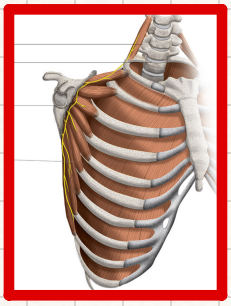
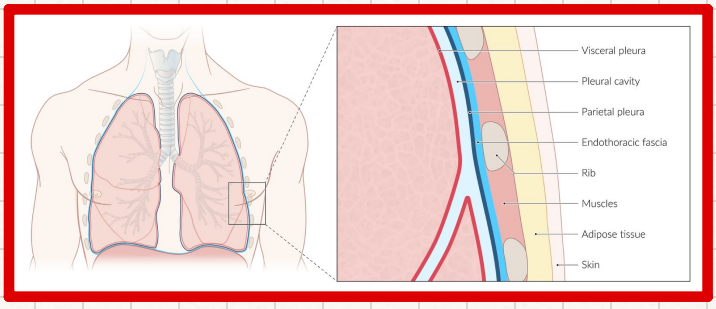
Intro. to Thorax

Thorax: is the part of the trunk extending between the root of the neck & abdomen



Thoracic Wall



Thoracic Cavity

Openings to the thorax

Thoracic outlet:

→ it's an opening between chest cavity & the root of the neck

Boundaries:

- anteriorlly: superior border of the manubrium sterni
- posteriorlly: first thoracic vertebra
- laterally: medial borders of the first ribs & their costal cartilages

Structure passing:

Esophagus, trachea & many vessels & nerves.

Inferior thoracic aperature:

→ the thoracic cavity communicates with the abdomen through a large opening

Boundaries

- anteriorlly: xiphisternal joint
- posteriorlly: 12th thoracic vertebra
- laterally: costal margin

Structure passing:

Esophagus & many large vessels & nerves through diaphragm foramina

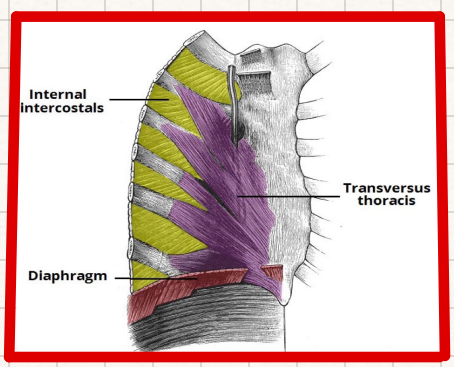
Intercostal muscles: Are arranged in free layers

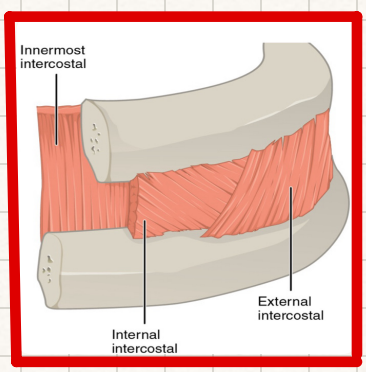
1. **External intercostal muscle:**
   - its fibers are directed downward & forward
   - it extends from the inferior border of the rib above to the superior border of the rib below
2. **Internal intercostal muscle**
   - its fibers are directed downward & backward
   - it extends from the subcostal groove of the rib above to the upper border of the rib below
   - Responsible for Expiration
3. Innermost intercostal muscle
4. Subcostal muscle
5. Transverseus thoracis muscle

nerve supply: Intercostal nerves

Action: Respiration

Strengthen the intercostal spaces





Diaphragm

it's a thin muscular & tendinous septum that separates the chest cavity above from the abdominal cavity below

nerve supply: motor nerve supply

↓

The right & left phrenic nerves " C3,4,5 "

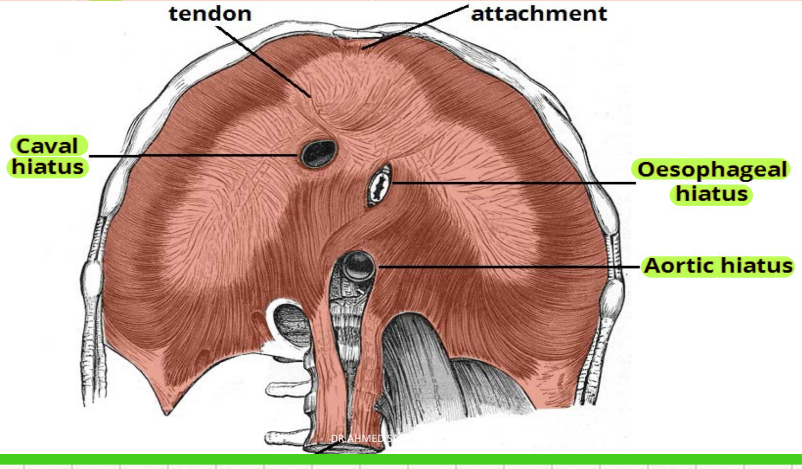
Functions of the Diaphragm:

1. Respiration
2. muscle of abdominal straining: the contraction of the diaphragm is raising the intra-abdominal press
3. Weight-lifting muscle
4. Thoracoabdominal pump: pump for blood & lymph

100

Opening of the diaphragm

Opening	Level	Structures passing through it
Vena Caval	8th thoracic vertebra	It transmits the inferior vena cava and terminal branches of the right phrenic nerve.
Oesophageal (Oesophagus)opening	10th thoracic vertebra	oesophagus, the right and left vagus nerves
Aortic	12th thoracic vertebra	aorta, the thoracic duct, and the azygos vein.



Intercostal nerves

- it's a ventral ramus of thoracic nerves
- there are 11 nerves on each side
- the last one called Subcostal nerve

Functions:

Sensory: skin — parietal layer of pleura & peritoneum

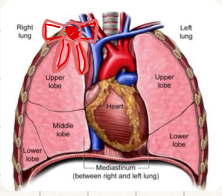
motor: muscles of anterior thoracic & abdominal walls

postganglionic sympathetic: Blood vessels — Sweat glands

Blood Supply of thoracic Wall

anterior Wall	posterior Wall
9 on each side	11 on each side
2 in each space	One in each space
upper 6 from internal thoracic artery	1st, 2nd from superior intercostal artery
7,8,9 from musculophrenic artery	3-11 from descending thoracic aorta

Thoracic Cavity



- it bounded by thoracic cage, Diaphragm
- it contains two pleural cavities containing lungs & mediastinum

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It is the septum between the two pleural cavities

Boundaries: Superior: thoracic outlet Anterior: sternum
Inferior: Diaphragm posterior: vertebral column

Subdivision

Division:

an imaginary line form sternal angle to lower border of 4th thoracic vertebra

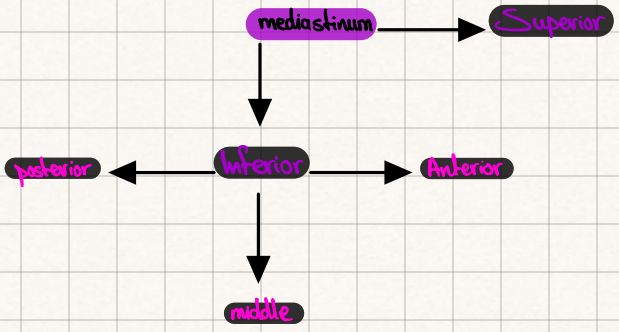
divide mediastinum into:

- Superior mediastinum above the line & Inferior mediastinum below the line
- Inferior mediastinum divided into:

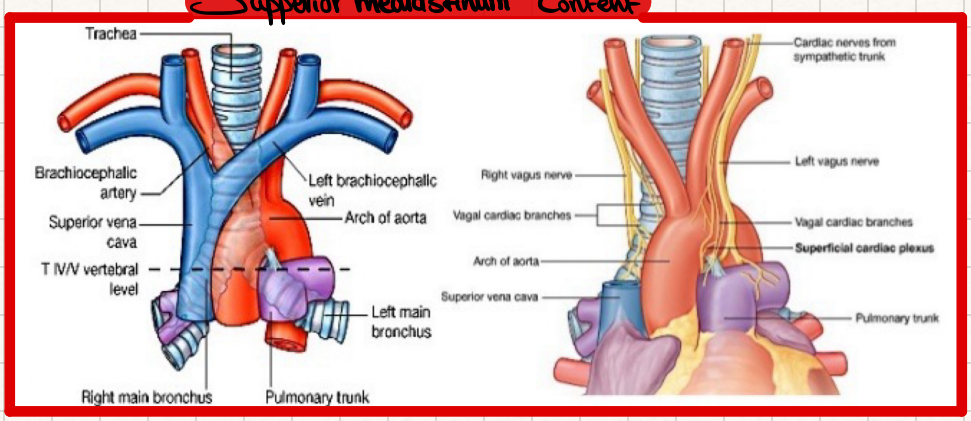
middle mediastinum contains heart & pericardium

anterior mediastinum infront middle mediastinum

posterior mediastinum behind middle mediastinum



Superior mediastinum Content



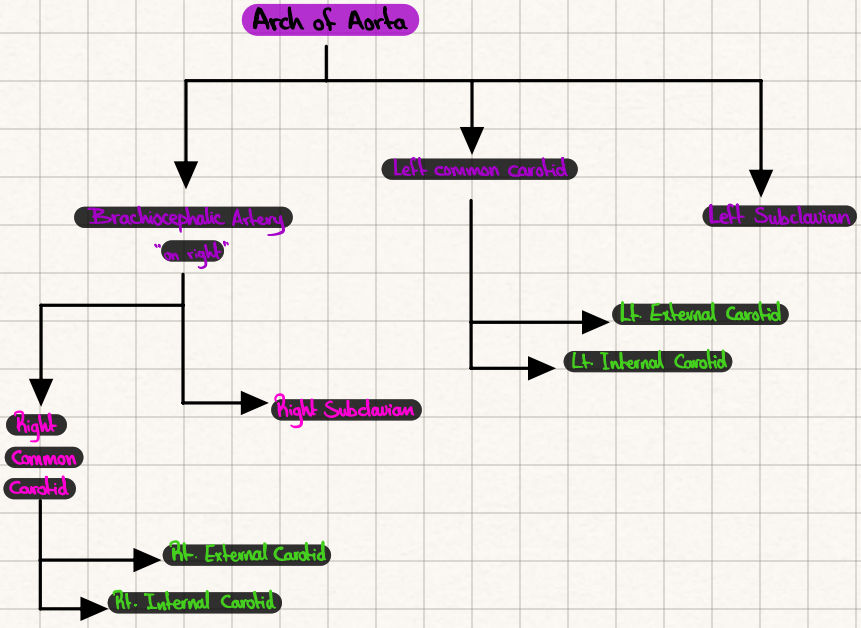
Vein of the head & the neck: Internal jugular vein

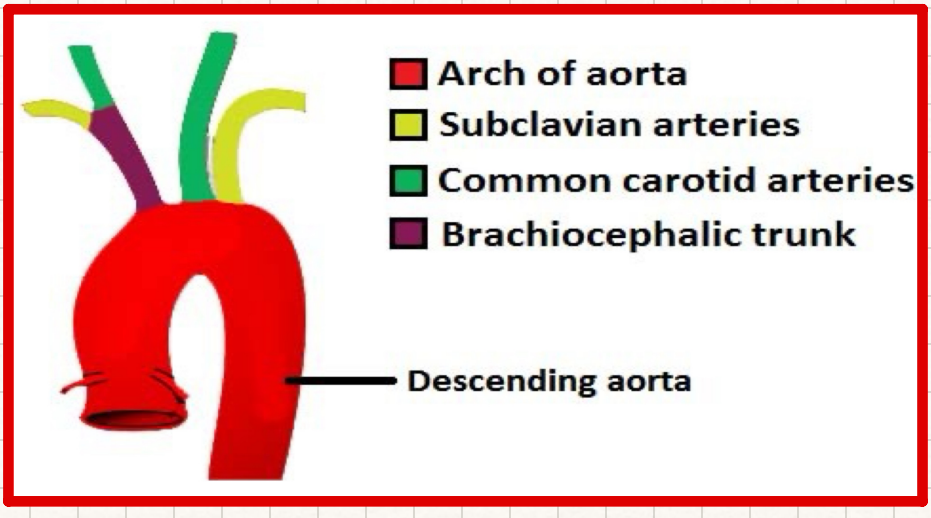
Vein of the upper limb: Subclavian vein

Right internal jugular vein joins right subclavian vein to form right brachiocephalic vein

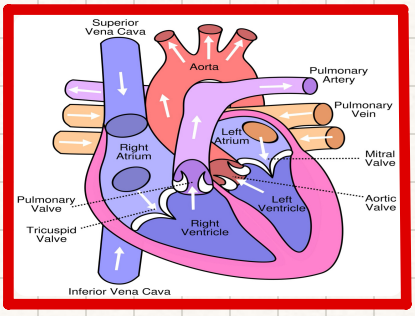
Left internal jugular vein joins left subclavian vein to form Lt. brachiocephalic vein

Right brachiocephalic vein joins left brachiocephalic vein to form superior vena cava





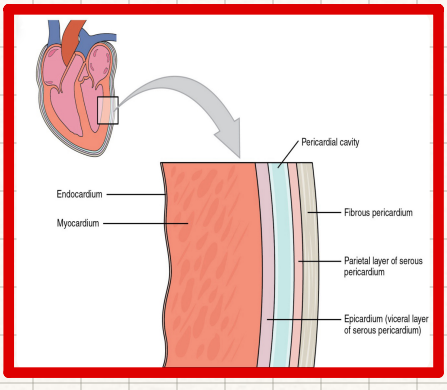
The Heart



- a muscular pump that propels blood to various parts of the body
- lies within the pericardium in the middle mediastinum
- 1/3 of the heart lies to the right & 2/3 to the left of the median plane

The walls of the heart are composed of three layers from outside:

1. Epicardium
2. Mypcardium → Which is the cardiac muscle
3. Endocardium



pericardium: is a fibroserous sac surrounding the heart & the roots of the great vessels

its function is to:

1. Restrict excessive movements of the heart
2. Serve as a lubricated container in which the different parts of the heart can contract.

Pericardium

Fibrous pericardium

- it is outer sac of pericardium
- it is firmly attached to the diaphragm

Serous pericardium

- It is thin transport double layered sac that lies within the fibrous pericardium

The pericardial cavity

it is the space between the 2 layers of serous pericardium

Contains a thin film of fluid that acts as a lubricant for movements of the heart

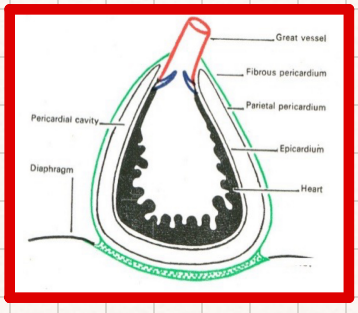
parietal

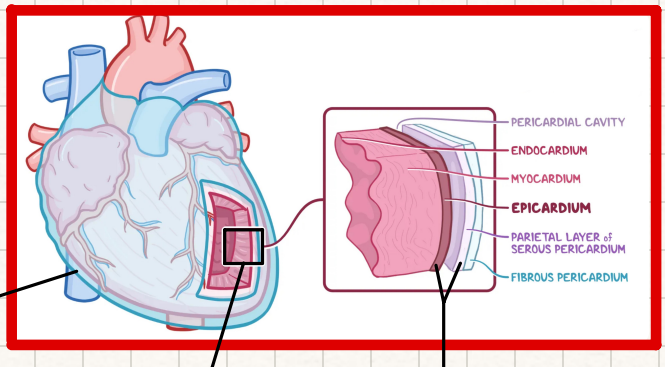
lines the inner surface of the fibrous pericardium

Visceral

Adheres to the heart & forms its outer covering

Layers of pericardium

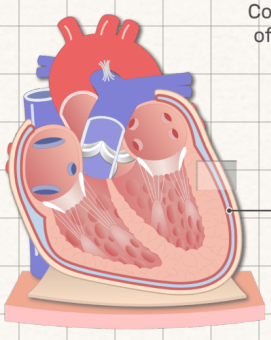




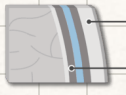
Pericardium Surround heart

Pericardial Cavity Filled with Fluid

2 Layers of pericardium



Coronal Section of Pericardium



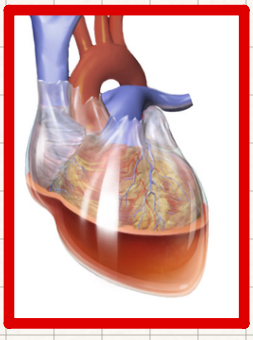
Outer wall

Inner wall

2 Layers of pericardium

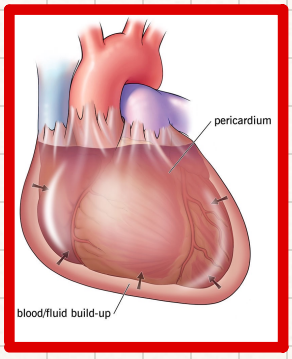
Pericardial cavity

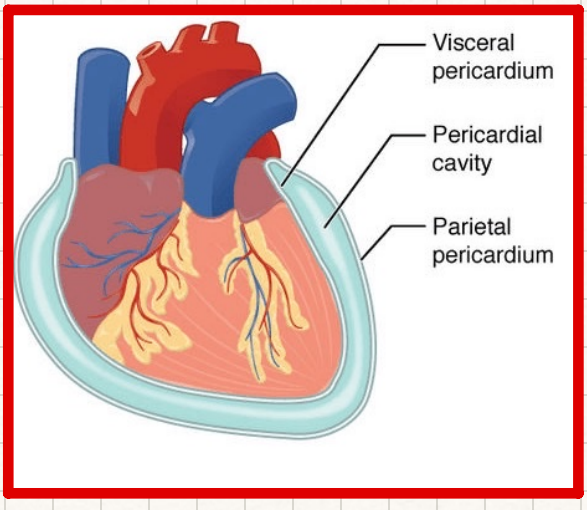
Cardiac tamponade

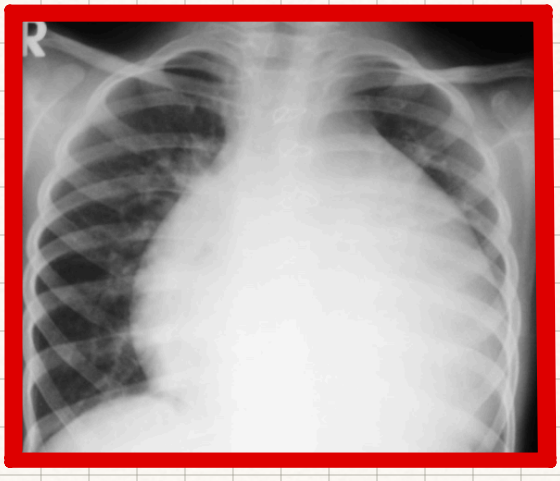


- When fluid in the pericardium builds up, resulting in compression of the heart

- a medical emergency that takes place when abnormal amounts of fluid accumulate in the pericardial sac compressing the heart & leading to a decrease in cardiac output & shock







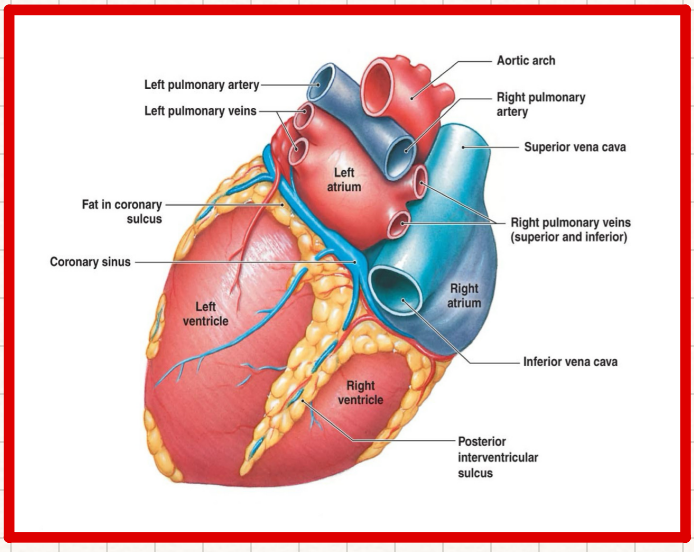
External morphology of the heart

Base: located posteriorly, it's formed mainly by the left atrium

Apex: formed by the left ventricle

"it lies at the 5th left intercostal space 3.5 inch (9cm) from midline"

Two Surfaces: Anterior or sternocostal and Inferior or diaphragmatic



Posterior Surface

Heart Chambers

- The heart is composed of 4 chambers:

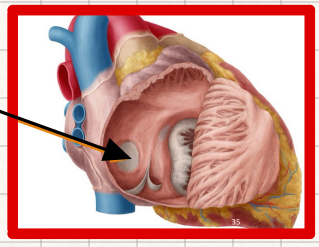
"Atria"
Receiving Chambers: Right Atrium, Left Atrium

"Ventricles"
Discharging Chambers: Right Ventricle, Left Ventricle

- Two Atria, Two Ventricles

Right Atrium: it has **Smooth posterior part** and **Rough anterior part**

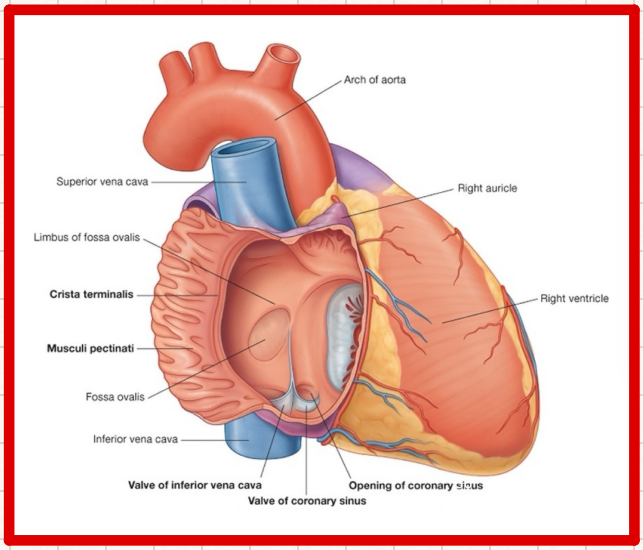
Septal Wall: which separates the right atrium from the left atrium.
It contains fossa ovalis which was the site of the foramen ovale in the fetus.



Openings to the Right Atrium:

- **S.V.C:** It returns the blood to the heart from the upper half of the body
- **I.V.C:** It returns the blood to the heart from the lower half of the body
- **The Coronary Sinus:** It drains most of the blood from the heart.

Right Atrioventricular orifice which is guarded by Tricuspid Valve



2 **Right Ventricle:** it has

Smooth outflow part —called→ **Infundibulum** leads into the pulmonary Artery

Communication of the Right Ventricle:

With Right Atrium & pulmonary artery

3 **Left Atrium:**

Openings to the Left Atrium:

1- the four pulmonary

2- the left atrioventricular orifice is guarded by mitral value

4 **Left Ventricle:**

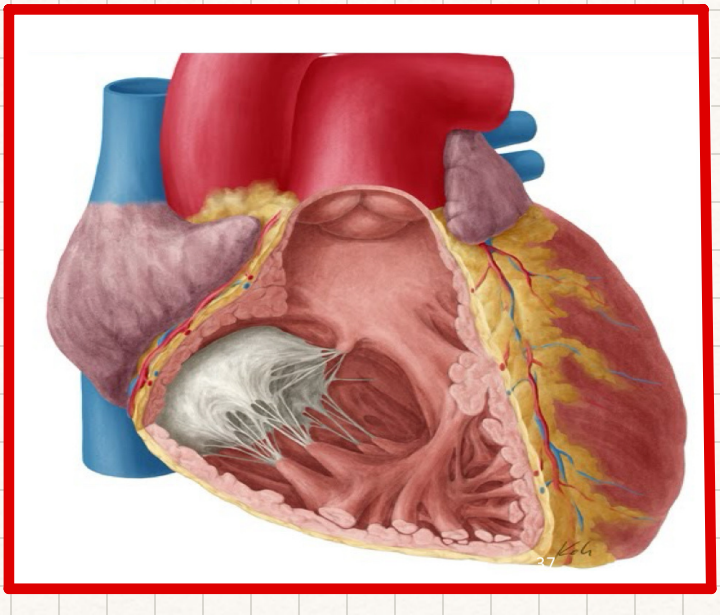
the thickness of its wall is 3:1 that of the Left Ventricle it has:

- Rough Inflow rough part:

outflow smooth part or the vestibule: leads into the ascending aorta

Communication to the Right Ventricle:

Left Atrium & Aorta

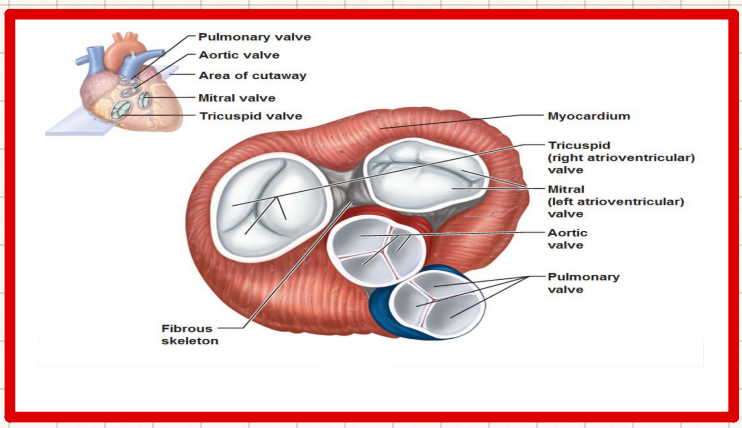


Heart Valves

- **Atrioventricular Valves**
  - **Tricuspid Valve** — between right atrium & right ventricle
  - **mitral or Bicuspid valve** — between left atrium & left ventricle
- **Semilunar Valves**
  - **pulmonary** — between right ventricle & pulmonary artery
  - **Aorta** — between left ventricle & Aortic artery

Heart valves & the fibrous skeleton

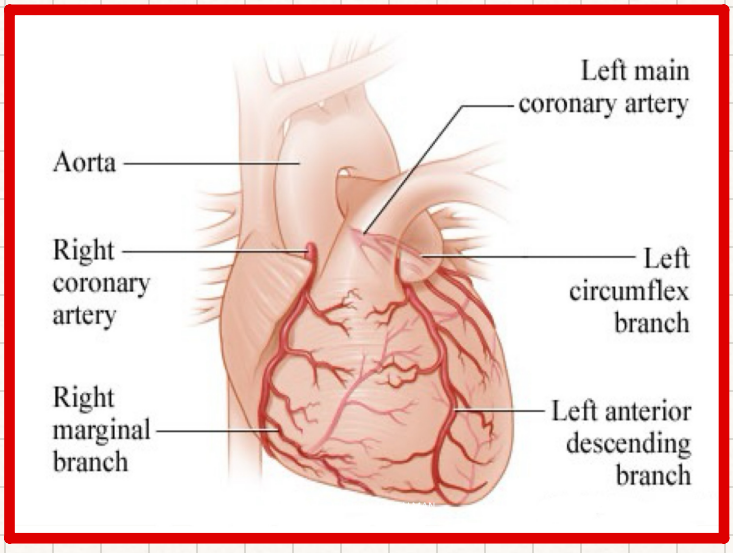
"Dense CT"

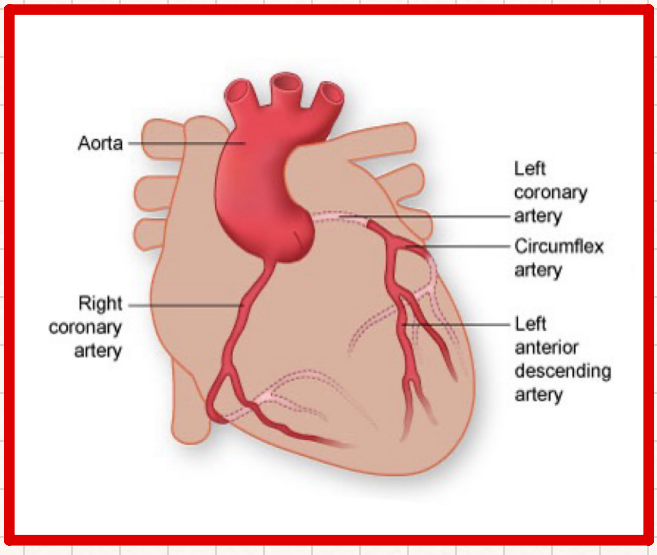


Blood Supply of the Heart

- Arterial
  - Right coronary
  - Left Coronary
- Venous
  - Coronary Sinus

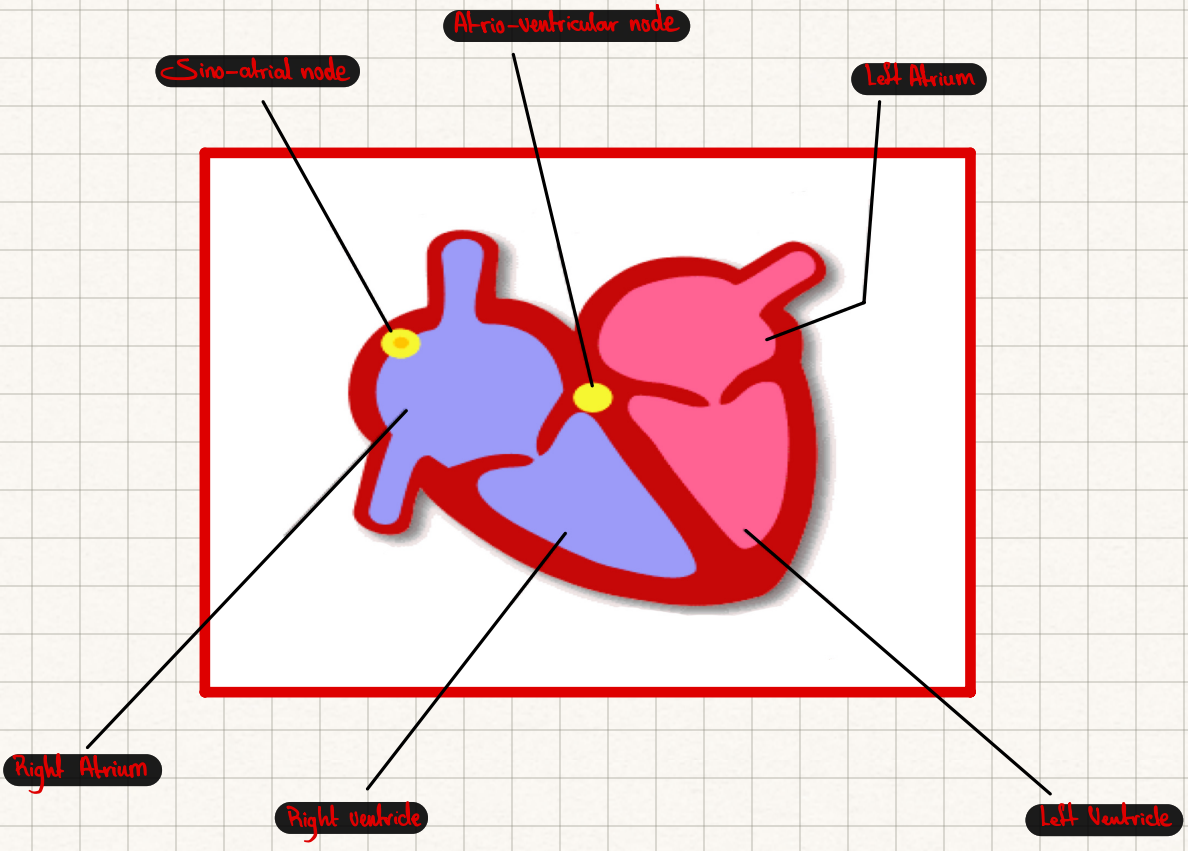
Right Coronary	Left Coronary
Arises from the anterior aortic sinus to the ascending aorta	Arises from the posterior aortic sinus to the ascending aorta
Important Branches	
1. posterior interventricular artery.	it gives: 1. Anterior interventricular artery.
2. SA node Branch	2. Circumflex





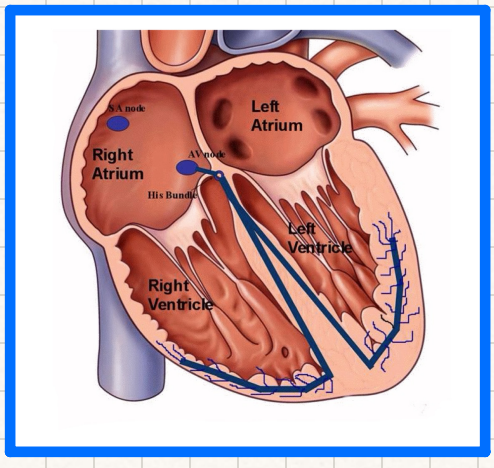
Conducting System of the Heart

- Responsible for initiation & conduction of the Cardic Impulses



Parts of Conducting system of the heart:

- Sinoatrial node "SA node"
- Atrioventricular node "AV"
- Atrioventricular bundle of His
- The right branch of AV bundle
- The left branch of AV bundle
- The Purkinje fibers

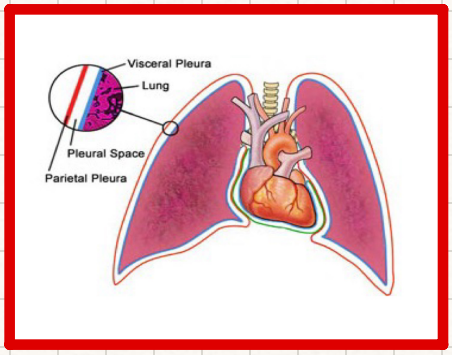


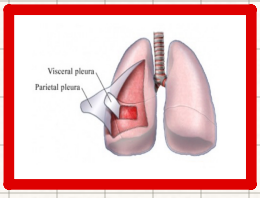
Lungs & pleura

- it's a serous sac invaginated from its medical side by the Lungs
- Two pleural sacs are separated from each other by the mediastinum

Visceral

Parietal





The Pleura

Visceral Layer

covers the outer surface of the lungs & extends into the interlobar fissures

Parietal Layer

Lines thoracic wall, covers the diaphragm & lateral aspect of the mediastinum

Pleural Cavity

contains the pleural fluid, permits the 2 layers to move on each other with the minimum of the friction

Nerve Supply of the pleura

Parietal

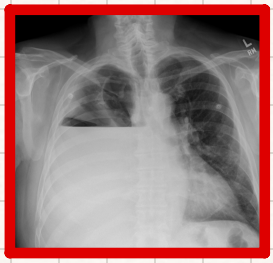
- Supplied by somatic nerves "Intercostal nerves"
- It's sensitive to pain, temperature, touch and pressure

Visceral

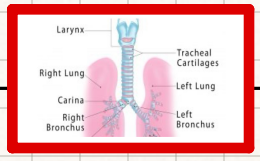
- Supplied by Visceral nerves "autonomic"
- It's sensitive to stretch

The pleural Cavity may be distended by one of the following

- Fluid ---------- pleural effusion "Hydrothorax" →
- Air ---------- pneumothorax
- Blood ---------- haemothorax
- pus ---------- pyothorax
- Lymph ---------- chylothorax

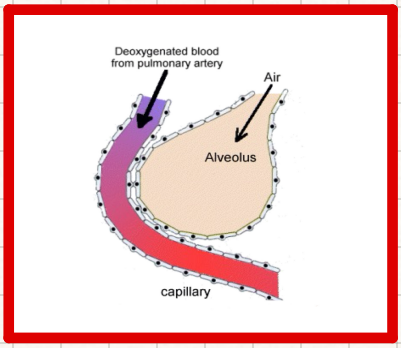


X-ray of a patient With Hydrothorax

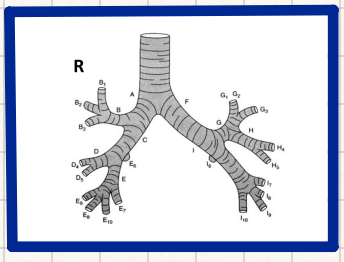


Trachea

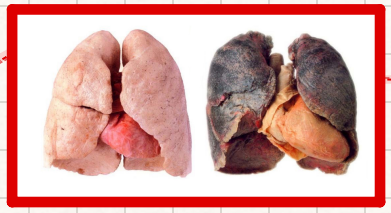
- it's Cartilaginous & membranous tube conducting air from Larynx to the Lungs
- Beginning: At the level 6th Cervical vertebra
  End: At the level of the sternal angle
  "Opposite the disc between the 4th & 5th thoracic vertebrae"
- is divided into right & left principle ("main") bronchi
- is kept patent by the presence of U-shaped bars ("rings") of hyaline Cartilage



Right principal bronchus	Left principal bronchus
Shorter	Longer
Wider	narrower
more vertical	more horizontal
Inhalation of foreign bodies into the lower respiratory tract in common, especially in children	Less Common



Lungs



It's the essential organs of respiration

Each lung is conical, covered with visceral pleura

Each has an apex, base, 3 borders "anterior, posterior & inferior" & 2 surfaces "Costal & medial"

Apex: is blunt & projects upward into the neck for about "2.5 cm" above the clavicle

Base: is a concave & related to the diaphragm

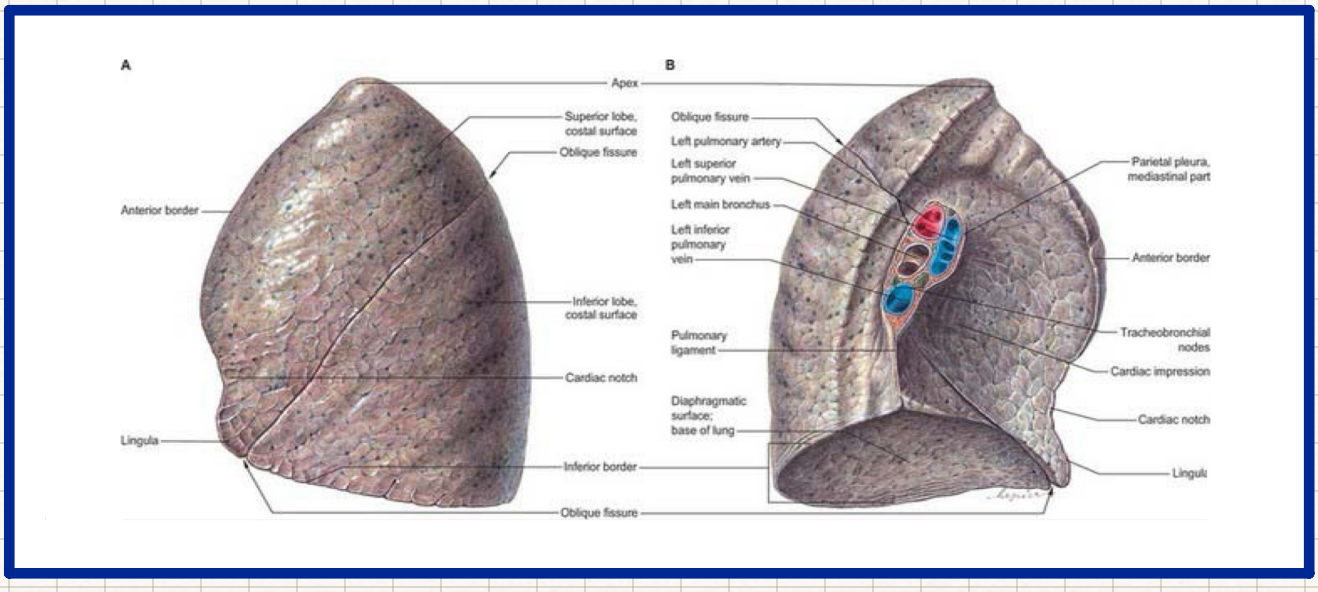
Costal Surface: is a convex related to ribs & costal cartilages

Mediastinal Surface: is concave & related to mediastinum & contains: Hilum

Anterior Border: is thin & overlaps the heart

"it has Cardiac notch on the left side"

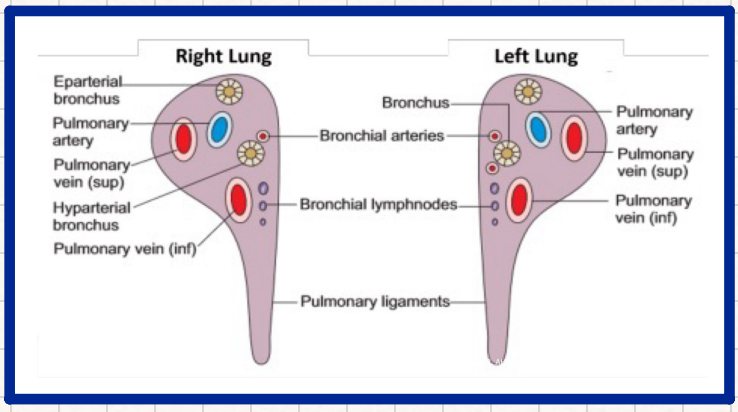
Posterior Border: is thick & lies beside the vertebral column

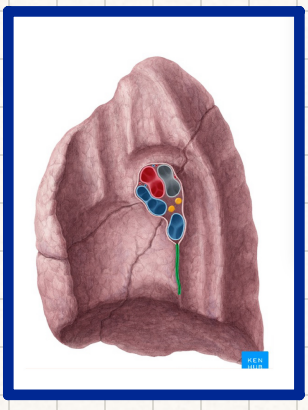


Hilum: It's the group of structures that enter or leave the lung through the hilum

Contents:

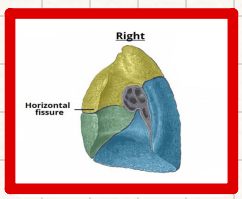
- ✓ Bronchus
- ✓ Pulmonary artery
- ✓ Superior pulmonary vein
- ✓ Inferior pulmonary vein
- ✓ Vessels, nerves & lymphatics

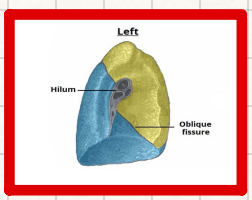




Difference between Right Lung and Left Lung

Right Lung	Left Lung
Larger	Smaller
Has two fissures oblique & horizontal fissures	Has oblique fissures only
Has 3 lobes, upper, middle & lower lobes	Has two lobes, upper & lower lobes
shorter	Taller





Blood Supply of the Lungs

✓ The Bronchi, the connective tissue the lung, & the visceral pleura receive their blood supply from the Bronchial arteries, which are branches of the descending aorta.

✓ The Bronchial Veins drain into the Azygos & Hemiazygos veins

DONE!