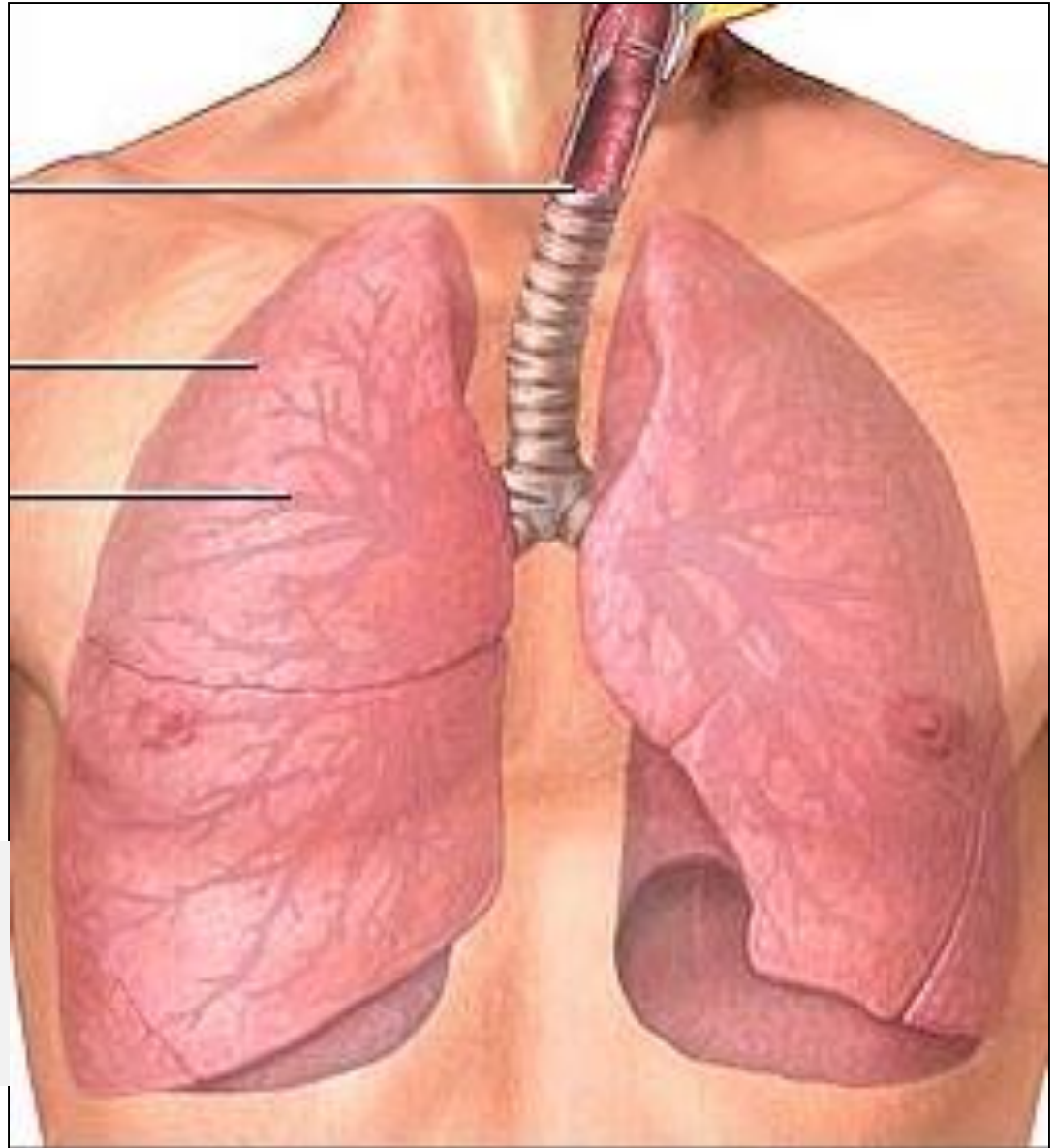


Pleura & Lung

By
Prof. Saeed Abuel Makarem
&
Dr. Sanaa Al Sharawi



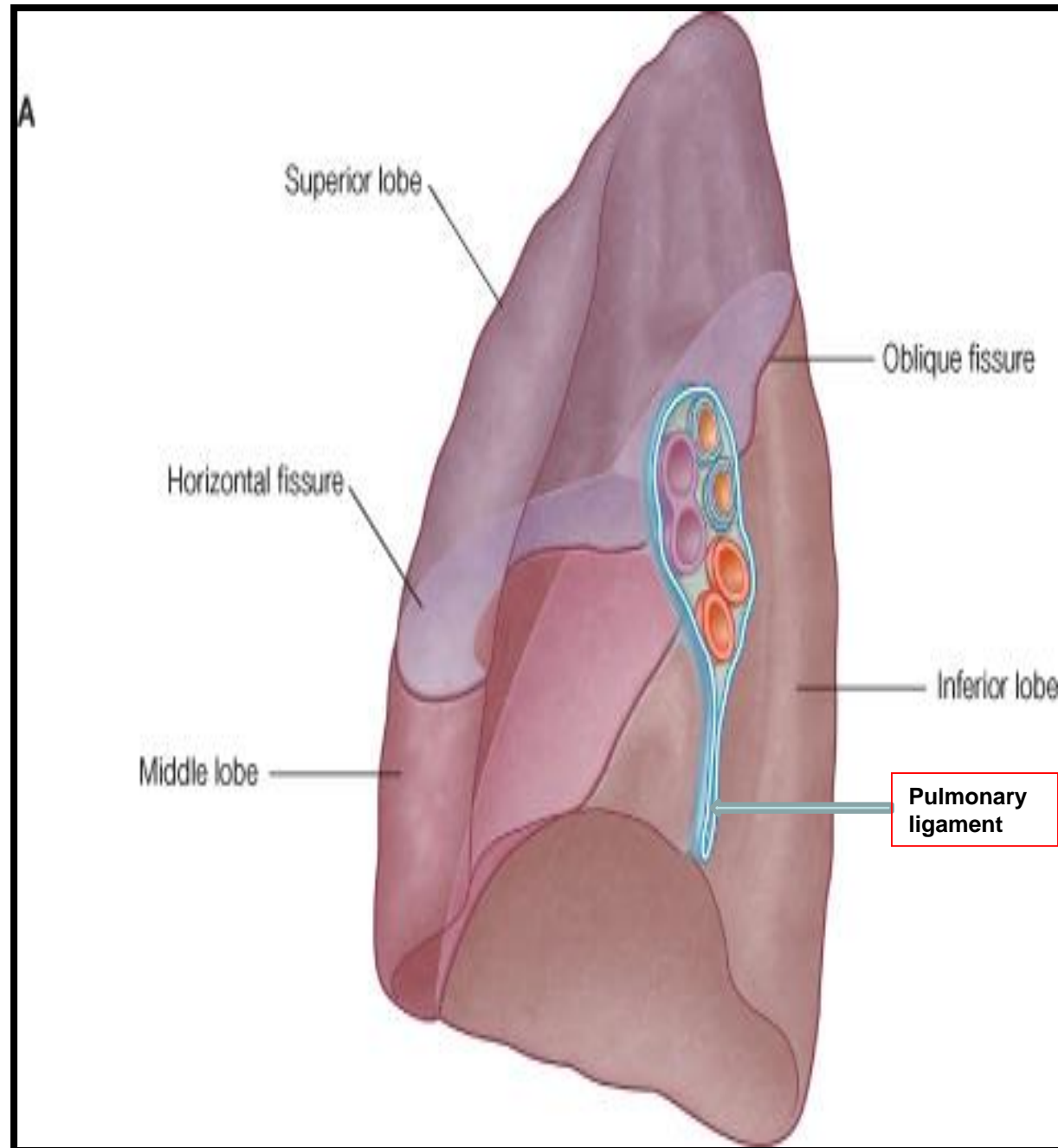
Objectives

By the end of the lecture, the student should be able to :

- Describe the anatomy of the pleura: subdivisions into parietal & visceral pleurae, nerve supply of each of them.
- List the parts of parietal pleura and its recesses.
- Describe the surface anatomy of both pleurae and lungs.
- Describe the anatomy of lungs : shape, relations, nerve supply & blood supply.
- Describe the difference between right & left lungs.
- Describe the formation of bronchopulmonary segments and the main characteristics of each segment in the lung.

Pleura

- Double-layered serous membrane enclosing the lung.
- Has two layers:
 - **Parietal layer**, which lines the thoracic walls.
 - **Visceral layer**, which covers the surfaces of the lung.
- The two layers continue with each other around the **root of the lung**, where it forms a loose cuff hanging down called the **pulmonary ligament**.
- **The space** between the two layers, **the pleural cavity**, contains a thin film of pleural serous fluid (5-10 ml.).



Parietal Pleura

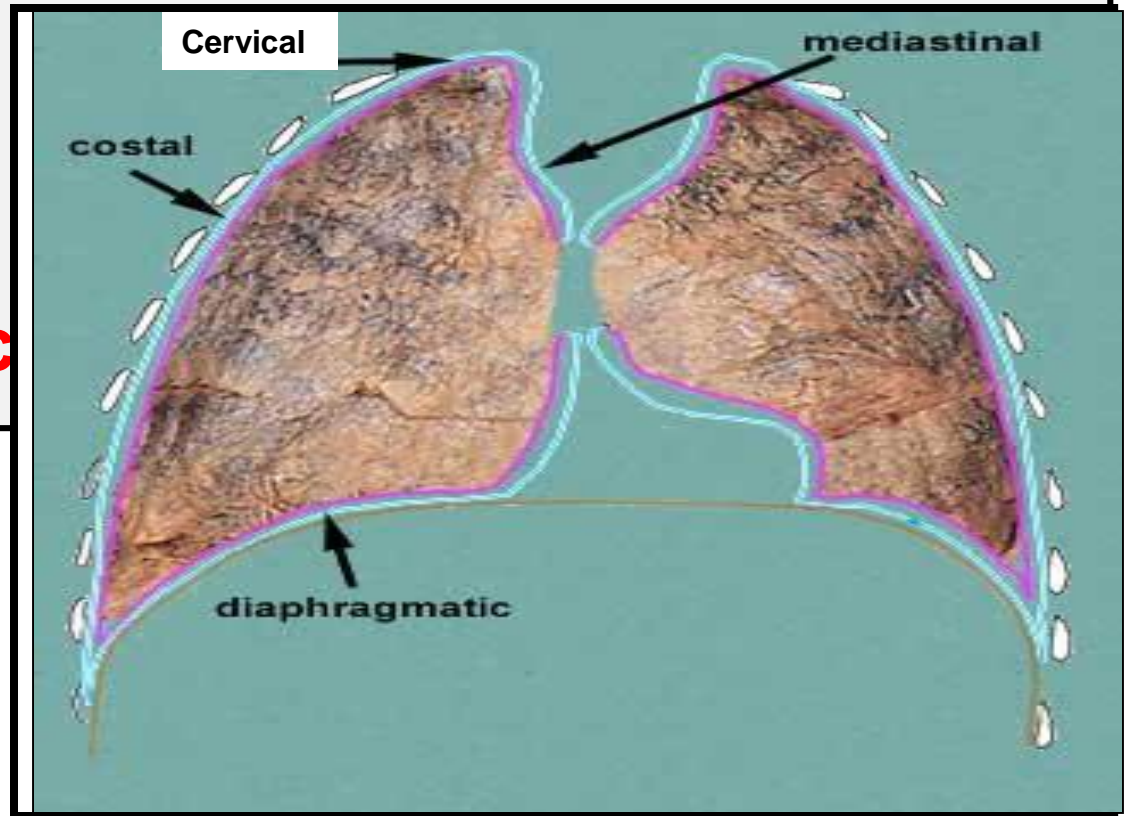
- It is divided according to the region in which it lies and the surfaces it covers, into:

1- Cervical

2- Costal

3- Mediastinal

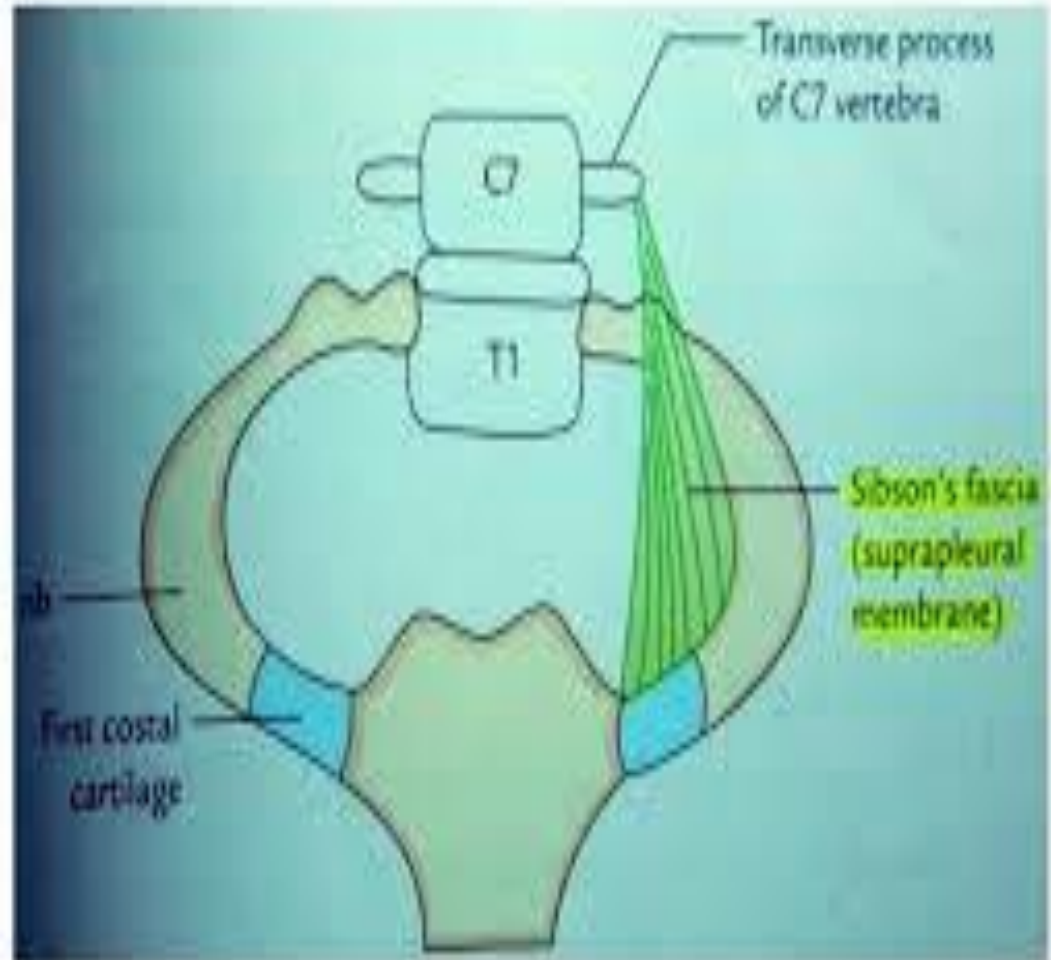
4- Diaphragmatic



Parietal Pleura

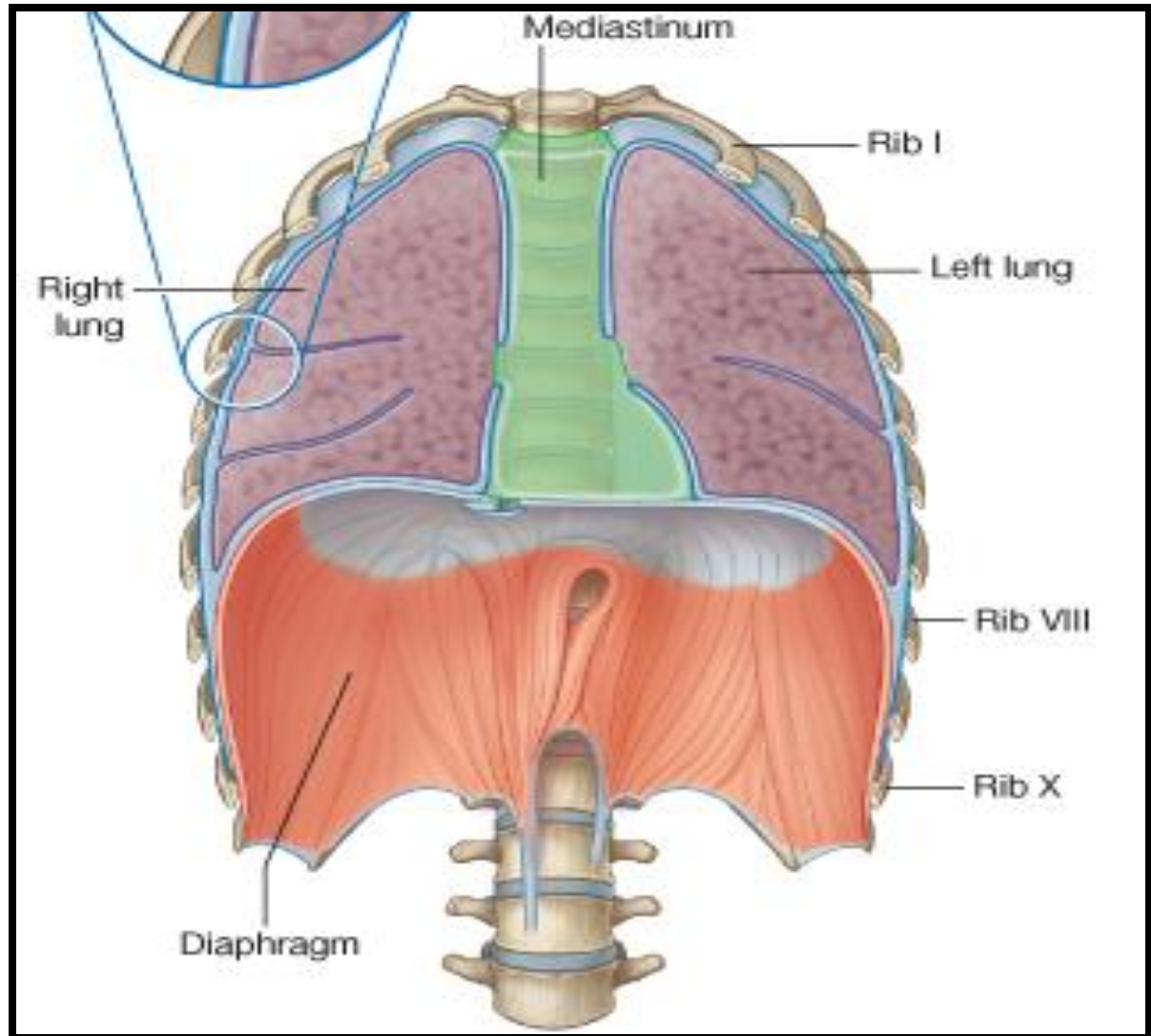
- **Cervical Pleura:**
- Projects up into the neck about one inch above the medial 1/3rd of clavicle.
- **It lines** the under surface of **the suprapleural membrane.**
- **Costal pleura:**
- **lines**, the back of the:
 - Sternum,
 - Ribs & costal cartilages,
 - Intercostal spaces &
 - Sides of vertebral bodies

Suprapleural membrane/ Sibson's fascia



Parietal Pleura

- **Mediastinal pleura:** covers the mediastinum.
- **At the hilum**, it is reflected on to the vessels and bronchi, and continuous with the visceral pleura.
- **Diaphragmatic pleura:** covers the thoracic (upper) surface of the diaphragm.



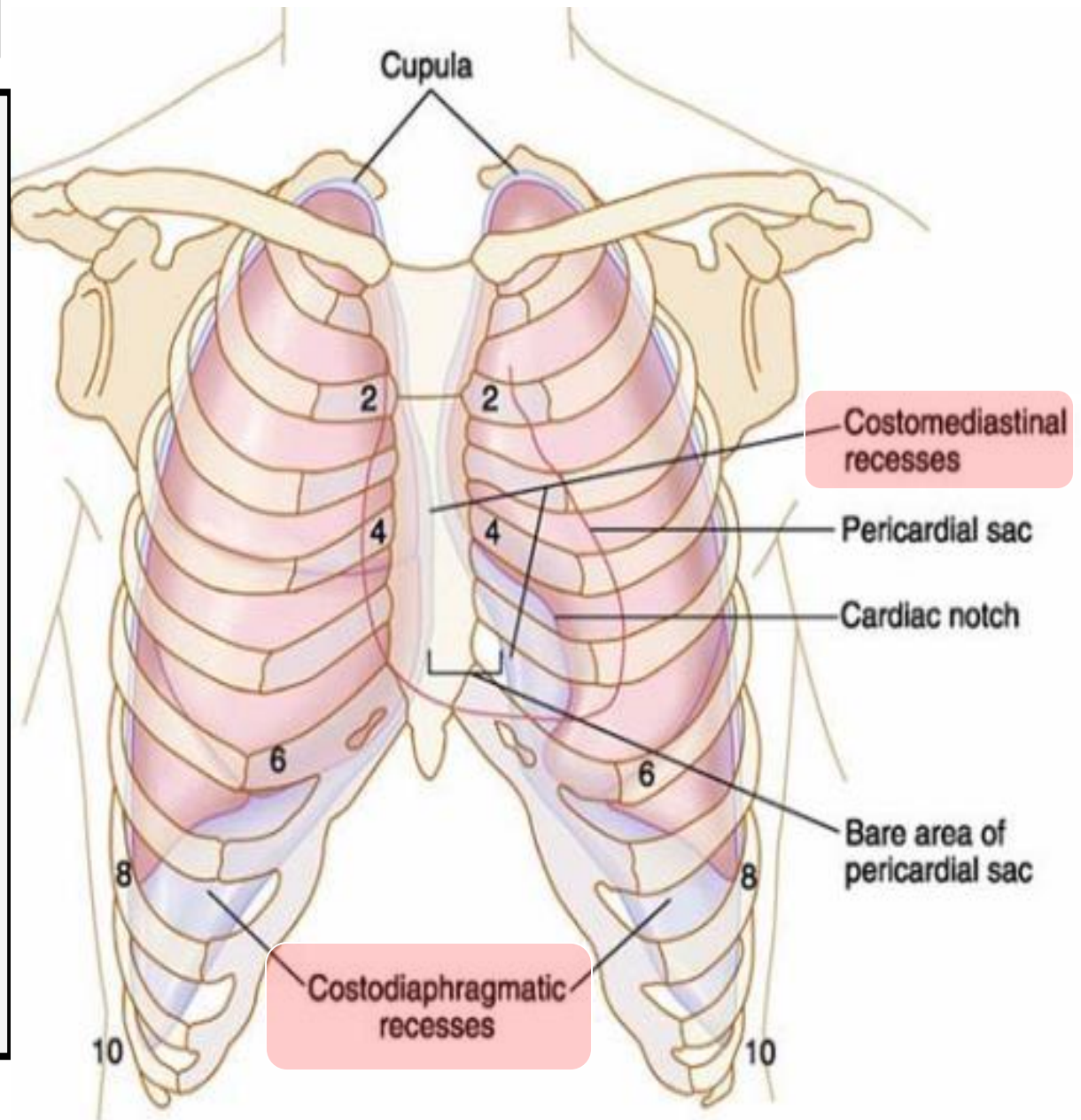
Pleural Recesses

Costodiaphragmatic:

- **Slit like space** between costal and diaphragmatic pleurae, **along the inferior border** of the **lung** which enters through it in deep inspiration.

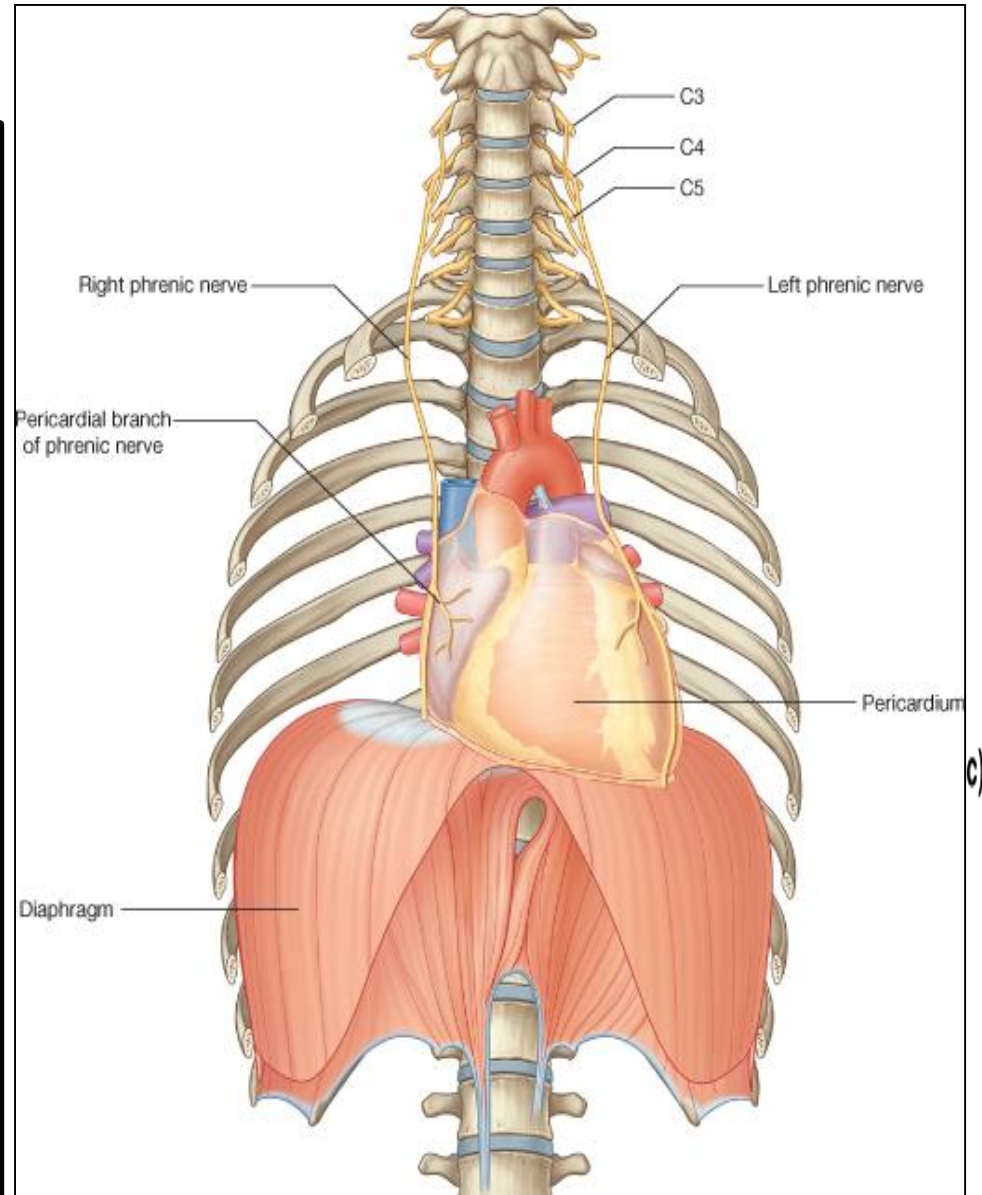
Costomediastinal:

- **Slit like space** between costal and mediastinal pleurae, **along the anterior border** of the **lung** which enters through it in deep inspiration.

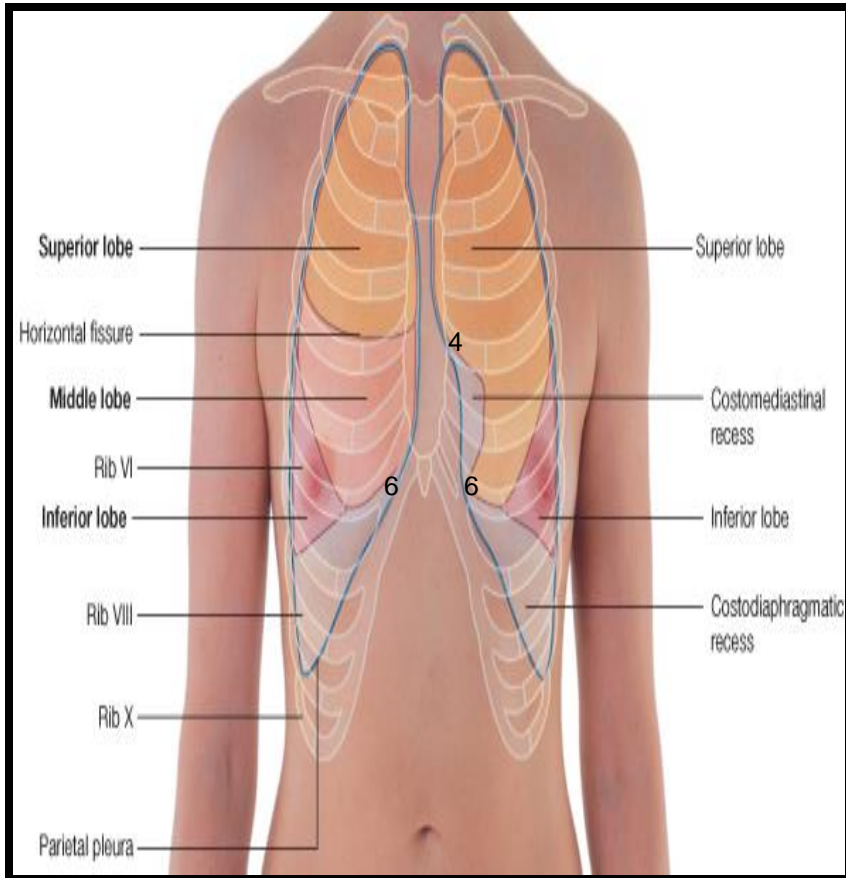


Pleura: Nerve Supply

- Parietal pleura:
- It is sensitive to pain, pressure, temperature, and touch.
- It is supplied as follows:
 - ❖ **Costal pleura** is segmentally supplied by the **intercostal nerves**.
 - ❖ **Mediastinal pleura** is supplied by **phrenic nerves**.
 - ❖ **Diaphragmatic pleura** is supplied over the domes by **phrenic** nerves, around the periphery by **lower 6 intercostal nerves**.
- Visceral pleura sensitive to **stretch** only and is supplied by the **autonomic fibers** from the **pulmonary plexus**.

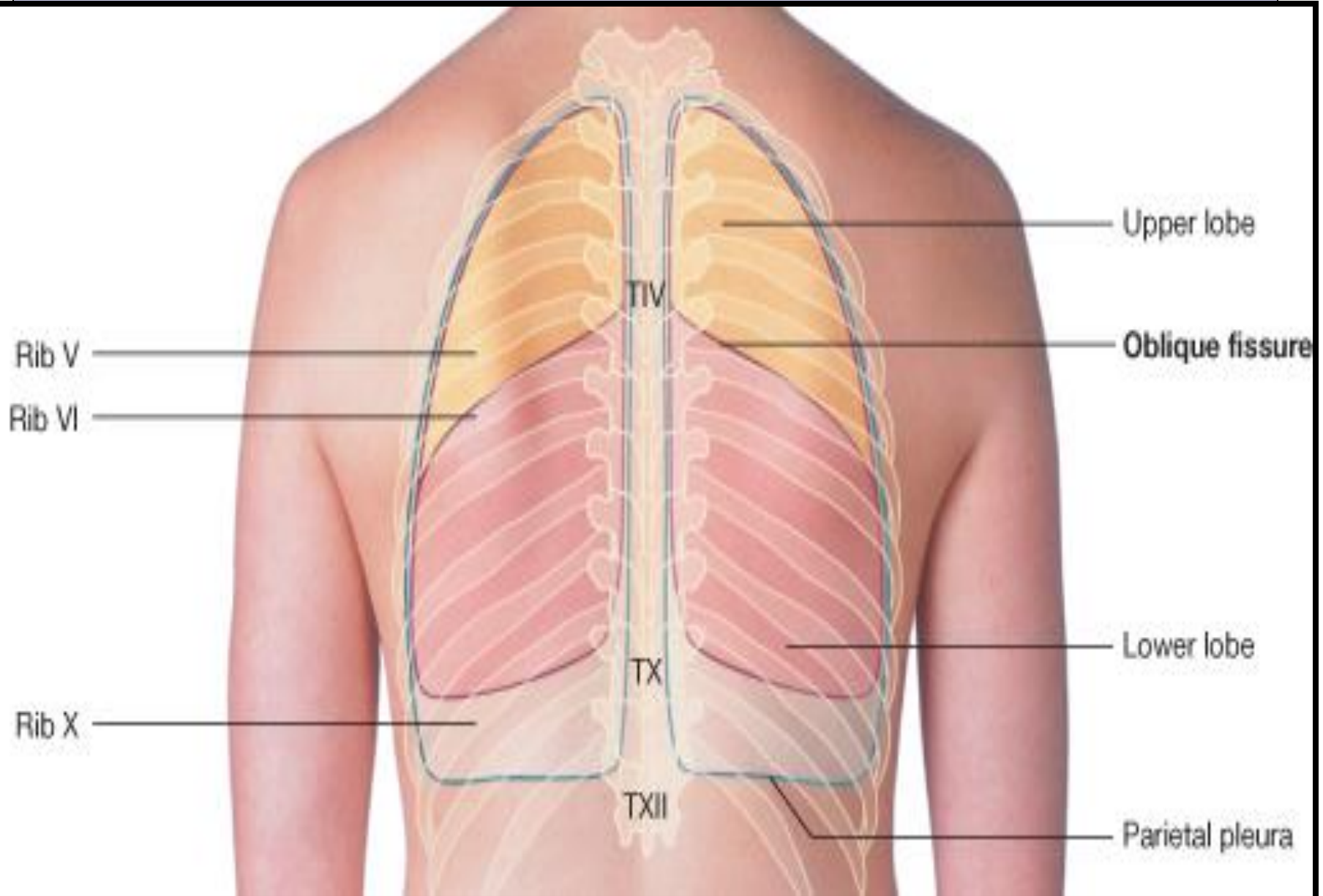


SURFACE ANATOMY OF PLEURA

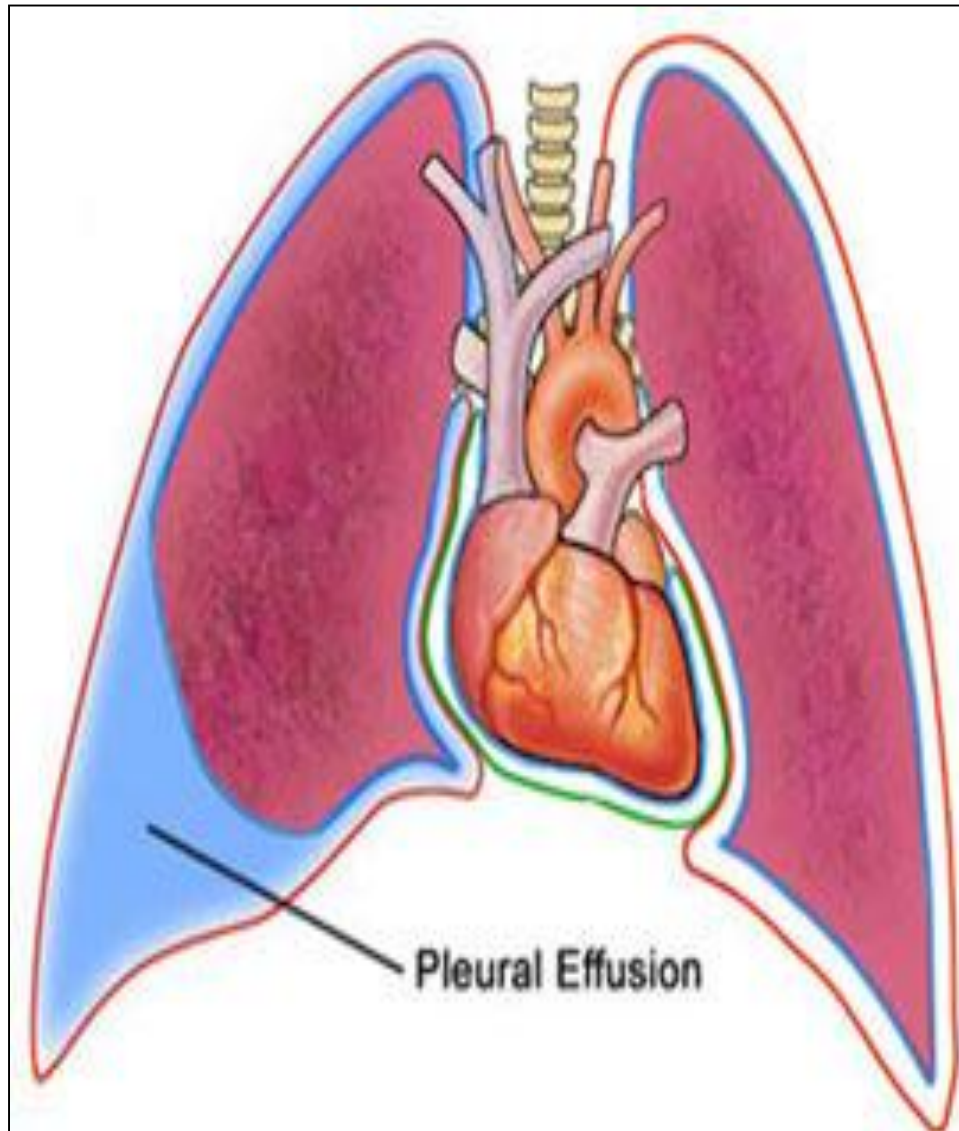


- **Apex:** lies one inch above the medial 1/3 of the clavicle.
- **Right pleura:** **The anterior margin** extends vertically from **sterno-clavicular joint** to **6th costal cartilage**.
- **Left pleura:** **The anterior margin** extends from **sternoclavicular joint** to the **4th costal cartilage**, then deviates for about 1 inch to left at **6th costal cartilage** to form **cardiac notch**
- **Inferior margin :** passes around the chest wall, on the **8th rib** in **midclavicular line**, **10th rib** in **mid-axillary line** and finally reaching to **the last thoracic spine (T12 spine)**.
- **Posterior margin :** along the **vertebral column** from the **apex** to the **inferior margin (T12 spine)**.

SURFACE ANATOMY OF LUNG



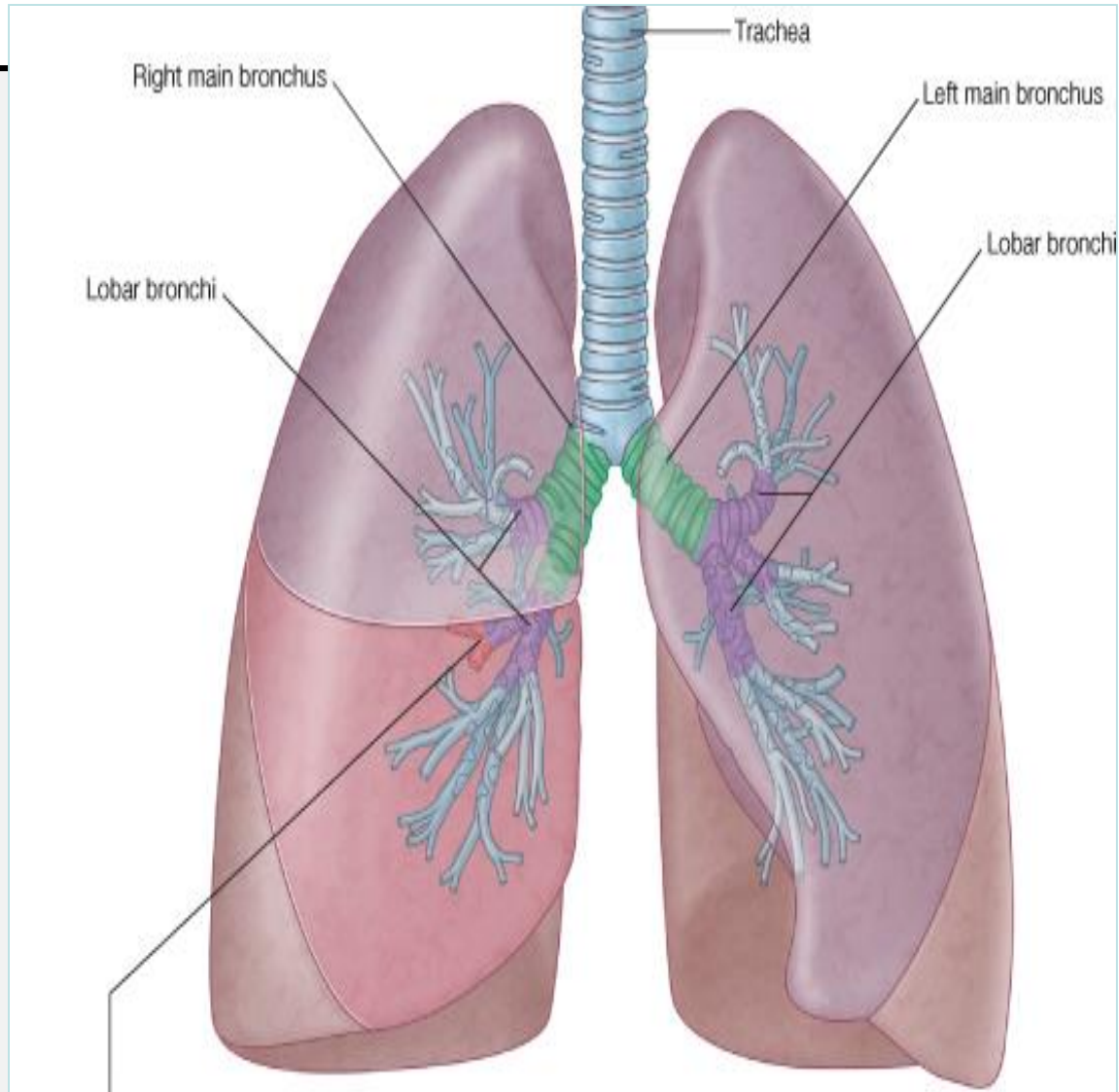
Pleural Effusion



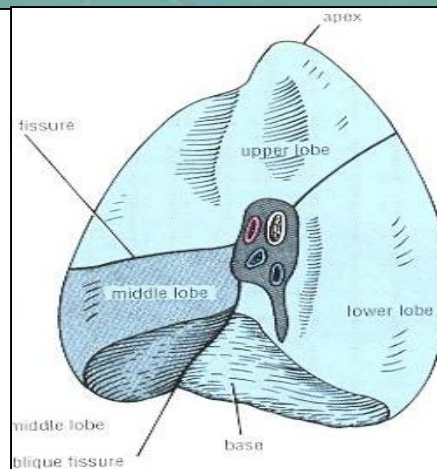
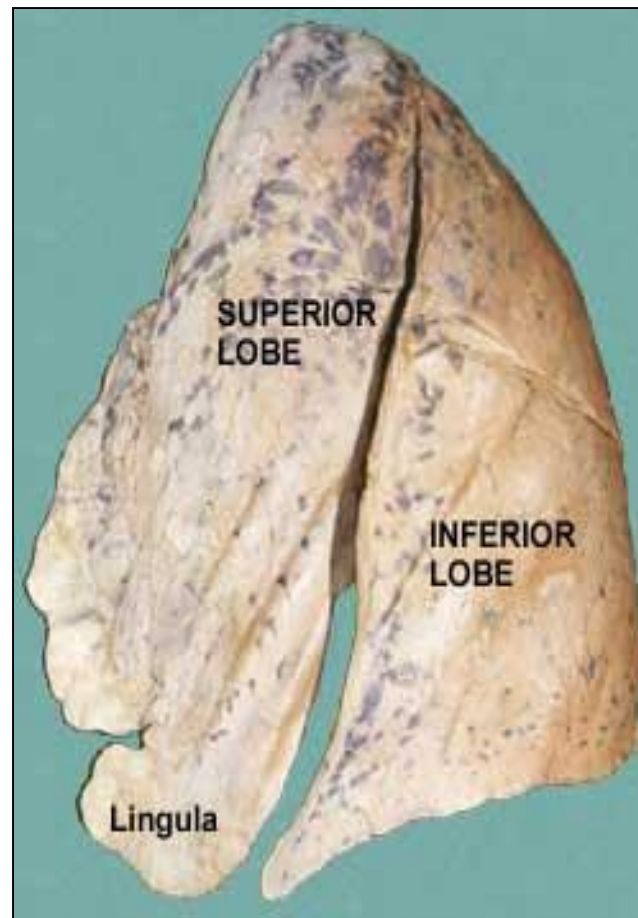
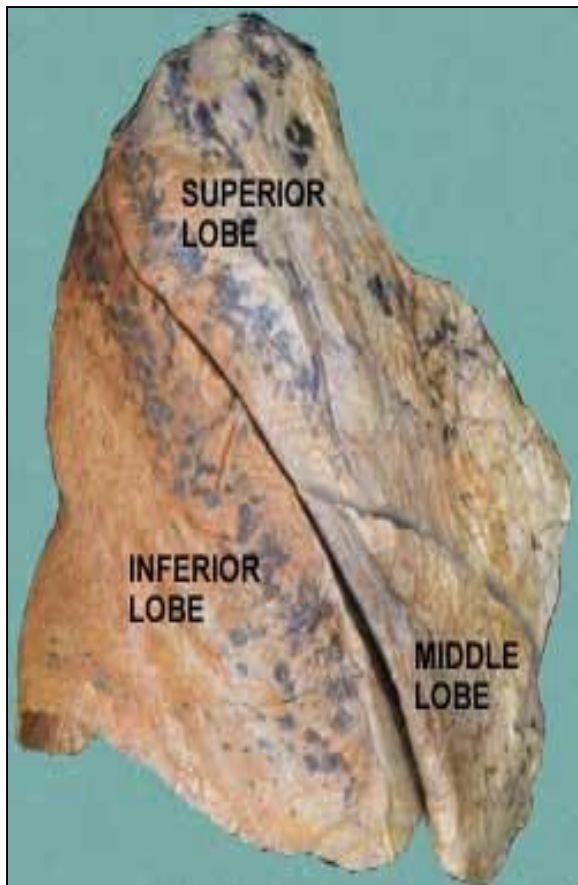
- It is an abnormal accumulation of pleural fluid about 300 ml, in the *Costodiaphragmatic pleural recess* , (normally 5-10 ml fluid)
- **Causes:** inflammation, TB, congestive heart disease and malignancy.
- The lung is compressed & the bronchi are narrowed.
- **Auscultation** would reveal only faint & decreased breathing sounds over compressed or collapsed lung lobe.
- **Dullness on percussion** over the effusion.

Lungs

- **Located** in the **thoracic cavity**, one **on each side** of the **mediastinum**
- **Each lung is:**
 - Conical** in shape.
 - Covered** by the visceral pleura.
 - Suspended** free in its own pleural cavity.
 - Attached** to the mediastinum only by its root.

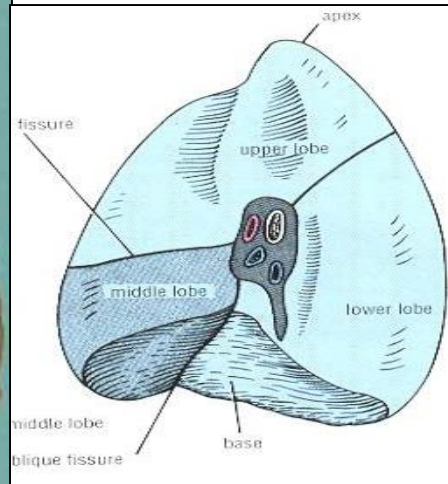
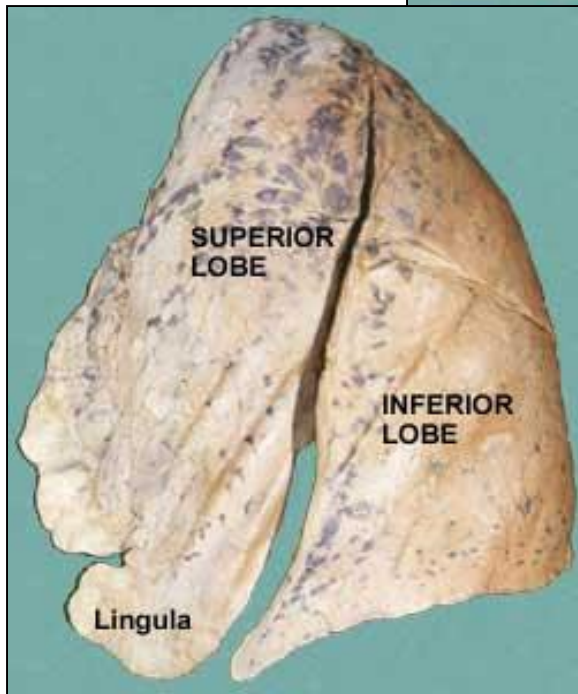
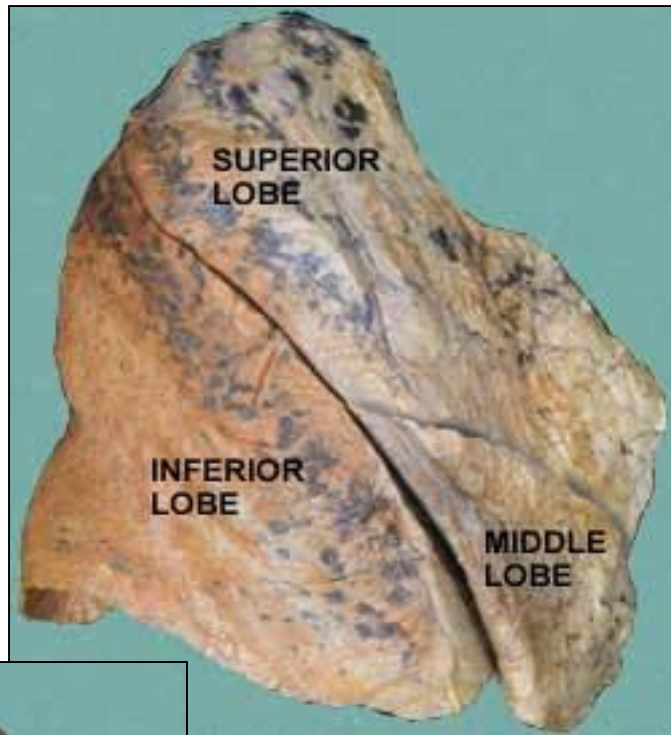


LUNGS



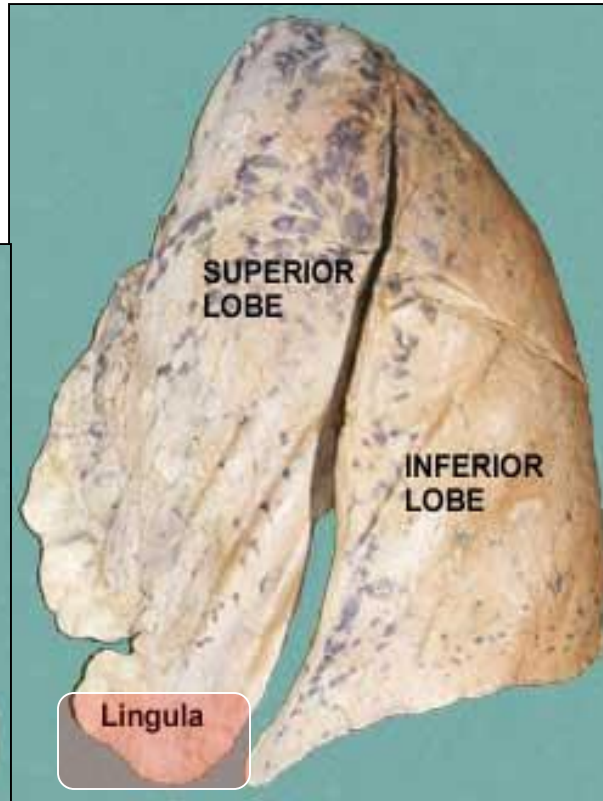
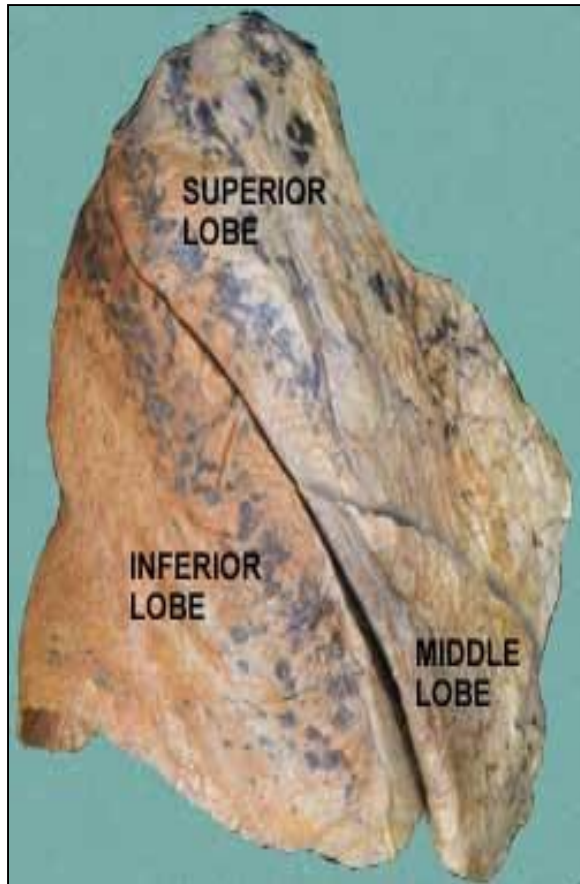
- **Each lung has:**
- **Apex and base:** identify the top and bottom of the lung, respectively.
- **Costal surface:** surrounded by the ribs from front & back).
- **Medial surface:**
- **Where the bronchi, blood vessels, and lymphatic vessels enter the lung at the hilum.**
- It is also related to the structures forming the mediastinum.

LUNGS



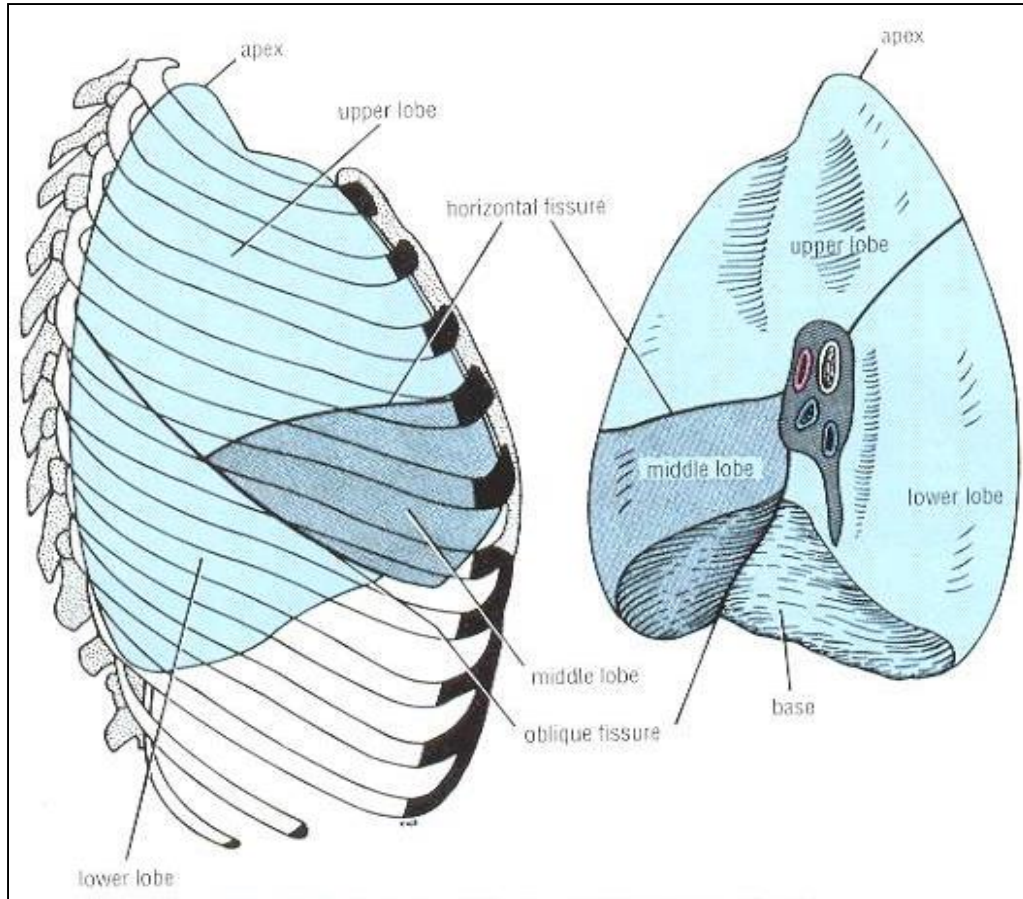
- Apex:
- Projects into the root of the neck
- (1/2 an inch above medial 1/3 of clavicle).
It is covered by cervical pleura.
- It is grooved anteriorly by subclavian artery.
- Base:
- inferior or diaphragmatic surface) is concave and rests on the diaphragm.

Borders: Anterior & Posterior



- **Anterior border** :
- Is sharp, thin and overlaps the heart.
- **Anterior border of left lung** presents a cardiac notch at its lower end, has a thin **projection** called the **lingula** below the cardiac notch.
- **Posterior border** : is rounded, thick and lies beside the vertebral column.

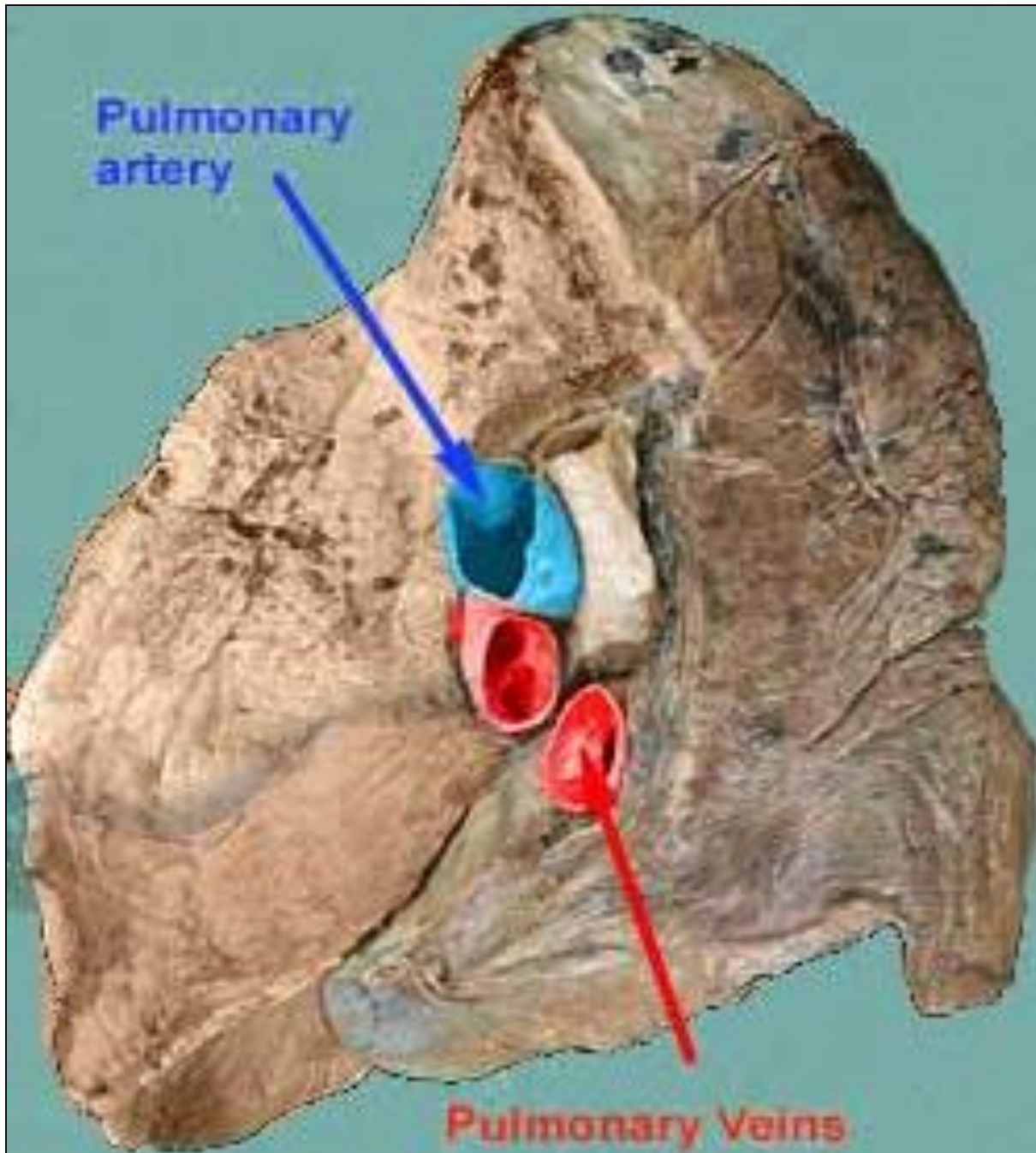
Surfaces: Costal & Mediastinal



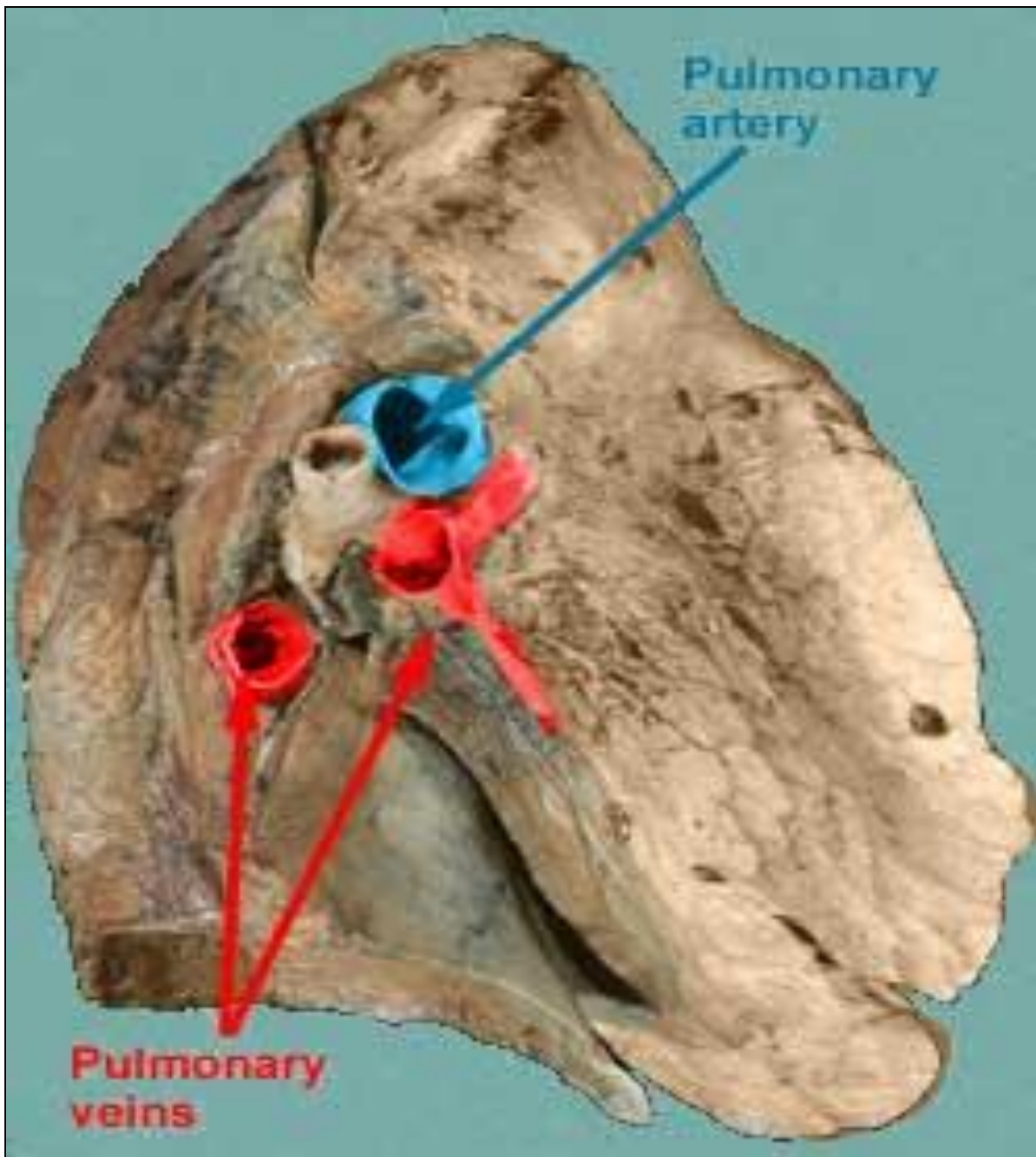
Lateral & medial surfaces of right lung

- **Costal surface:**
- Convex.
- Covered by costal pleura which separates lung from: ribs, costal cartilages & intercostal muscles.
- **Medial surface:**
- It is divided into 2 parts:
- **Anterior (mediastinal) part:**
- Contains a hilum in the middle (it is a depression in which bronchi, vessels, & nerves forming the root of lung).
- **Posterior (vertebral) part:**
- **It is related to:**
- Bodies of thoracic vertebrae,
- Intervertebral discs,
- Posterior intercostal vessels
- Sympathetic trunk.

RIGHT LUNG ROOT

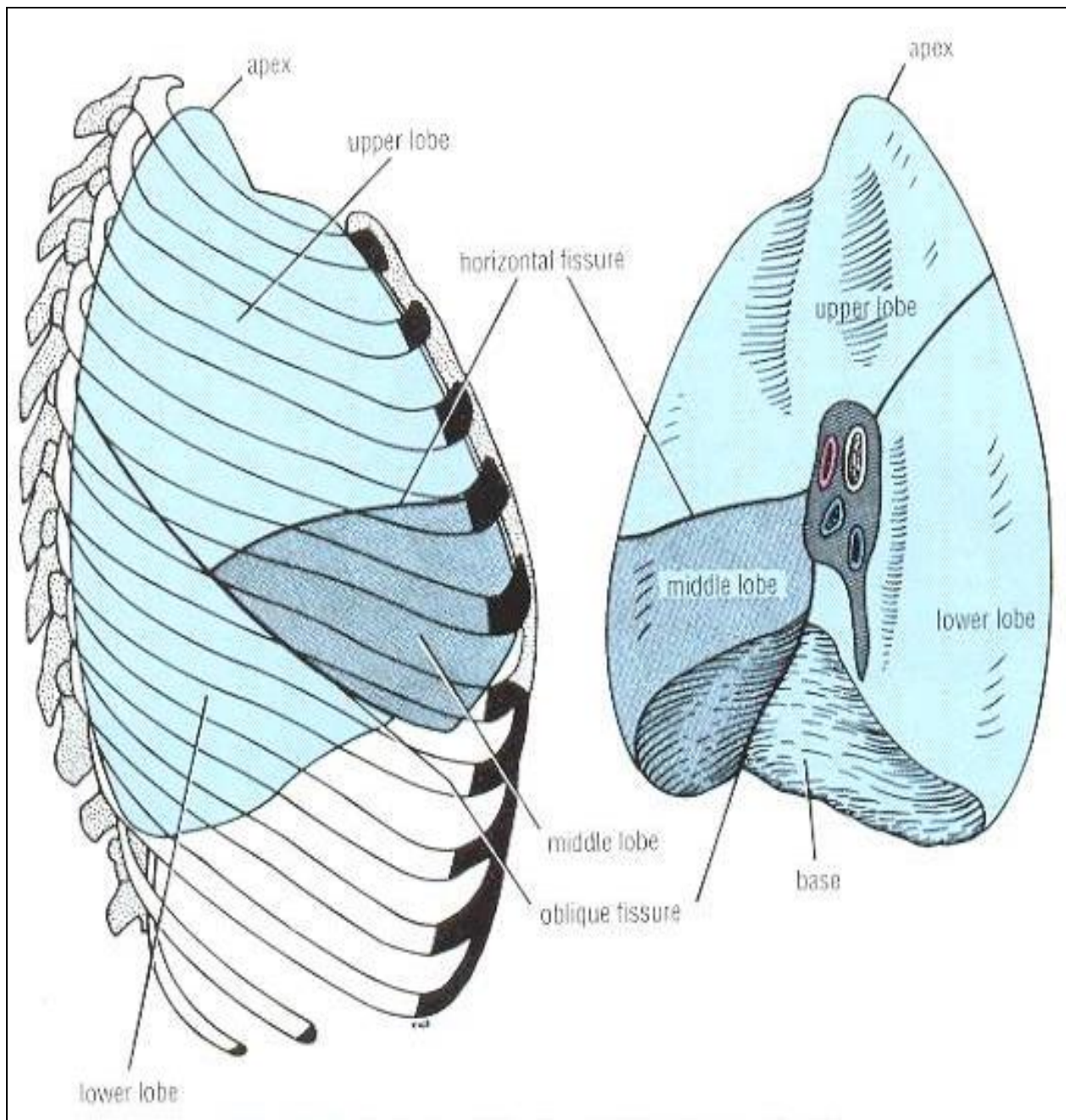


- **2 bronchi:**
- Lie posterior.
- **Pulmonary artery:**
- Is superior
- **Pulmonary veins:**
- Are inferior and anterior.



LEFT LUNG ROOT

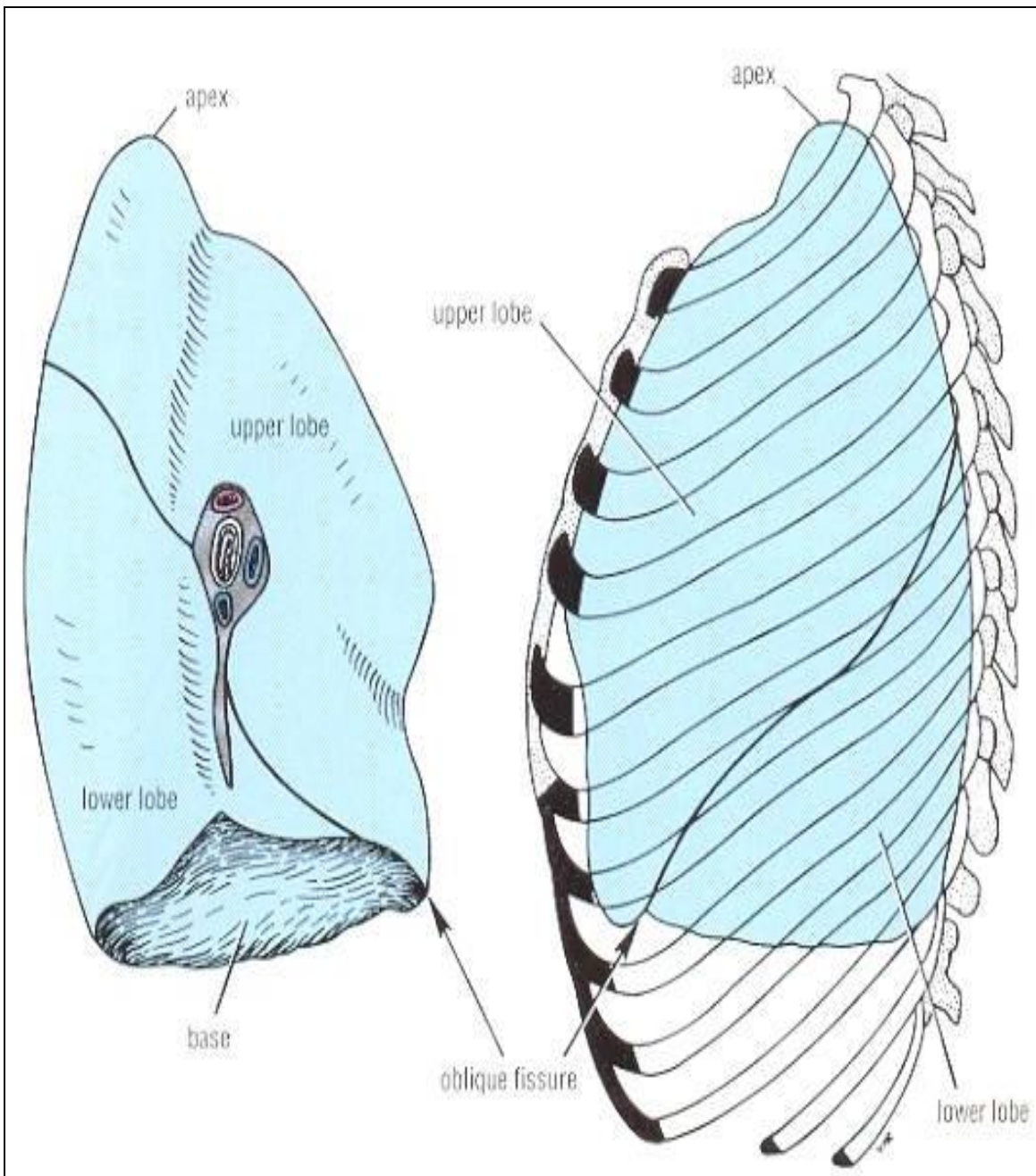
- **One bronchus:**
- Lies posterior
- **Pulmonary artery:**
- Is superior
- **Pulmonary veins:**
- Is inferior and anterior



Right lung

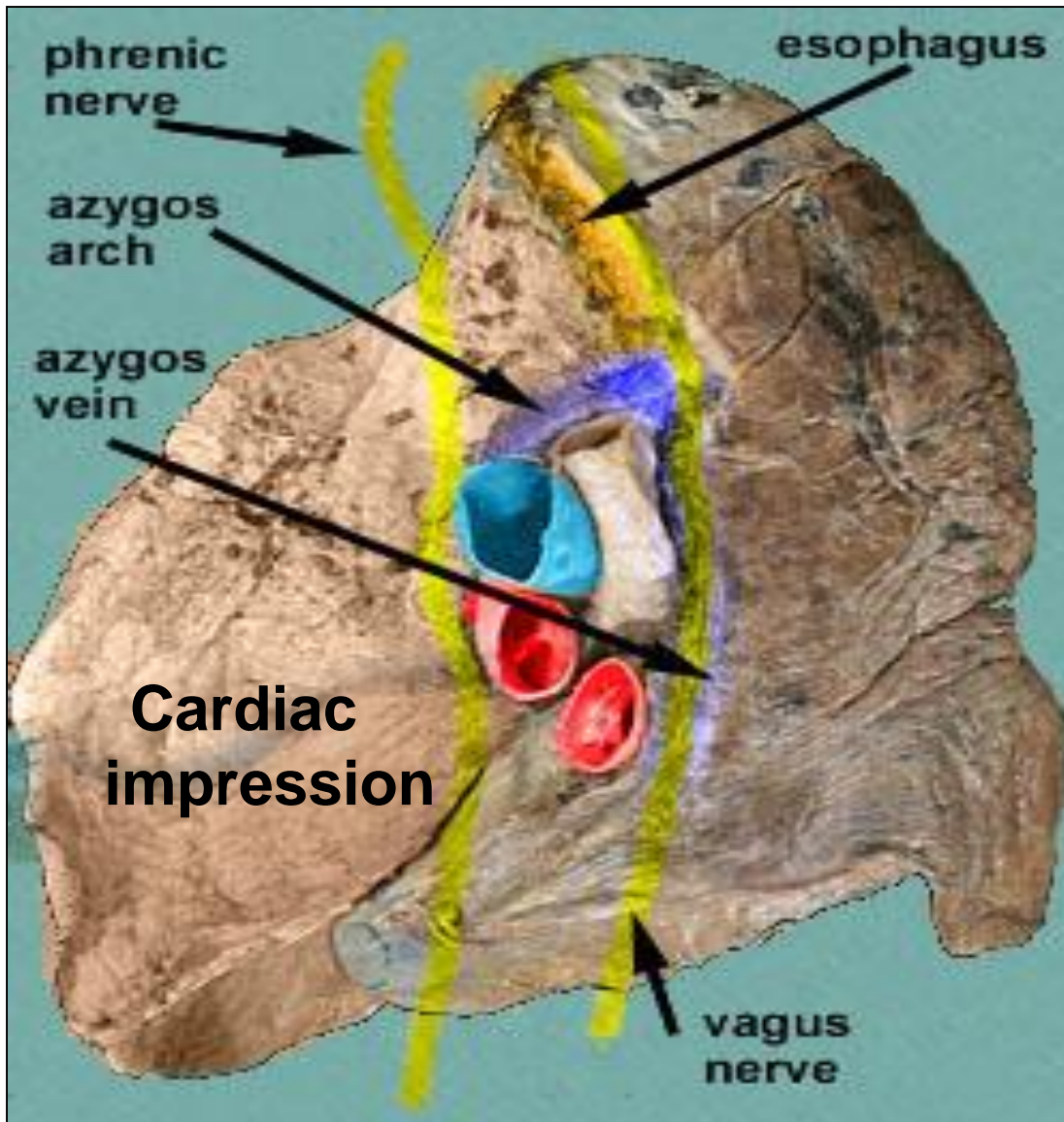
- **Larger & shorter** than left lung.
- **Divided by 2 fissures (oblique & horizontal) into 3 lobes (upper, middle and lower lobes).**

Left Lung



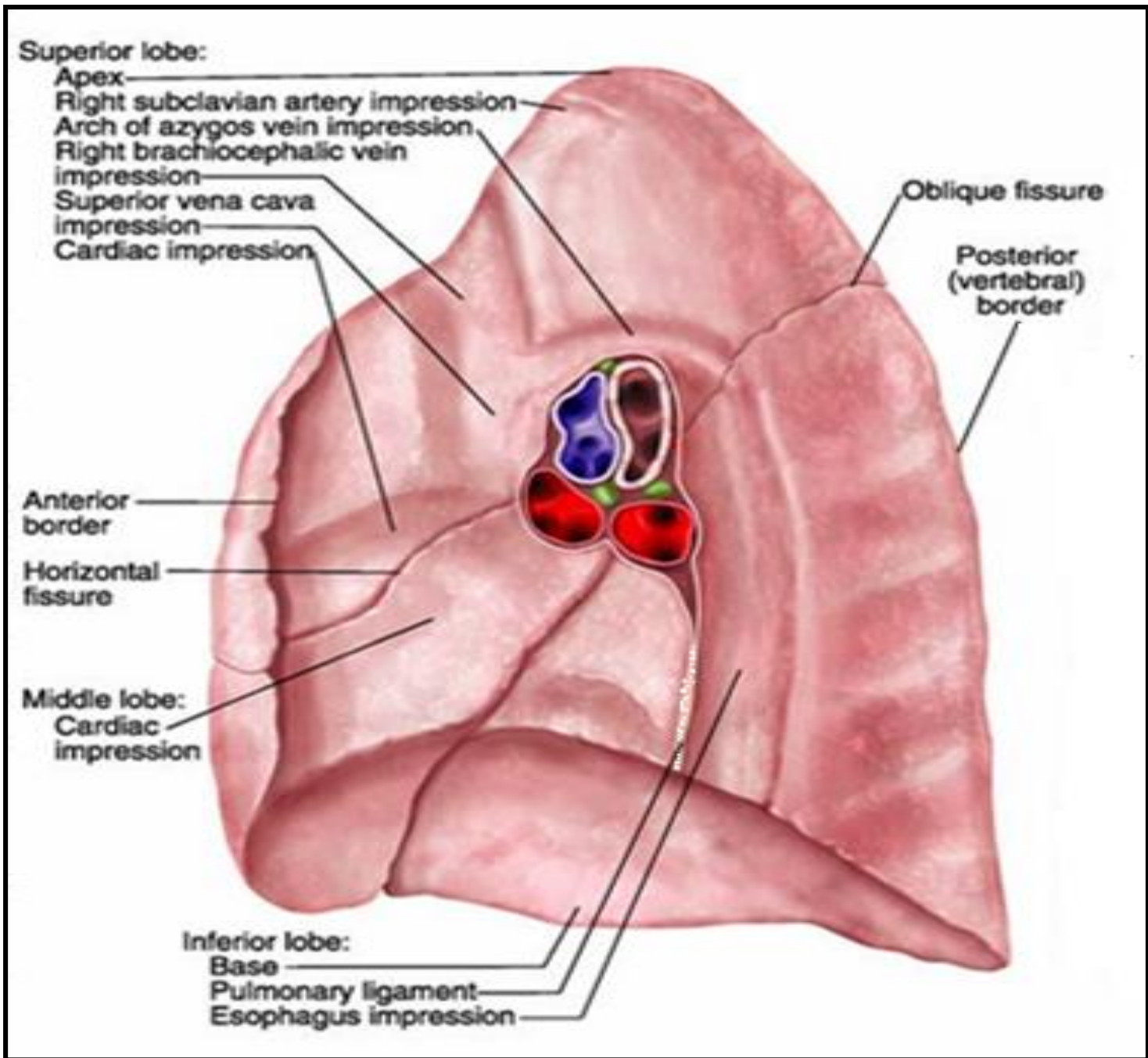
- Divided by **one oblique fissure** into **-2 lobes**, Upper and lower.
- There is **No** horizontal fissure.
- It has **a cardiac notch** at **lower part** of its **anterior border.**

Mediastinal surface of right lung

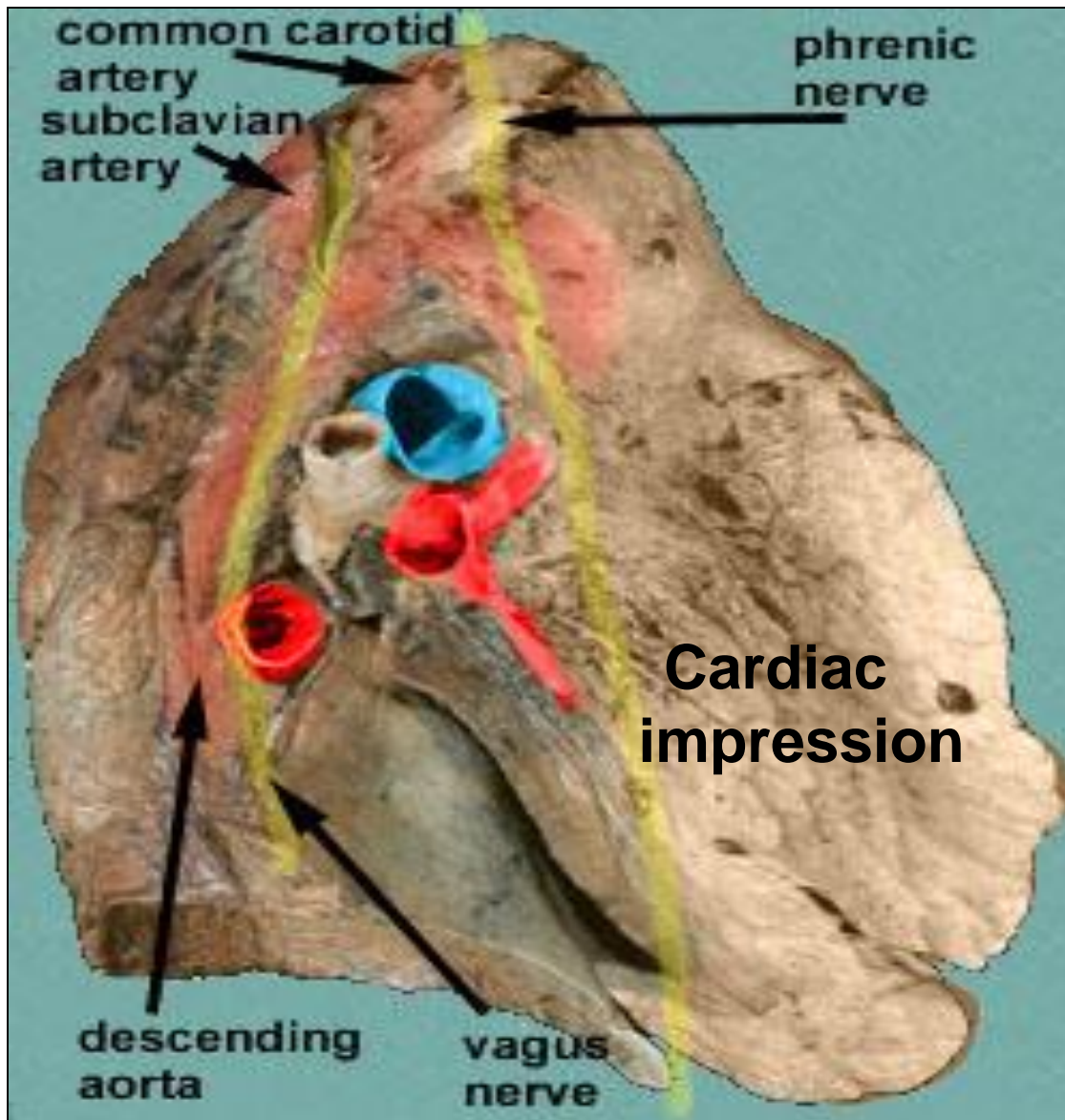


- On the **mediastinal surface of the right lung**, you find these structures:
- **Azygos vein and its arch** (posterior and over the root of the lung).
- **Vagus nerve** posterior to the root of the lung.
- **Esophagus** posterior to the root.
- **Phrenic nerve** anterior to the root of the lung.
- **Cardiac impression**: related to **right atrium**.
- **Below hilum and in front of pulmonary ligament** : groove for **I.V.C.**

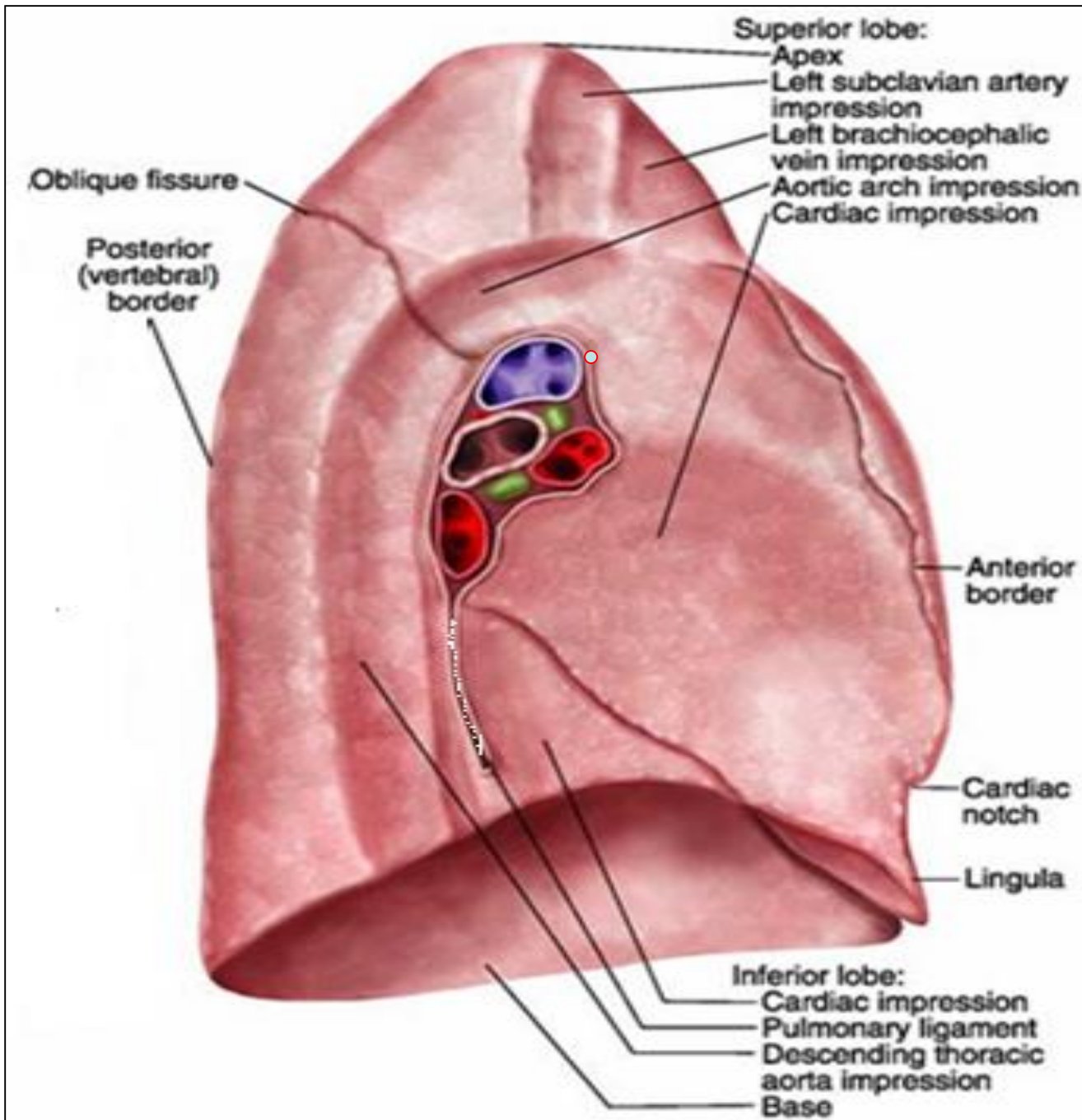
Mediastinal surface of the right lung



Mediastinal surface of left lung



- **On the mediastinal surface of the left lung**, you will find these structures:
- **Descending aorta** posterior to the root.
- **Vagus nerve** posterior to the root of the lung
- **Arch of the aorta** over the root of the lung
- **Groove for left common carotid and left subclavian arteries.**
- **Phrenic nerve** anterior to the root of the lung.
- **Cardiac impression:** related to **left ventricle.**



Mediastinal surface of the left lung

Blood supply of lung

- ***Bronchial arteries*** (From descending aorta)....
It supplies oxygenated blood to **bronchi** , **lung tissue & visceral pleura**.
- ***Bronchial veins*** : drain into **azygos & hemiazygos veins**.
- ***Pulmonary artery*** which carries non-oxygenated blood from right ventricle to the lung alveoli.
- ***2 pulmonary veins*** : carry oxygenated blood from lung alveoli to the left atrium of the heart.

Nerve Supply of the lung

- ***Pulmonary plexus*** at the root of lung...is formed of autonomic N.S. from sympathetic & parasympathetic fibers.

1- Sympathetic Fibers

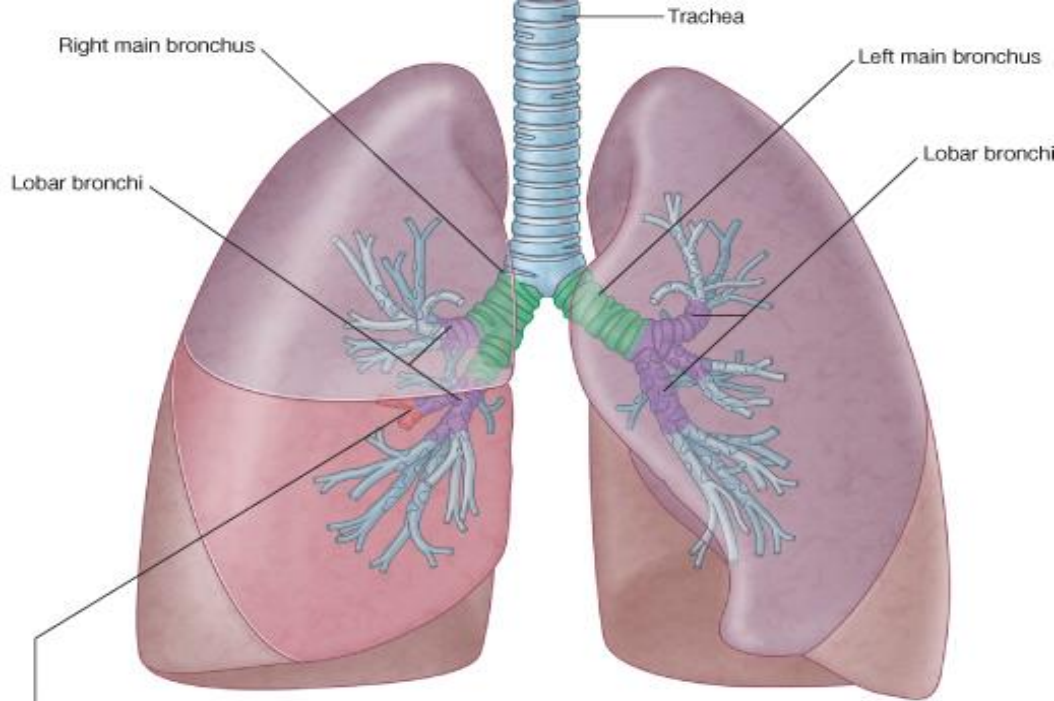
From ... *sympathetic trunk*...

Action: broncho-dilatation/and vasoconstriction.

2- Parasympathetic Fibers

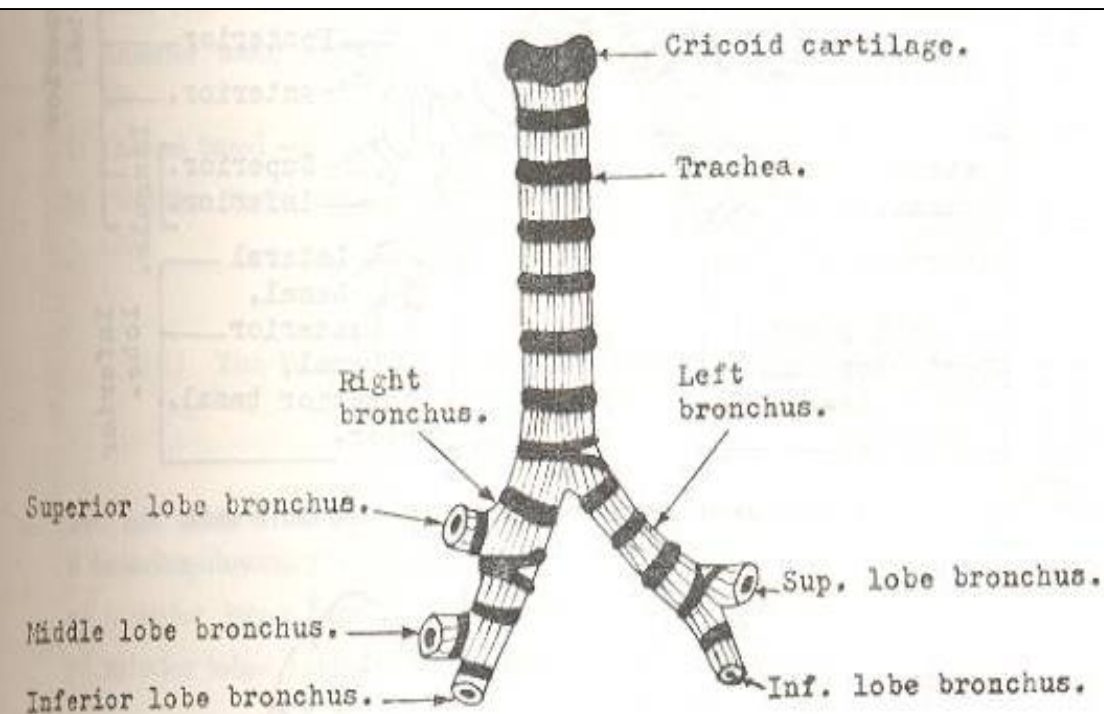
From..... *Vagus nerve*

Action: Broncho-constriction and secretomotor to bronchial glands /and vasodilatation.

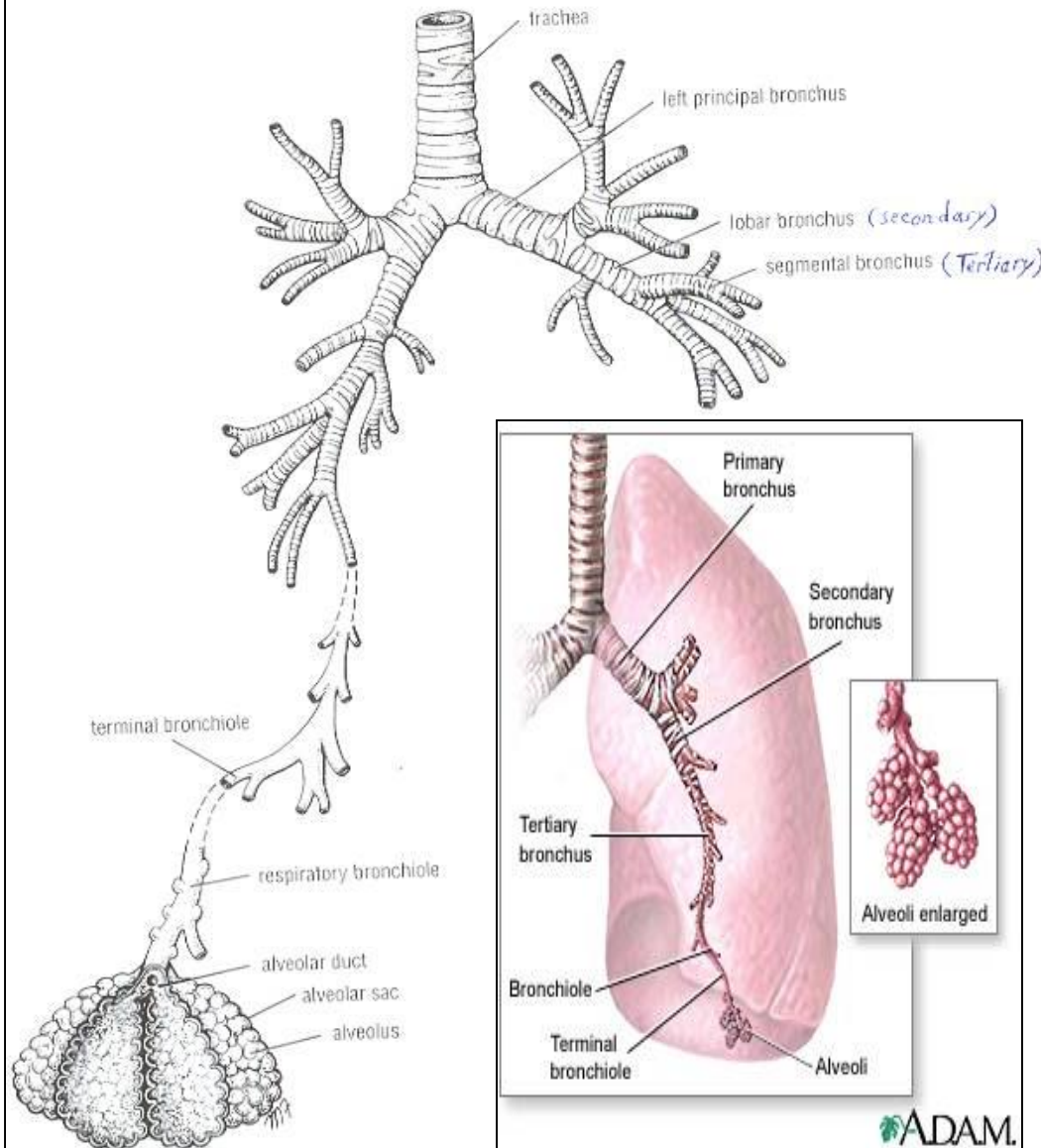


Bronchi

- The trachea divides into 2 main bronchi:
- Right main bronchus: which divides before entering the hilum, it gives: superior lobar (secondary) bronchus. On entering hilum, it divides into middle & inferior lobar bronchi.
- Left main bronchus: On entering hilum, it divides into superior & inferior lobar bronchi.

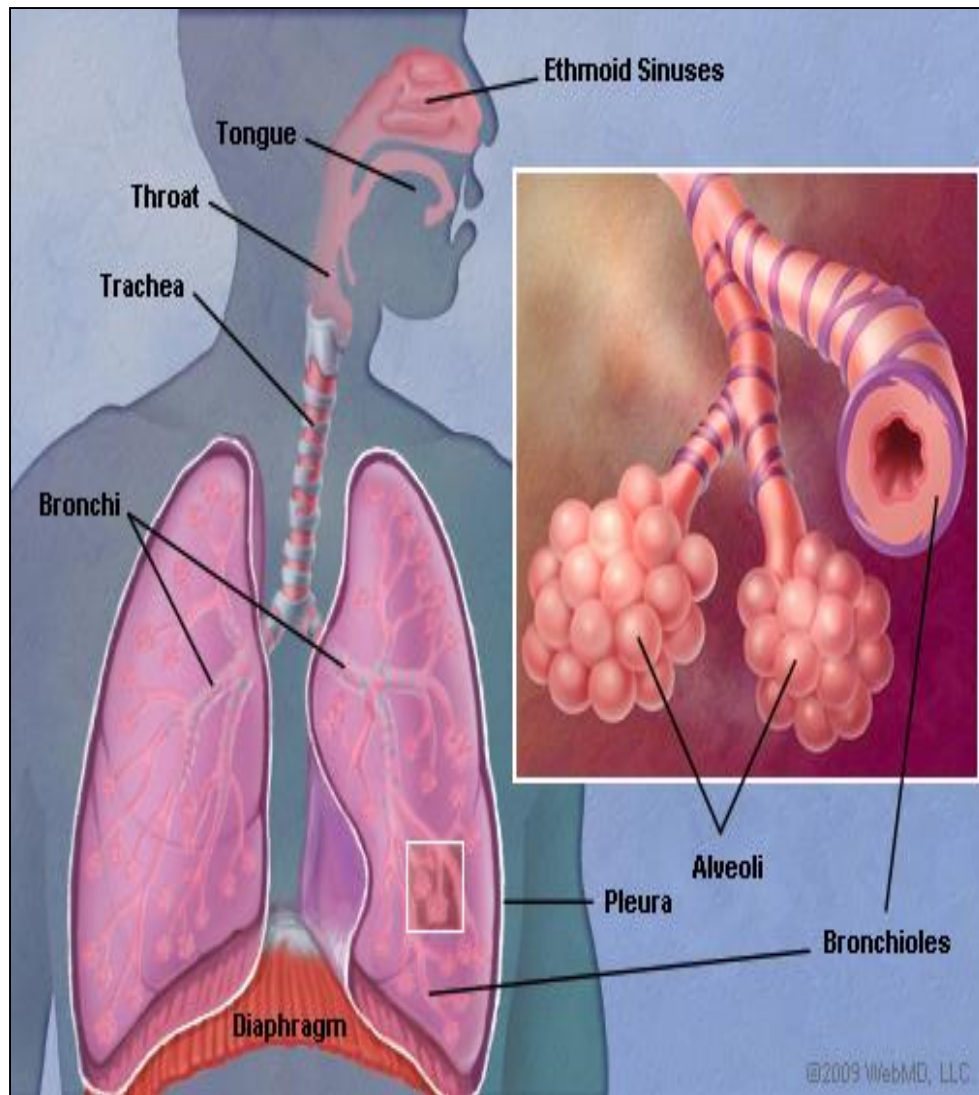


Bronchopulmonary segments



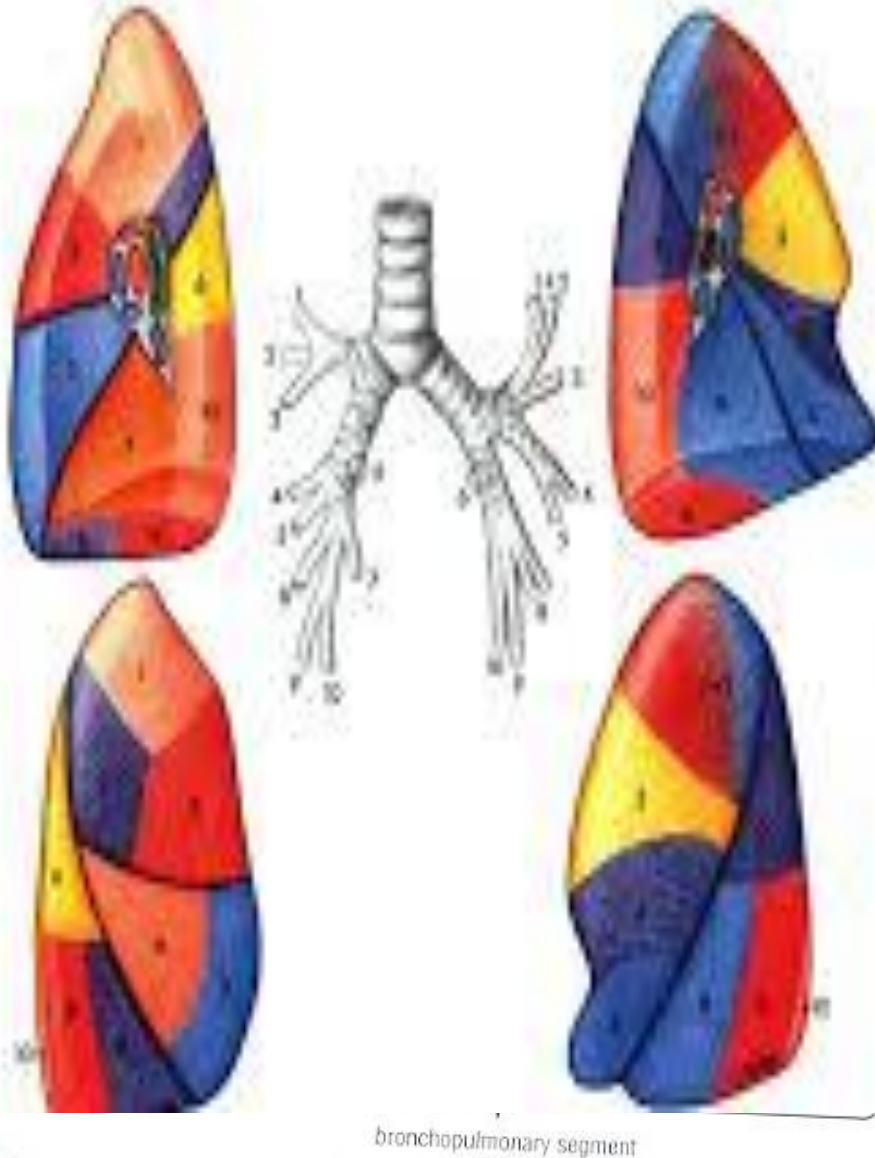
- They are the **anatomic**, **functional**, and **surgical** units of the lungs.
- Each lobar (secondary) bronchus gives **segmental (tertiary) bronchi**.
- Each segmental bronchus divides repeatedly into **bronchioles**.
- Bronchioles divide into **terminal bronchioles**, which show delicate outpouchings 'the **respiratory bronchioles**'.

Bronchopulmonary segments



- The respiratory bronchioles end by branching into alveolar ducts, which lead into alveolar sacs.
- The alveolar sacs consist of several alveoli, each alveolus is surrounded by a network of blood capillaries for gas exchange.

Bronchopulmonary segments



- The main characteristics of a bronchopulmonary segment/
- It is a subdivision of a lung lobe.
- It is pyramidal shaped, its **apex** toward the lung root.
- It is **surrounded by** connective tissue septa.
- It has a segmental bronchus, a segmental artery, lymph vessels, and autonomic nerves.
- The segmental vein lies in the inter- segmental C.T. septa between the segments.
- **A diseased segment** can be removed surgically, because it is a structural unit.

THANK YOU