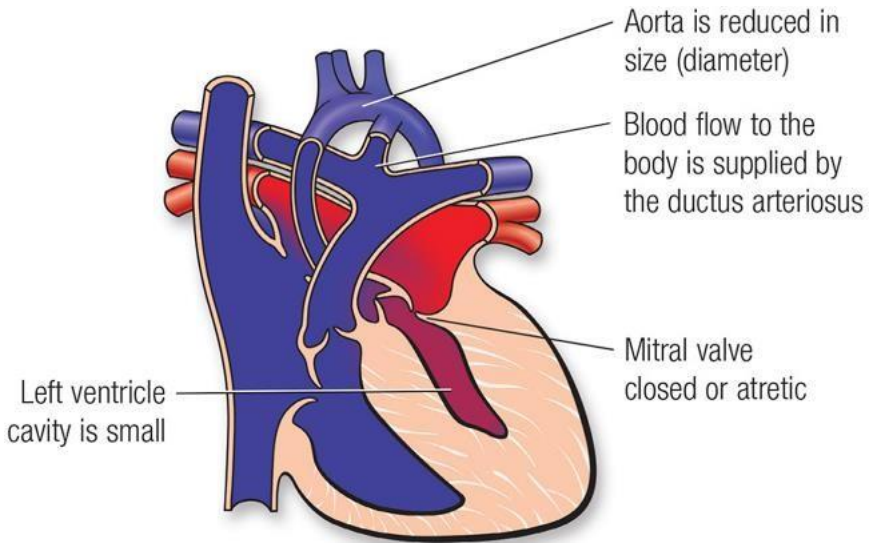
Tricuspid Stenosis &/or Mitral regurgitation

Anomalies of Atrio-ventricular canal

3. Mitral Atresia:

Cause: complete fusion of the cusps of mitral valve.

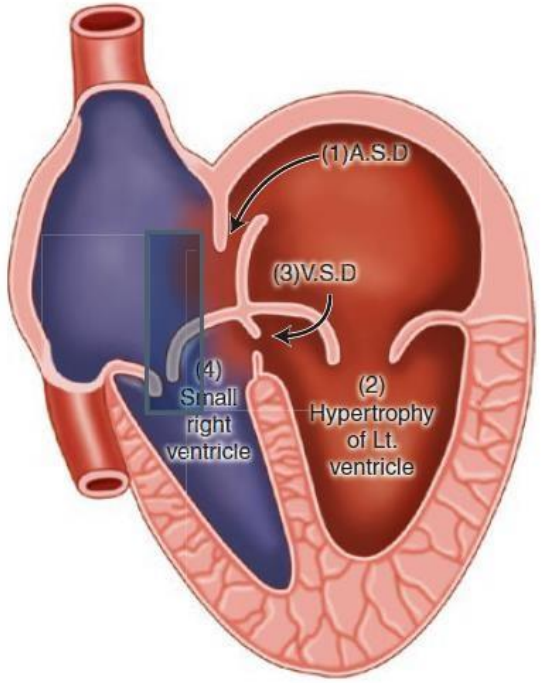
Features: small left ventricle and large right ventricle.



4. Tricuspid Atresia:

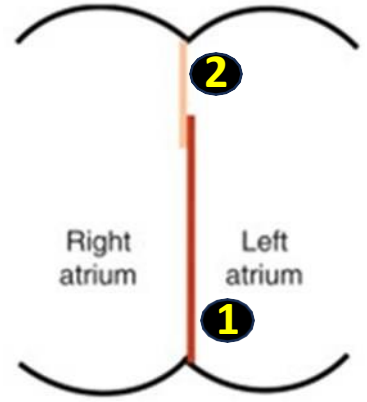
Cause: complete fusion of the cusps of tricuspid valve.

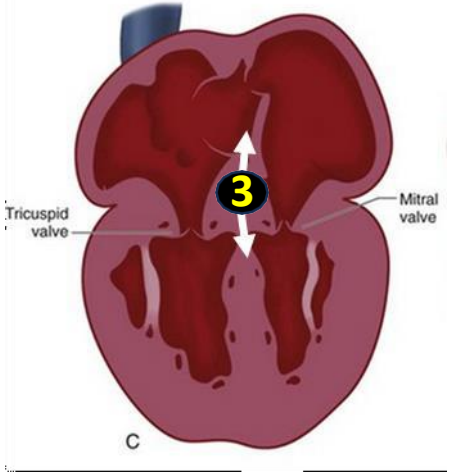
Features: small right ventricle and large left ventricle.

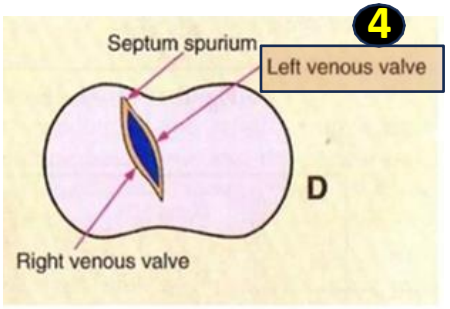


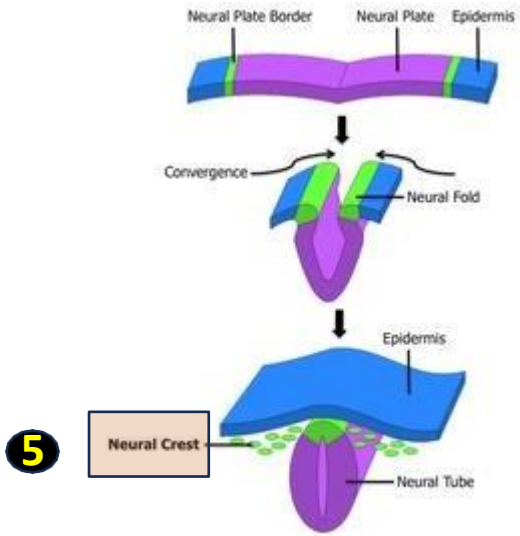
Embryological origin of Inter-Atrial Septum, right & left atria

1. Septum primum.
2. Septum secundum.
3. Septum intermedium.
4. Left venous valve of sino-atrial orifice.
5. Some cells of neural crest.









Congenital anomalies of inter-atrial septum

Atrial Septal defects (ASD)

TRILOCULAR HT

Cause: failure of development of inter-atrial septum.

Features:

- The heart is formed of one atrium and 2 ventricles.

2. Persistent foramen primum (Patent ostium primum):

Cause: failure of fusion between the septum primum and intermedium.

Features:

- There is opening in the lower part of inter-atrial septum.

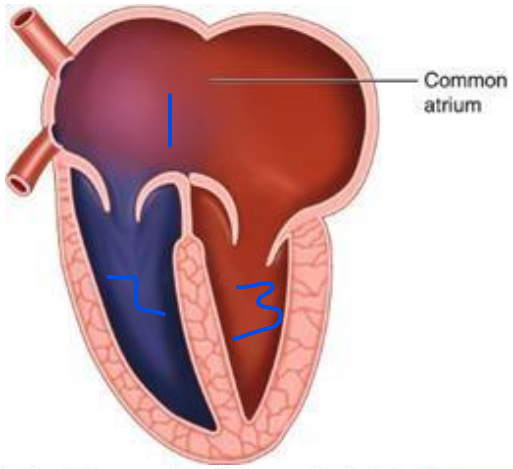
3. Persistent foramen secundum (Patent ostium secundum):

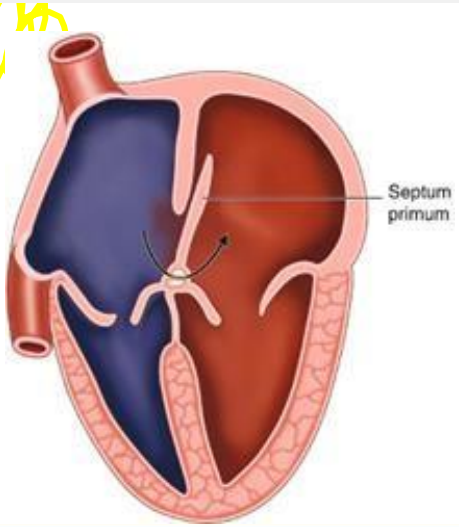
Cause:

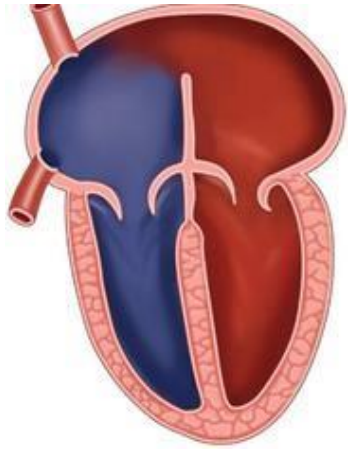
- Excess destruction of septum primum.
- Failure of development of septum secundum.

Features:

- There is opening in the upper part of inter-atrial septum.
- The most common form of ASD.







Congenital anomalies of inter-atrial septum

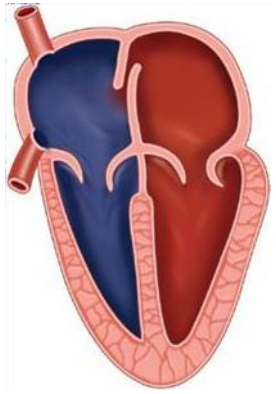
Foramen ovale Defects

1. Patent foramen ovale:

Cause: failure of fusion between septum primum and secundum.

Features:

- There is an opening between the right and left atria.
- Blood passes from right to left during crying or exercise due to increased venous pressure).

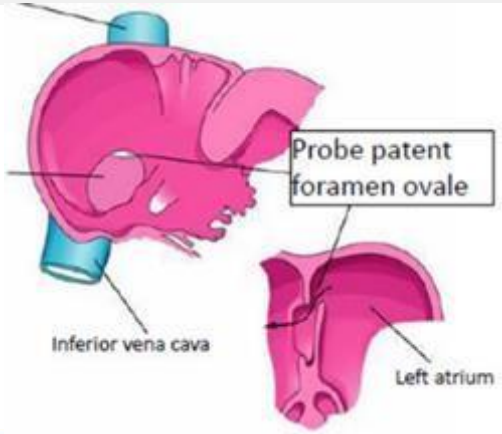


2. Probe patent foramen ovale:

Cause: failure of complete fusion between septum primum and secundum.

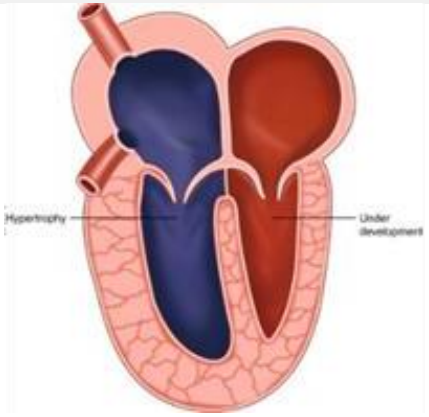
Features:

- Present in 20-30% of people.
- No symptoms.
- There is a very narrow passage between septum primum and secundum which allow a probe to pass and not the blood.

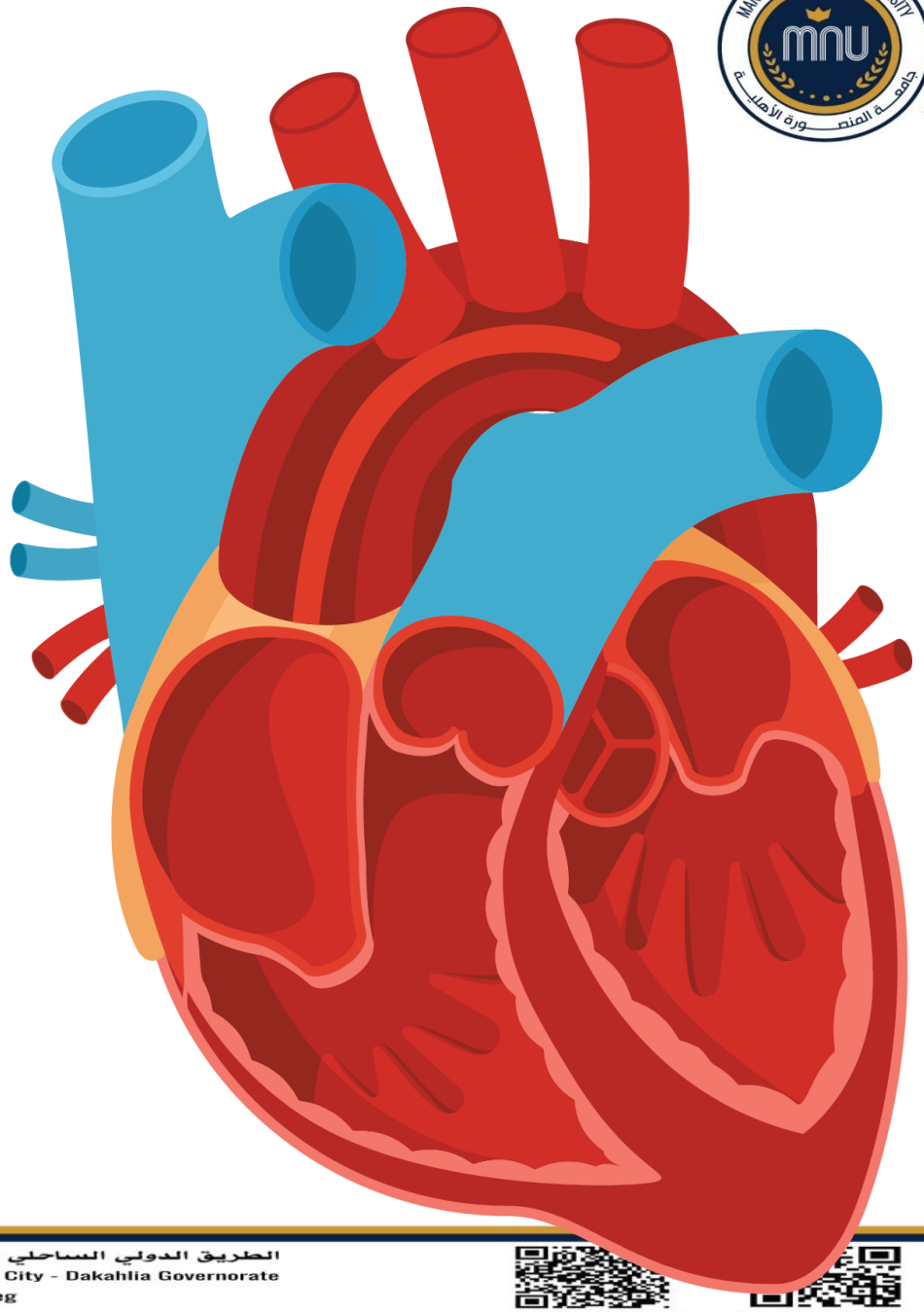


Cause: fusion between septum primum and secundum during intra-uterine life.

Features: leads to intra-uterine fetal death.



Development of the heart (part 2)



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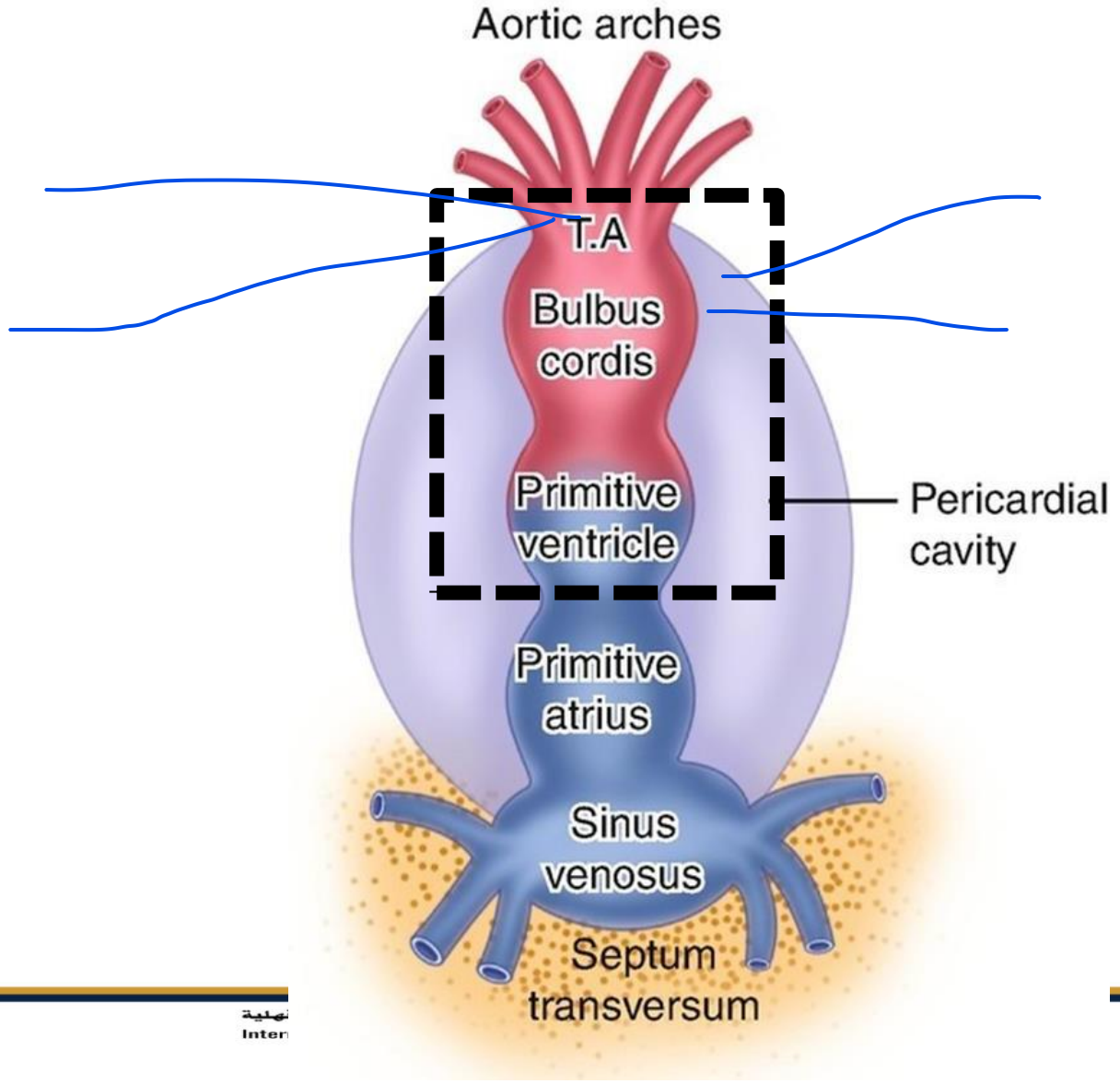
Development of the heart



Division of the truncus arteriosus

Process of division:

At the upper end of the truncus arteriosus:

- 2 ridges (right & left) appear then fuse together to form the aorticopulmonary septum which grow distally taking a spiral course (180º).

The spiral aotico-pulmonary septum divides the truncus as follows:

At the upper part:

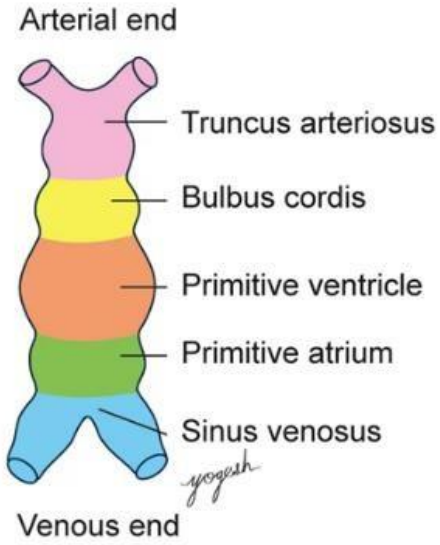
- **Anterior part:** ascending aorta.
- **Posterior part:** pulmonary trunk.

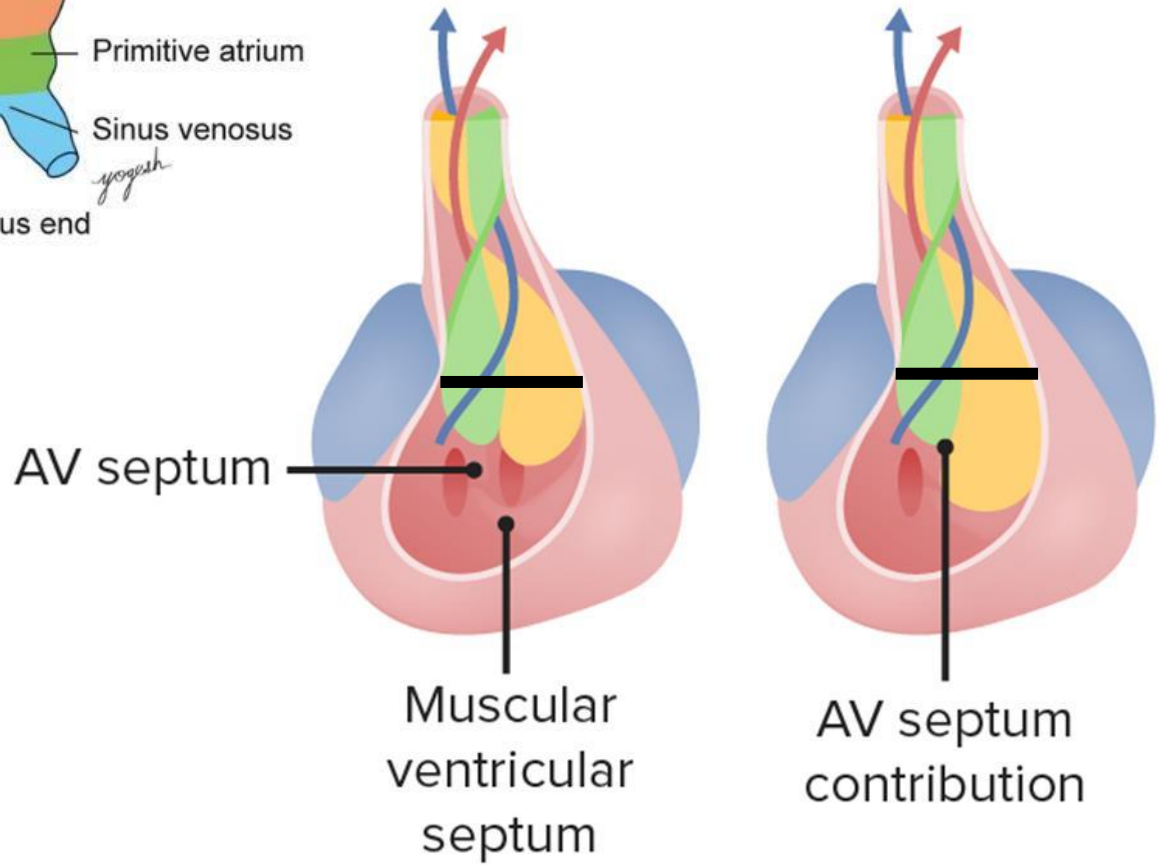
At the middle part:

- **Right part:** ascending aorta.
- **Left part:** pulmonary trunk.

At the lower part:

- **Anterior part:** pulmonary trunk.
- **Posterior part:** ascending aorta.





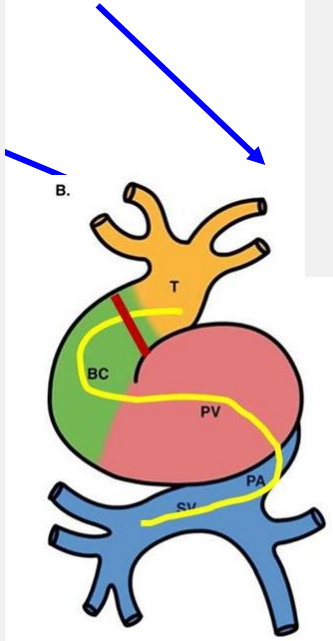
Development of aortic & pulmonary valves

Process of development: At the upper end of the bulbus cordis.

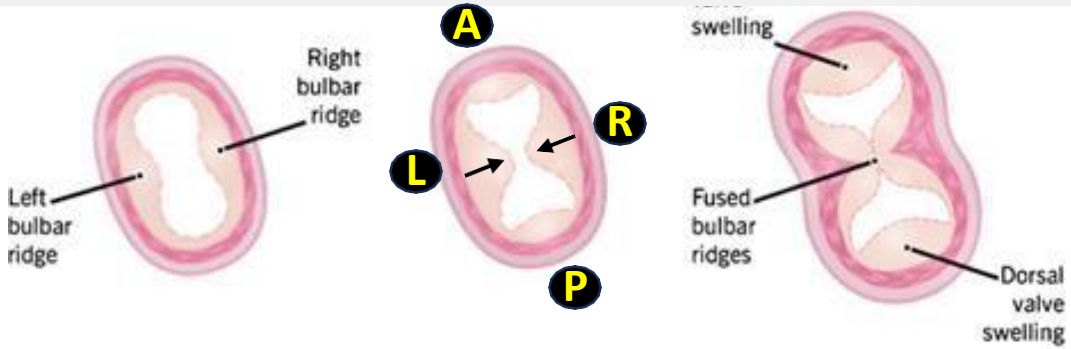
- 4 Endocardial cushions appear: (right, left, anterior & posterior).
- The right & left ridges fuse with each other dividing the orifice into:

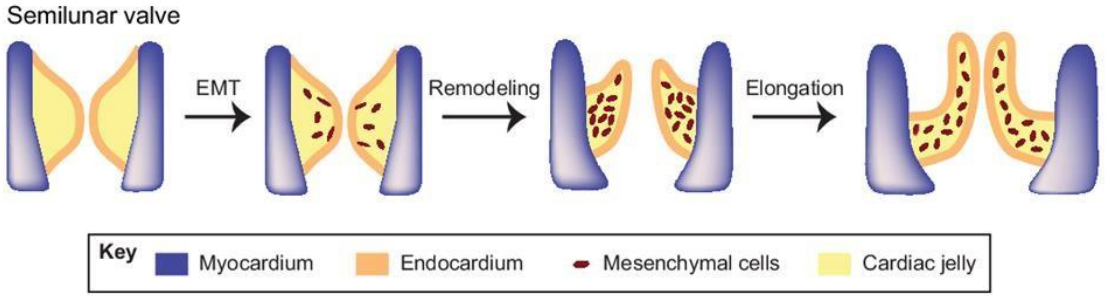
  Anterior part: pulmonary orifice.

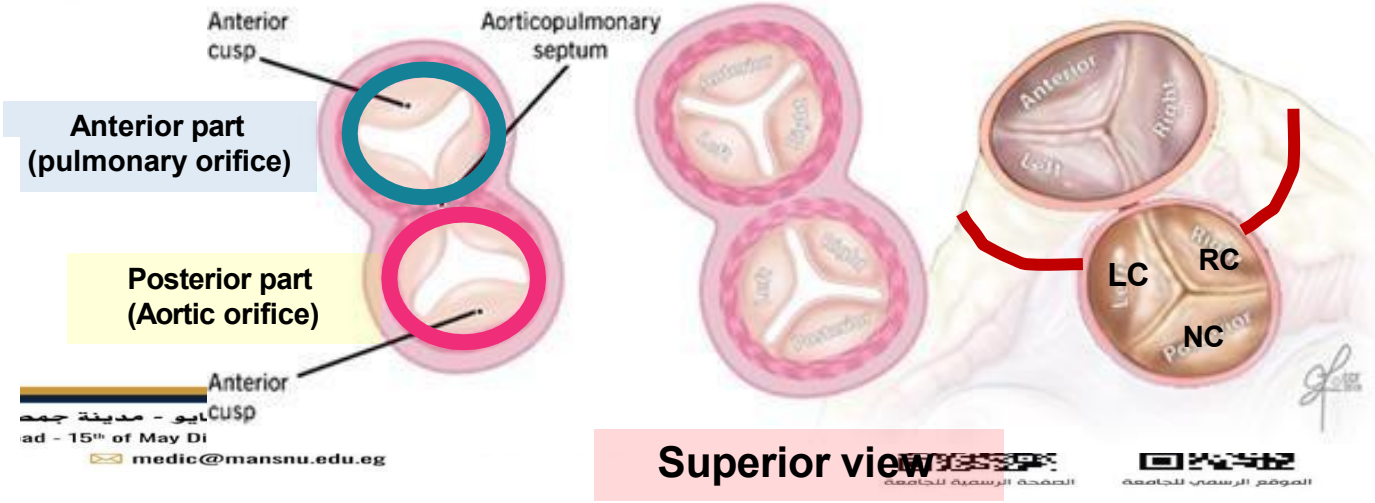
  Posterior part: aortic orifice.



- Each of the aortic & pulmonary orifices has 3 cusps.
- The pulmonary cusps are one anterior & 2 posterior (right & left) while the aortic cusps are 2 anterior (right & left coronary cusps) and one posterior (non coronary cusp).







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medic@mansnu.edu.eg

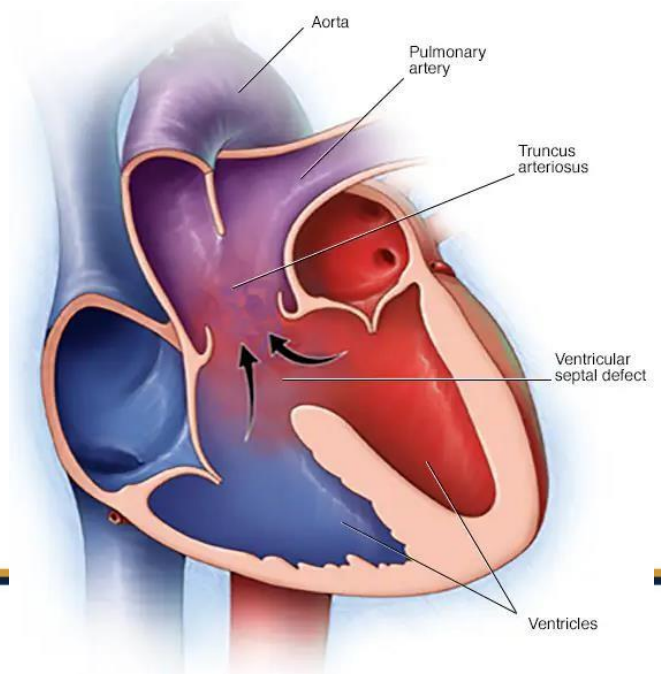
Anomalies of truncus arteriosus & bulbus cordis

1. Persistent truncus arteriosus:

Cause: failure of development of the spiral septum.

Features:

- The truncus arteriosus persists as single trunk.
- It receives blood from both ventricles.
- Accompanied by ventricular septal defect (VSD).



TRANSPOSITION OF GREAT VESSELS

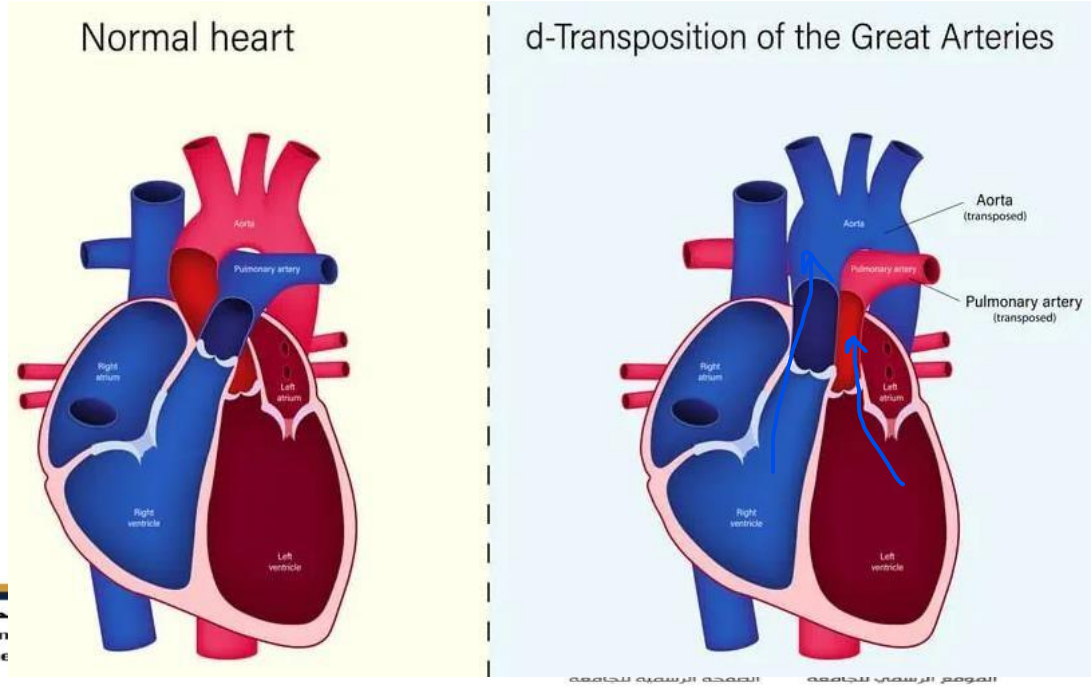
Cause: the aortico-pulmonary septum fails to spiral.

Features:

- The aorta arises from the right ventricle while the pulmonary trunk arises from the left.

Upper part

- Pulmonary trunk
- Ascending aorta



Anomalies of truncus arteriosus & bulbus cordis

3. Fallot's tetralogy: **The most common cyanotic heart disease.**

Cause:

- Unequal division of the truncus arteriosus.

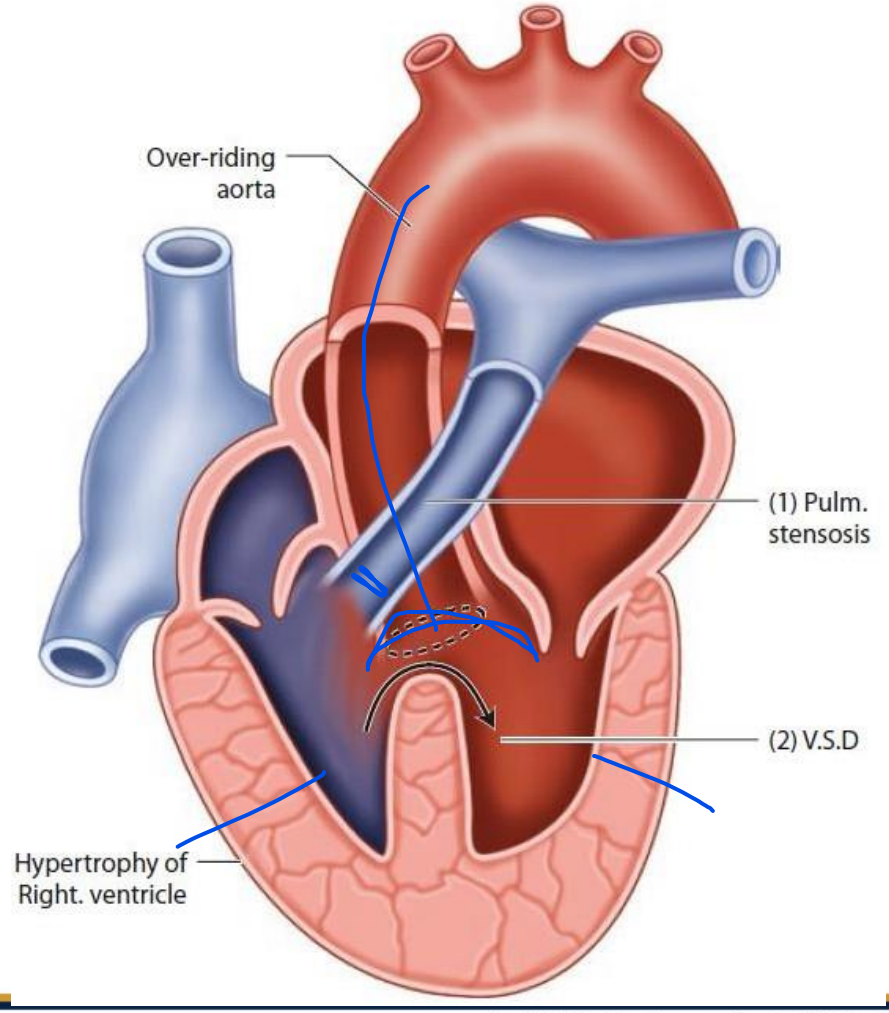
(Deviation of spiral septum towards the pulmonary trunk)

leading to:

- Pulmonary Stenosis.
- Widening of the aorta.
- The bulbar ridges not share in the formation of interventricular septum.

Features:

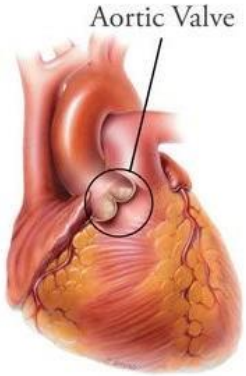
1. Pulmonary Stenosis.
2. Hypertrophy of the right ventricle.
3. Overriding of aorta on both ventricles.
4. VSD.

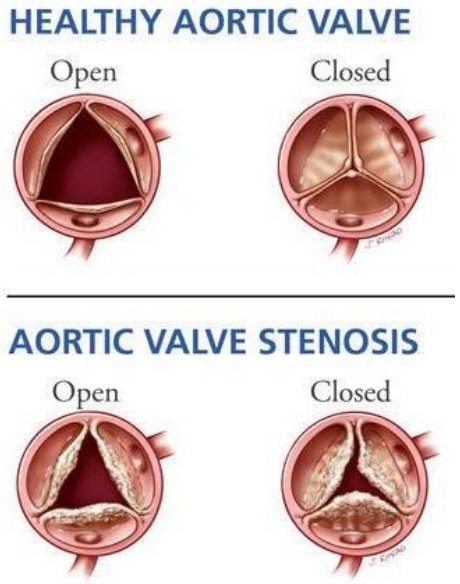


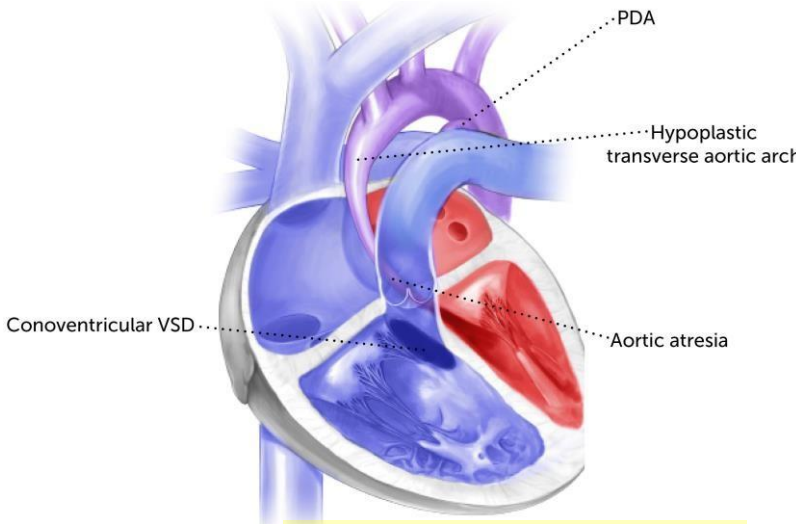
Anomalies of truncus arteriosus & bulbus cordis

4. Anomalies of Semilunar (aortic & pulmonary) valves:

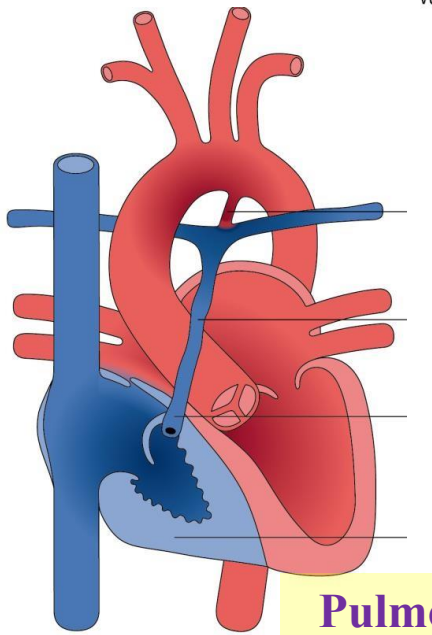
- **Aortic Stenosis:** due to partial fusion of the cusps of aortic valve.
- **Aortic Atresia:** due to complete fusion of the cusps of aortic valve.
- **Pulmonary Stenosis:** due to partial fusion of the cusps of pulmonary valve.
- **Pulmonary Atresia:** due to complete fusion of the cusps of pulmonary valve.



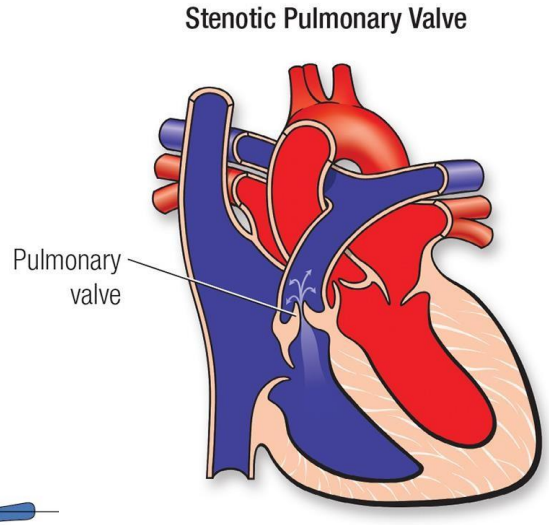




Aortic Atresia



Pulmonary Atresia



Development of the primitive ventricle

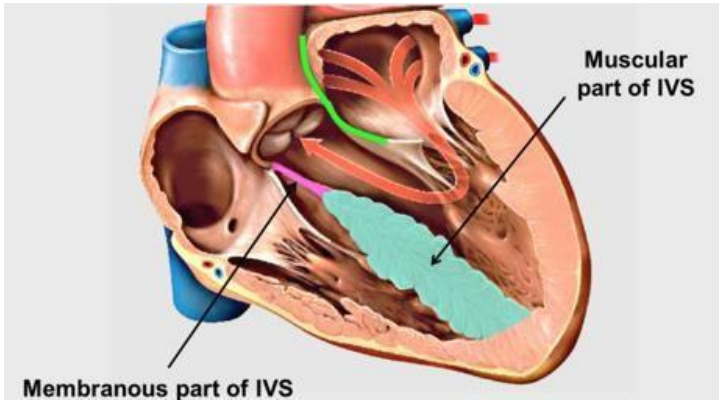
1.

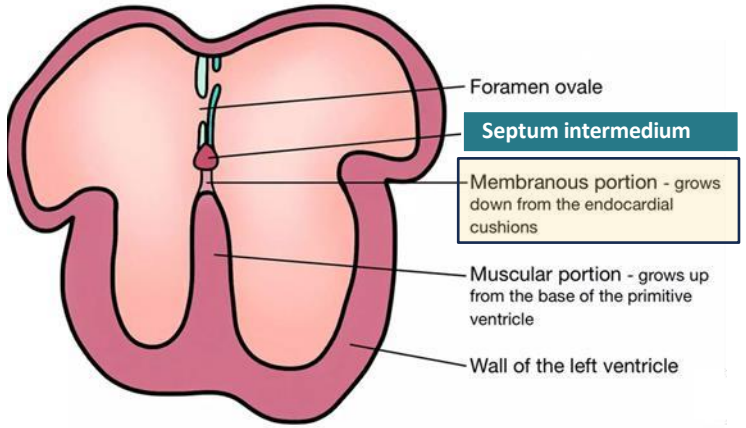
The inter-ventricular septum consists of 2 parts:

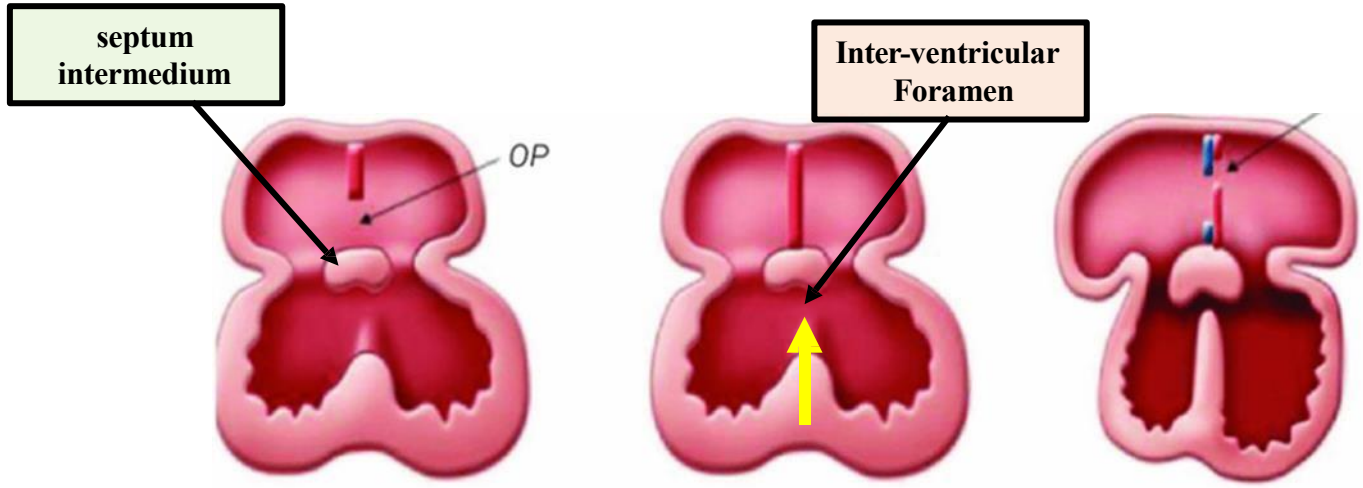
- Muscular part.
- Membranous part.

- Appears as a crescentic ridge from the floor of primitive ventricle then gradually enlarges.
- Its upper end is separated from the septum intermedium by inter-ventricular foramen.

- Closes the inter-ventricular foramen.
- Derived from:
  1. Septum intermedium.
  2. Right & left bulbar ridges.



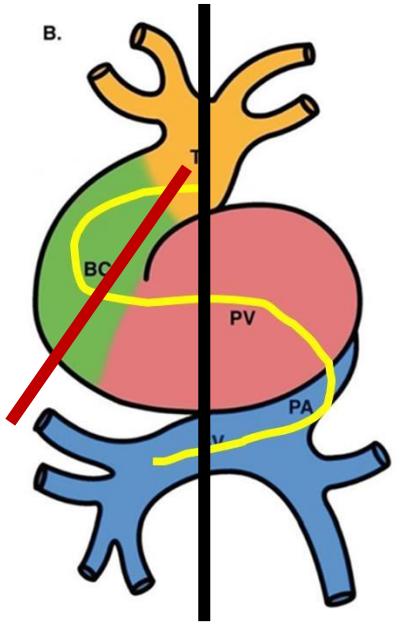


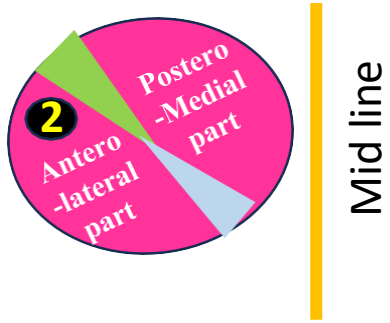


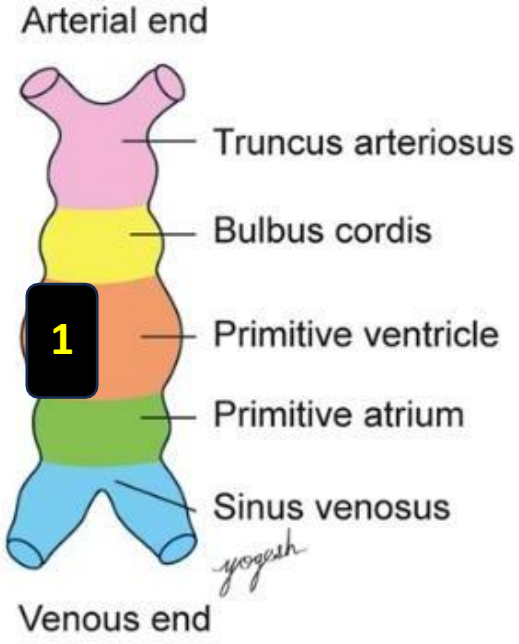
Development of the primitive ventricle

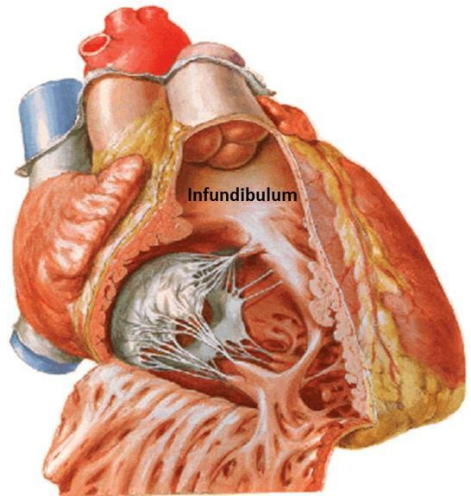
The right ventricle develops from:

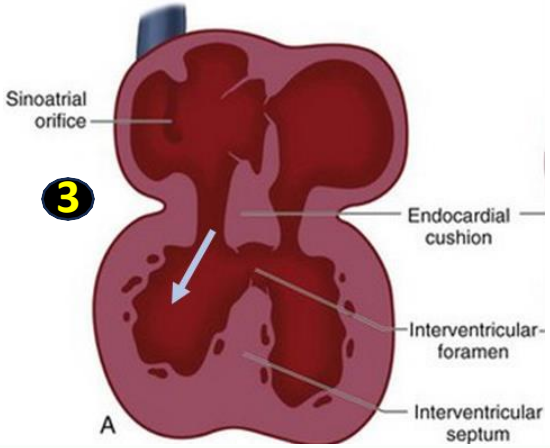
1. Right ½ of the primitive ventricle (gives the rough part).
2. Antero-lateral part of bulbus cordis (gives the infundibulum).
3. Lower part of the right ½ of A-V canal.







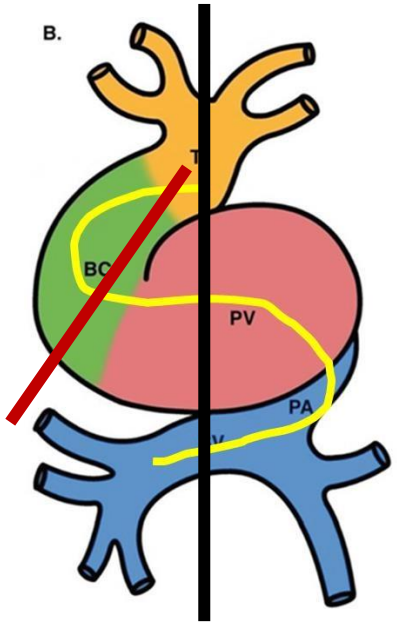


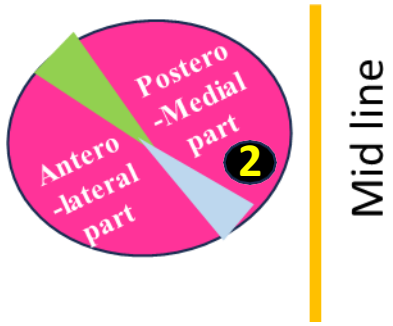


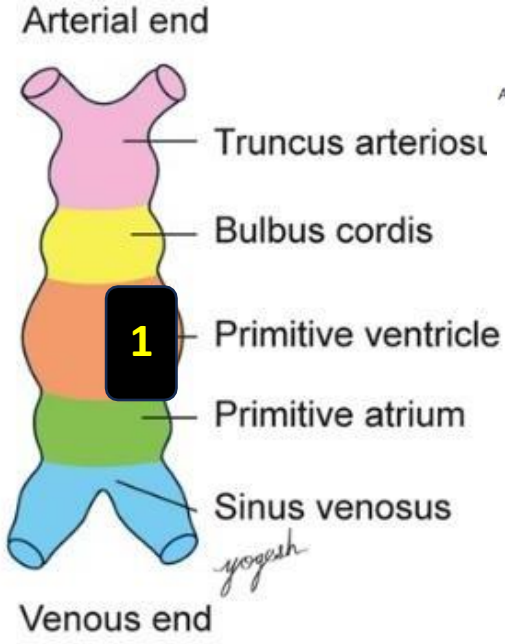
Development of the primitive ventricle

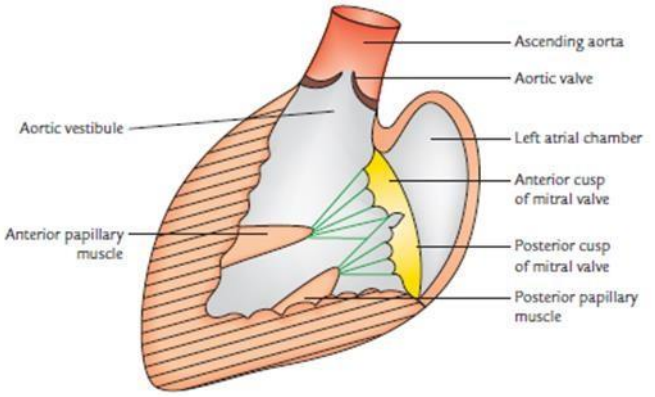
The left ventricle develops from:

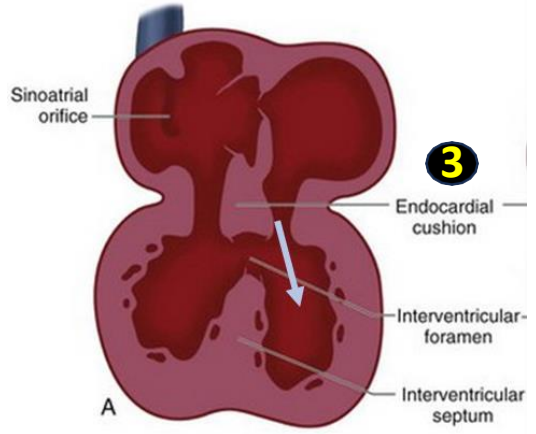
1. Left ½ of the primitive ventricle (gives the rough part).
2. Postero-medial part of bulbus cordis (gives the aortic vestibule).
3. Lower part of the left ½ of A-V canal.









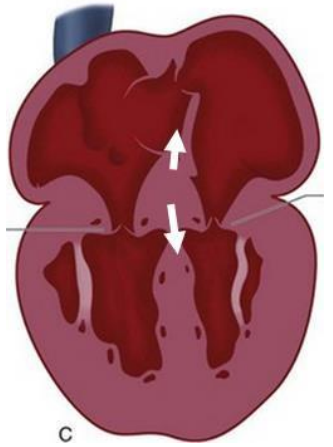


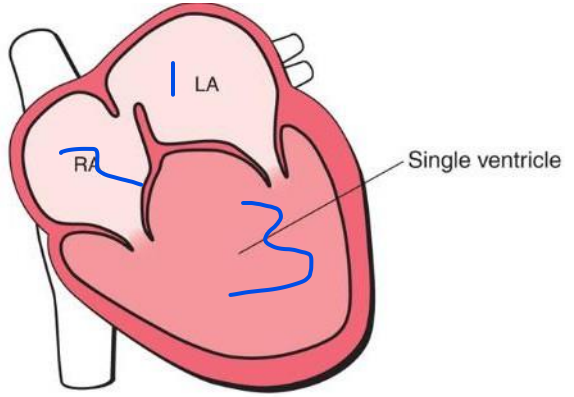
Anomalies of Inter-ventricular septum

Cause: **Complete absence** of inter-ventricular septum (failure of development of both muscular & membranous parts of inter-ventricular septum).

Features:

- The heart is formed of 2 atria & one ventricle.



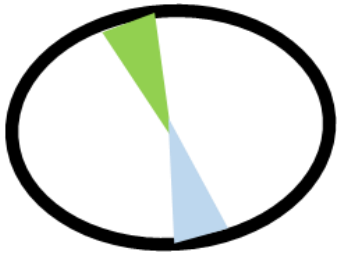


Cause: failure of development of **membranous part** of the inter-ventricular septum due to:

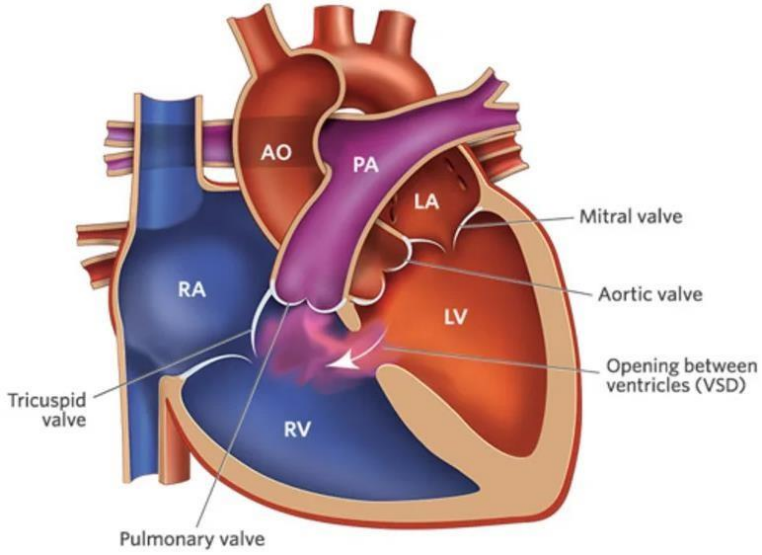
1. Deviation of septum intermedium to right or left.
2. Failure of development of bulbar ridges.

Features:

- There is a small foramen between the 2 ventricles.



Bulbar ridges



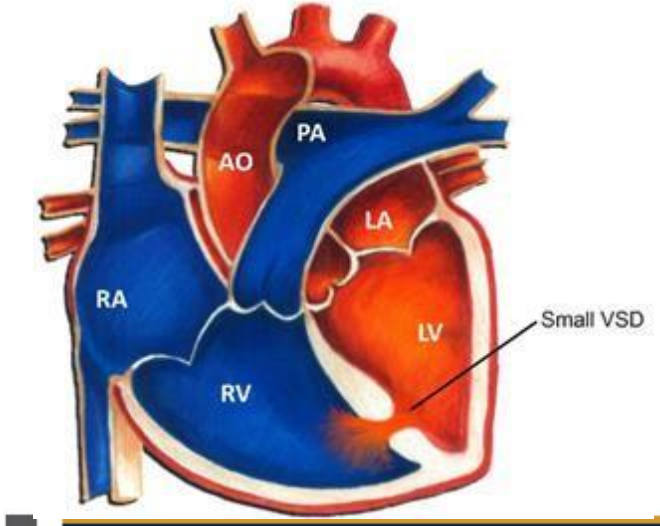
Anomalies of Inter-ventricular septum

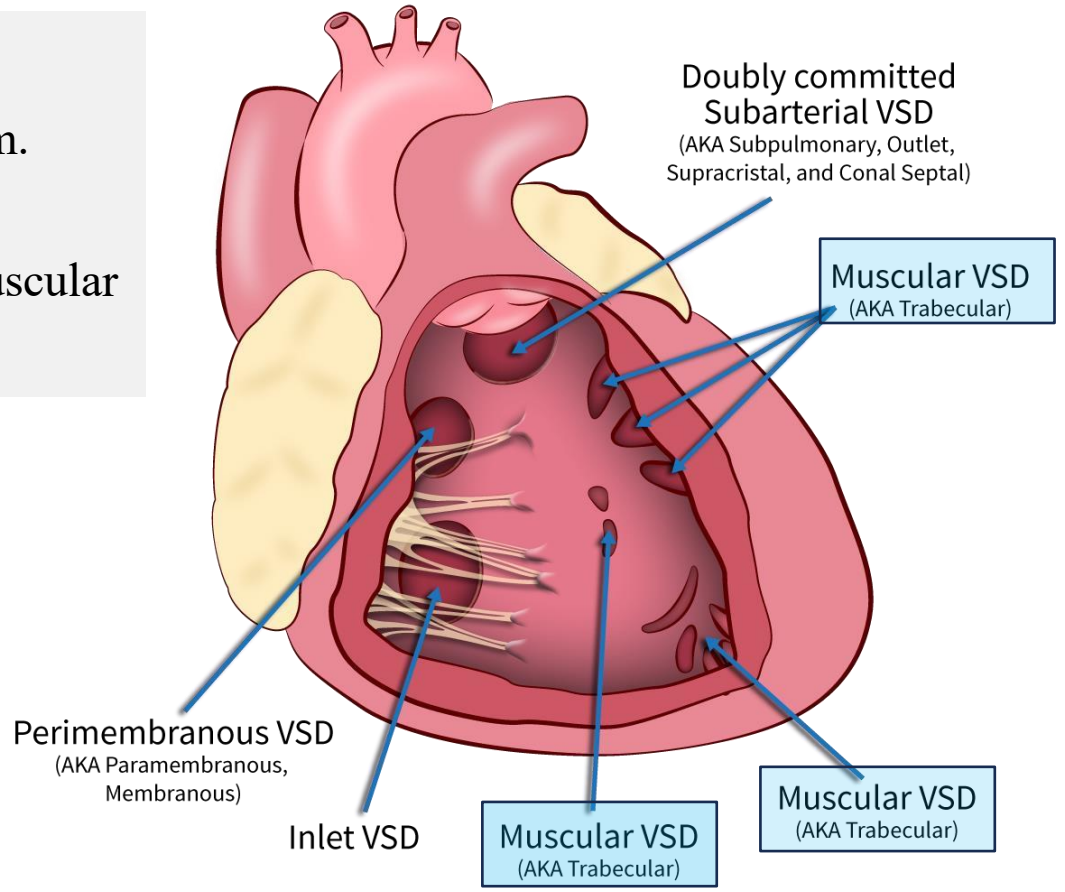
3. Muscular ventricular septal defect (VSD):

Cause: due to perforations in the muscular part of the I.V. septum.

Features:

- There may be single or multiple small openings in the muscular part of the septum.





Fetal circulation

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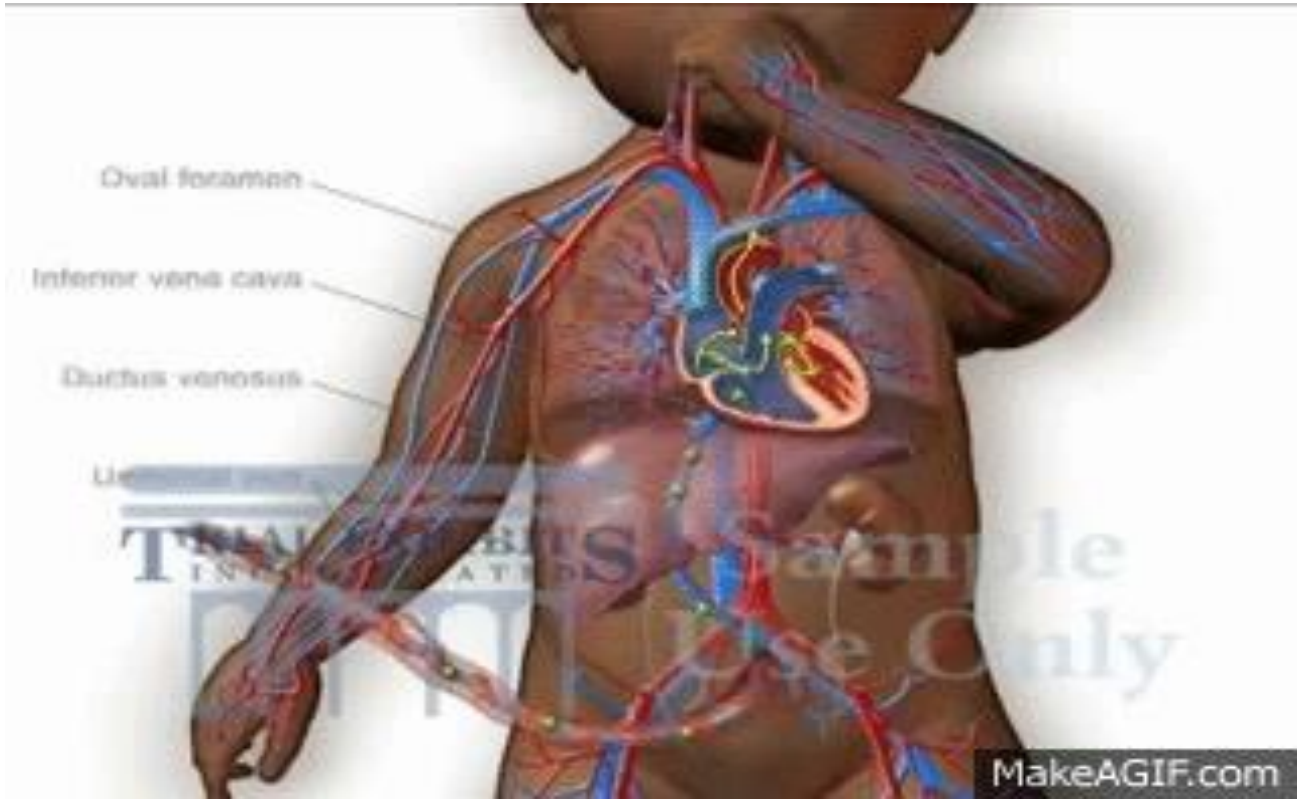
Faculty of Medicine
Mansoura National University, Egypt

Fetal Circulation

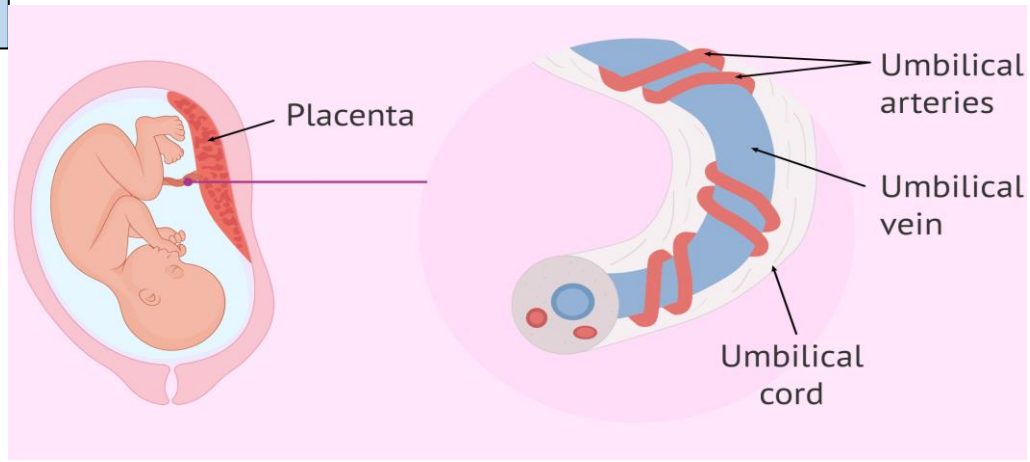
Definition:

- Circulation of blood between the fetus and mother and through the fetus.



Steps of Fetal Circulation before birth

1) At early embryonic life the umbilical cord contains:



- **2 umbilical veins** (Rt. &Lt.): carry **oxygenated** blood from the mother to the fetus.
- **2 umbilical arteries** (Rt. & Lt.): carry **non-oxygenated** blood from the fetus to the mother.

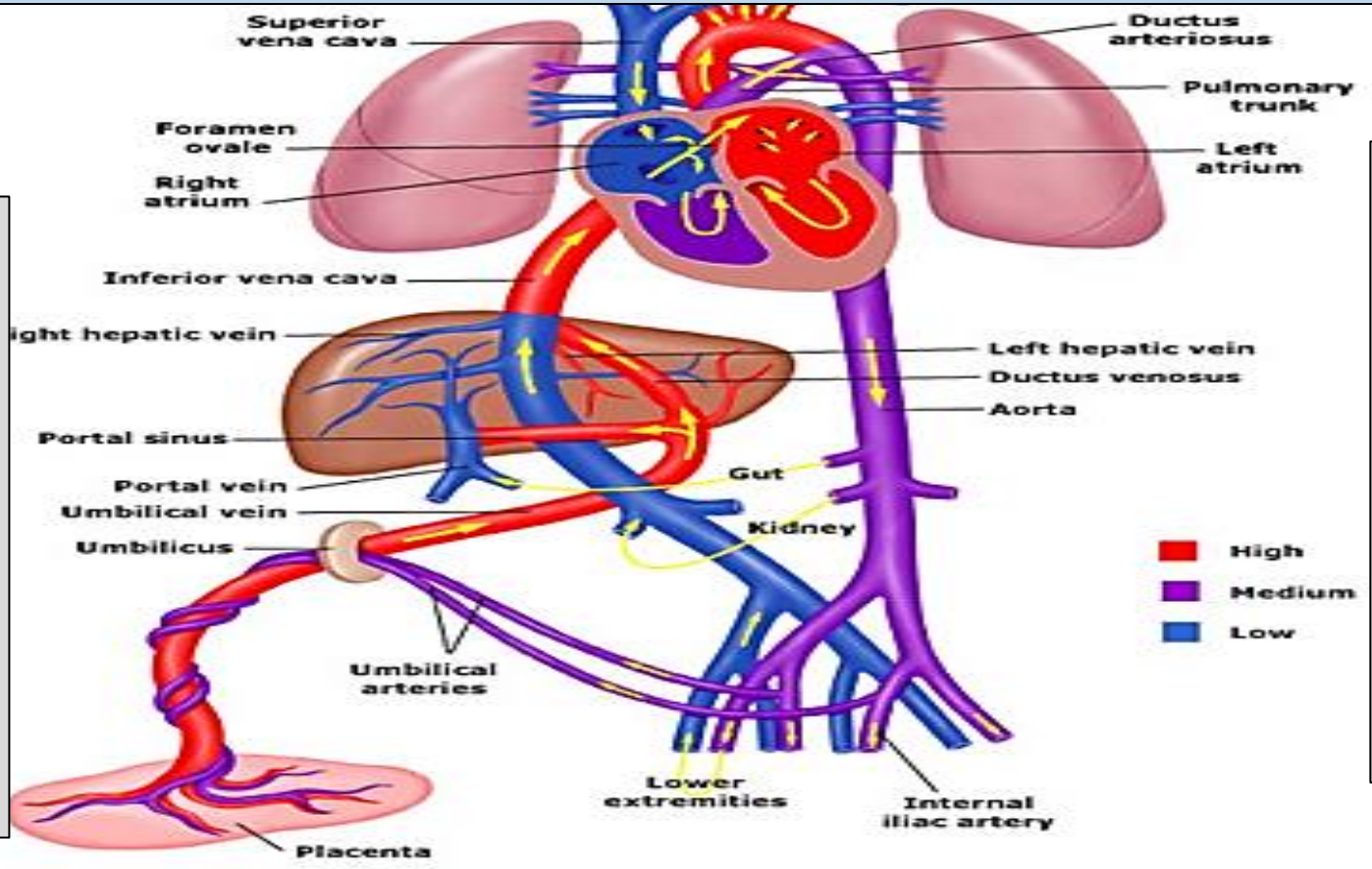
2) Later on, the right umbilical vein regresses. So, the umbilical cord contains only left umbilical vein and 2 umbilical arteries.

Steps of Fetal Circulation before birth

3) The oxygenated blood reaches the fetus through the left umbilical vein. Then undergoes 2 pathways:

a) Long circuit:

Small amount passes through the **left branch of portal vein** to the **liver** then to the IVC through the **Rt. and Lt. hepatic veins**.



b) Short circuit:

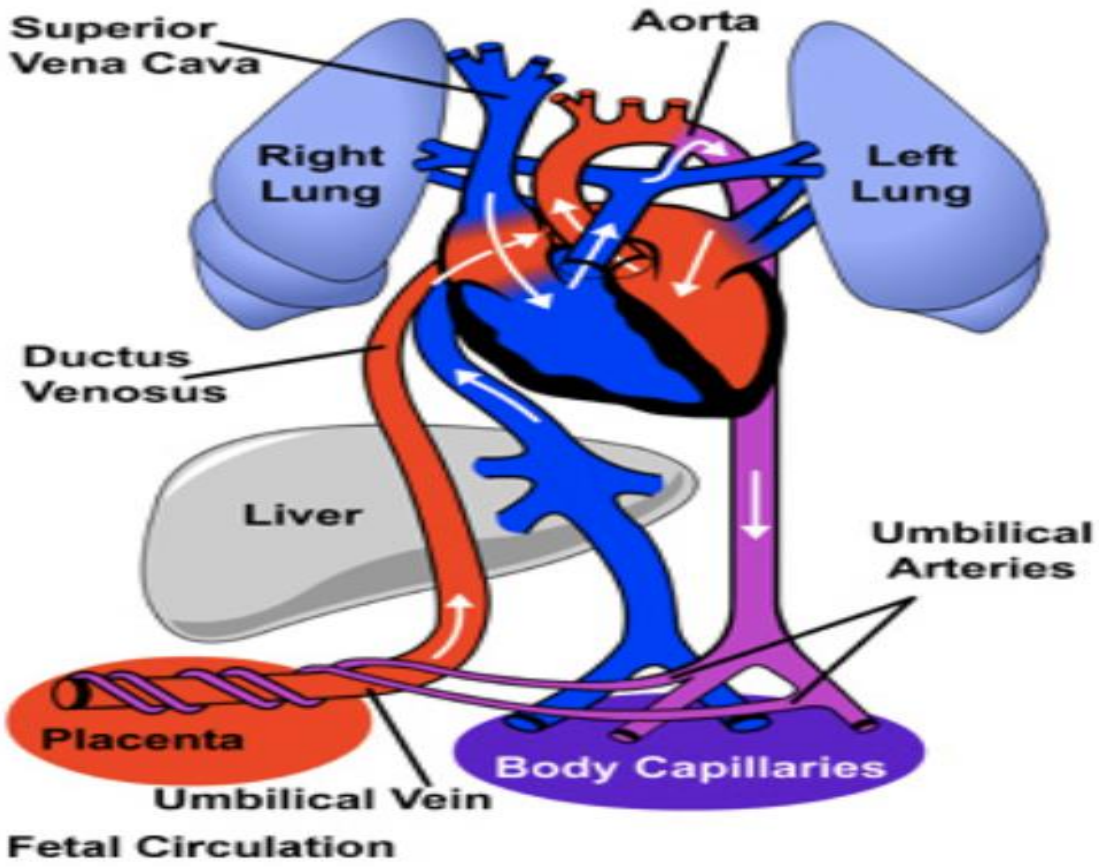
the **main part** passes directly from the **left branch of portal vein** to the IVC through the **ductus venosus**.

Steps of Fetal Circulation before birth

4) The blood passes from the IVC to the Rt. atrium. Then divides into 2 parts:

a) The major part:

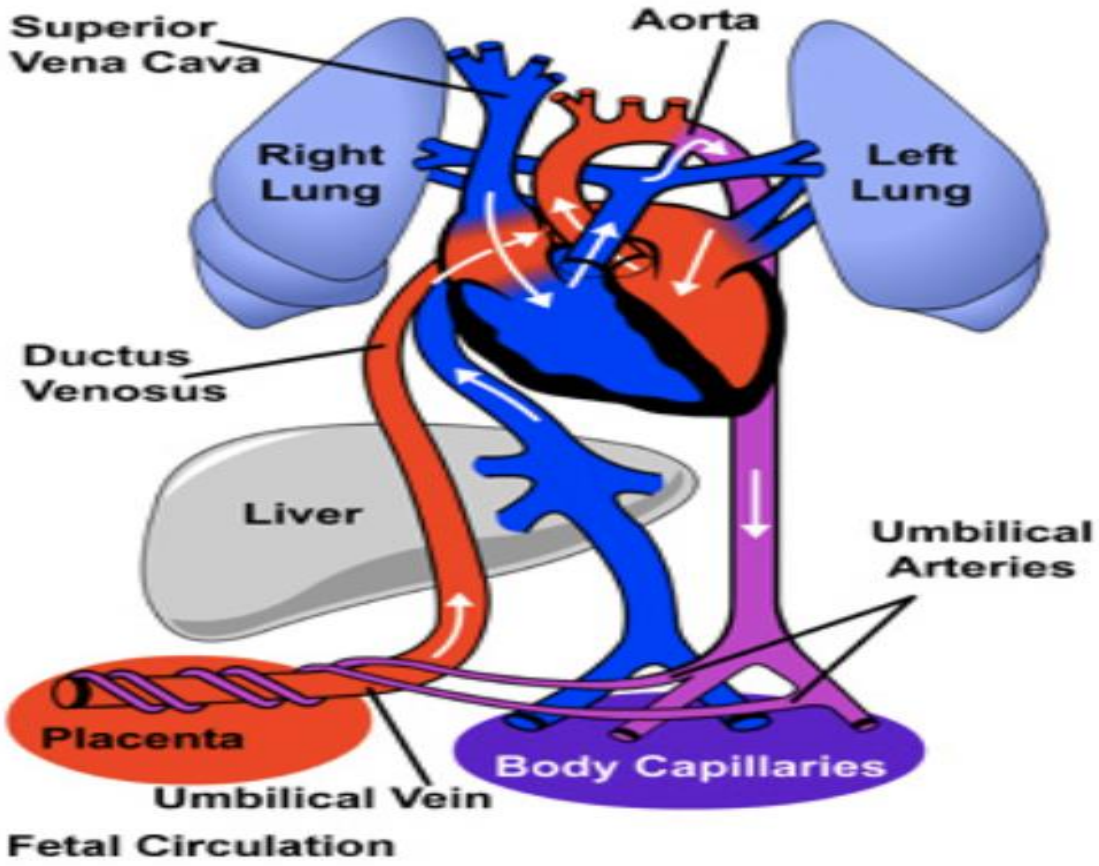
- It passes through the **foramen ovale to the left atrium**.
- Then passes **to the left ventricle**.
- Then through the **aorta**.



Steps of Fetal Circulation before birth

b) Small part:

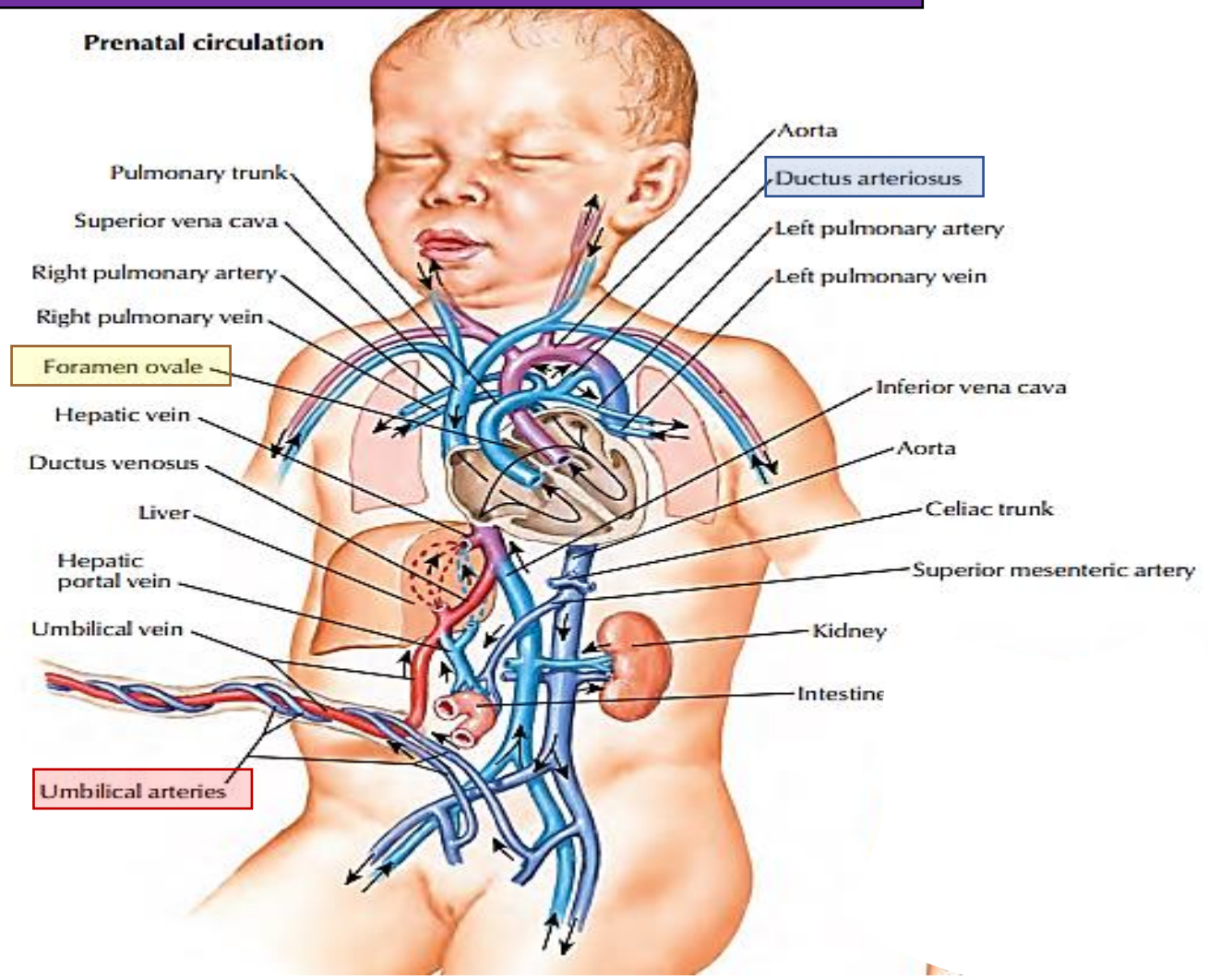
- It mixes with non-oxygenated blood coming from SVC.
- Then passes **to the right ventricle**.
- Then passes through **the pulmonary trunk**.



Steps of Fetal Circulation before birth

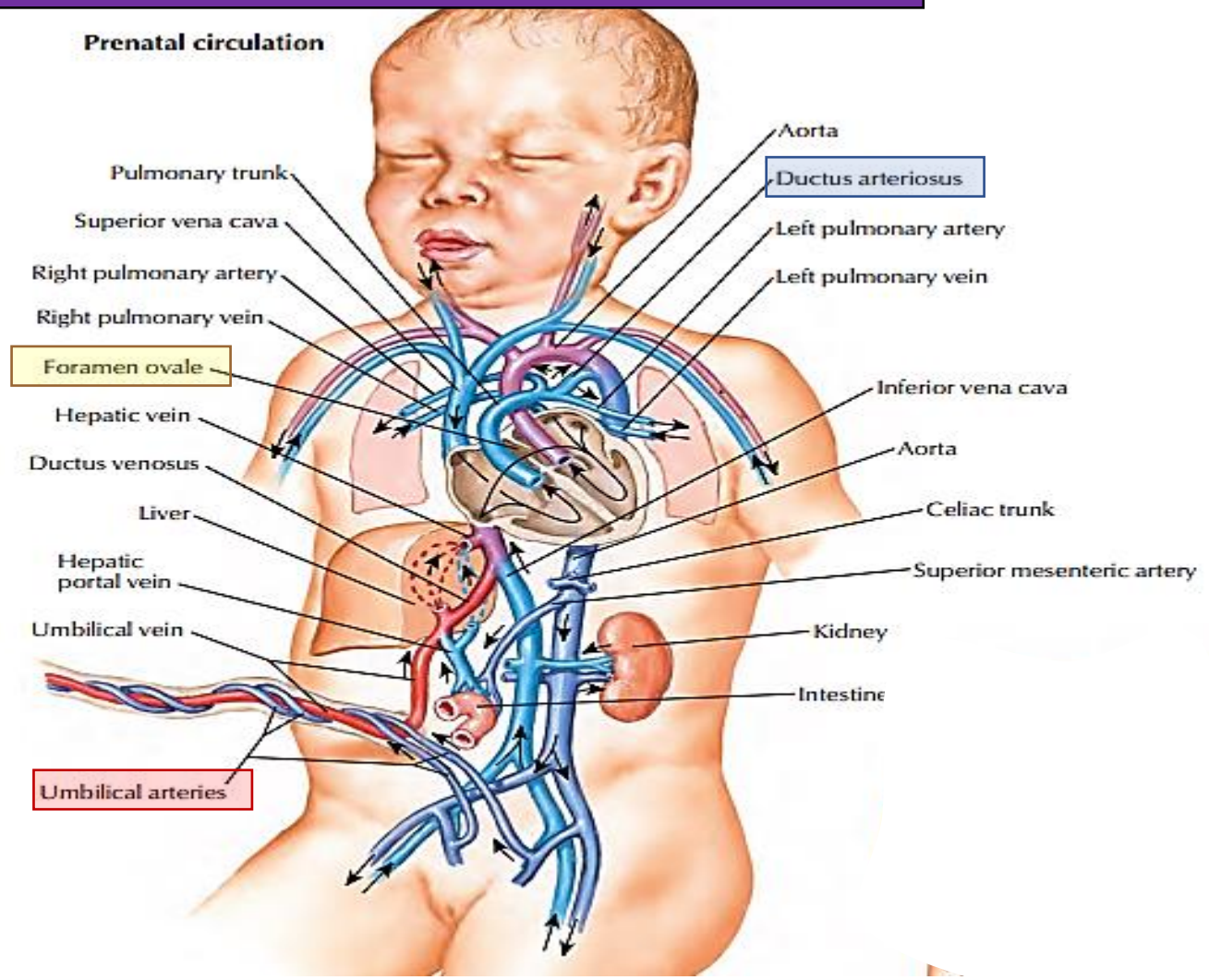
5) The mixed blood reaching the pulmonary trunk divides into 2 parts:

- **Small amount** passes **to the lungs** to supply them.
- **The major part** passes through the **ductus arteriosus to the aorta** to supply the lower part of the body.

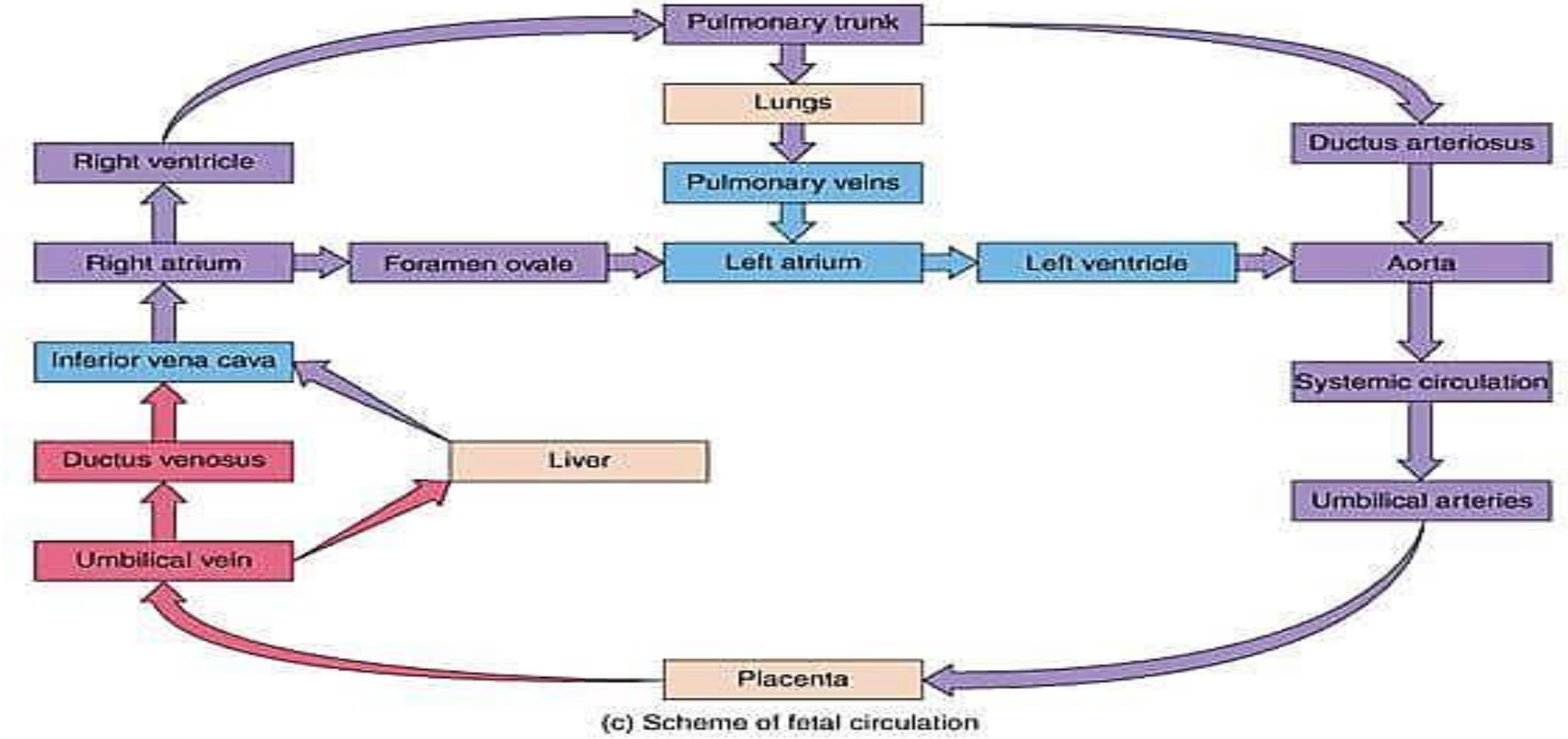


Steps of Fetal Circulation before birth

6) **Finally**, the less oxygenated blood passes through the **two umbilical arteries to the placenta**.

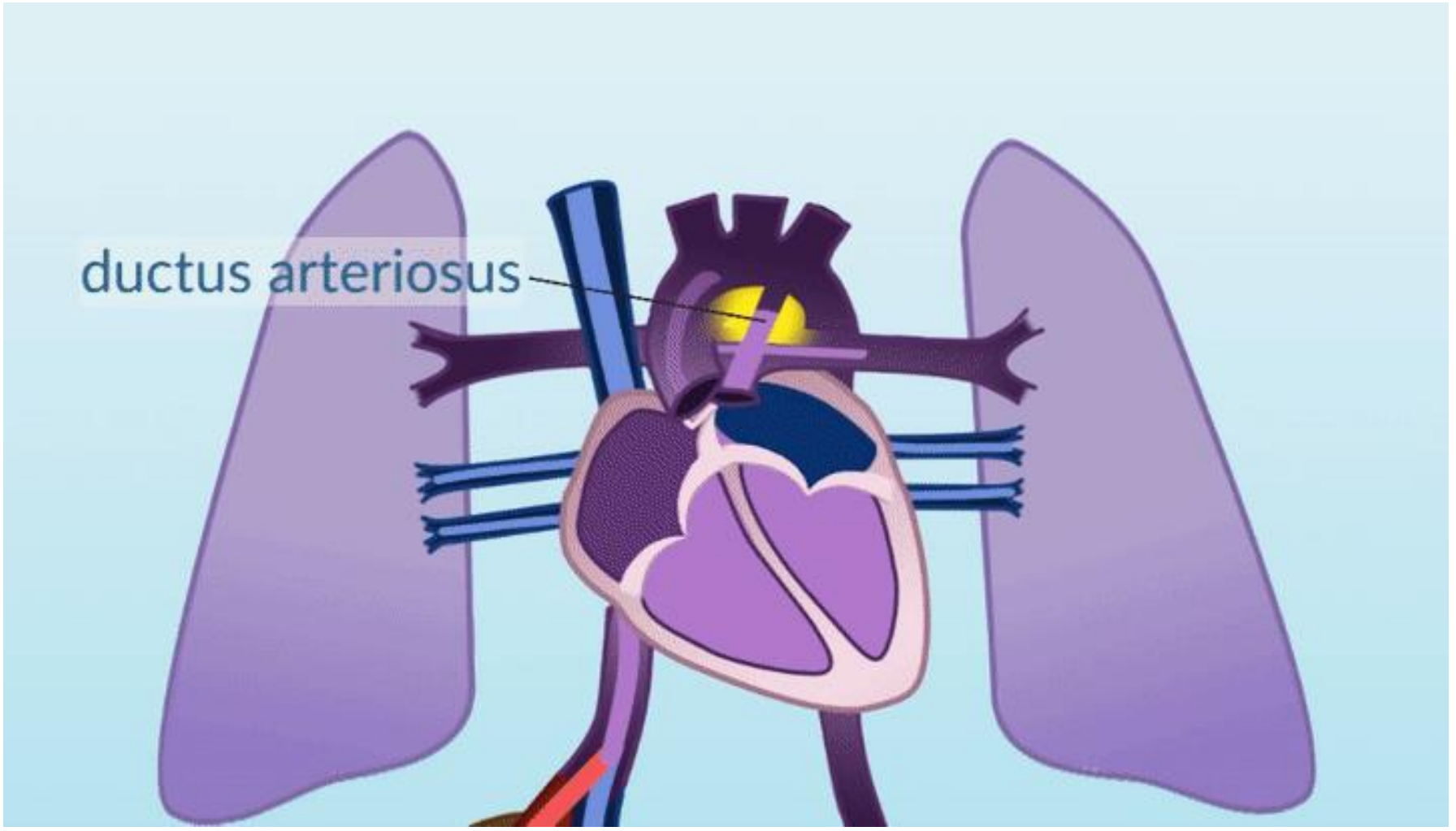


Steps of Fetal Circulation before birth

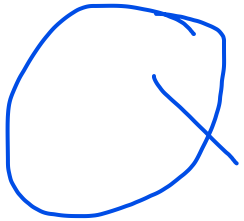


(c) Scheme of fetal circulation

Fetal Circulation before birth



Changes in Fetal Circulation at birth



A) Ligature of the umbilical cord.

At birth the fetus is exposed to 2 factors:

1. Obliteration of **the left umbilical vein** and forms the **ligamentum teres hepatis**. MCQ
2. Obliteration of the **umbilical arteries** will give the **medial umbilical ligaments**. MCQ
3. Obliteration of the **ductus venosus** to form the **ligamentum venosum.** MCQ
4. The **ductus arteriosus** will give the **ligamentum arteriosum**. MCQ
5. **Reduction of pressure in the right atrium.**

Changes in Fetal Circulation at birth

At birth the fetus is exposed to 2 factors:

B) Exposure to cold.

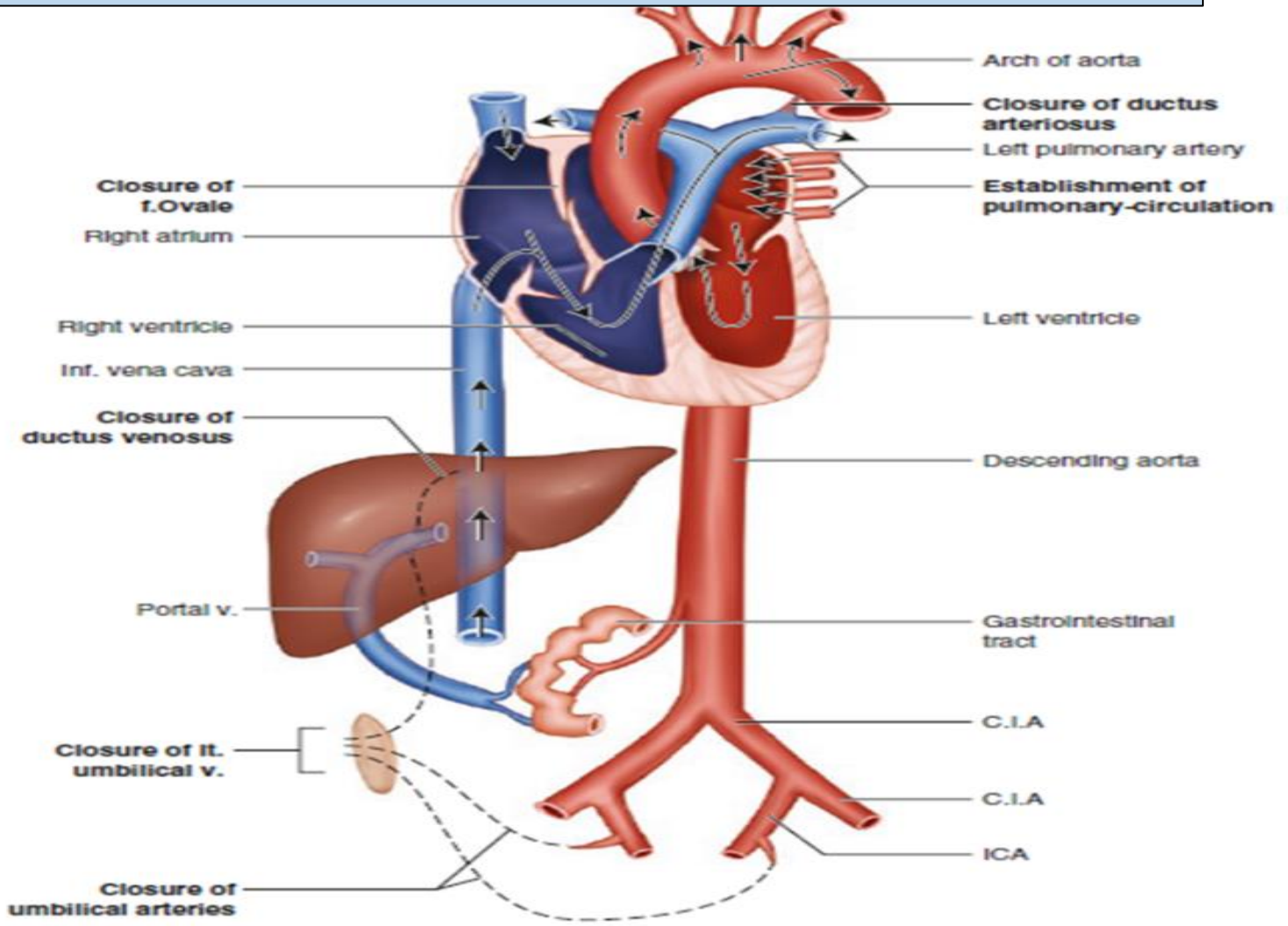
1. **Lungs become functioning.**
2. The **pressure inside the left atrium is increased**.
3. The ductus arteriosus is occluded and gives the **ligamentum arteriosum**.

Changes in Fetal Circulation at birth

At birth the fetus is exposed to 2 factors:

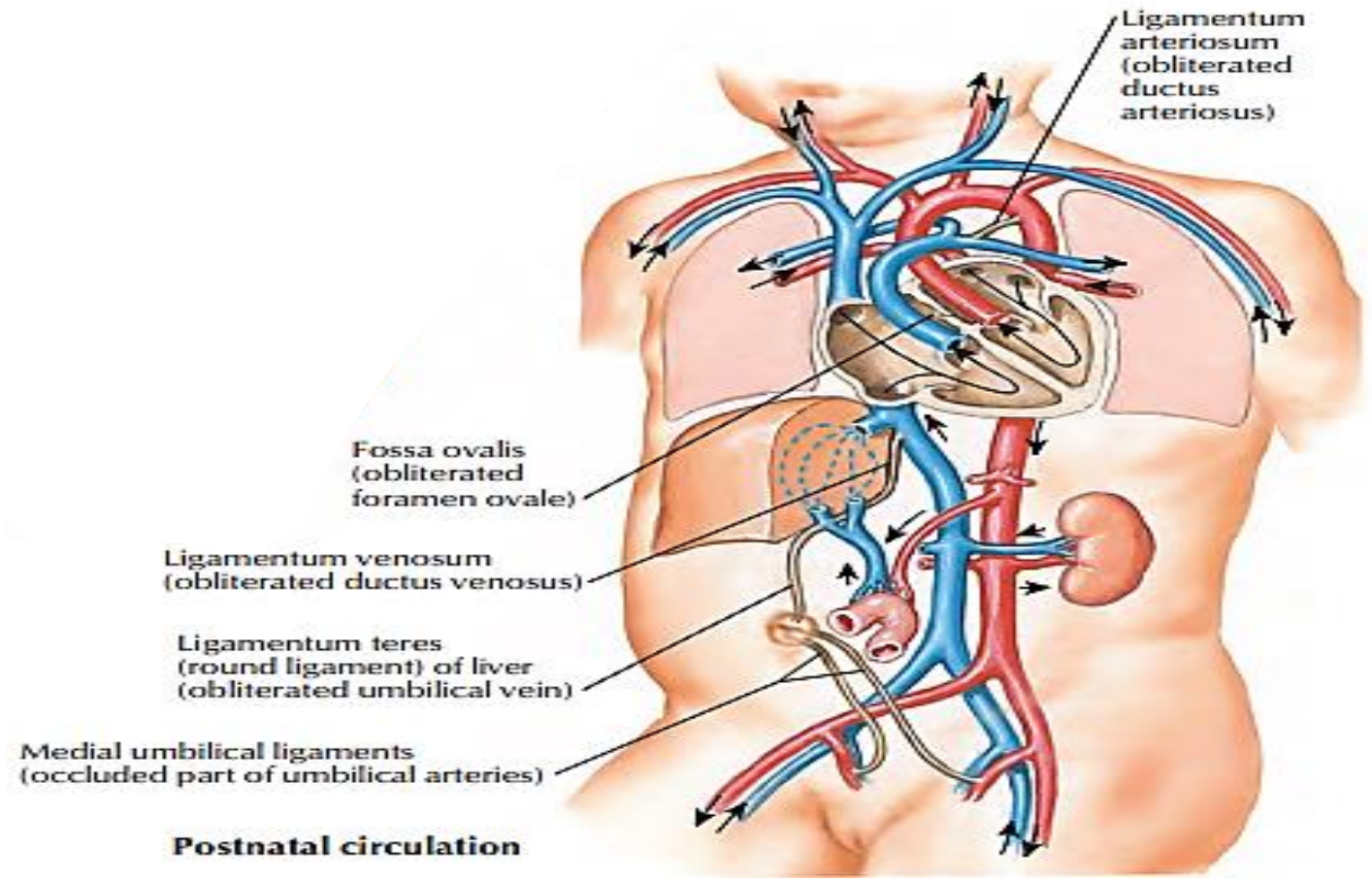
A) Ligature of the umbilical cord.

1. ligamentum teres of the liver.
2. Medial umbilical ligaments.
3. ligamentum venosum.
4. ligamentum arteriosum.
5. **reduction of pressure in the right atrium.**



Changes in Fetal Circulation at birth

At birth the fetus is exposed to 2 factors:



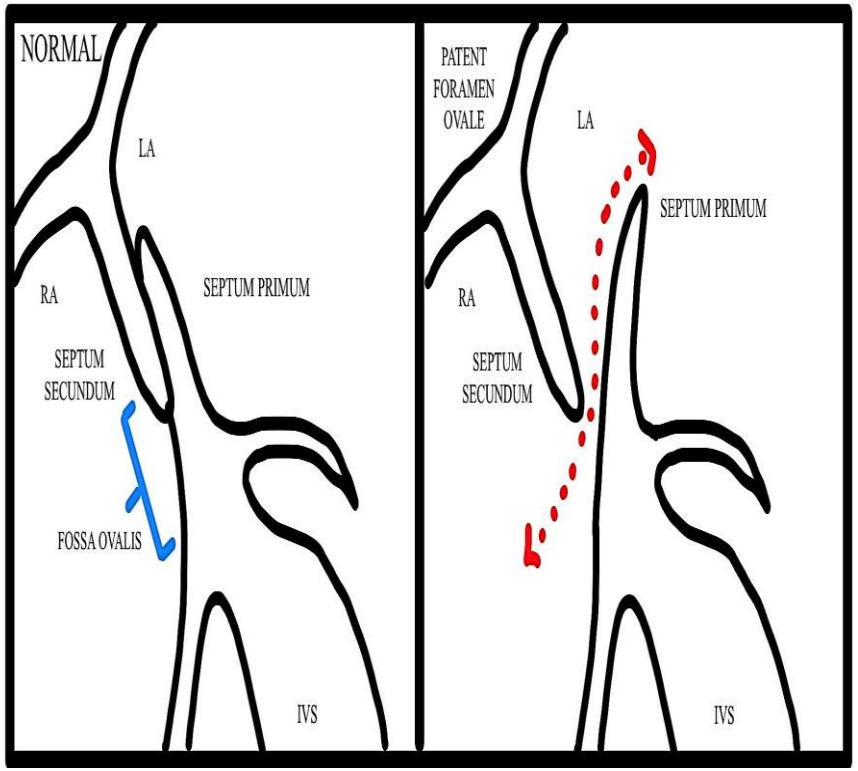
B) Exposure to cold.

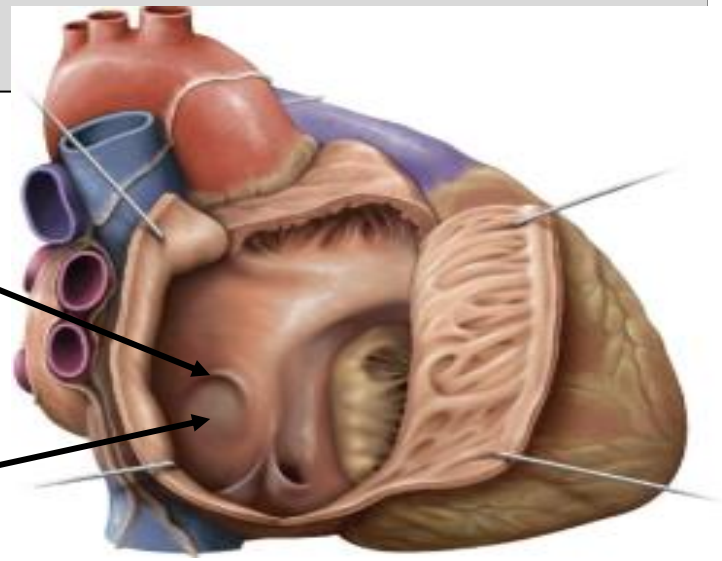
1. lungs become functioning.
2. **the pressure inside the left atrium is increased.**
3. ligamentum arteriosum.

Changes in Fetal Circulation at birth

Pressure difference between the 2 atria will result ir

1. Septum primum is pressed against septum secundum with **closure of foramen ovale**.
2. **Septum primum** will give **the fossa ovalis**.
3. Crescentic inferior margin of **septum secundum** will give the **annulus ovalis**.





Development of Aortic Arches

Department of human Anatomy and Embryology
Faculty of Medicine
Mansoura National University, Egypt

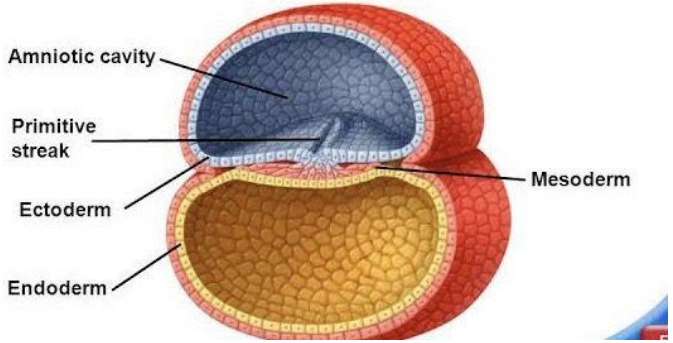
Development of Arteries

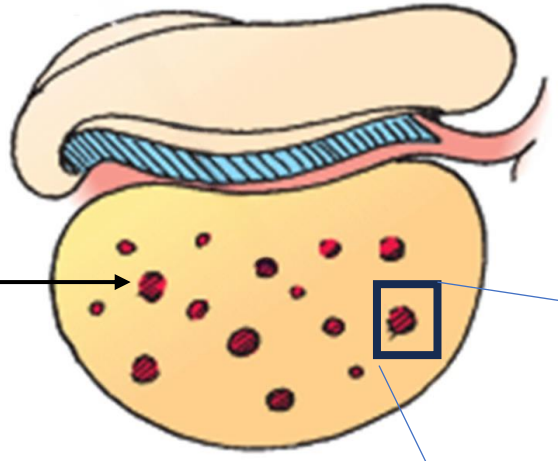
Time: at the beginning of **3rd week**.

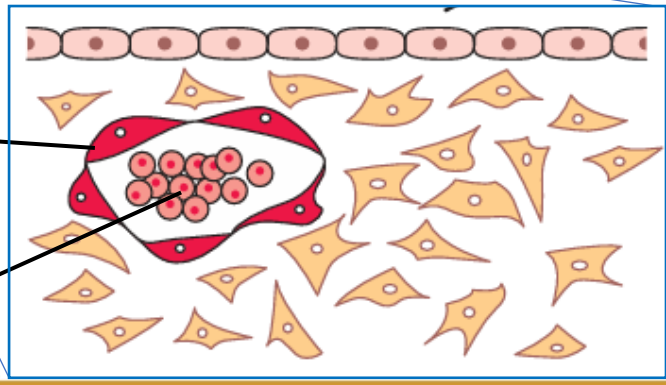
Source: from **angioblastic cells** (mesoderm).

Process of development:

- Angioblastic cells collect together to form islands of cells.
- The **central cells** separate to form blood cells, while the **peripheral cells** form the blood vessels.



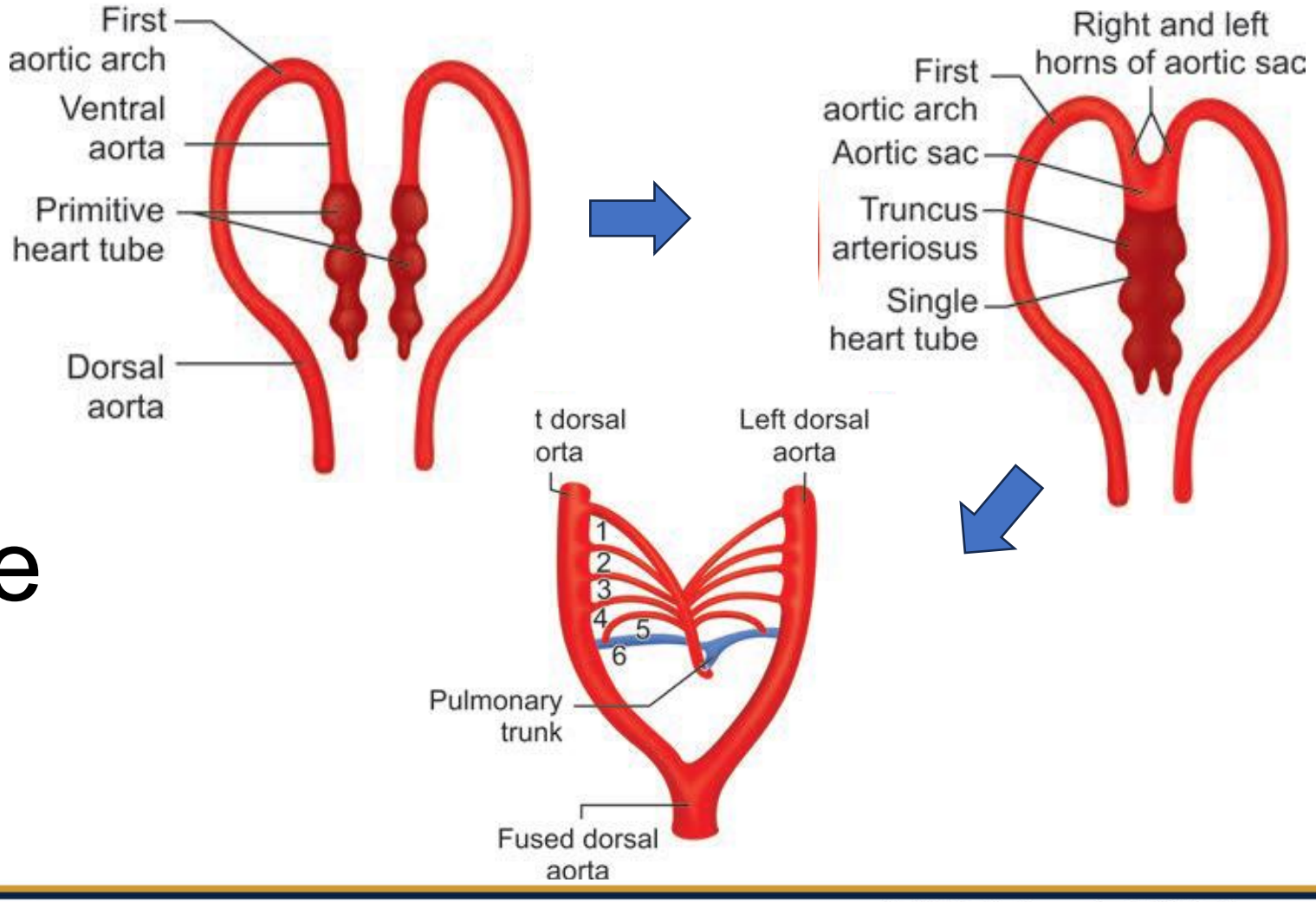




Development of Arteries

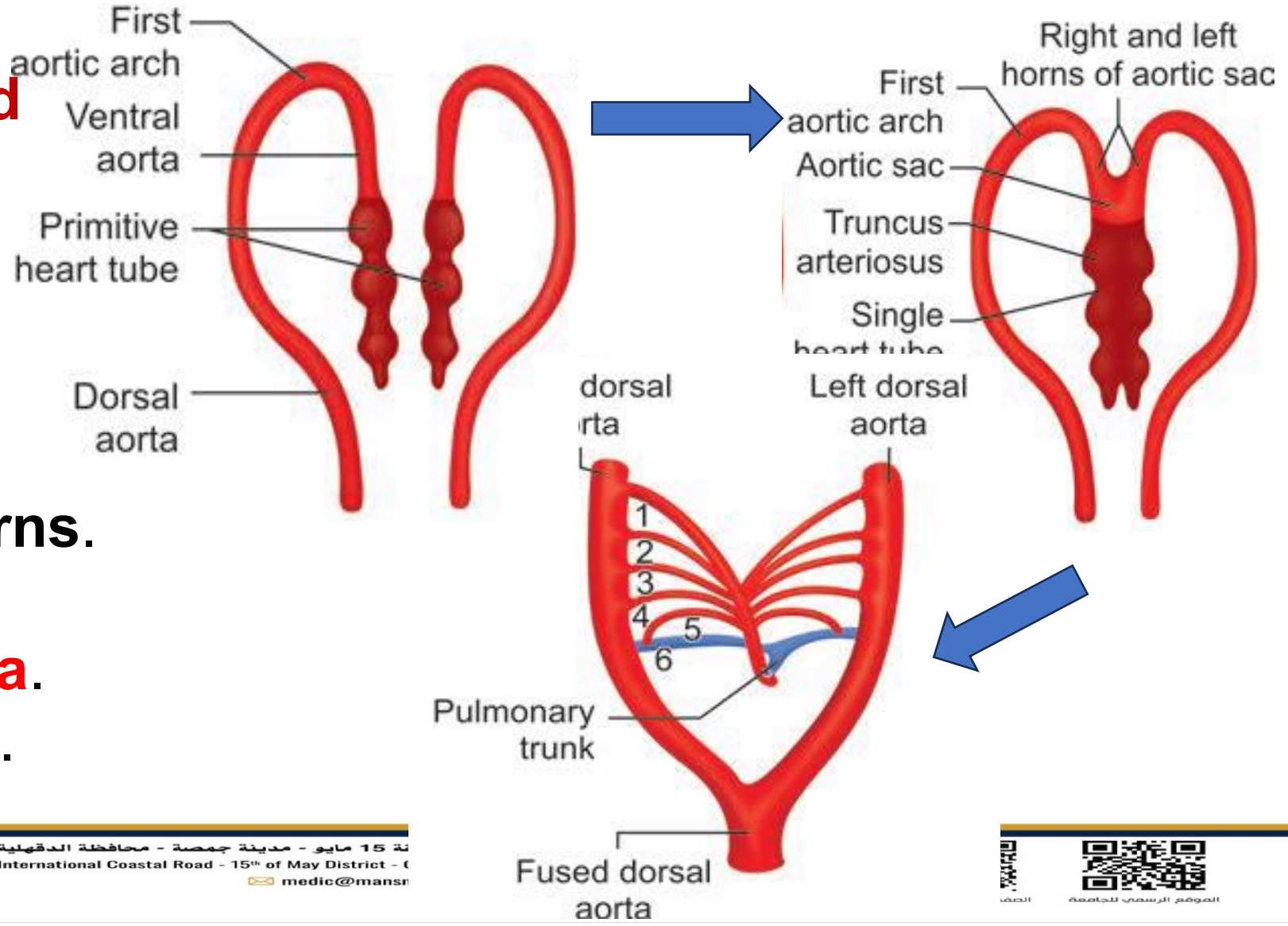
Process:

By the 4th week: two blood vessels appear (right & left primitive Aortae).



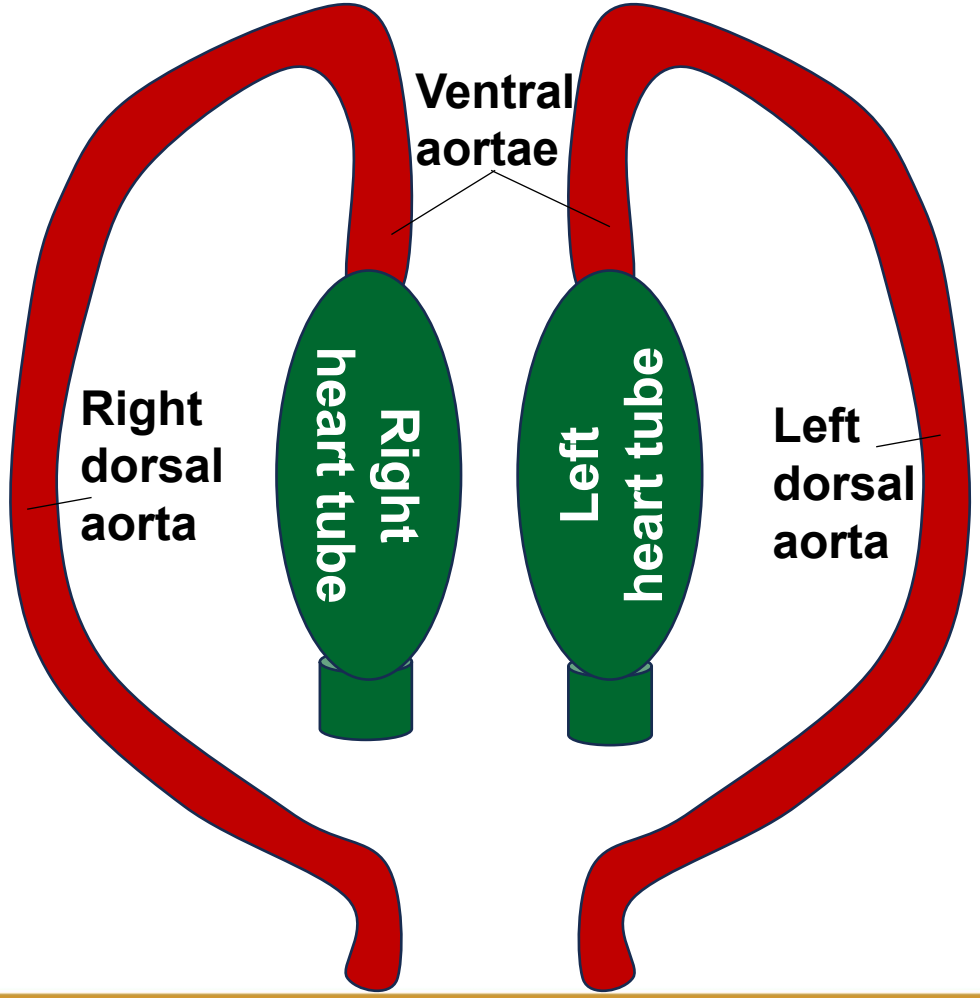
Development of Arteries

- **Each aorta is U- shaped having**:
  - **ventral aorta**.
  - **dorsal aorta**.
- **The 2 Ventral aortae**:
  - **aortic sac**
  - **right & left aortic horns**.
- **The 2 dorsal aortae**:
  - **common dorsal aorta**.
- **6 pairs of aortic arches**.



Development of Arteries

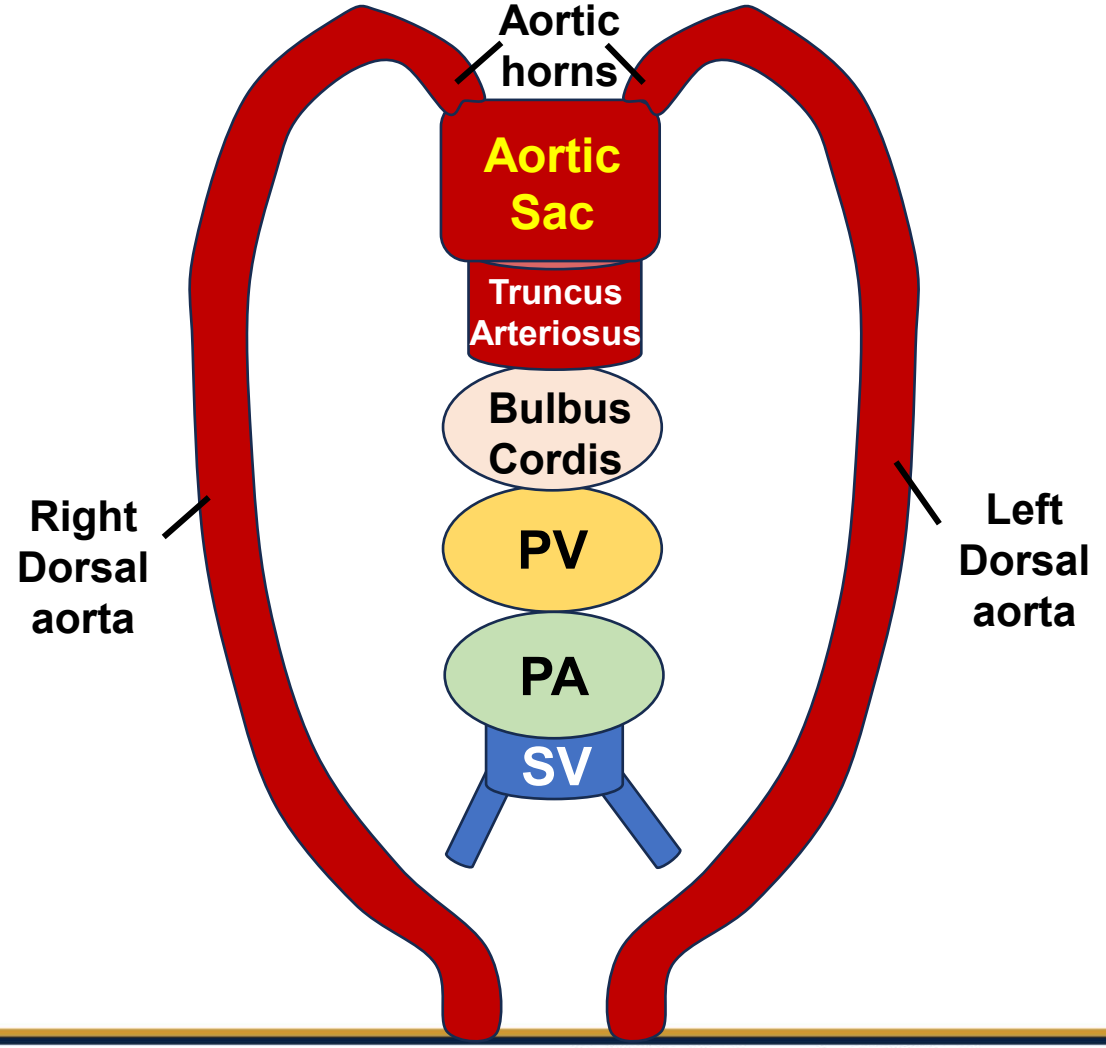
- **Each aorta is U-shaped having**:
  - Ventral limb: called **ventral aorta**.
  - Dorsal limb: called **dorsal aorta**.



Development of Arteries

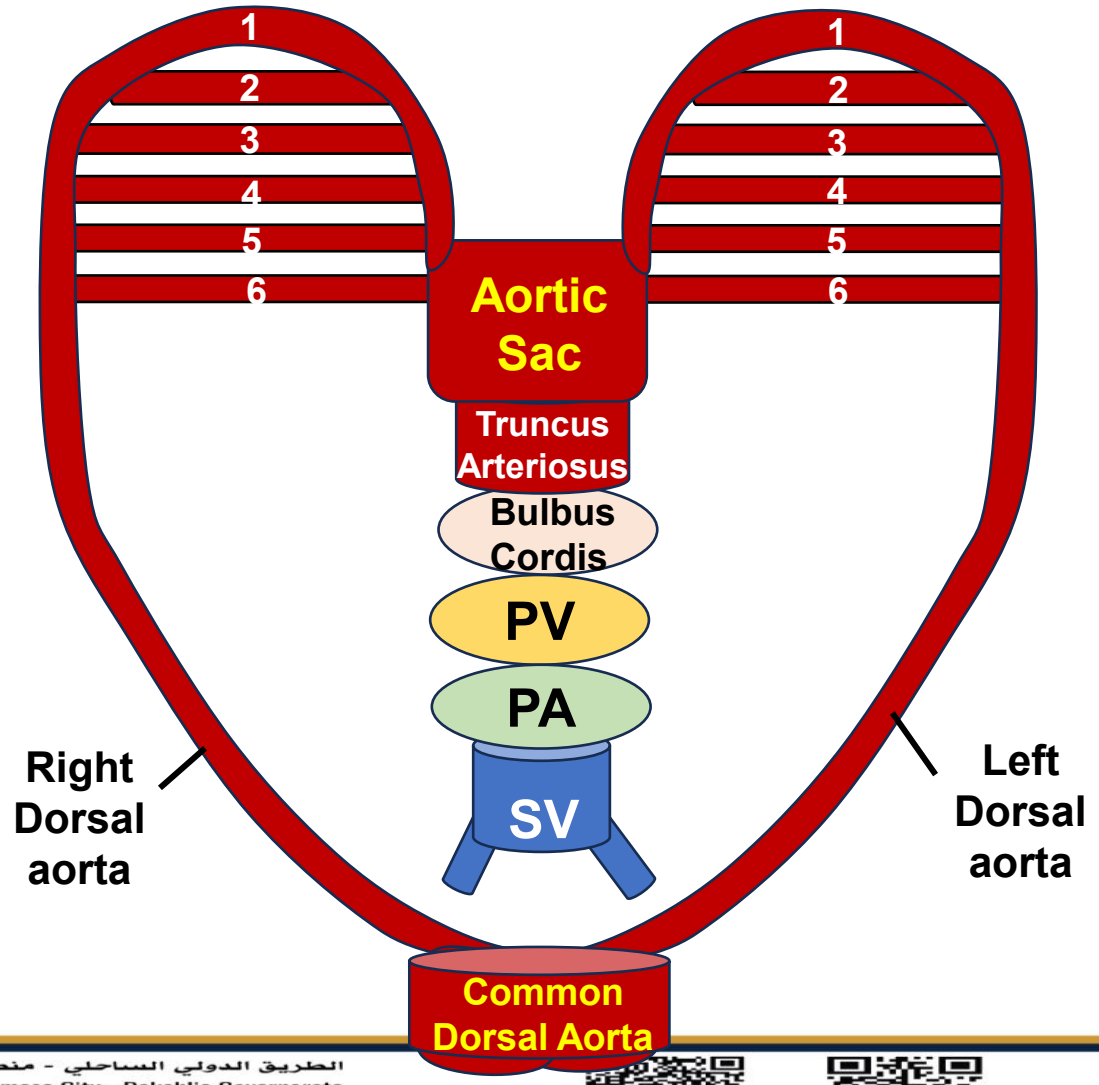
❑The 2 Ventral aortae:

- The **lower ends** fuse together to form **aortic sac**
- The **upper ends** remain separated to form **right & left aortic horns**.



Development of Arteries

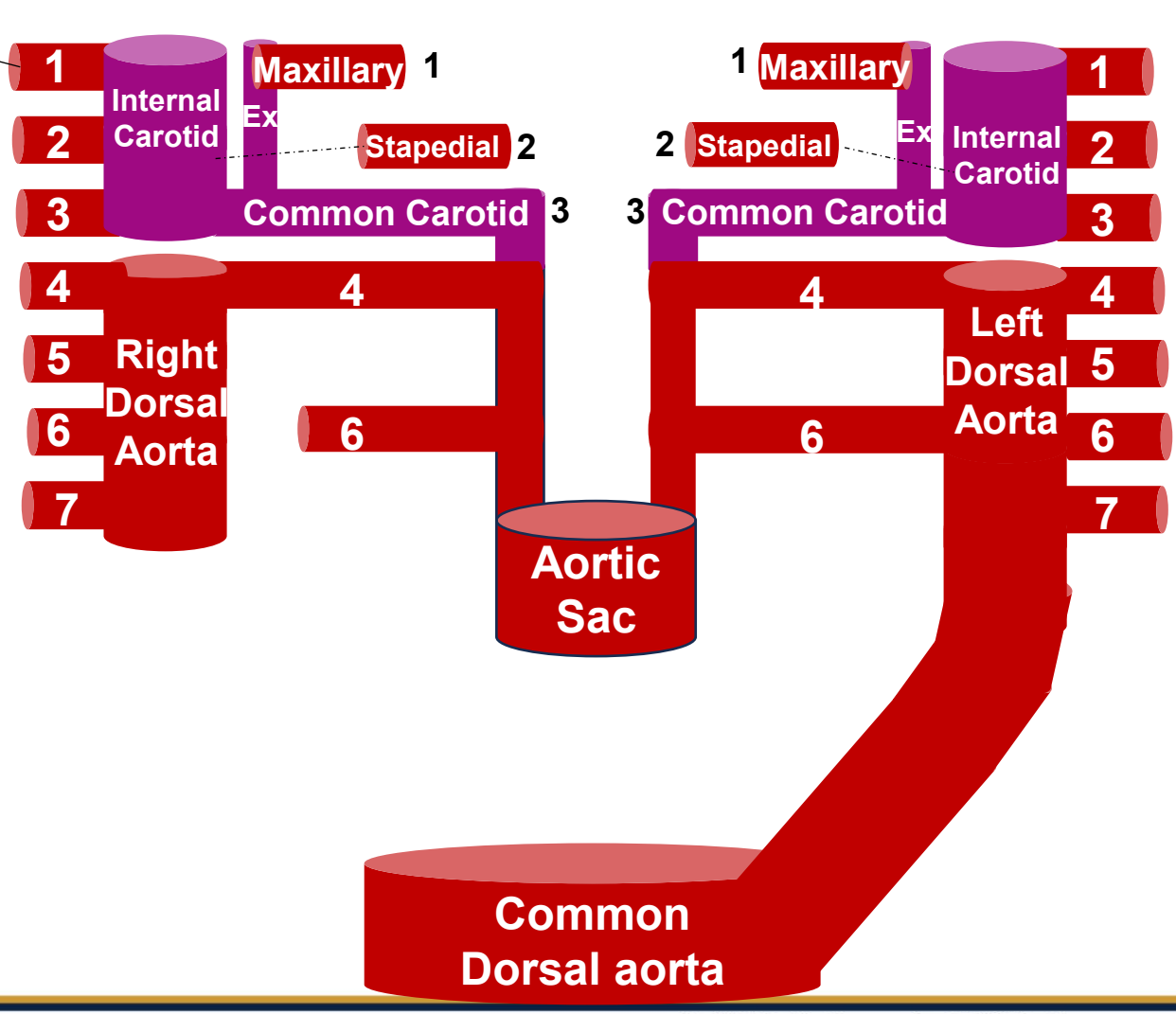
- **The 2 dorsal aortae**:
  - unite caudally to form common dorsal aorta.
- **6 pairs of aortic arches** connect the aortic sac and its horns to the dorsal aorta.



Development of Arteries

Fate of the aortic arches:

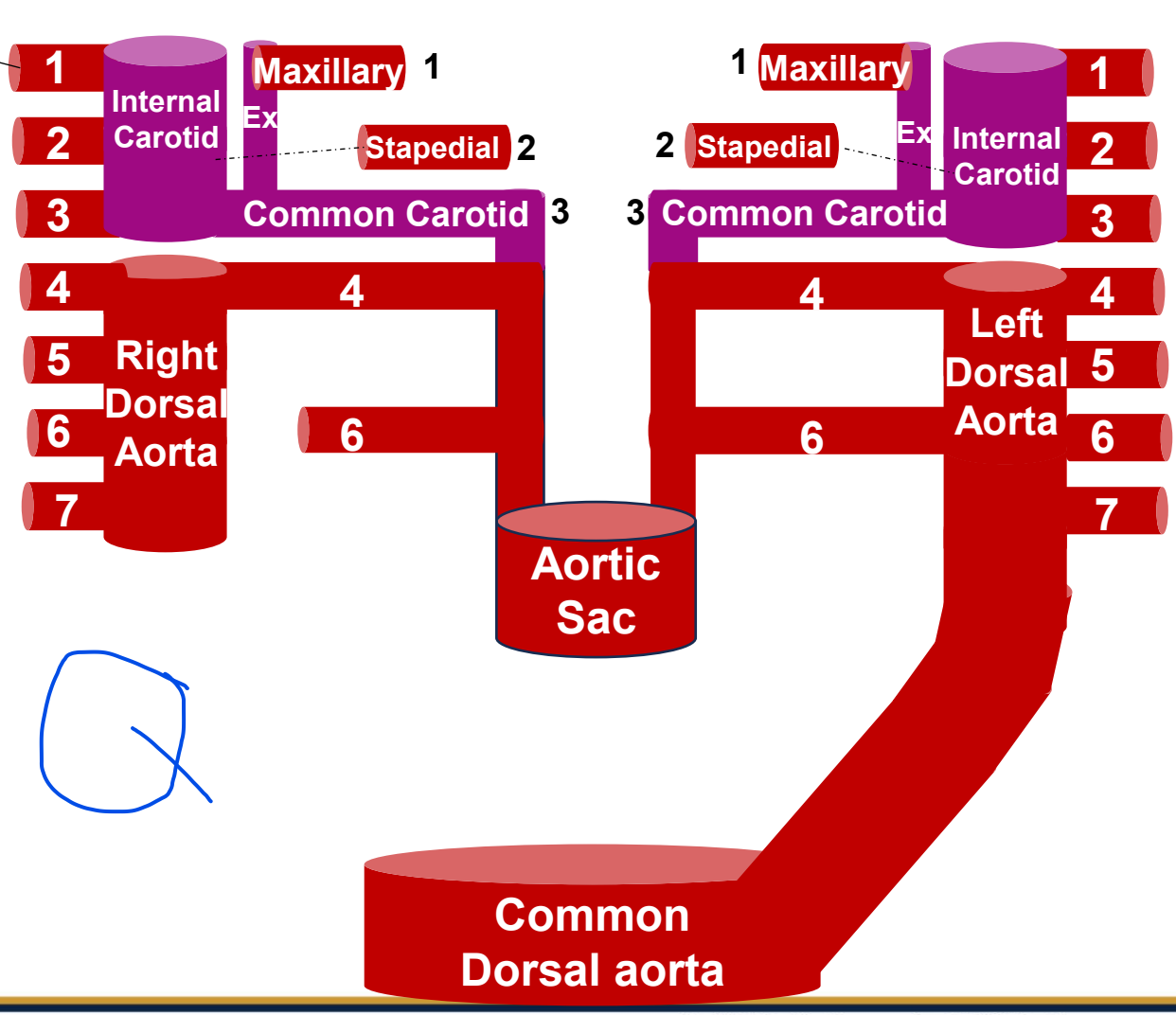
- ❑ **1st arch** → Degenerates. Rest forms maxillary artery
- ❑ **2nd arch** → Degenerates. Rest forms stapedial artery
- ❑ **3rd arch:**
  - **Proximal part** forms common carotid artery.
  - **Distal part** joins dorsal aorta to form internal carotid artery.
    N.B. External carotid artery (Ex) arises as a new bud



Development of Arteries

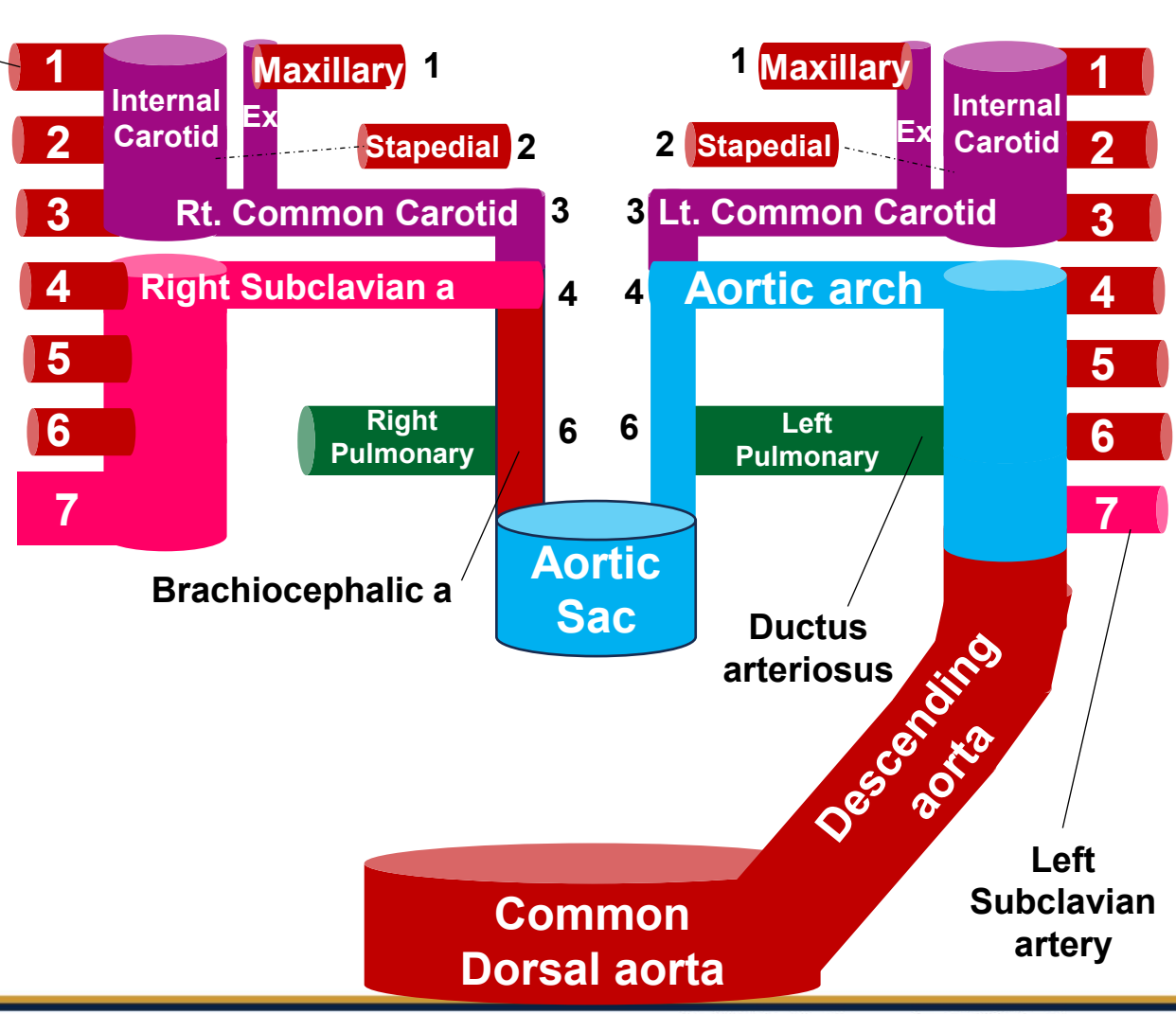
Fate of the aortic arches:

- **4th arch**
  - **Right**: forms the proximal part of the right subclavian artery.
  - **Left**: forms part of the aortic arch between the left common carotid and left subclavian arteries.
- **5th arch** → Degenerates completely
- **6th arch**:
  - **Right**: forms the right pulmonary artery.
  - **Left**: forms the left pulmonary artery and ductus arteriosus.



Development of Arteries

Fate of the aortic arches:



Development of Arteries

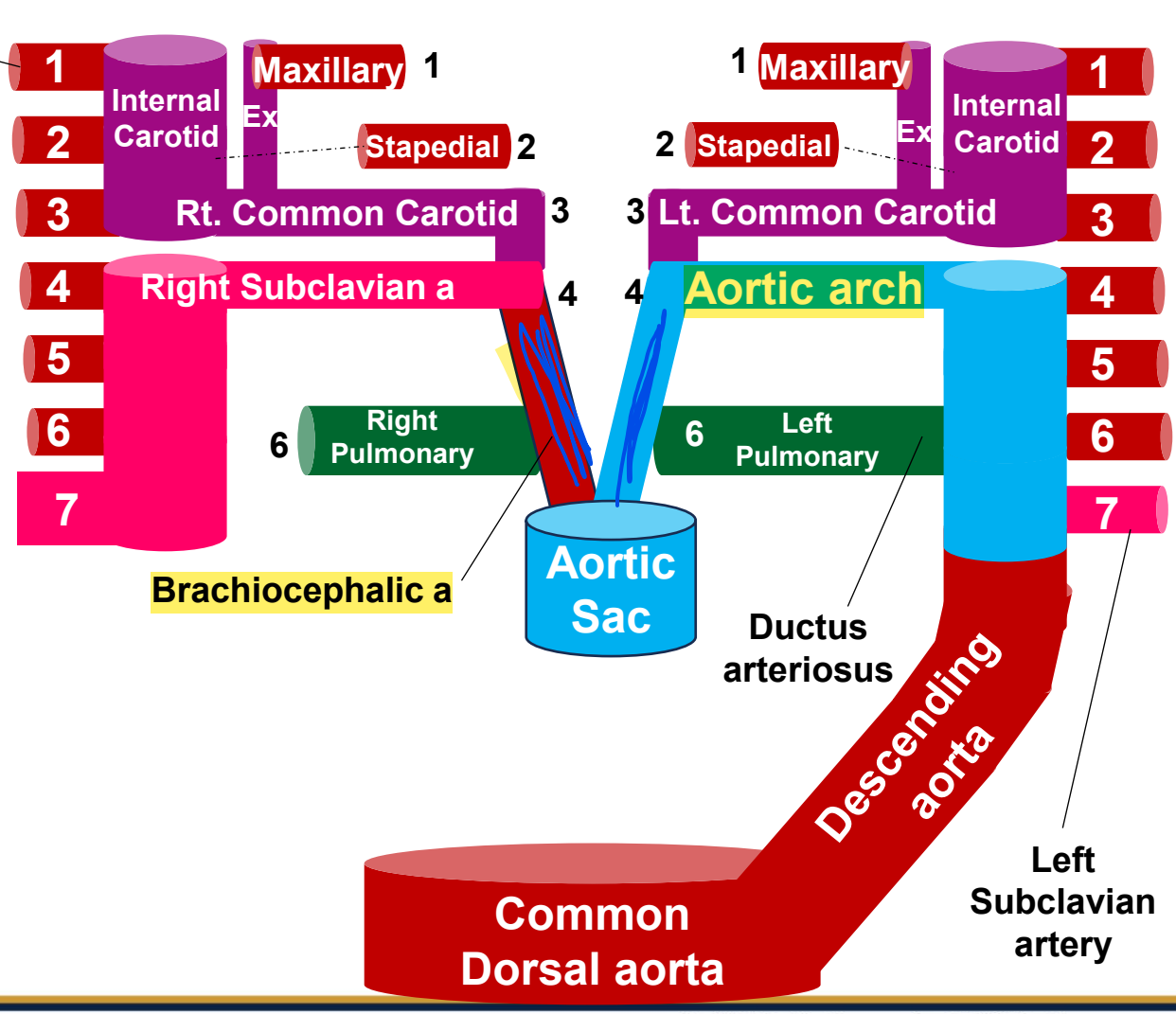
Derivatives of aortic sac:

SAQ

A. The right horn: forms the **brachiocephalic artery**.

B. The left horn: forms the **aortic arch** between the brachiocephalic and the left common carotid arteries.

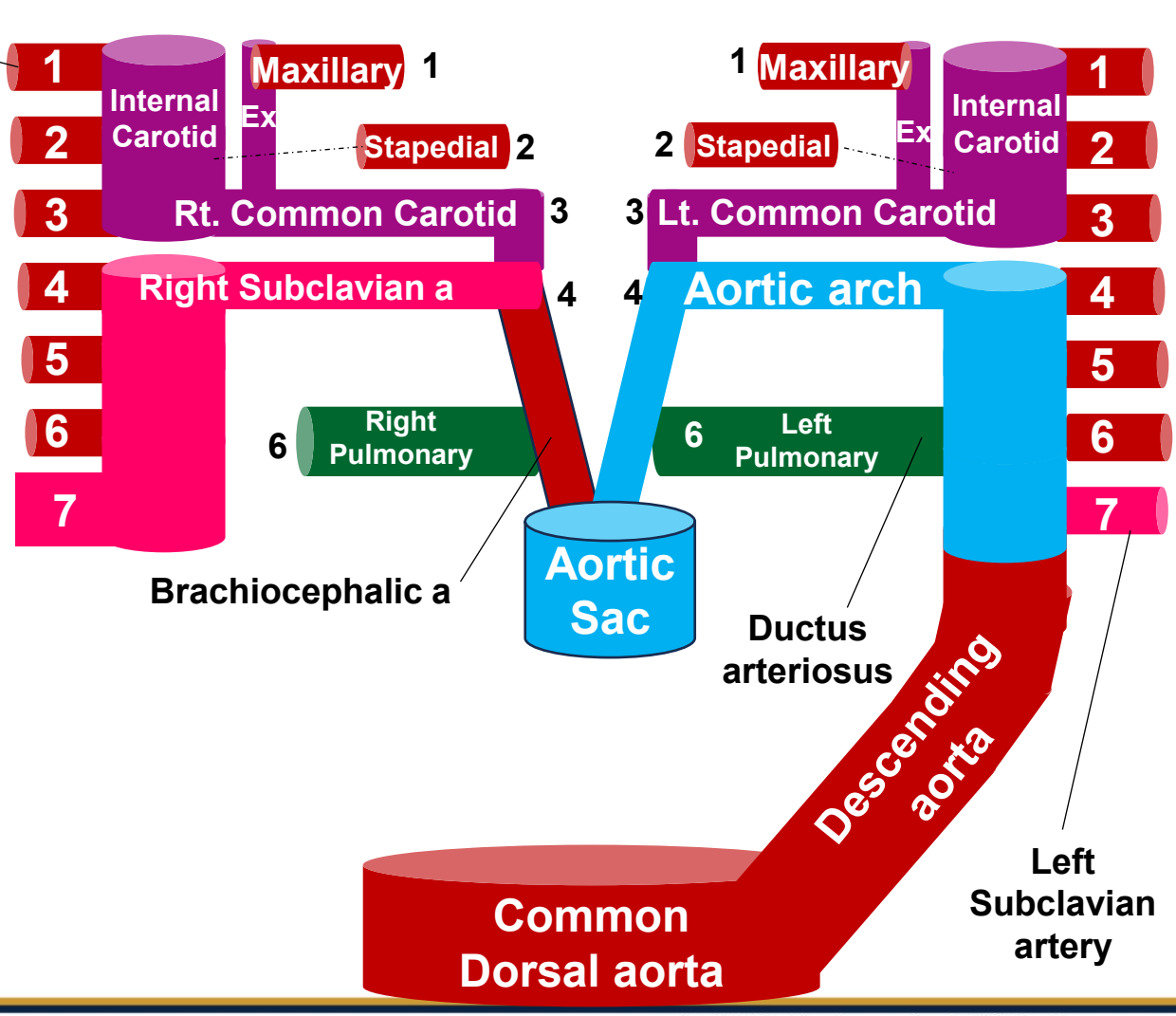
C. The aortic sac: forms the aortic arch proximal to the brachiocephalic artery.



Development of Arteries

Embryological origin of aortic arch:

- **The proximal part** arises from the **aortic sac**.
- **The 2nd part** arises from the **left horn of aortic sac**.
- **The 3rd part** arises from the **left 4th aortic arch**.
- **The distal part** arises from the **left dorsal aorta** between the 4th & 7th arches.



Congenital Anomalies

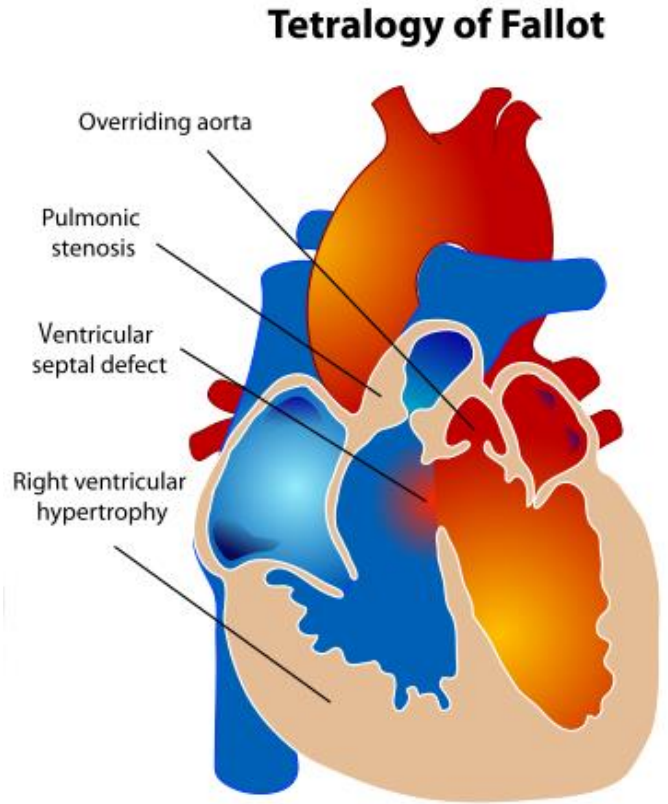
1- Patent Ductus Arteriosus (PDA):

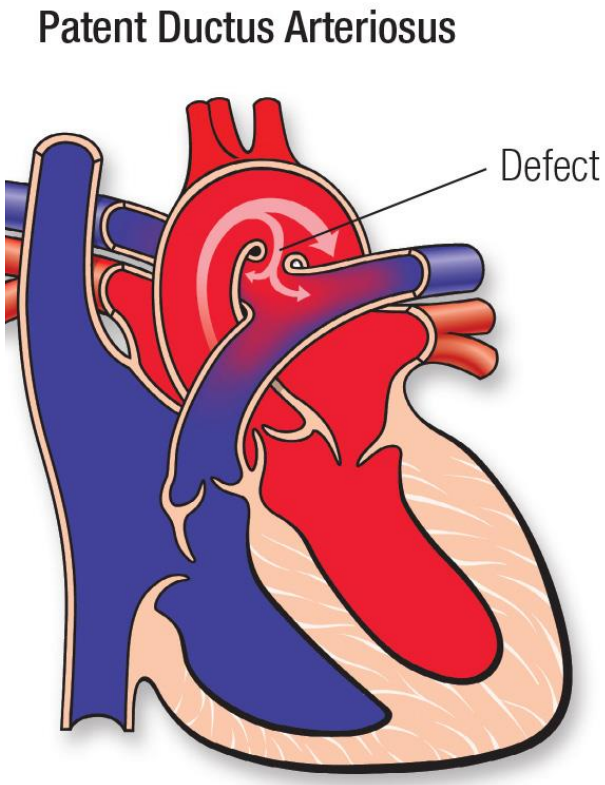
- **Cause:** the ductus arteriosus remains patent.
- **Features:**

❑ Common potential cyanotic heart disease.

❑ There is a duct between the left branch of pulmonary artery and aortic arch distal to its branches.

❑ May be accompanied with other diseases as Fallot's tetralogy.





Congenital Anomalies

2- Coarctation of the aorta:

Cause: **constriction of the aorta** distal to the origin of the left subclavian artery.

MCQ

Features:

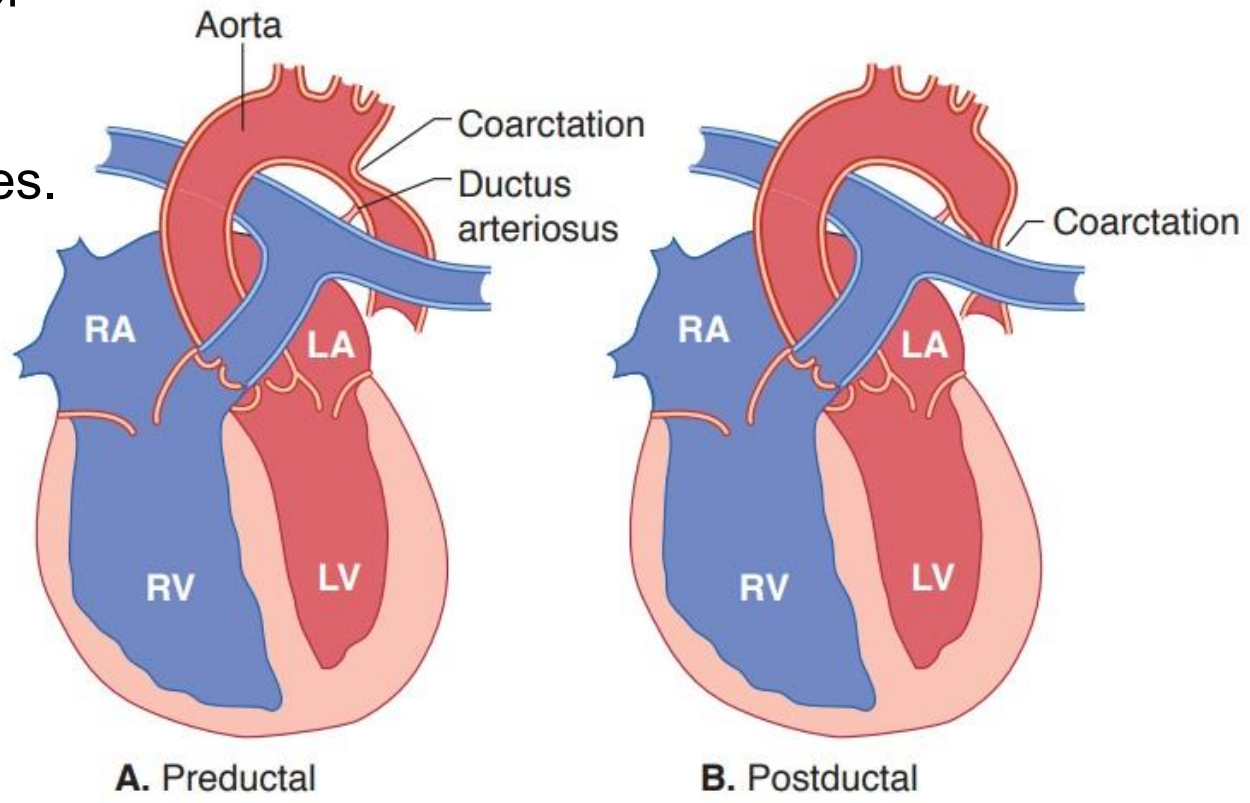
- occurs in 10 % of cases of congenital heart diseases.
- There are 2 types:

A. Pre-ductal:

- ❑ Coarctation of the aorta proximal to the entrance of ductus arteriosus.
- ❑ The ductus remains open (**PDA**).
- ❑ If closed, it is incompatible with life.

B. Post-ductal:

- ❑ Coarctation of the aorta distal to the entrance of ductus arteriosus.
- ❑ The ductus usually closes.
- ❑ Collateral circulation develops.



Quiz

The apex of the heart is formed by ……

A) left atrium
B) right atrium
C) left ventricle
D) right ventricle
E) both ventricles

- **The left surface of the heart is formed by:**

A) left atrium only
B) right atrium only
C) right ventricle only
D) both ventricles
E) both atria

Quiz

The right surface of the heart is formed by:

A) left atrium only
B) right atrium only
C) right ventricle only
D) both ventricles
E) both atria

Quiz

Base of the heart is formed by:

A) left atrium only
B) right atrium only
C) right ventricle only
D) both ventricles
E) both atria

Quiz

What separates the rough part and the smooth part of the right atrium?

A) Musculi pectinati
B) Fossa Ovalis
C) Annulus ovalis
D) Crista Terminalis
E) Right auricle

Answer: D

Thymus gland lies in which mediastinum?

A) Anterior and superior
B) Middle and superior
C) Superior and posterior
D) Anterior
E) Posterior

Trachea lies in which mediastinum?

A) Anterior and superior
B) Middle and superior
C) Superior and posterior
D) Anterior
E) Posterior

Thoracic duct lies in which mediastinum?

A) Anterior and superior
B) Middle and superior
C) Superior and posterior
D) Anterior
E) Posterior

Esophagus lies in which mediastinum?

A) Anterior and superior
B) Middle and superior
C) Superior and posterior
D) Anterior
E) Posterior

Mitral valve connects which of the following

A. Right ventricle with the pulmonary trunk
B. Right with left atrium
C. Right with left ventricle
D. Right atrium with right ventricle
E. Left atrium with left ventricle

The main part of right subclavian artery developed from the right ……. Aortic arch artery

A. 3rd

B. 4th

C. 5th

D. 6th

Tricuspid valve connects which of the following

A. Right ventricle with the pulmonary trunk
B. Right with left atrium
C. Right with left ventricle
D. Right atrium with right ventricle
E. Left atrium with left ventricle

Quiz

Common carotid artery develops from which aortic arch

A. 1st
B. 2nd
C. 3rd
D. 4th
E. 6th

Answer: C

Quiz

Maxillary artery develops from which aortic arch

A. 1st
B. 2nd
C. 3rd
D. 4th
E. 6th

Answer: A

- **Brachiocephalic artery develops from**

A. 1st aortic arch
B. 3rd aortic arch
C. 5th aortic arch
D. Right horn of aortic sac
E. Left horn of aortic sac

- **Medial umbilical ligament is the obliterated**

A. Left umbilical vein
B. Right umbilical vein
C. Umbilical artery
D. Ductus venosus
E. Ductus arteriosus

- **Is the obliterated left umbilical vein**

A. Ligamentum arteriosum
B. Ligamentum venosum
C. Ligamentum teres
D. Medial umbilical ligament
E. Lateral umbilical ligament

- **Middle cardiac vein is located in …….**

A. **Right coronary sulcus**

B. **Left coronary sulcus**

C. **Interatrial sulcus**

D. **Anterior interventricular groove**

E. **Posterior interventricular groove**

- **Small cardiac vein is located in …….**

A. **Right coronary sulcus**
B. **Left coronary sulcus**
C. **Interatrial sulcus**
D. **Anterior interventricular groove**
E. **Posterior interventricular groove**

- **Coronary sinus is located in …….**

A. **Right coronary sulcus**

B. **Left coronary sulcus**

C. **Interatrial sulcus**

D. **Anterior interventricular groove**

E. **Posterior interventricular groove**

- **Apex of the heart is anatomically located in ……. intercostal space.**

A. 4th

B. 5th

C. 6th

D. 7TH

D. 9th

- **Tetralogy of Fallot is characterized by ….**

A. Pulmonary regurgitation
B. Atrial septal defect
C. Mitral stenosis
D. Aortic stenosis
E. Right ventricular hypertrophy

- **Tetralogy of Fallot is characterized by ….**

A. Pulmonary regurgitation
B. Atrial septal defect
C. Mitral stenosis
D. Aortic stenosis
E. Overriding aorta

- **Tetralogy of Fallot is characterized by ….**

A. Pulmonary regurgitation
B. Atrial septal defect
C. Mitral stenosis
D. Aortic stenosis
E. Ventricular septal defects

- **Coarctation of the aorta is characterized by ……**

A. Aortic valve stenosis
B. Aortic valve regurge
C. Aortic artery narrowing
D. Overriding aorta
E. Right aorta

- **Abnormal connection between aortic arch and the left pulmonary artery**

a- Persistent ductus venosus

b- Right aortic arch

c- Persistent ductus arteriosus

d- Transposition of the great vessels

- **left 4th aortic arch artery will forms**

A. Internal carotid
B. Common carotid
C. External carotid artery
D. Proximal part of aortic arch
E. Main part of aortic arch

- **Failed development of aortico-pulmonary septum causes**

A. Persistent truncus arteriosus
B. Patent foramen ovale
C. Cortriloculare biatrial
D. Cortriloculare biventriculare
E. Pulmonary stenosis

- **unequal division of the truncus arteriosus causes**

A. Fallot`s tetralogy
B. Patent ductus arteriosus
C. Aortic stenosis
D. Cortriloculare biatrial
E. Cortriloculare biventriculare

SAQ

DESCRIBE Sinuses of the pericardium:

- **Transverse sinus:** lies between the ascending aorta and S.V.C. it will come out between the pulmonary trunk and the left auricle
- **Oblique sinus:** recess of pericardial cavity behind the left atrium.

SAQ

Compare between right & left ventricles

	Right ventricle	Left ventricle
Wall	thinner	L 3 times thicker
Cross section	Semilunar	Circular
Outflow part	Infundibulum	Aortic vestibule
Papillary muscles	3 (Anterior, posterior, septal)	2 (Anterior, posterior)
Moderator band	Present	Absent (No moderator band)
Valves	2 (Tricuspid, pulmonary)	2 (Mitral, aortic)

SAQ

SUMMERIZE

Blood supply of the heart

Arterial Supply

- Right coronary artery.
- Left coronary artery.

Venous Drainage

- Venae cordis minimi.
- Anterior cardiac veins.
- Coronary sinus.

SUMMERIZE CONTENTS OF Posterior Mediastinum (any 4 contents)

- Descending thoracic aorta.
- Esophagus: on the right side of the aorta then becomes anterior to it.
- Right & left vagi: form esophageal plexuses.
- Thoracic duct: on the right side of the esophagus.
- Azygos & hemiazygos veins (superior (accessory) & inferior).
- Splanchnic nerves: branches of the sympathetic chain.
- Posterior mediastinal lymph nodes.

Summerize Congenital anomalies of inter-atrial septum

Atrial Septal defects (ASD)

1. Tri-locular (bi-ventricular) heart:

2. Persistent foramen primum (Patent ostium primum):

3. Persistent foramen secundum (Patent ostium secundum):

SAQ

Mention the components of Fallot's tetralogy:

The most common cyanotic heart disease.

Cause:

- Unequal division of the truncus arteriosus. **Features:**
  - Pulmonary Stenosis.
  - Hypertrophy of the right ventricle.
  - Overriding of aorta on both ventricles.
  - VSD.

SAQ

Mention Changes in Fetal Circulation after Ligature of the umbilical cord.

1. ligamentum teres of the liver.
2. Medial umbilical ligaments.
3. ligamentum venosum.
4. ligamentum arteriosum.
5. **reduction of pressure in the right atrium.**


الحمد لله
Thank You
Thank You