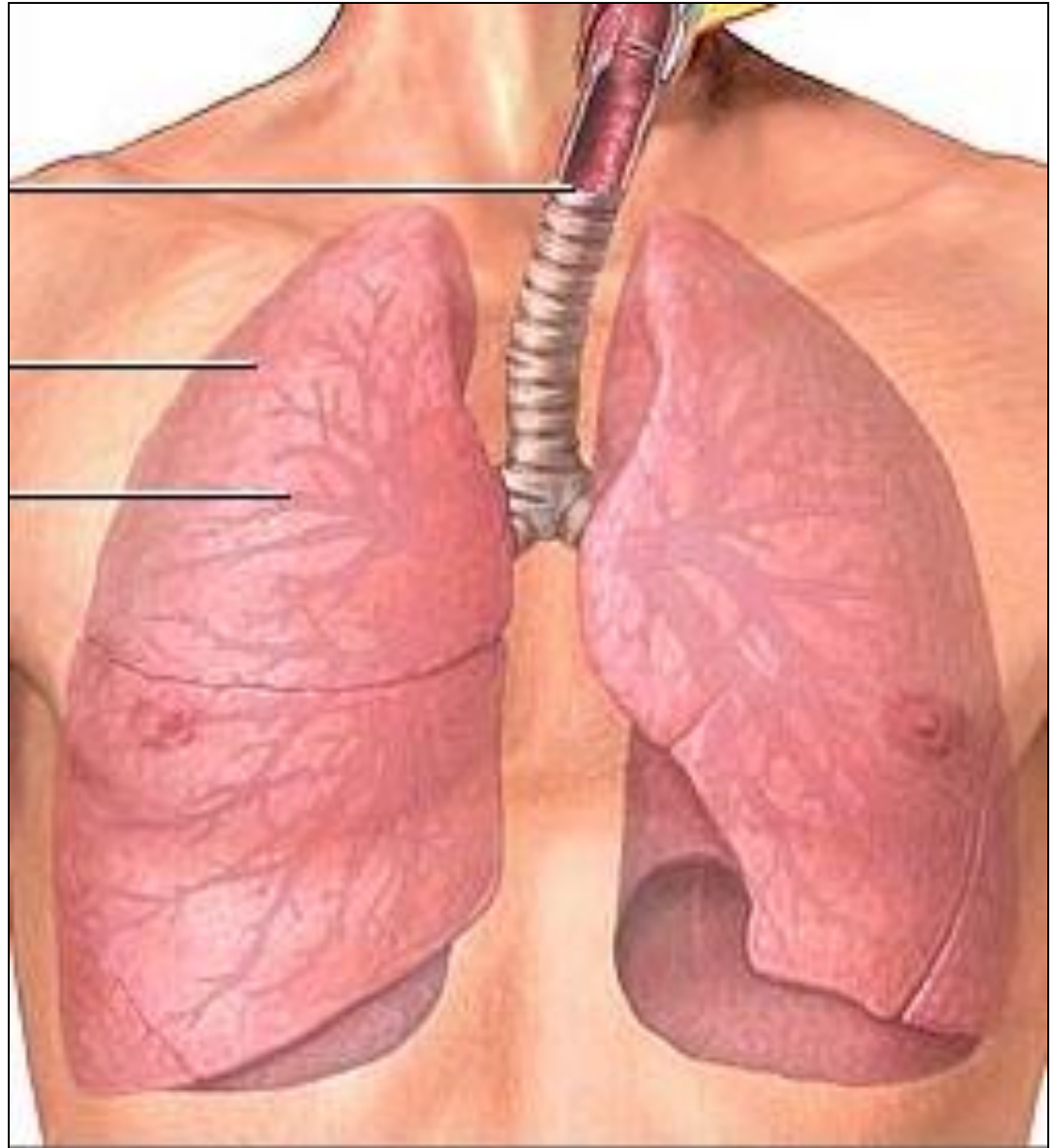


PLEURA & LUNG



Prof. Saeed Abuel Makarem

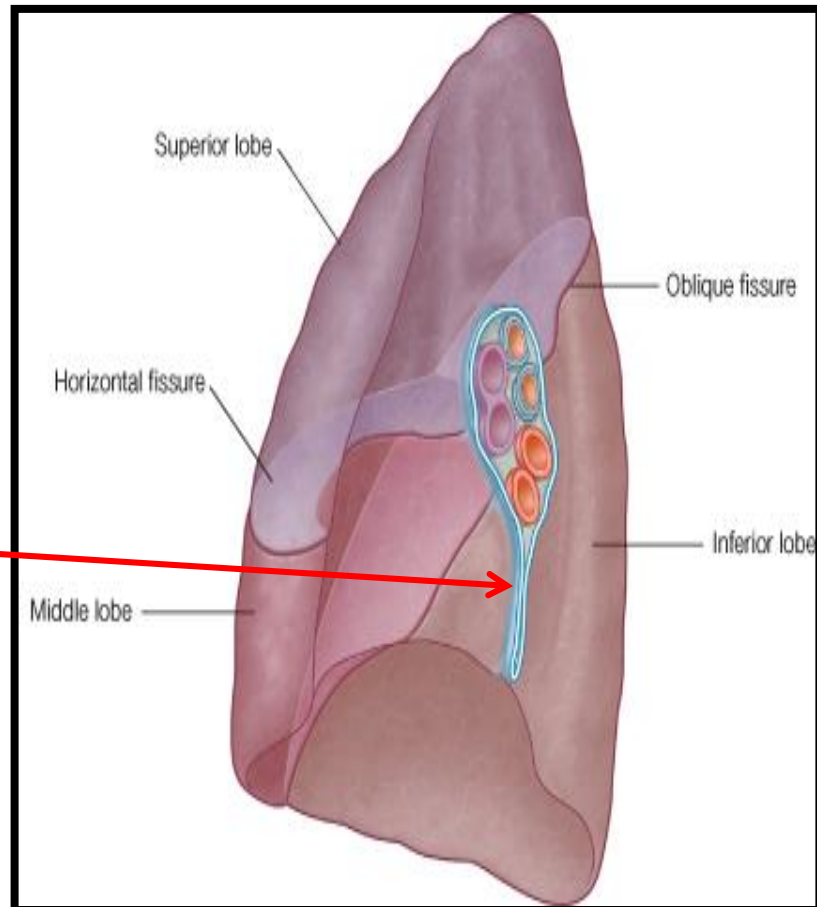
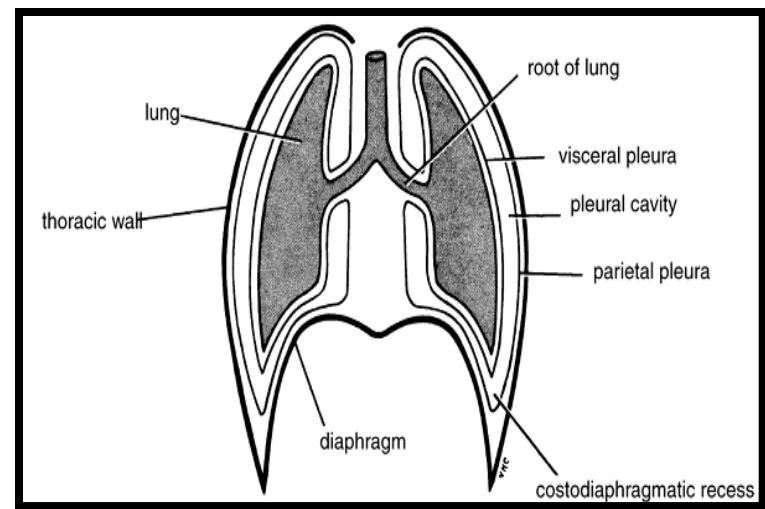
Objectives

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

- Describe the anatomy of the pleura:
Subdivisions into parietal & visceral pleurae, nerve supply of each part 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 these segment in the lung.

What is Pleura?

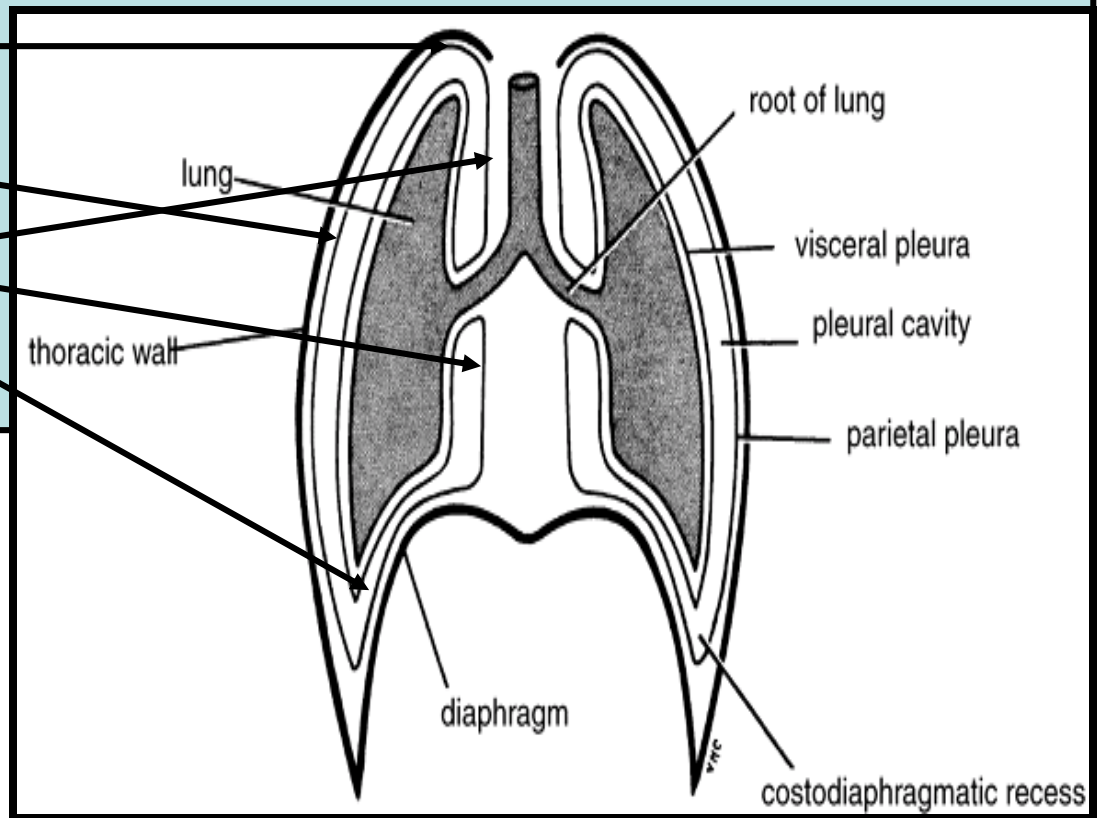
- Double-layered serous membranous sac enclosing the lung.
- Has two layers:
 - **Parietal layer**, which lines the thoracic walls.
 - **Visceral layer**, which covers the surfaces of the lung.
- The two layers continue with each other around the **root of the lung**, where it forms a loose cuff hanging down called the ***pulmonary ligament***.
- The space between the **2** layers, is the pleural cavity,
- It contains a very thin film of pleural fluid (5-10 ml.).



Parietal Pleura

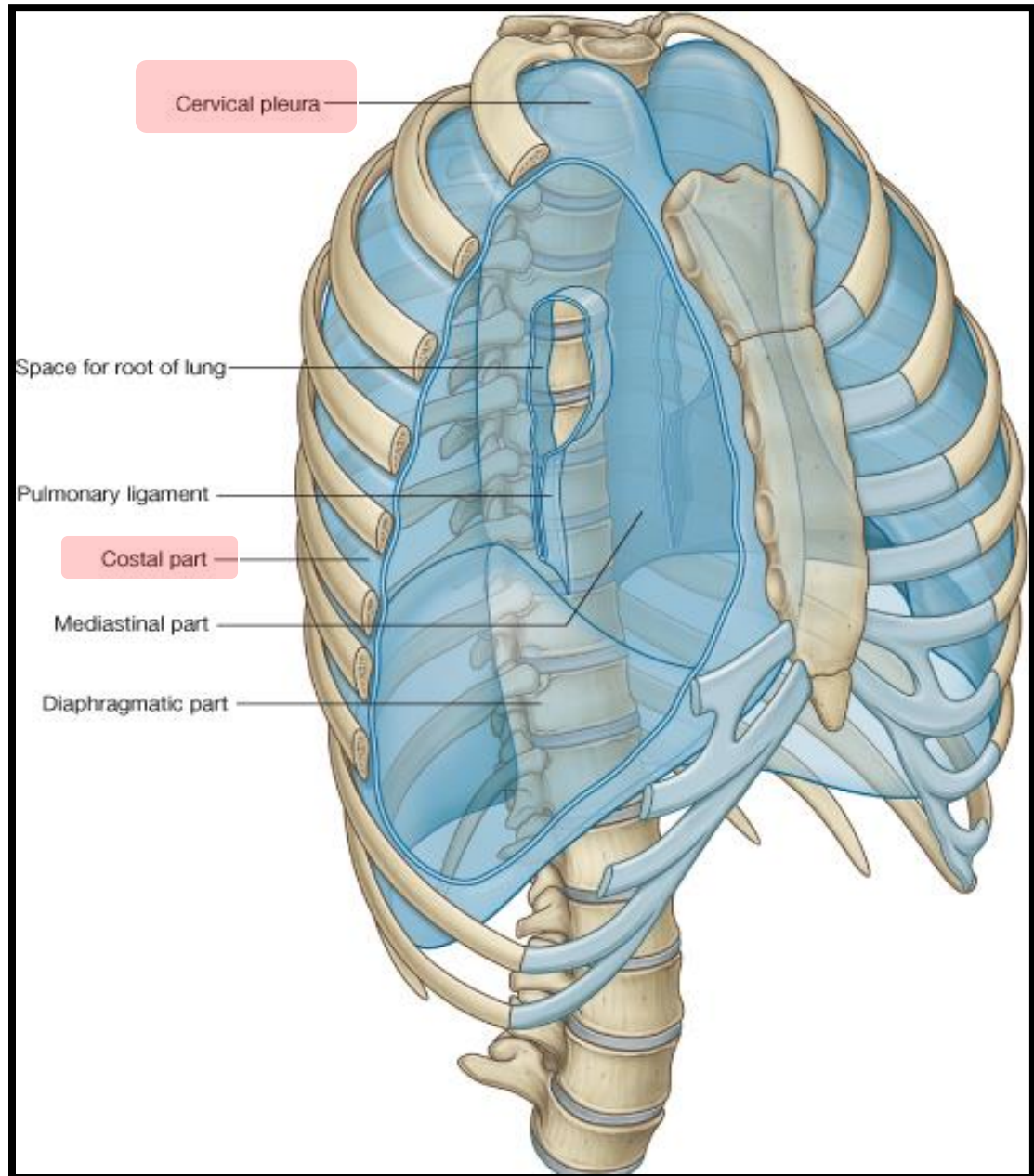
- It is divided according to the region in which it lies and the surfaces it covers, into:

- 1- Cervical.
- 2- Costal.
- 3- Mediastinal.
- 4- Diaphragmatic.



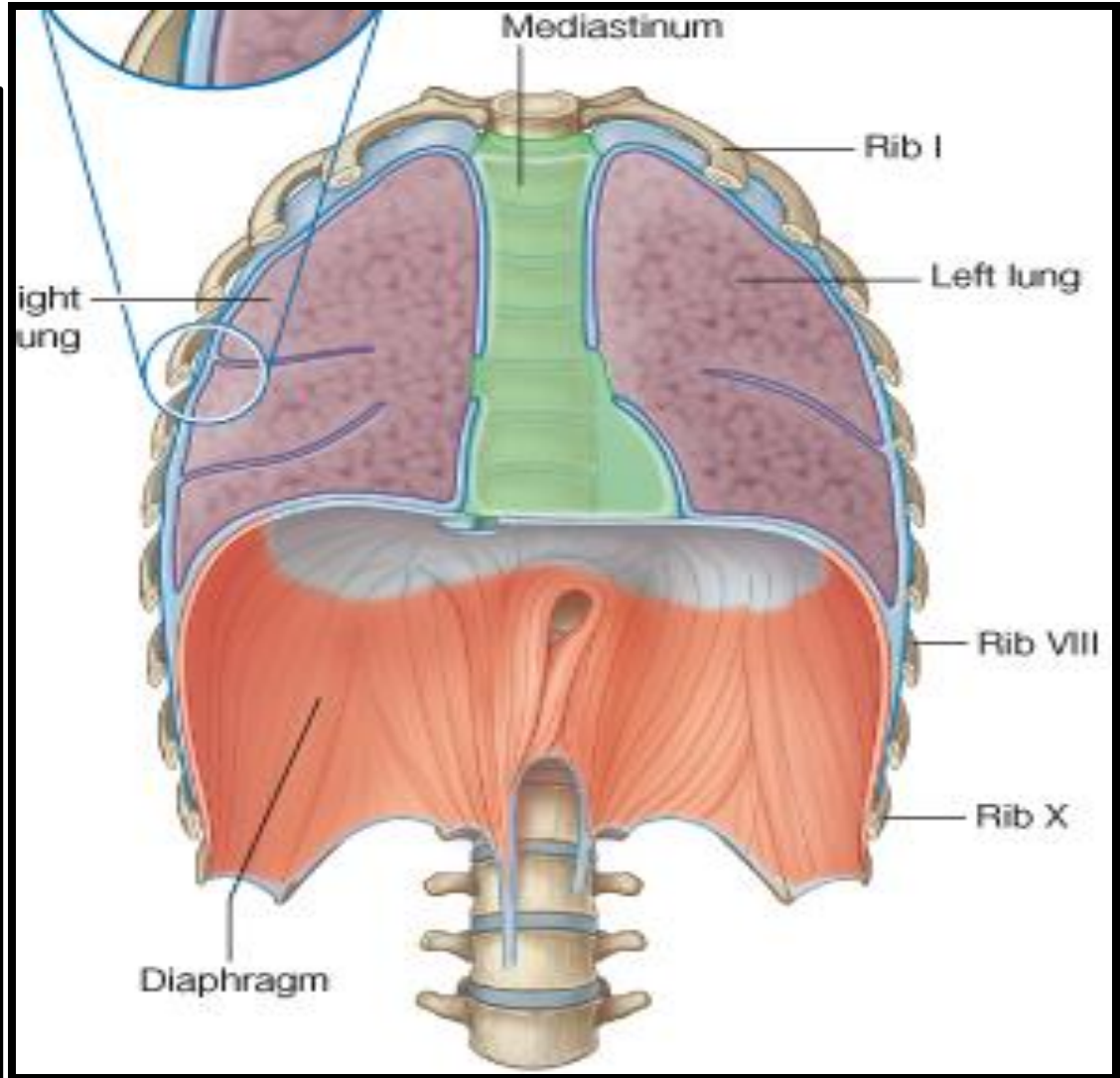
Parietal Pleura

- **Cervical Pleura:**
- Projects upward into the root of 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.



Parietal Pleura

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



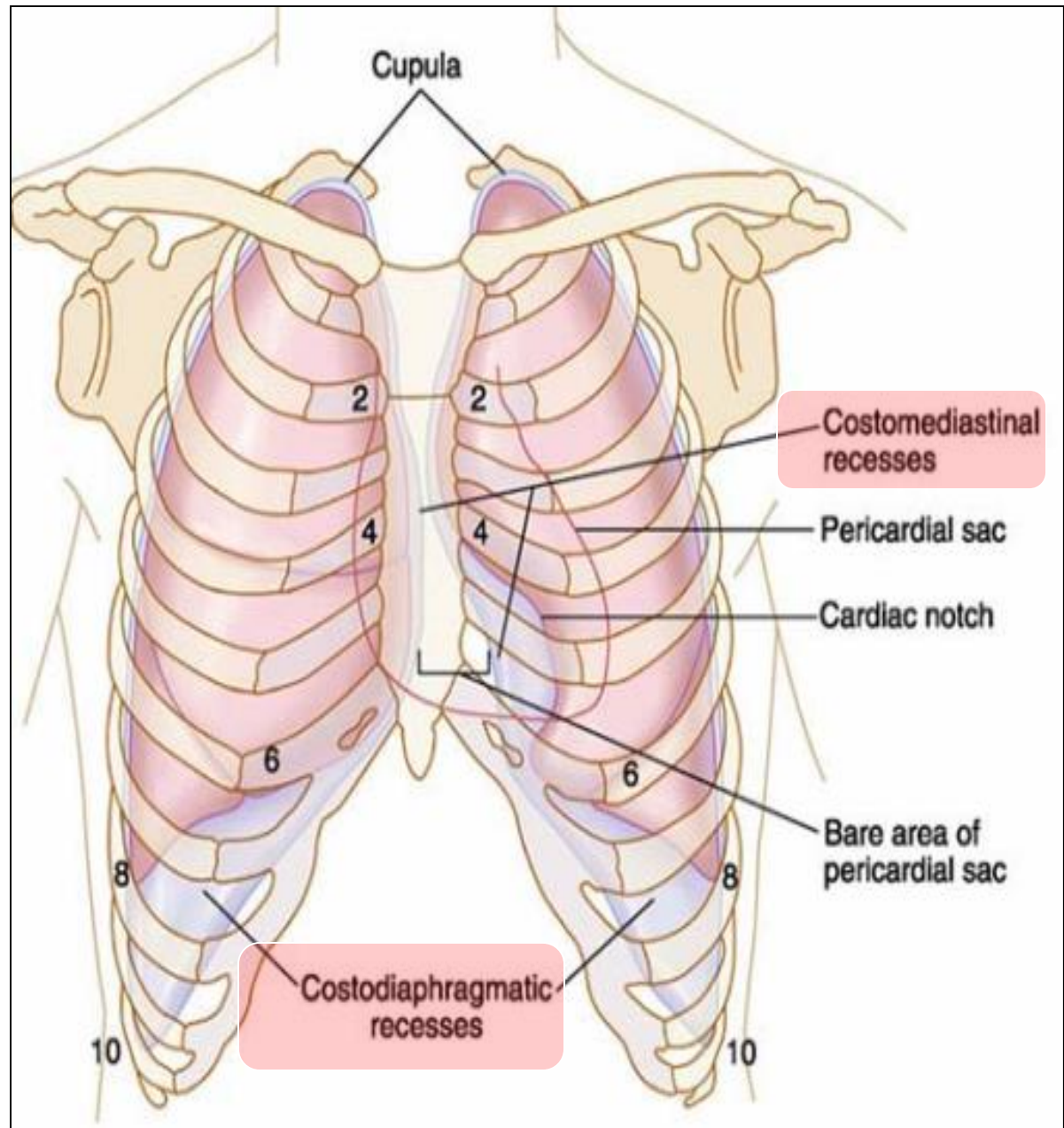
Pleural Recesses

Costodiaphragmatic:

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

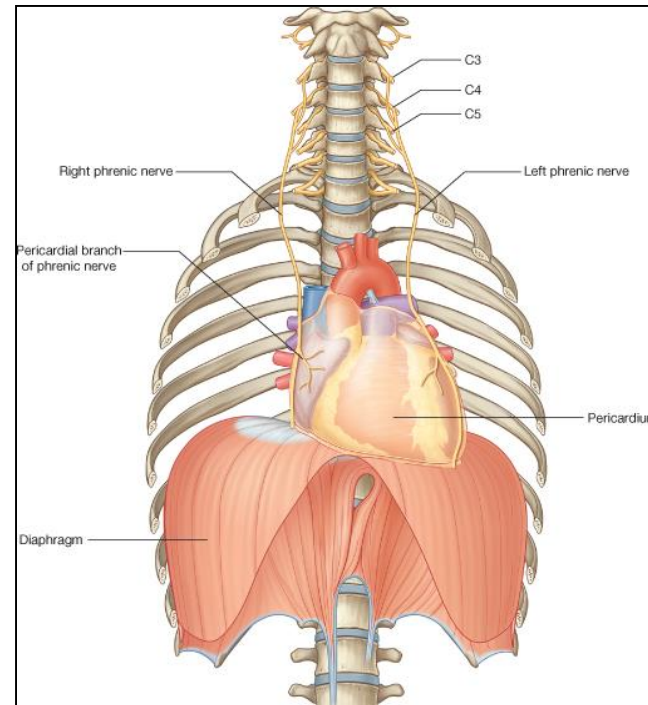
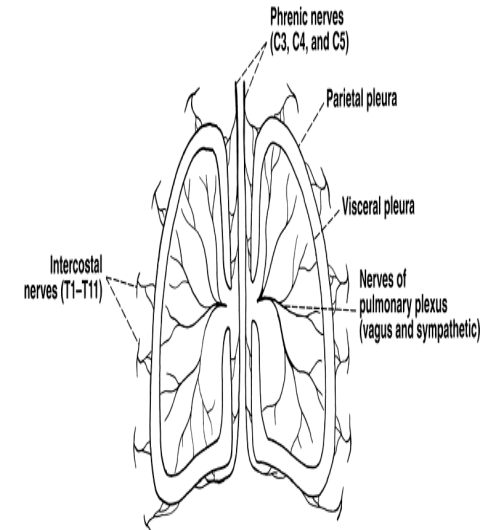
Costomediastinal:

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

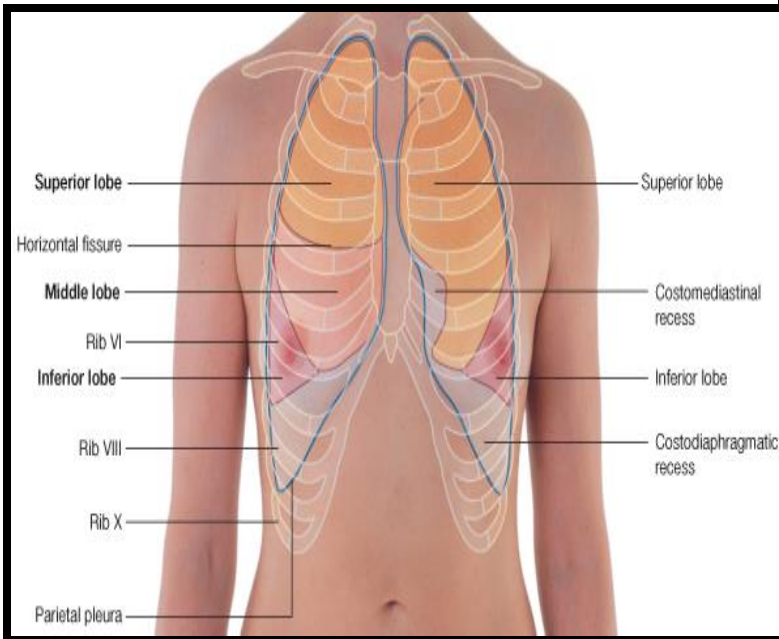


Pleura: Nerve Supply

- **Parietal pleura:**
- It is sensitive to **p**ain, **p**ressure, **t**emperature, and **t**ouch.
- 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 **as follow:**
 - ❖ central part (over diaphragmatic domes) by **phrenic nerves**,
 - ❖ Around the periphery by **lower 6 intercostal nerves**.
- **Visceral pleura** sensitive only to **stretch** and is supplied by the **autonomic fibers** from the pulmonary plexus.

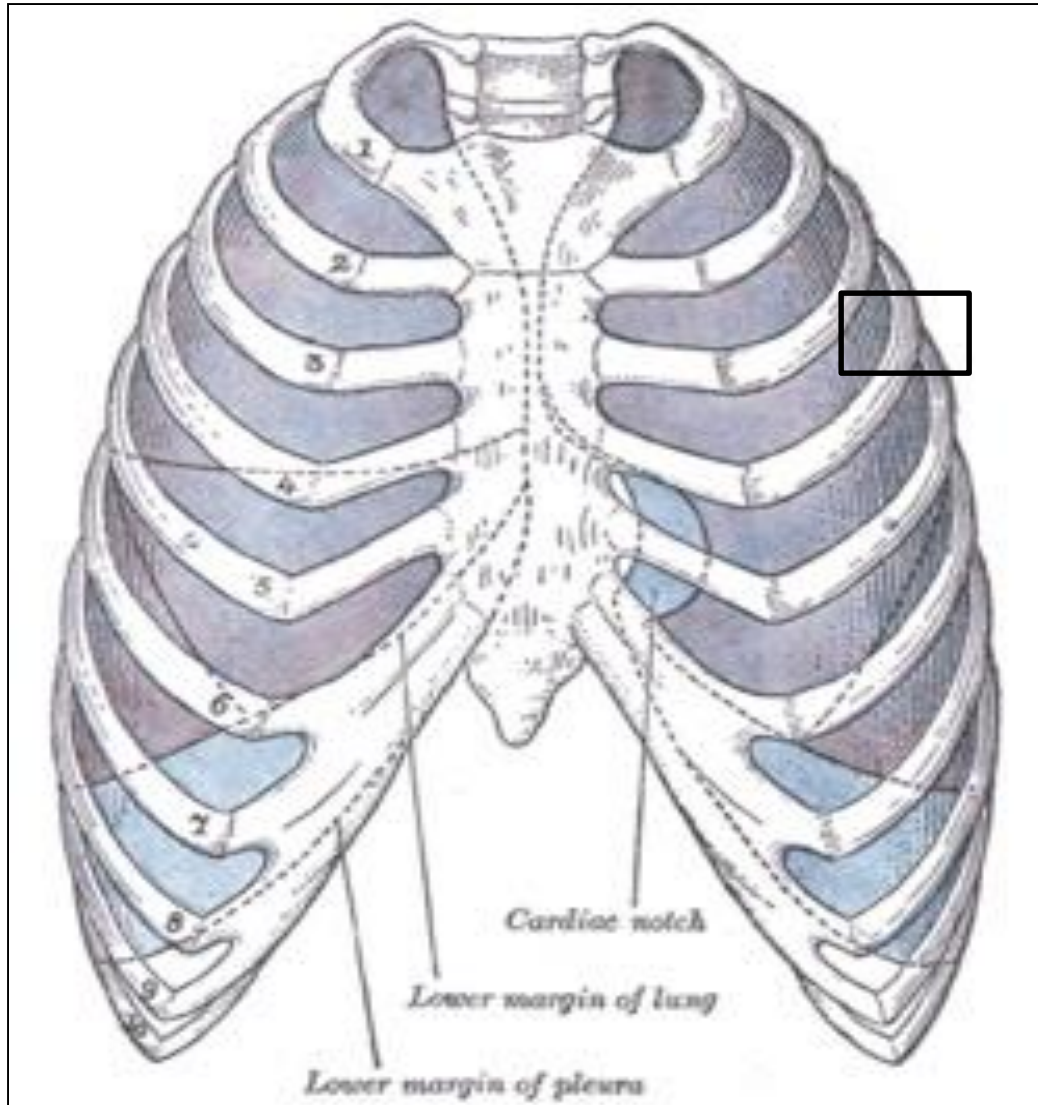


SUFACE ANATOMY OF PLEURA



- **Apex:**
- Lies one inch above the medial 1/3 of the clavicle.
- **Right pleura:**
- **The anterior margin** extends vertically from sternoclavicular 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 the **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.
- **Posterior margin:** along the vertebral column from the apex to the inferior margin.

SURFACE ANATOMY OF LUNG



- **Apex, anterior border and posterior border** correspond nearly to the lines of pleura but are slightly away from the median plane.
- **Inferior margin:** as the pleura but more horizontally and finally reaching to the 10th thoracic spine.

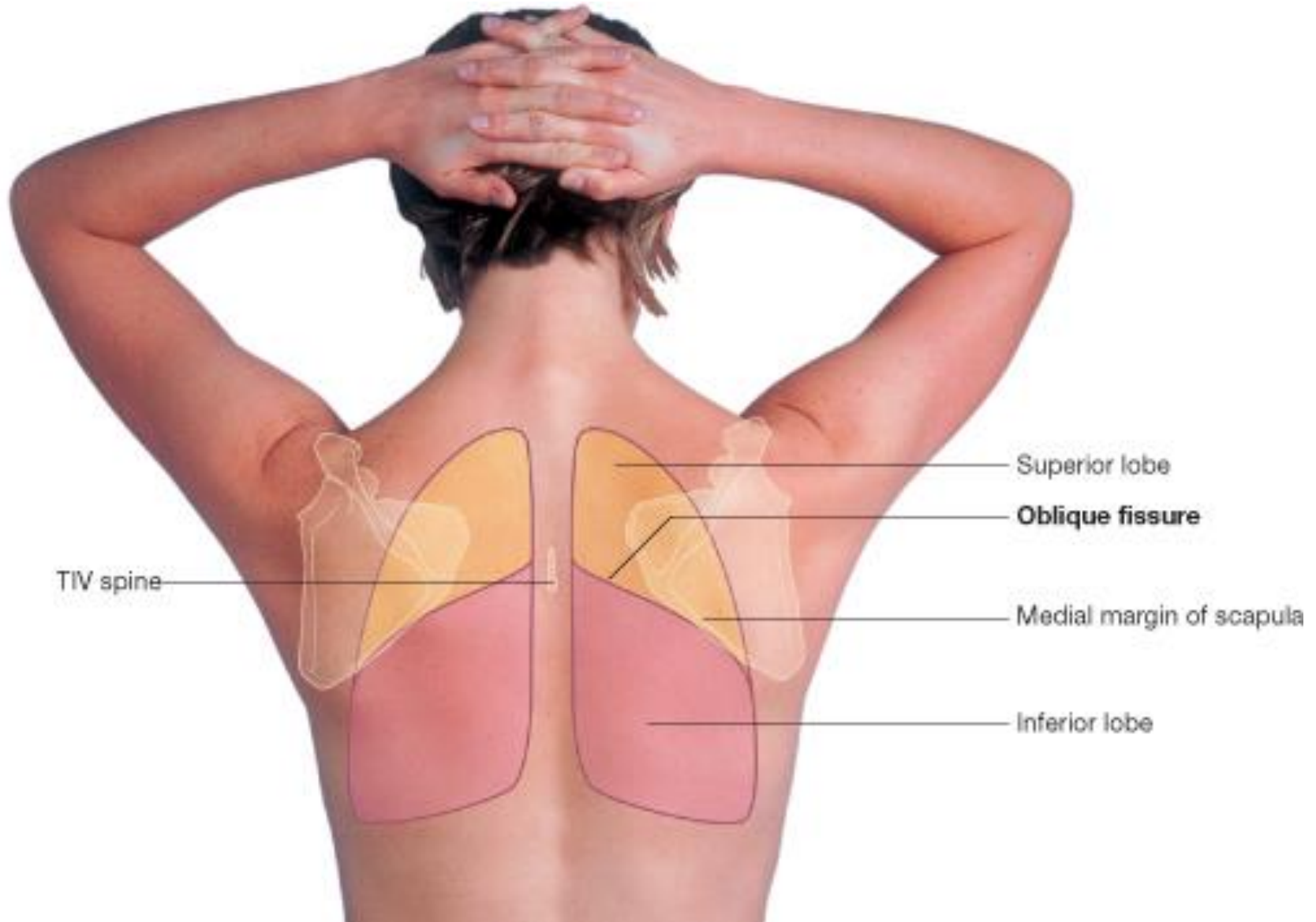
Oblique fissure:

- Represented by a line extending from 3rd thoracic spine, obliquely ending at 6th costal cartilage.

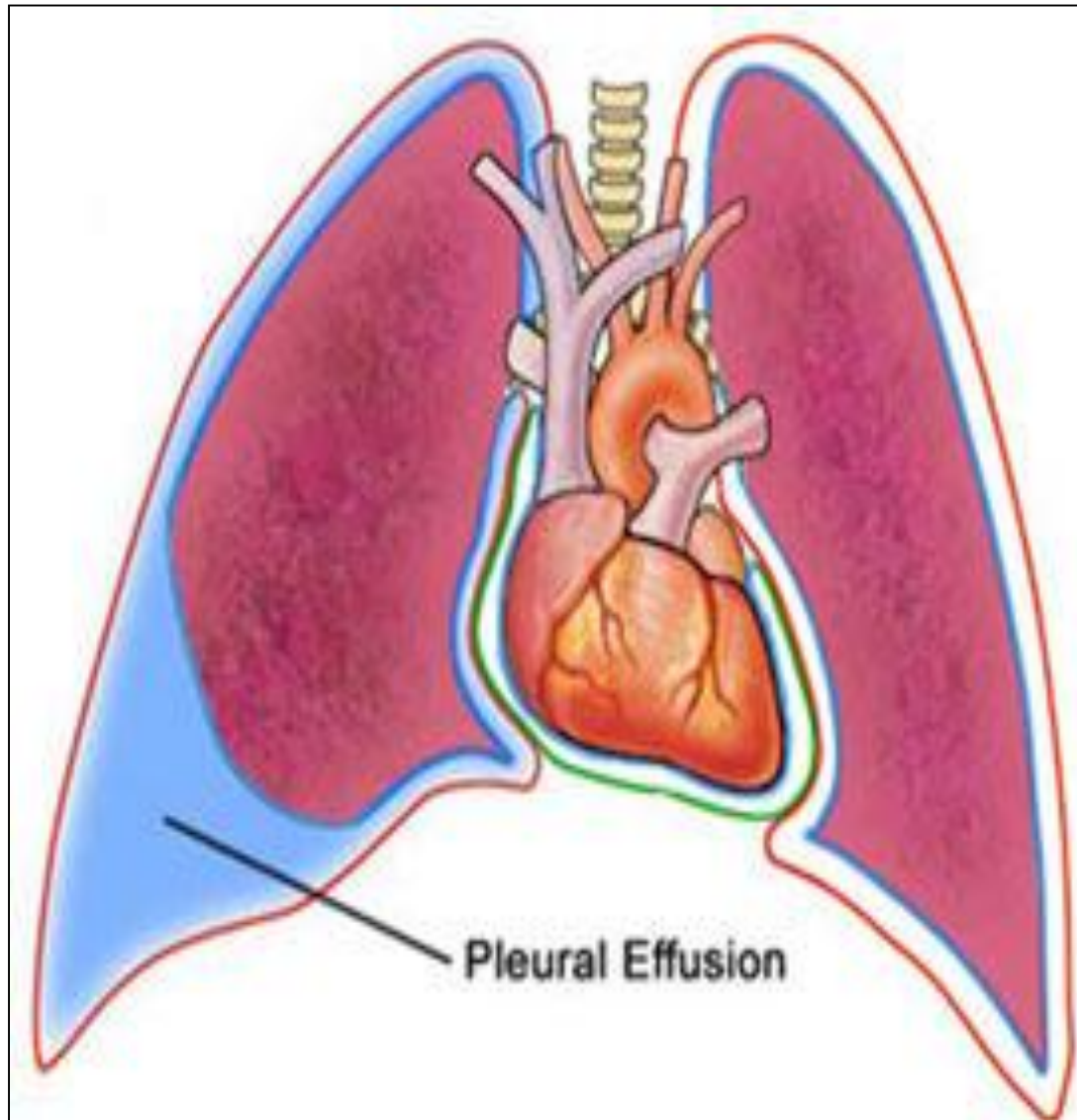
Transverse fissure: Only in the right lung: represented by a line extending from 4th right costal cartilage to meet the oblique fissure.

SURFACE ANATOMY OF LUNG

A



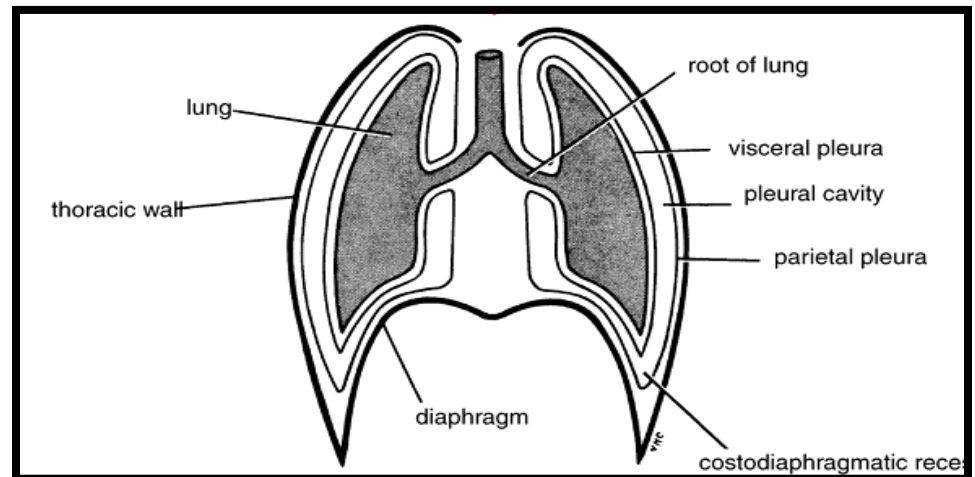
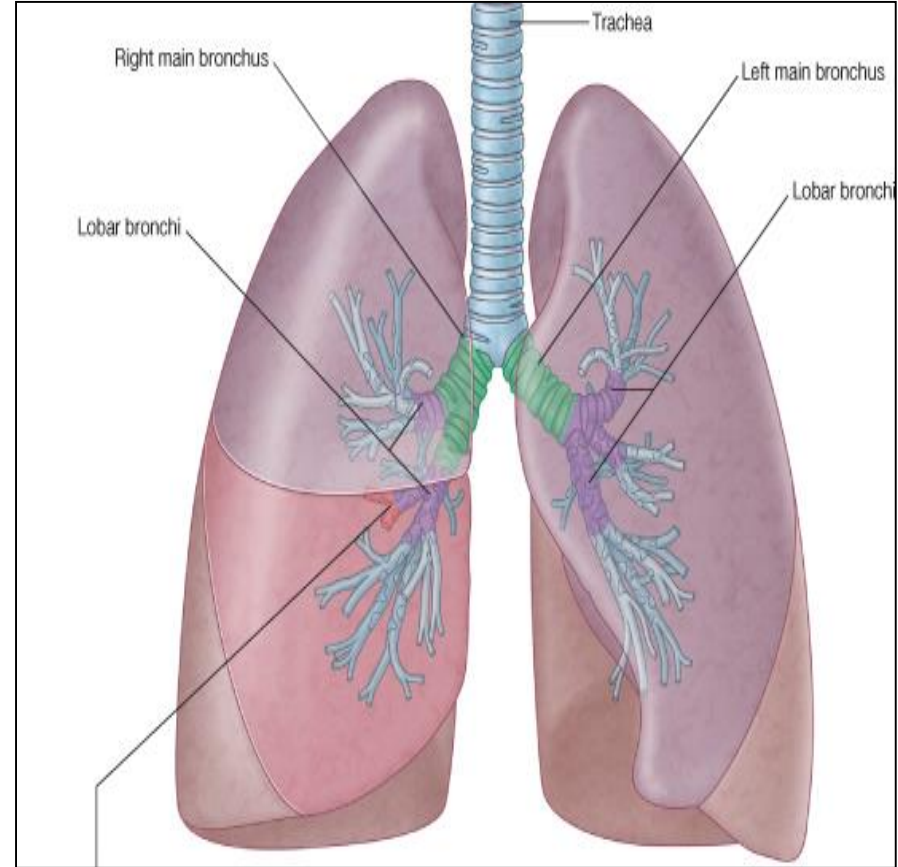
Pleural Effusion



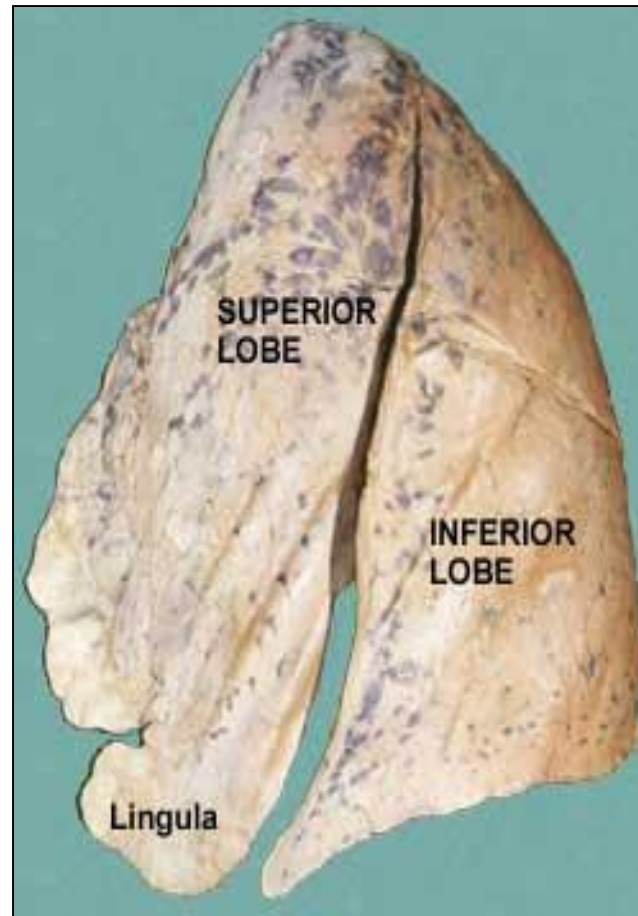
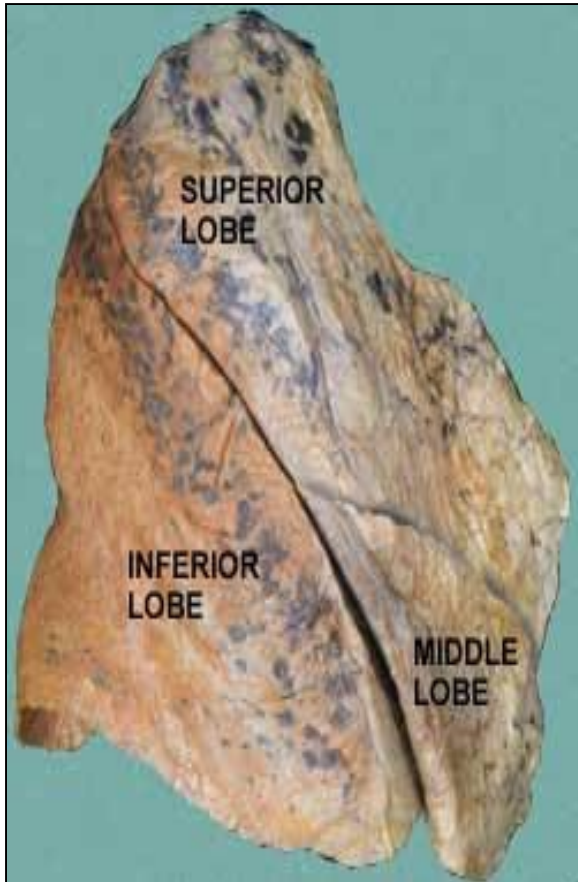
- It is an abnormal accumulation of pleural fluid about 300 ml, in the *Costodiaphragmatic pleural recess* , (normally 5-10 ml fluid)
- Causes:
 1. Inflammation,
 2. TB,
 3. Congestive heart disease.
 4. Malignancy, (mesothelioma of the pleural sac).
- The lung is compressed & the bronchi are narrowed.
- 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.

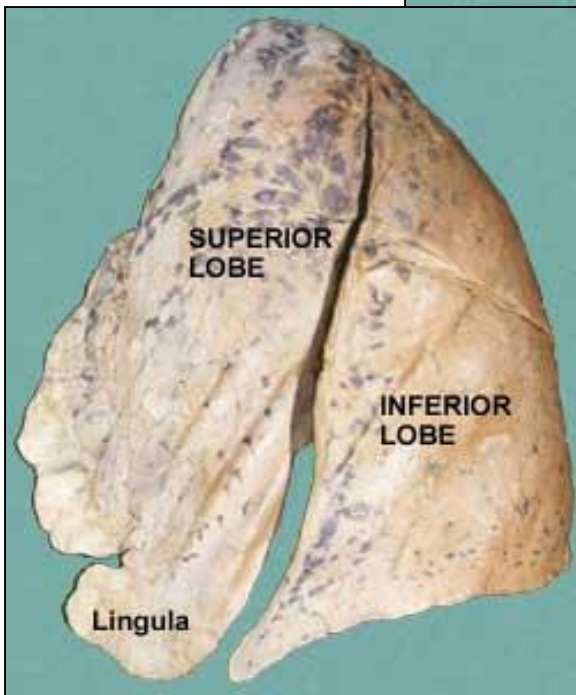
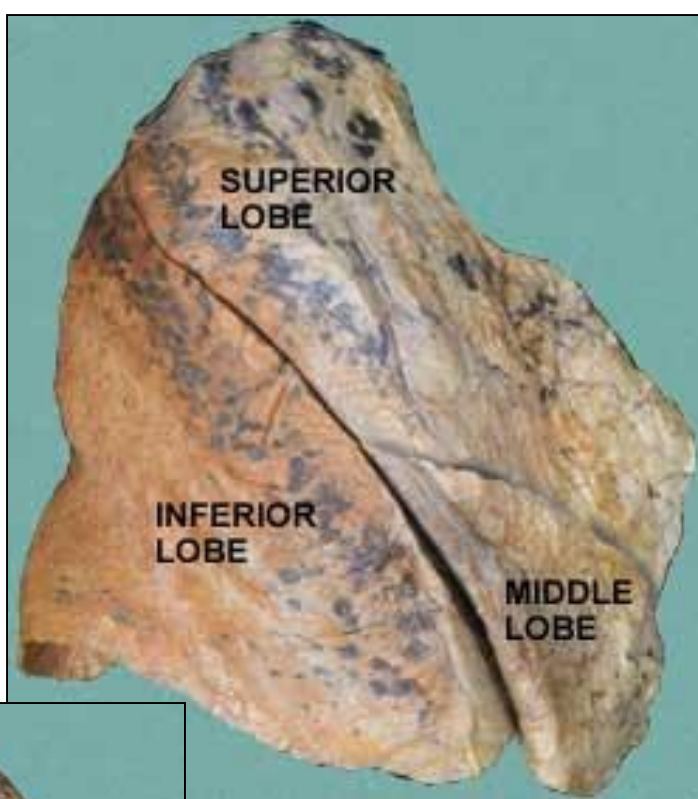


LUNGS



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

LUNGS

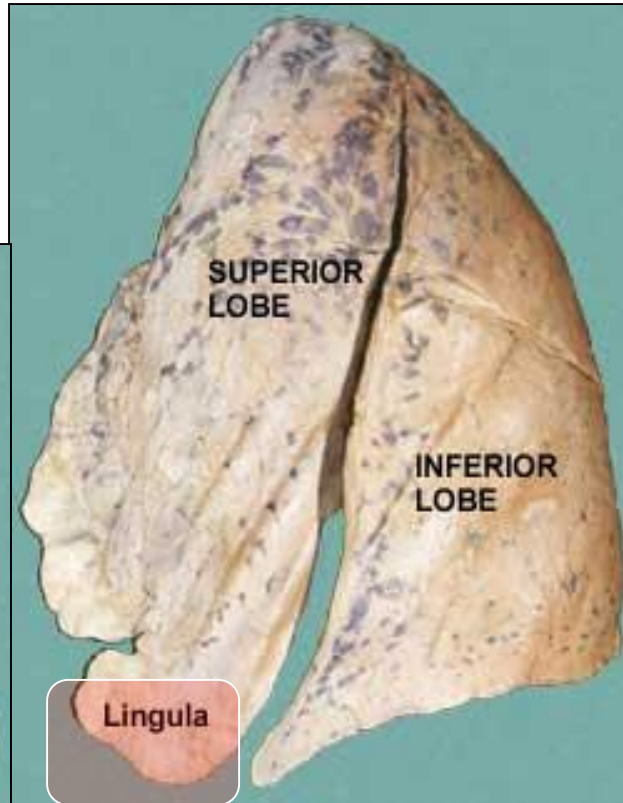
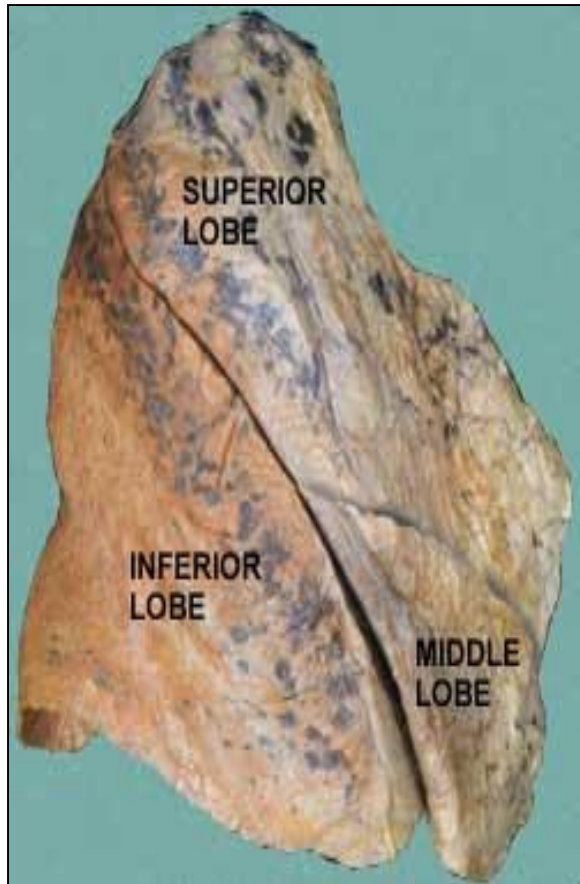


- **Apex:**
- Projects into the root of the neck.
- (1/2 an inch above medial 1/3 of clavicle). **It is covered** by cervical pleura.

It is grooved anteriorly by **subclavian artery.**

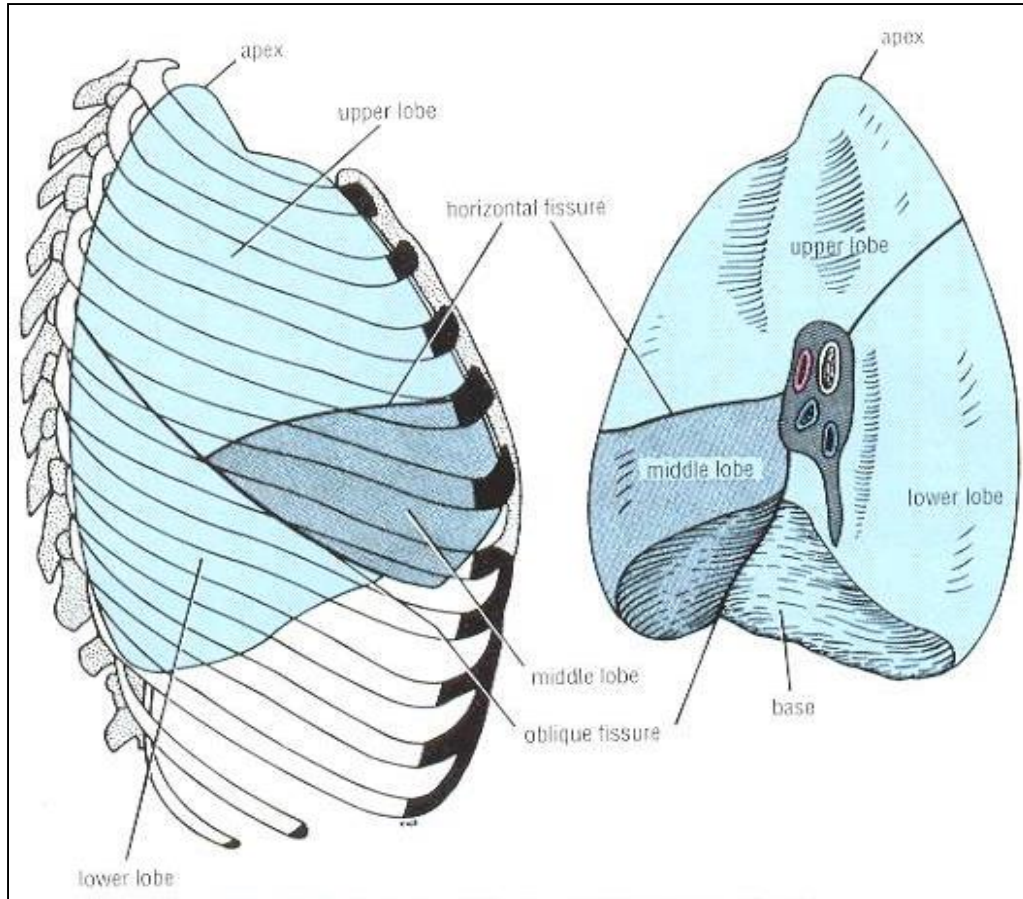
- **Base:**
- Inferior, (diaphragmatic surface) is concave and rests on the diaphragm.

Borders: Anterior & Posterior



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

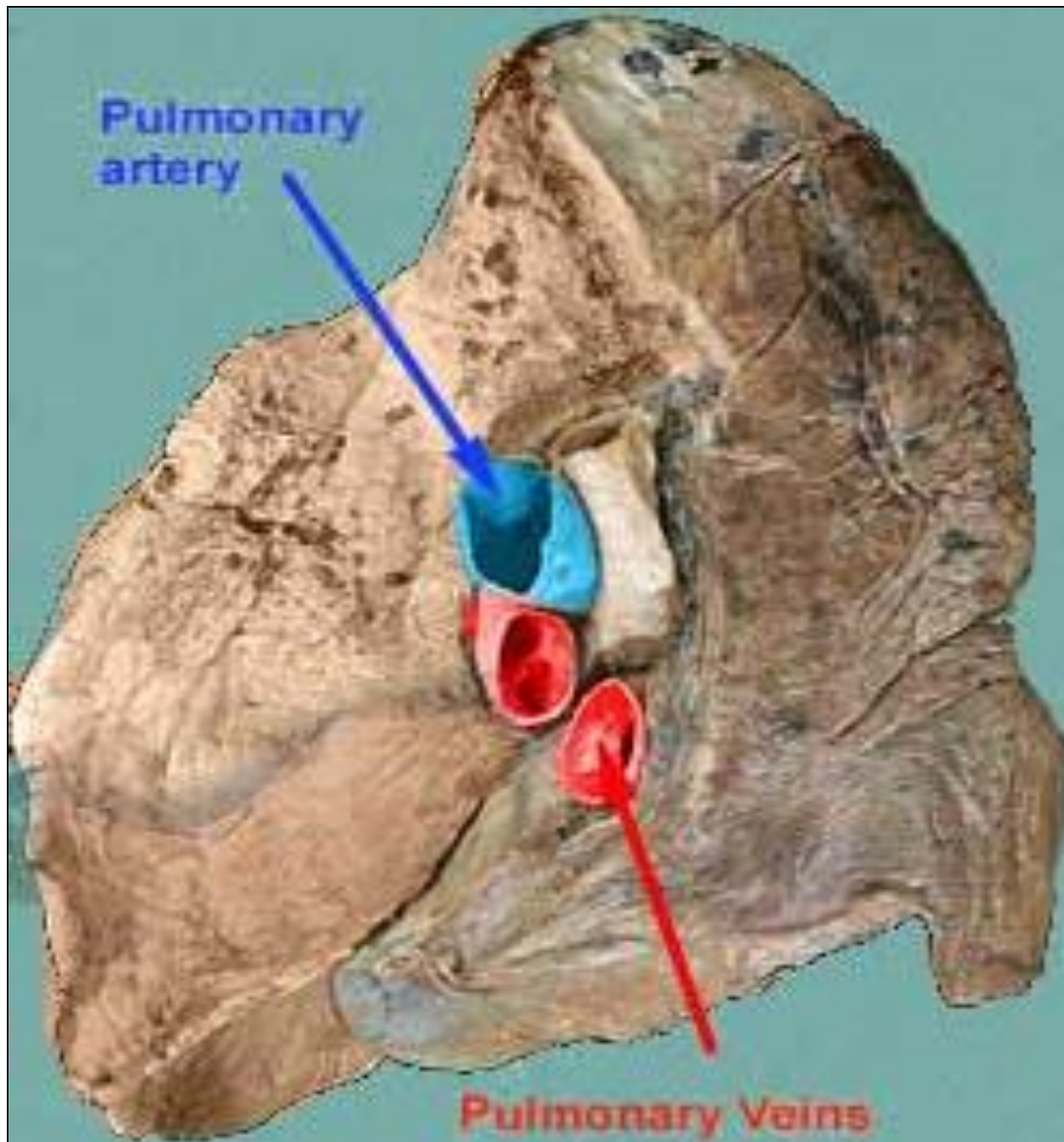
Surfaces: Costal & Mediastinal



Lateral & medial surfaces of right lung

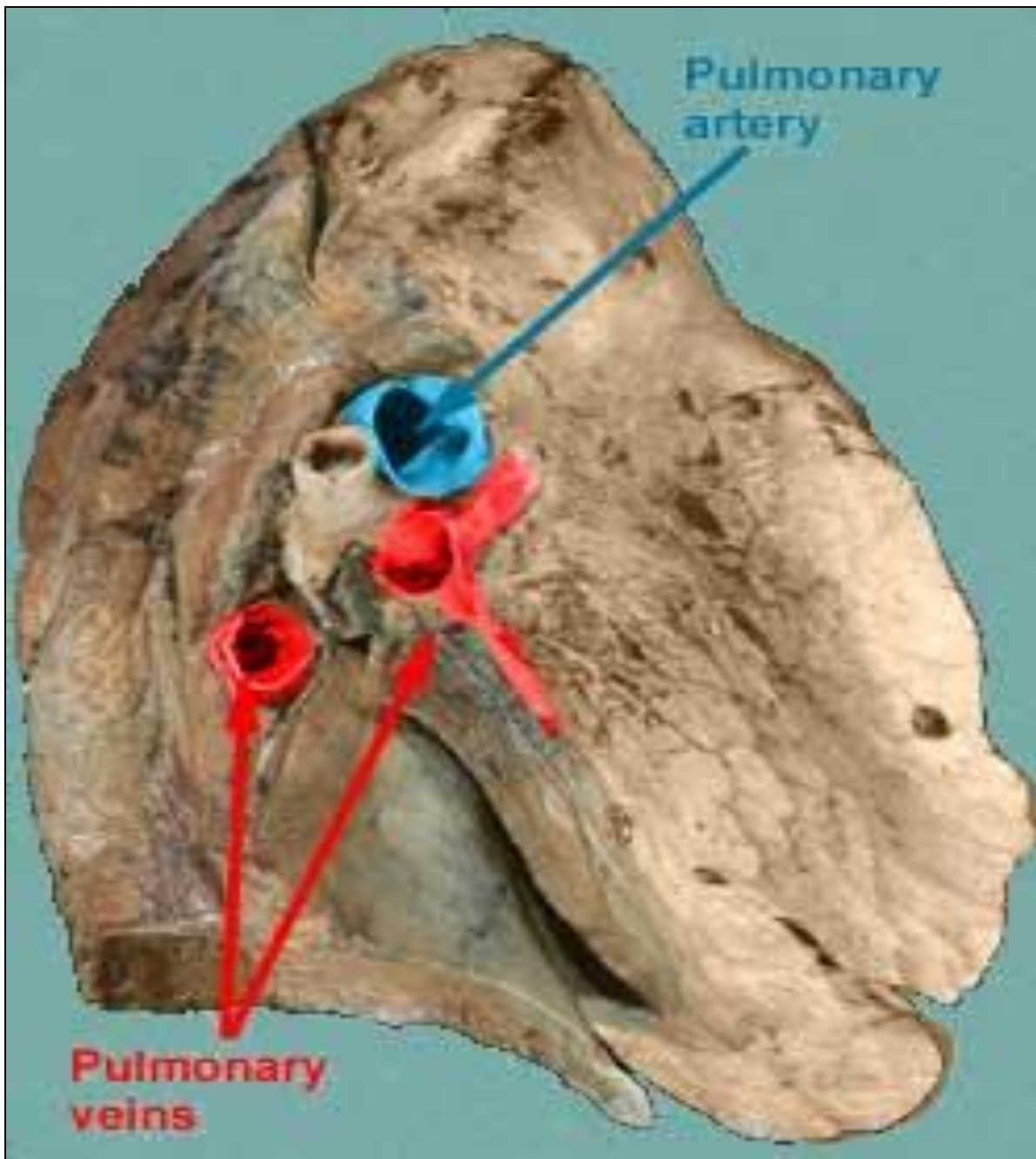
- **Costal surface:**
- Convex.
- Covered by costal pleura which separates the lung from: ribs, costal cartilages & intercostal muscles.
- **Medial surface:**
- It is divided into 2 parts:
- **Anterior (mediastinal) part:**
- Contains a hilum in the middle (it is a **depression** in which bronchi, vessels, & 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

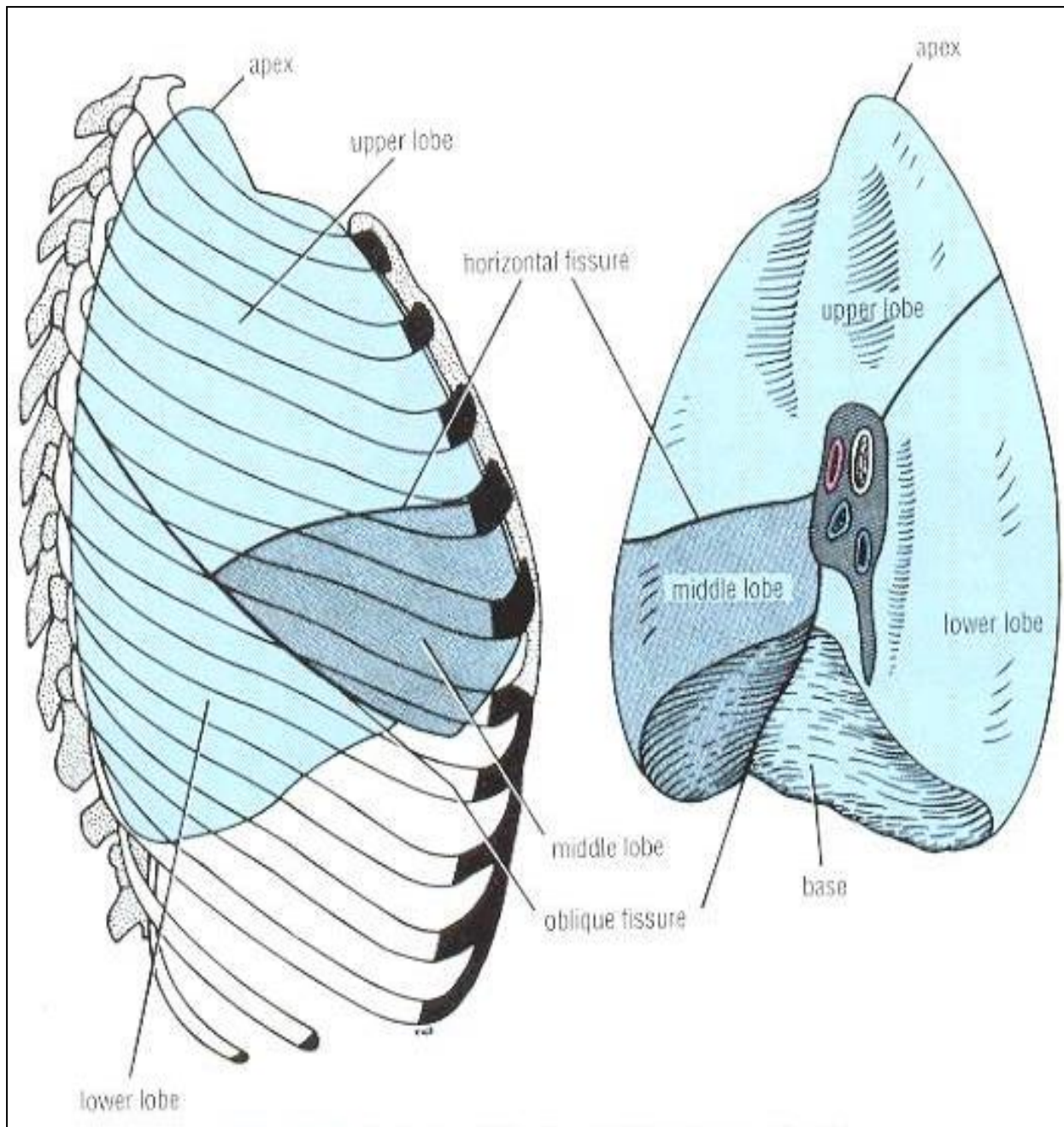


- **2 bronchi:**
Most posterior.
- **Pulmonary artery:**
Most superior.
- **Pulmonary veins:**
Are anterior
and inferior.

LEFT LUNG ROOT



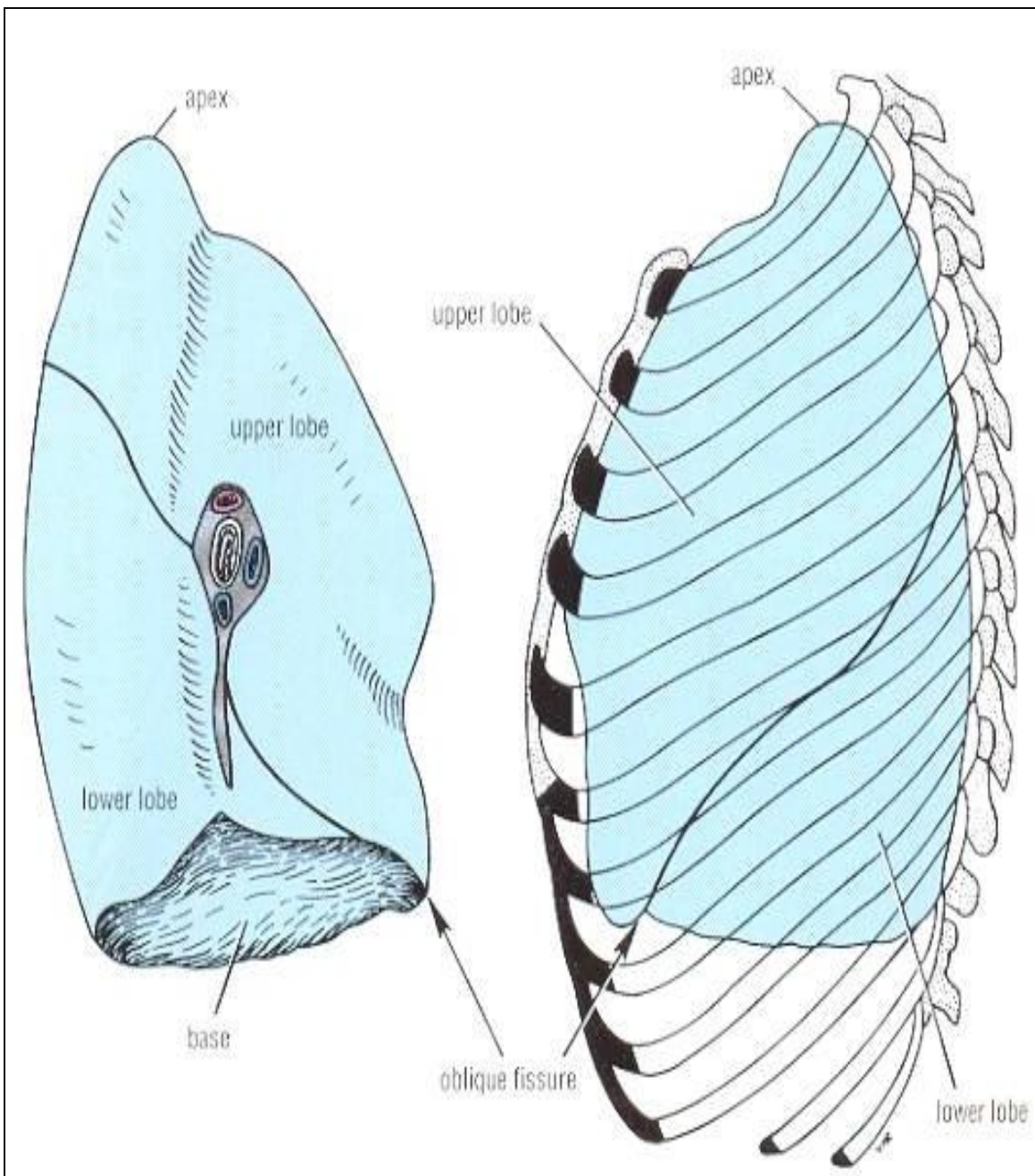
- **One bronchus:**
Most posterior.
- **Pulmonary artery:**
Most superior.
- **Pulmonary veins:**
- Are anterior and inferior.



Right lung

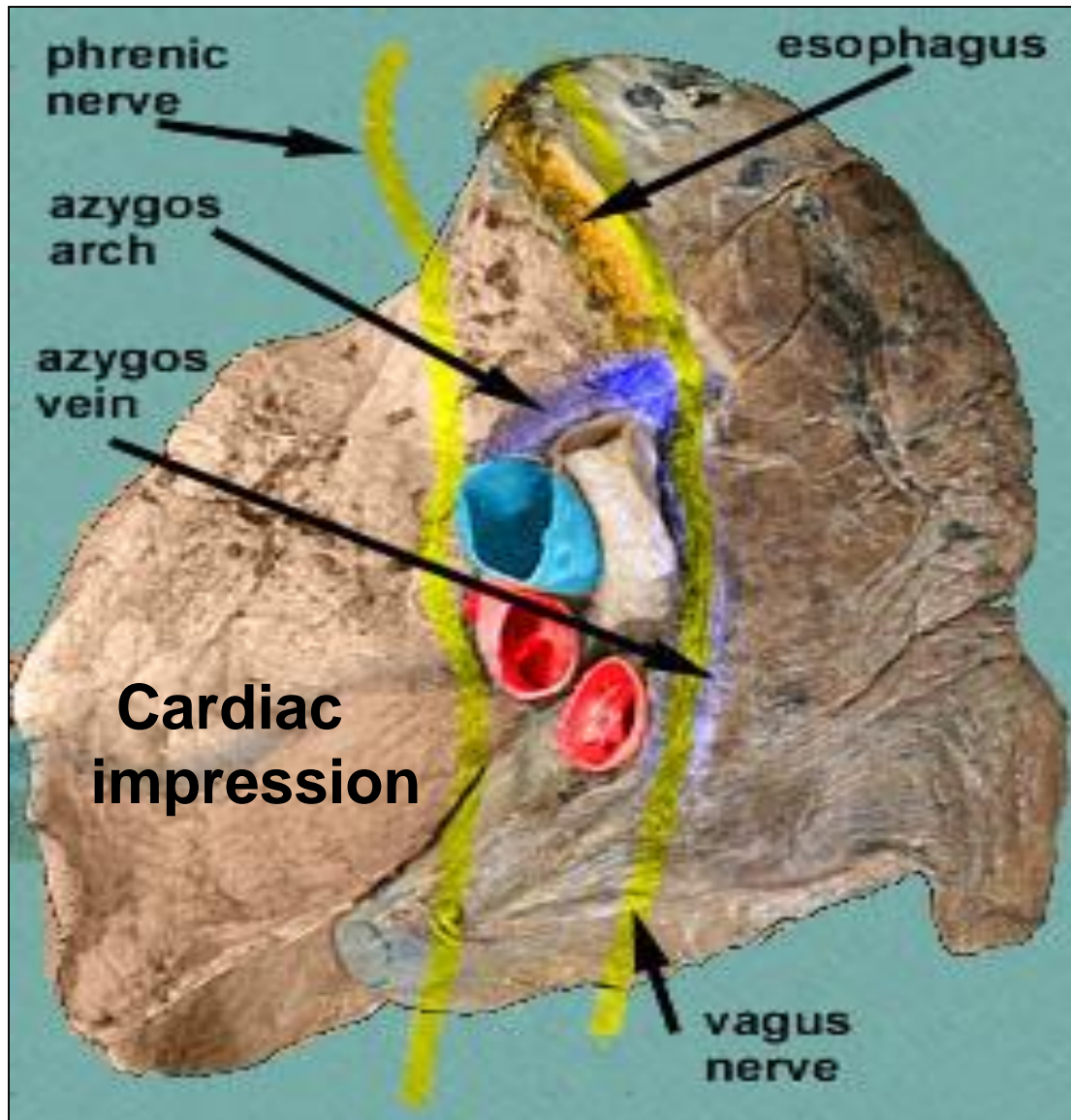
- Larger & shorter than left lung.
- Divided by 2 fissures (oblique & horizontal) into 3 lobes (upper, middle and lower lobes).

Left Lung



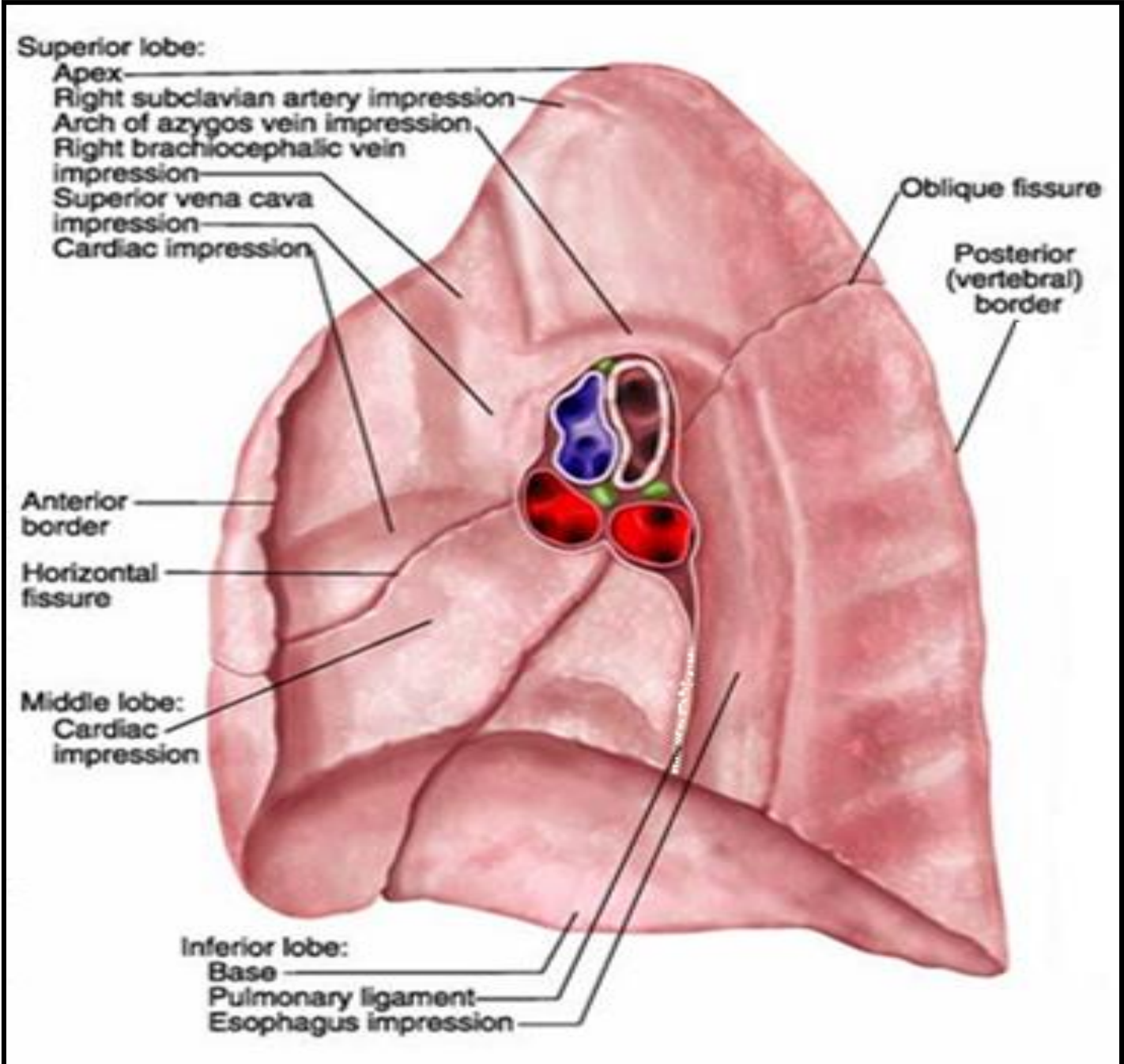
- Divided by **one oblique fissure** into **-2 lobes**, Upper and lower.
- There is **No** horizontal fissure.
- It has **a cardiac notch** at **lower part** of its **anterior border**.

Mediastinal surface of right lung

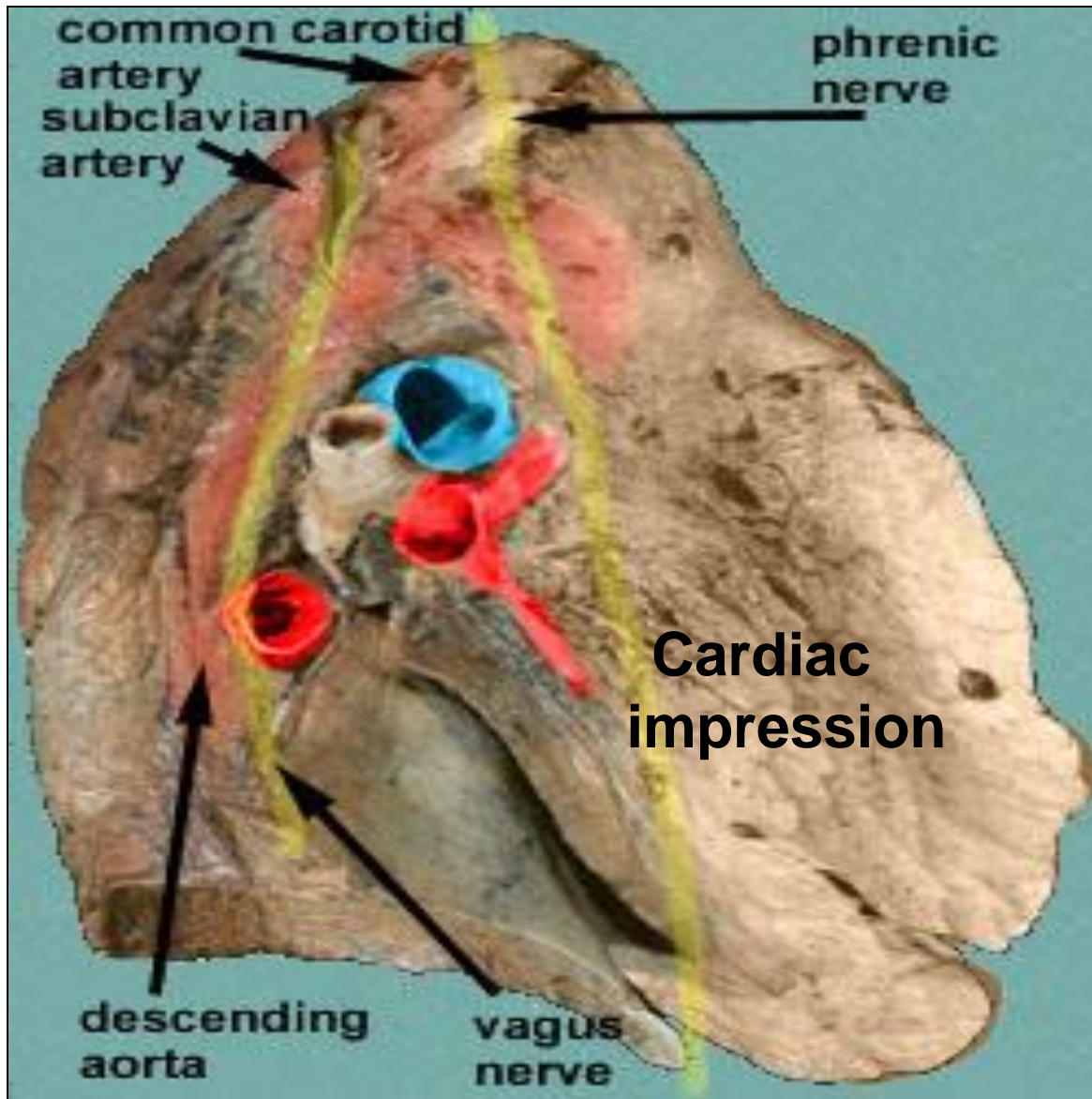


- On the mediastinal surface of the lung, you find these structures:
- **Azygos vein and its arch** (posterior and over the root of the lung).
- **Vagus nerve** posterior to the root of the lung.
- **Esophagus** posterior to the root.
- **Phrenic nerve** anterior to the root of the lung.
- **Cardiac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

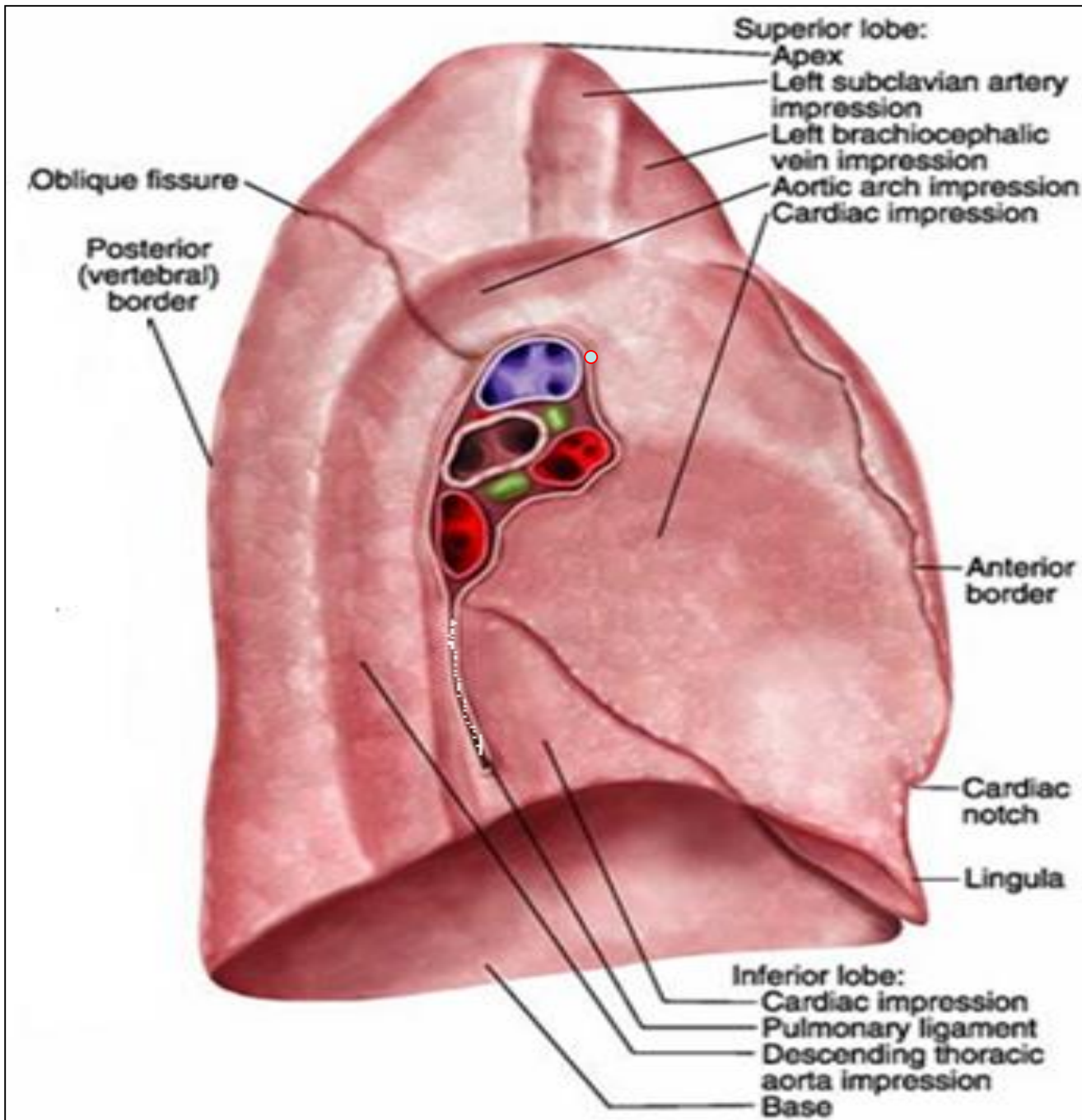
Mediastinal surface of the right lung



Mediastinal surface of left lung



- **On the mediastinal surface of the 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 supply **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***...

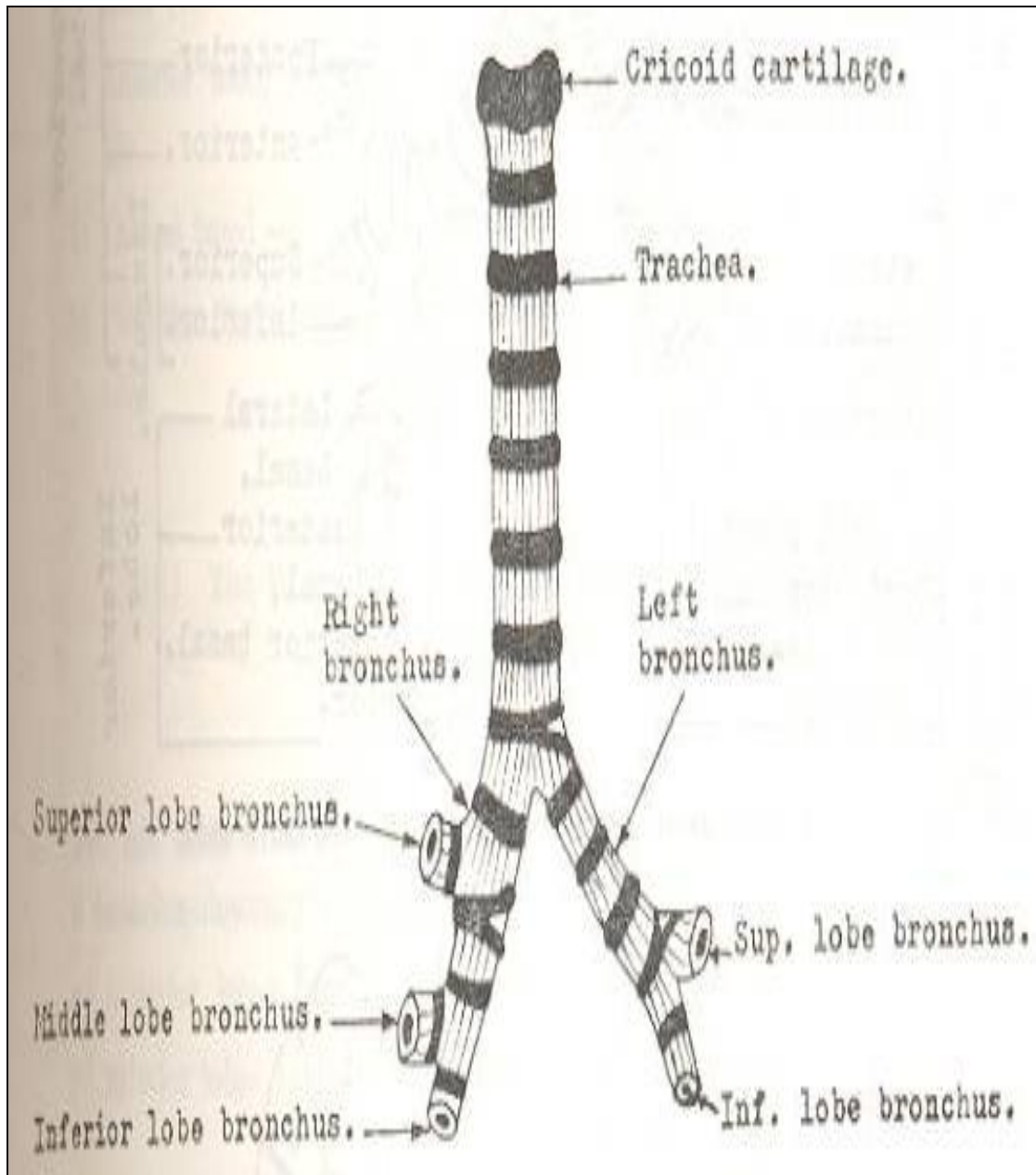
Action: broncho-dilatation/and vasoconstriction.

2- Parasympathetic Fibers

From..... ***Vagus nerve***

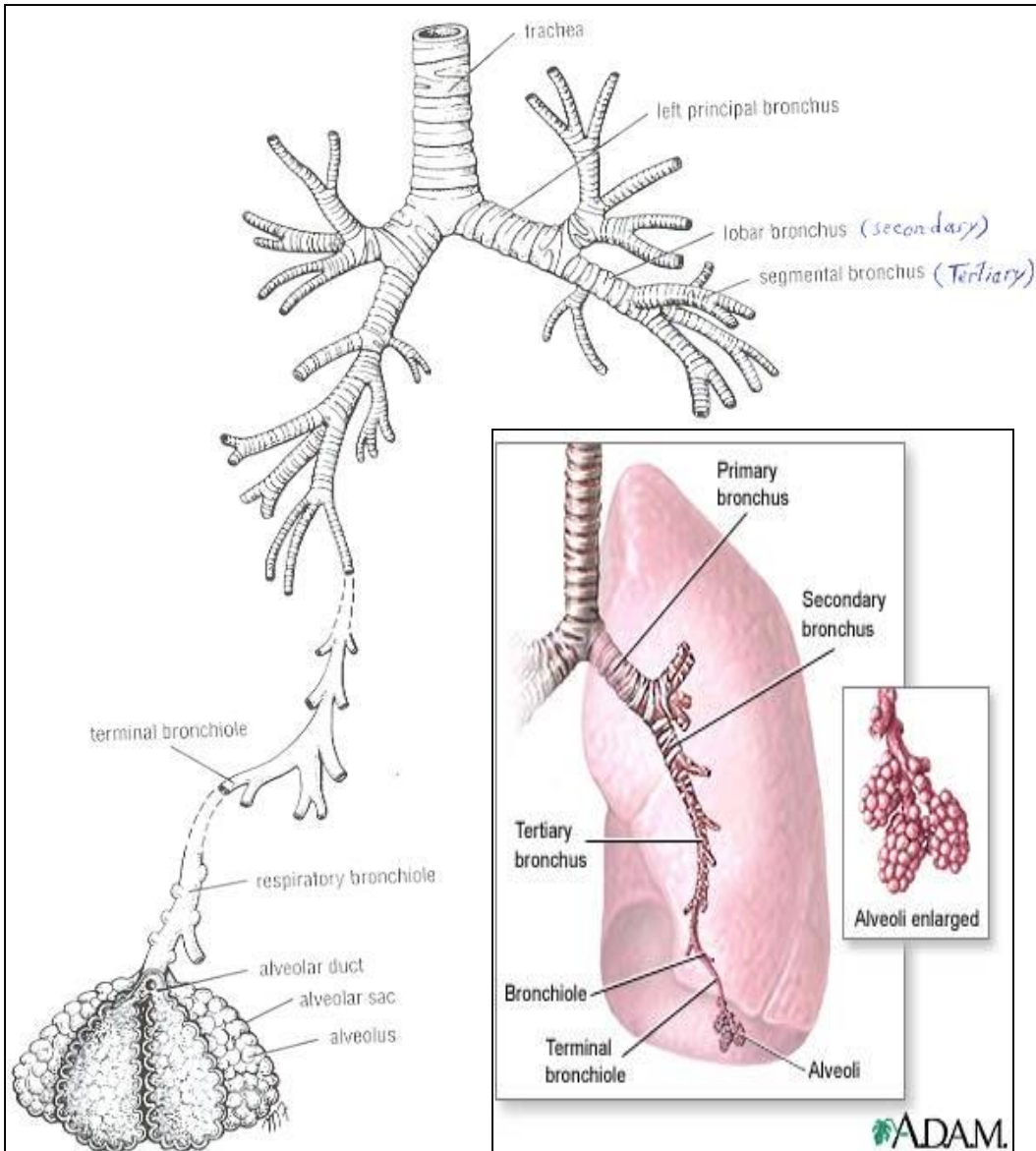
Action: Broncho-constriction and secretomotor to bronchial glands /and vasodilatation.

Bronchi



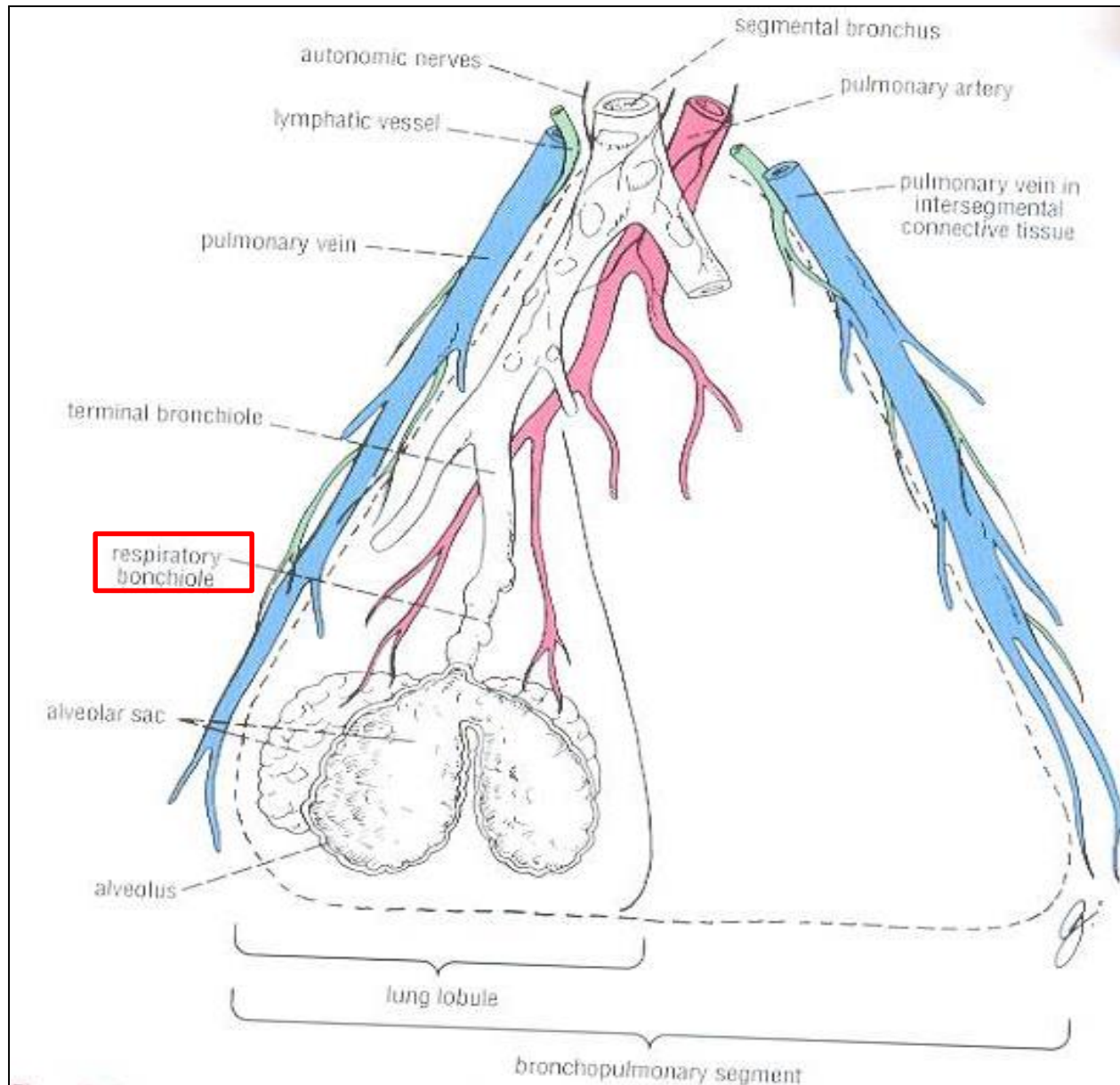
- The trachea divides into 2 main bronchi:
- Right main bronchus: which divides before entering the hilum, it gives: superior lobar (secondary) bronchus. On entering hilum, it divides into middle & inferior lobar bronchi.
- Left main bronchus: On entering hilum, it divides into superior & inferior lobar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

Bronchopulmonary segments



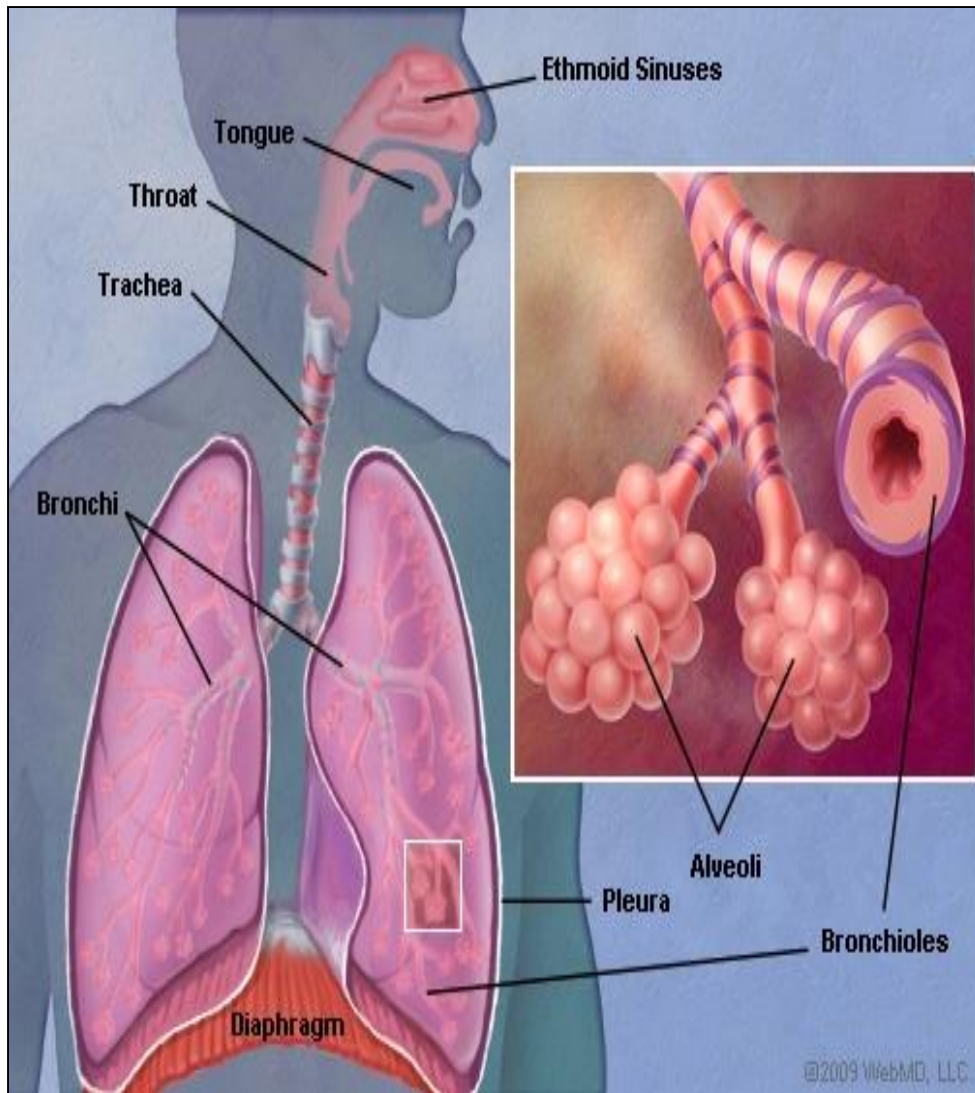
- These are the anatomical, functional, and surgical units of the lungs.
- Each lobar (secondary) bronchus gives segmental (tertiary) bronchi.
- Each segmental bronchus divides repeatedly into bronchioles.
- Bronchioles divide into terminal bronchioles, which show delicate outpouchings 'the respiratory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

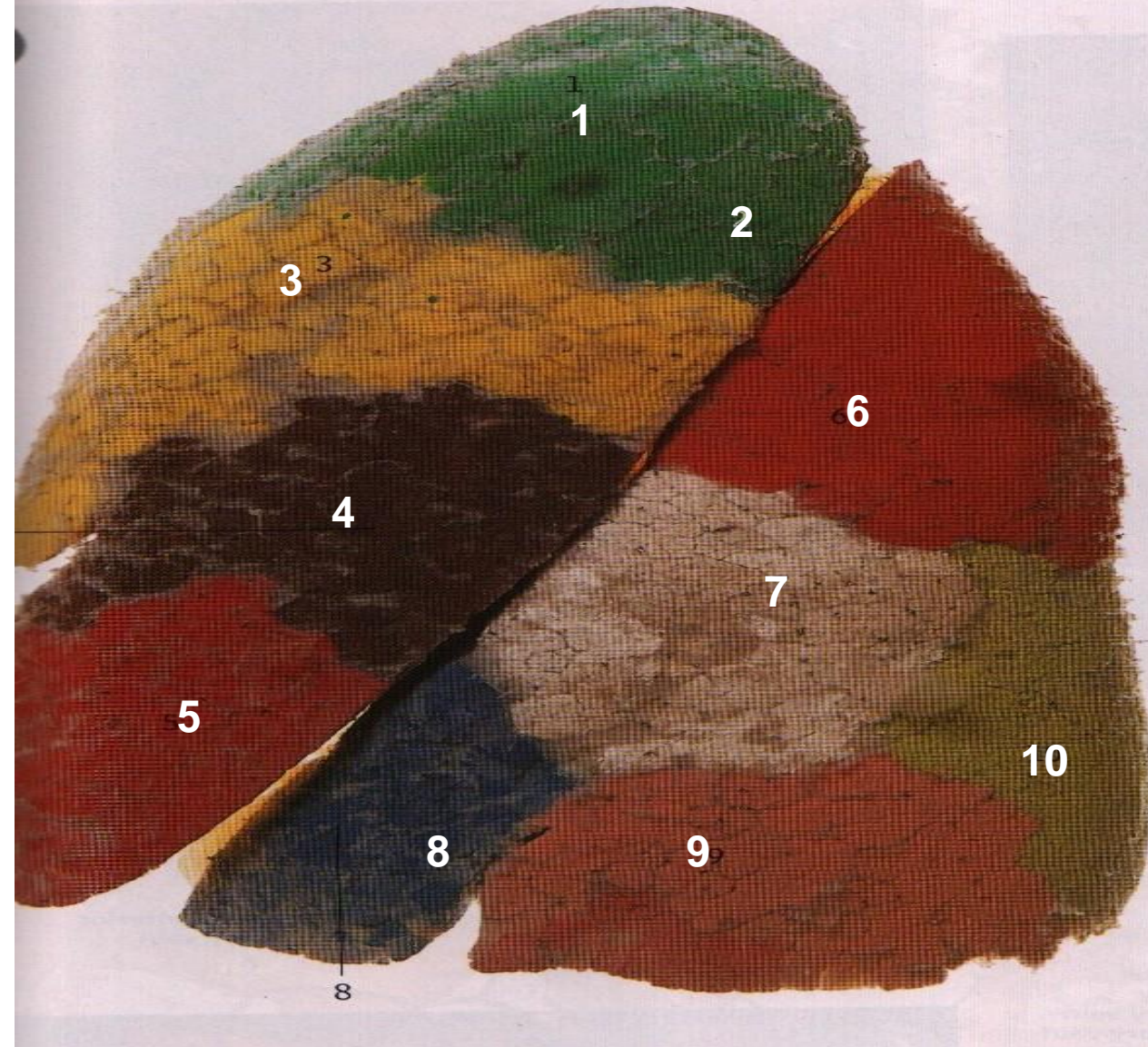
Bronchopulmonary segments



- **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.

Bronchopulmonary segments of the left lung from the lateral side

Left bronchogram



Superior lobe

- 1 Apical
- 2 Posterior
- 3 Anterior
- 4 Superior lingular
- 5 Inferior lingular

Inferior lobe

- 6 Apical (superior)
- 7 Medial basal (cardiac)
- 8 Anterior basal
- 9 Lateral basal
- 10 Posterior basal

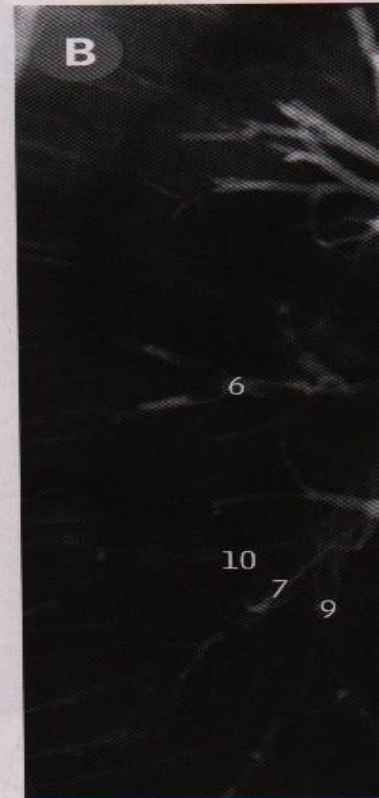
Bronchopulmonary segments of the right lung *from the lateral side*

Right bronch

A



B



Superior lobe

- 1 Apical
- 2 Posterior
- 3 Anterior

Middle lobe

- 4 Lateral
- 5 Medial

Inferior lobe

- 6 Apical (superior)
- 7 Medial basal
- 8 Anterior basal
- 9 Lateral basal
- 10 Posterior basal

THANK YOU

A 3D perspective rendering of the text "THANK YOU". The letters are rendered in a bold, sans-serif font. The color of the letters transitions from a bright yellow on the top surfaces to a deep orange on the sides and bottom surfaces. The text is positioned on a flat, orange-brown surface that recedes into the distance, creating a strong sense of depth and perspective. The background is plain white.