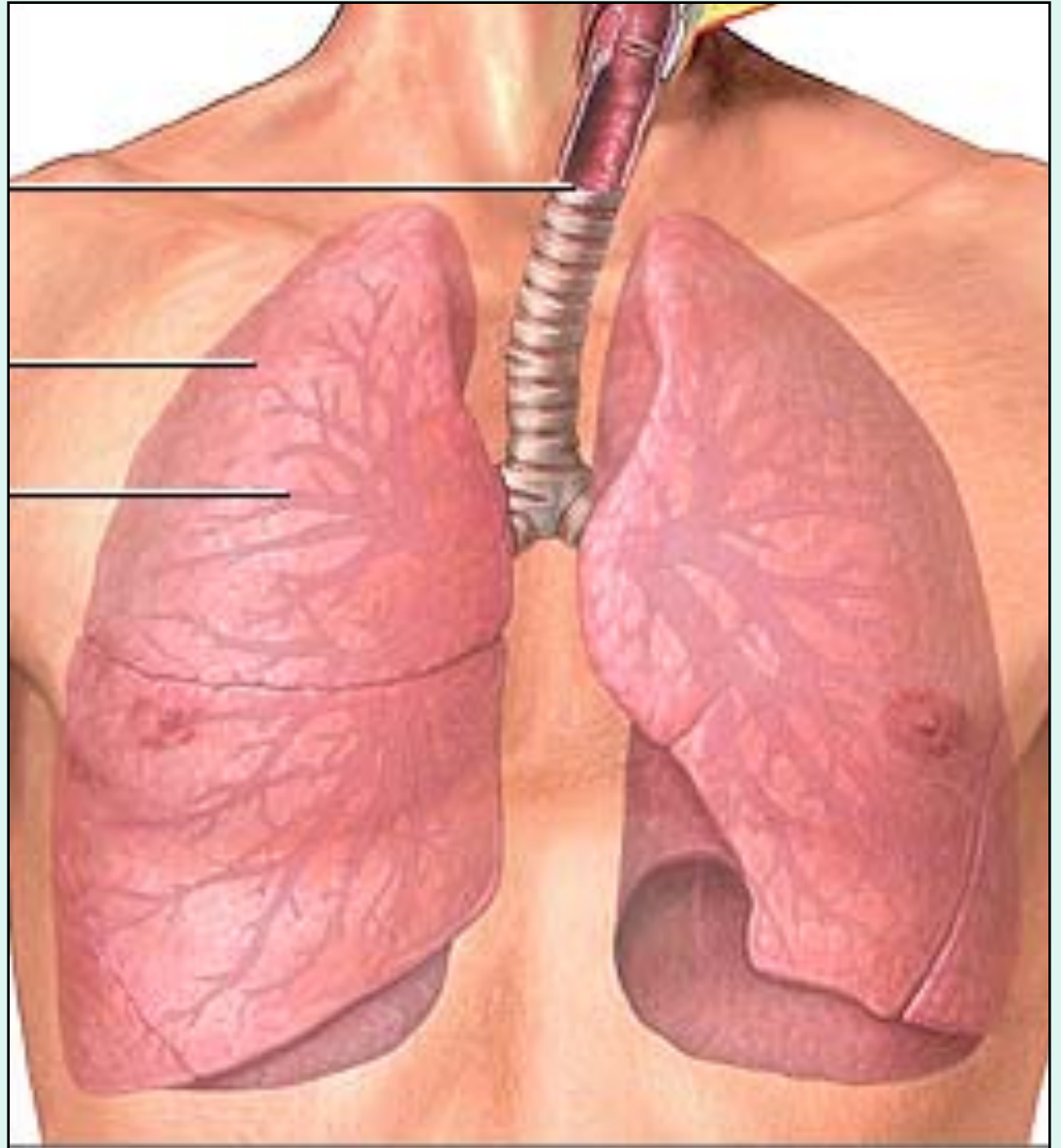


Pleura & Lung



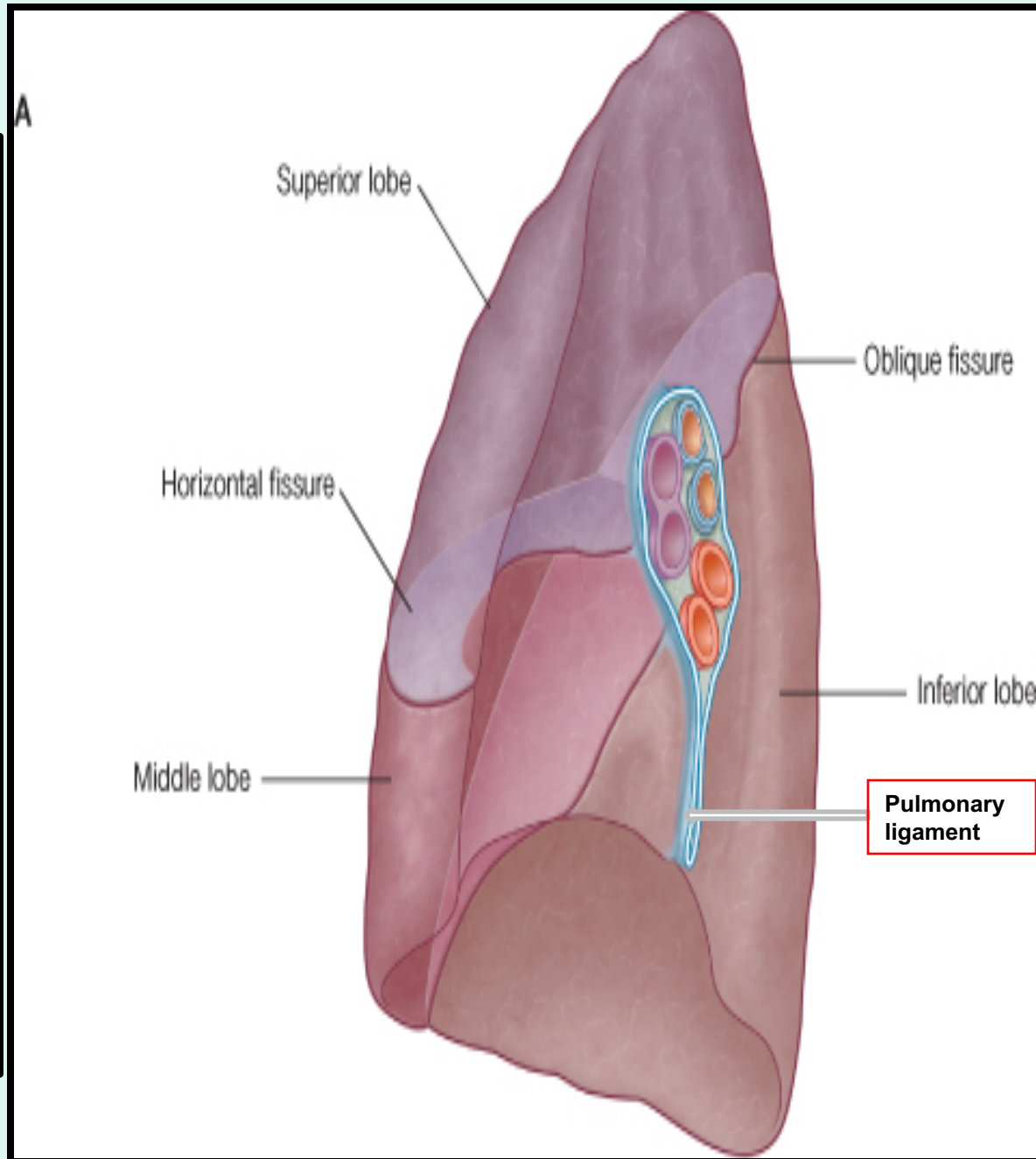
Objectives

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

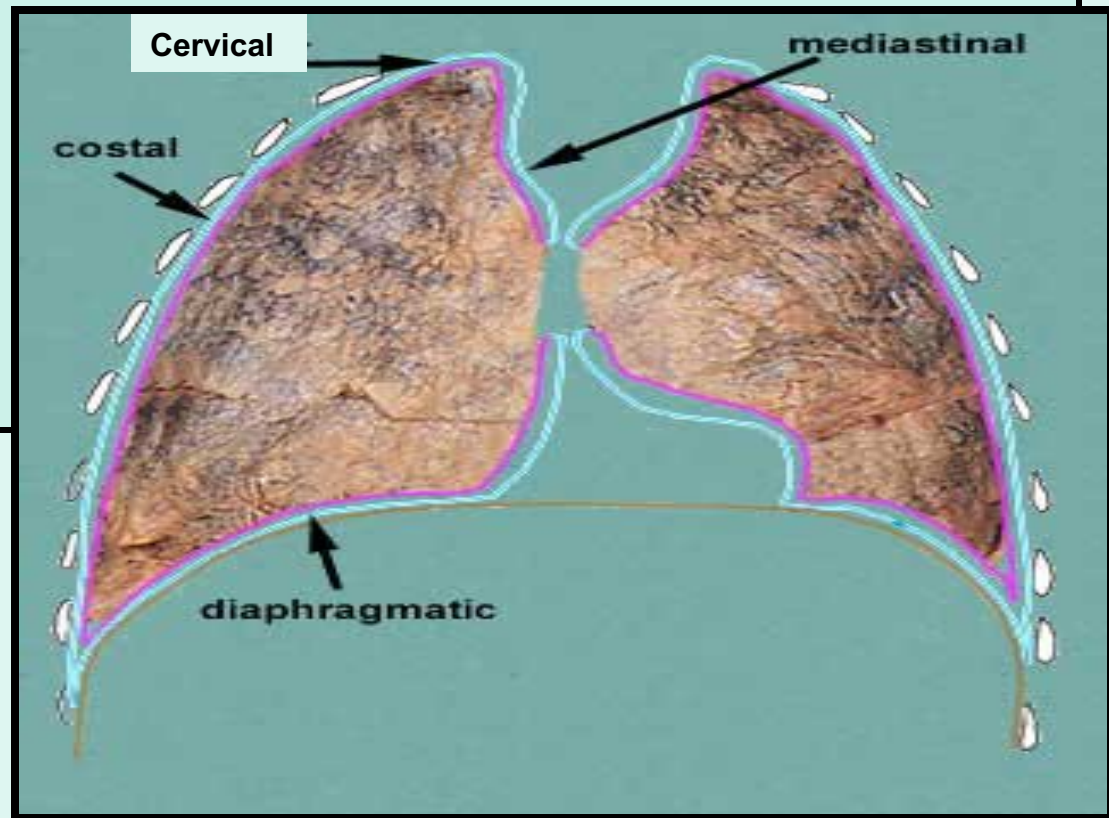
- Double-layered serous membrane enclosing the lung.
- Has two layers:
 - **Parietal layer**, which lines the thoracic walls.
 - **Visceral layer**, which covers the surfaces of the lung.
- The two layers **continue** with each other **around** the **root of the lung**, where it forms a loose cuff hanging 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:

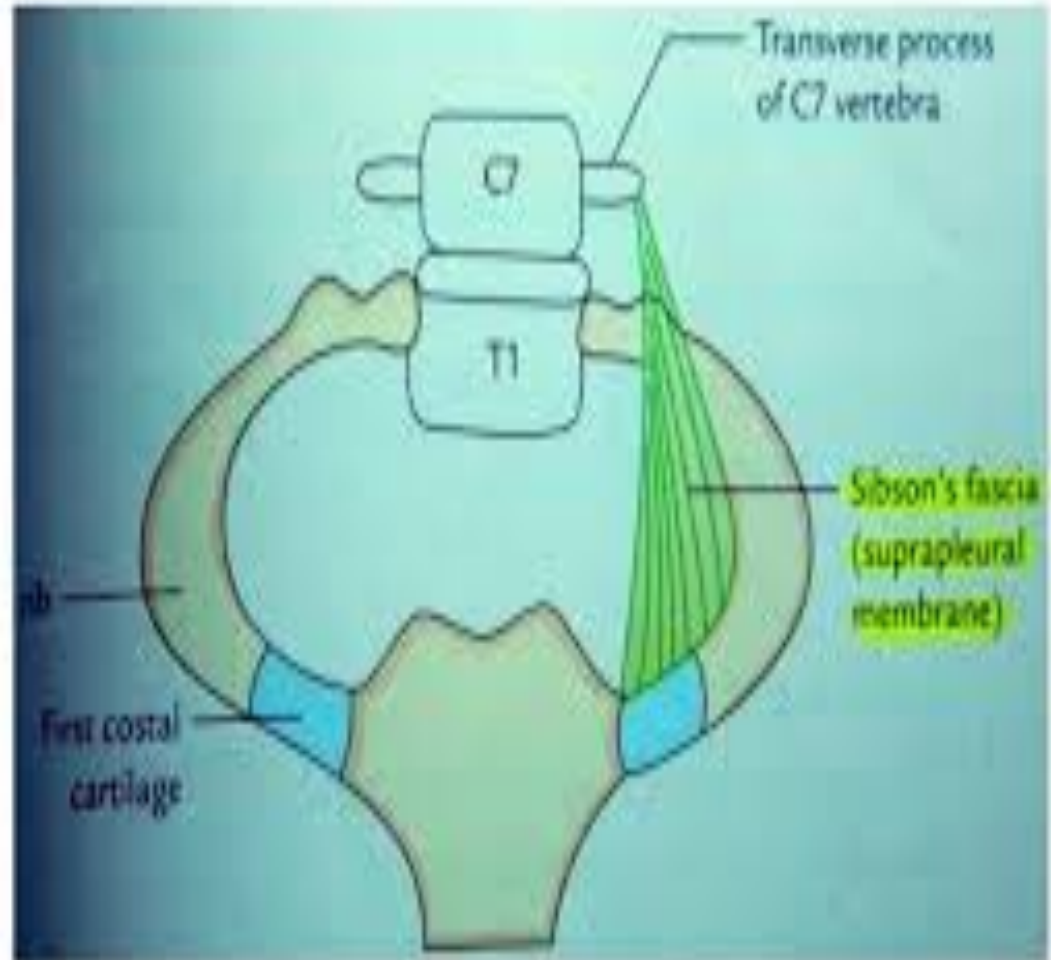
- 1- Cervical
- 2- Costal
- 3- Mediastinal
- 4- Diaphragmatic



Parietal Pleura

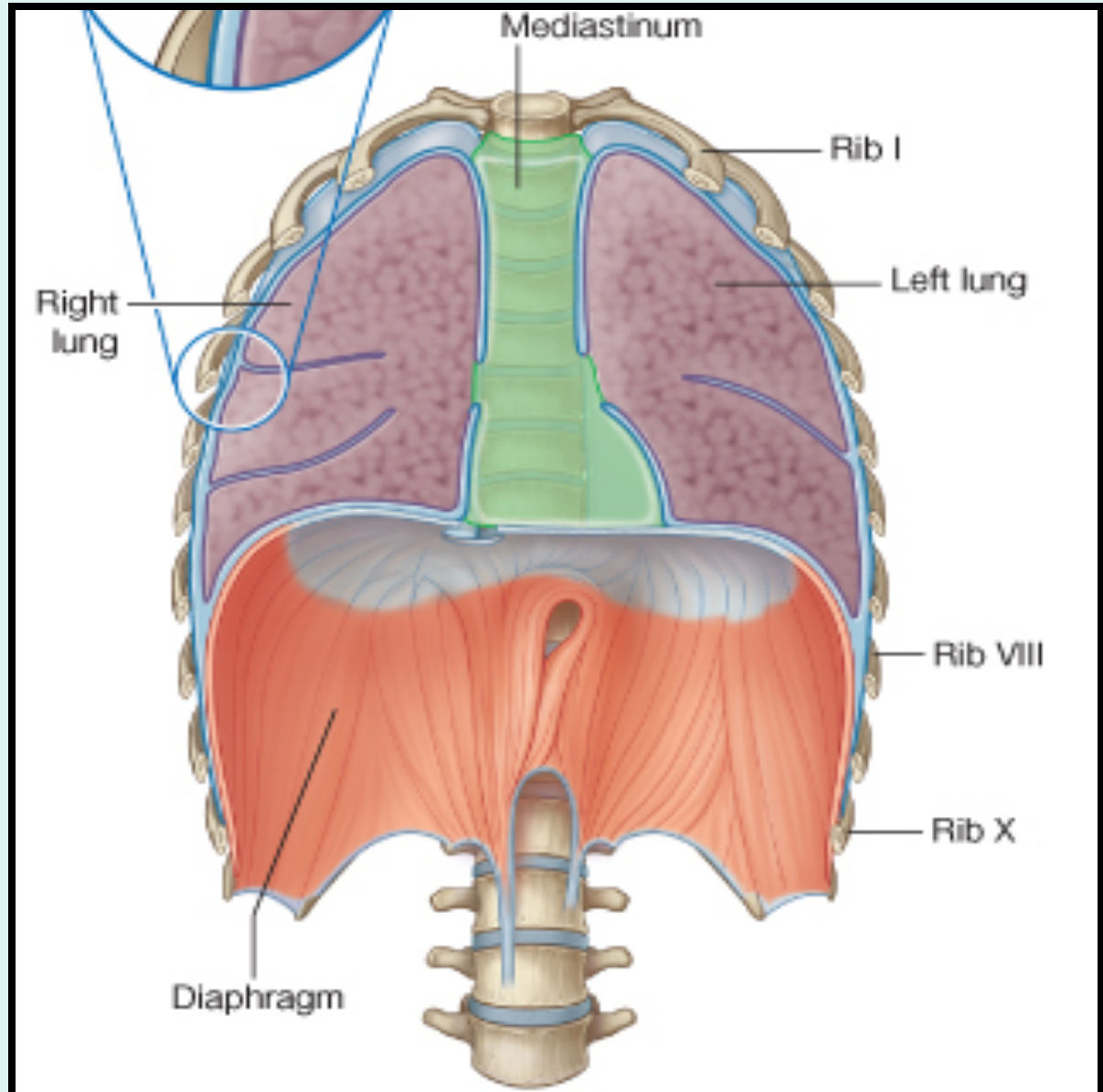
- **Cervical Pleura:**
- Projects up into the neck about one inch above the medial 1/3rd of clavicle.
- **It lines** the under surface of **the suprapleural membrane.**
- **Costal pleura:**
- **lines**, the back of the:
 - Sternum,
 - Ribs & costal cartilages,
 - Intercostal spaces &
 - Sides of vertebral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



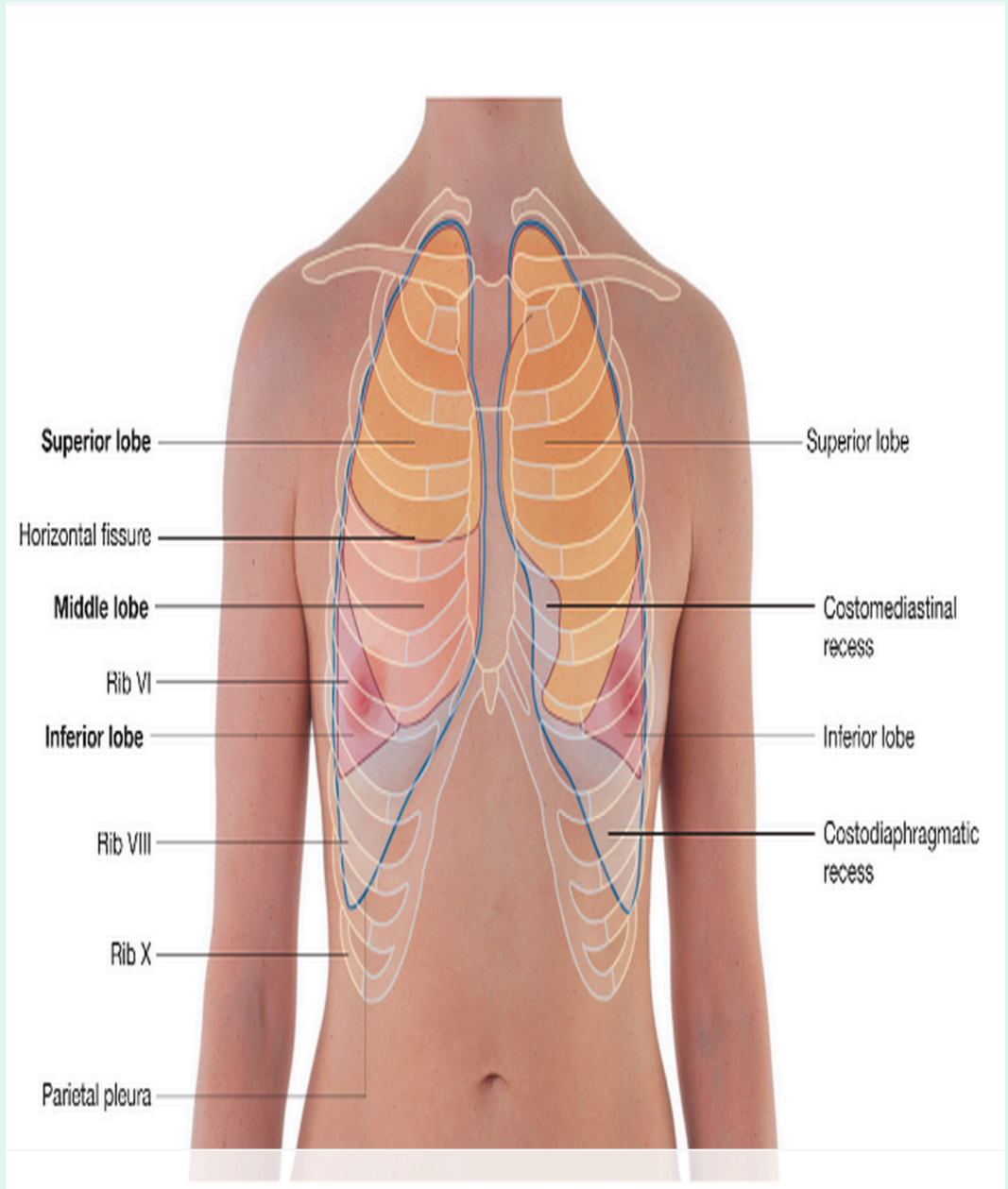
Pleural Recesses

Costodiaphragmatic:

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

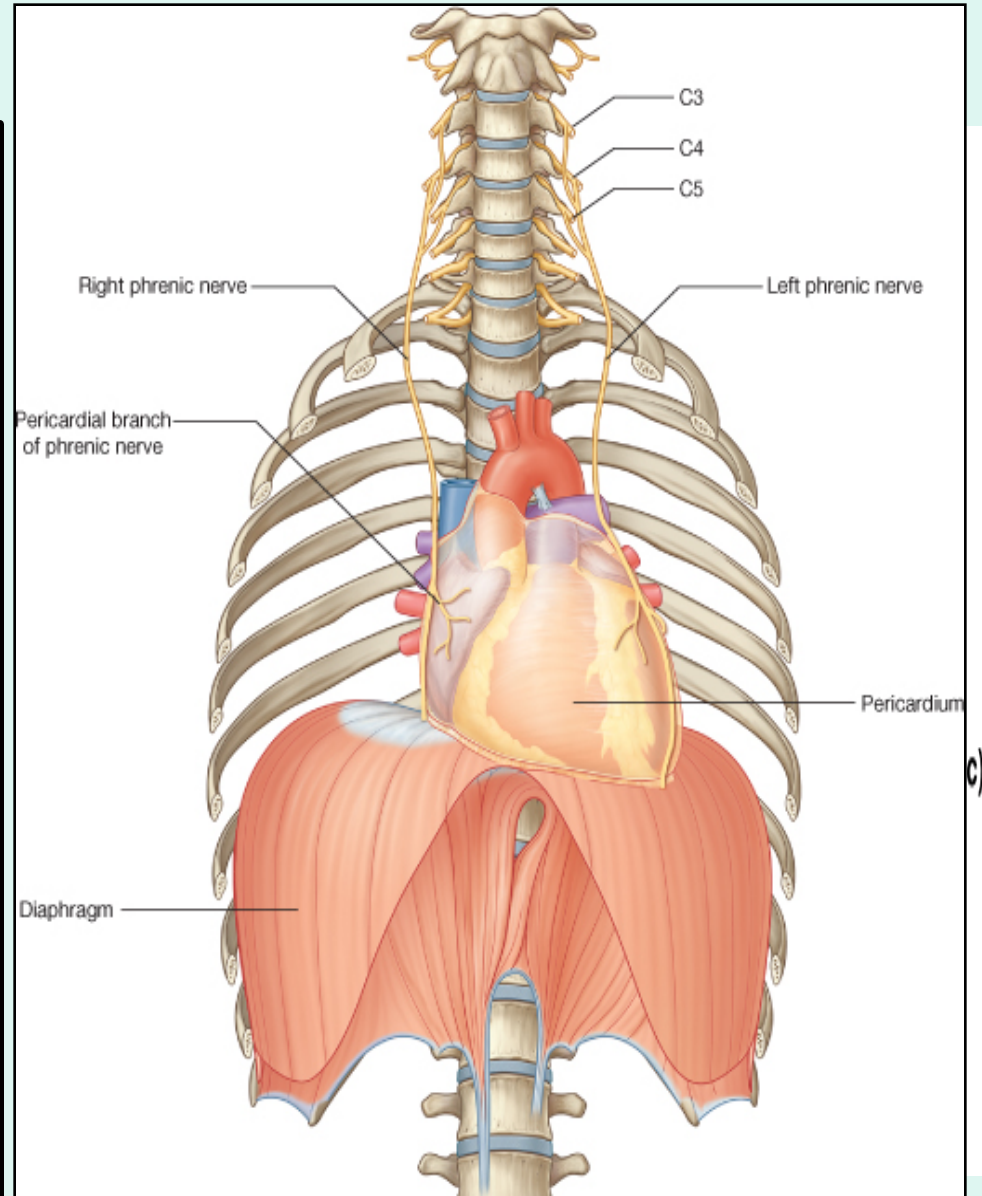
Costomediastinal:

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

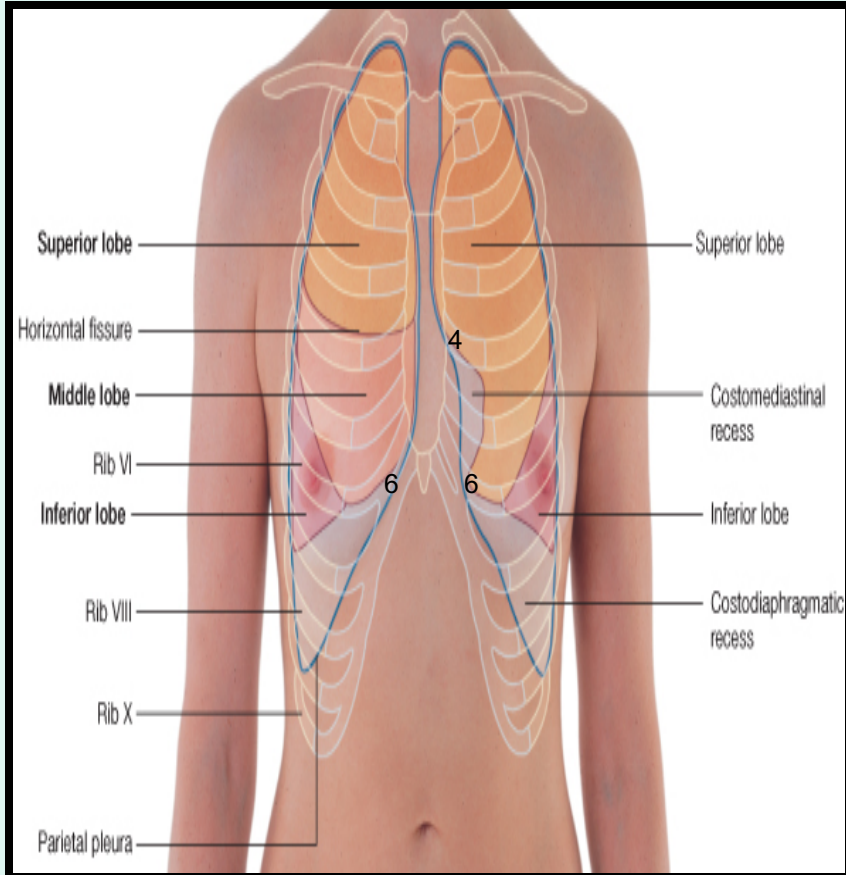


Pleura: Nerve Supply

- Parietal pleura:
- It is sensitive to **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 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**.

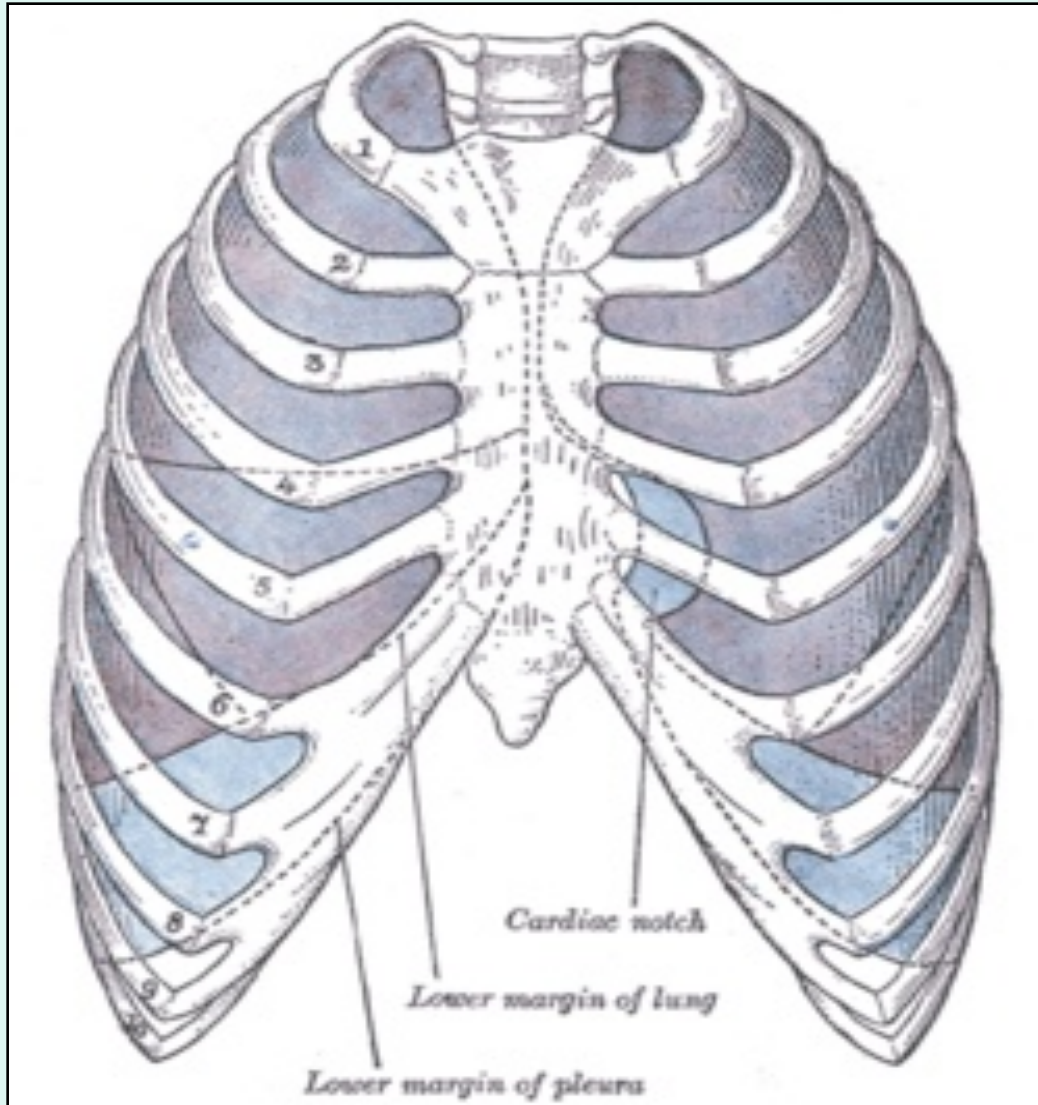


SURFACE ANATOMY OF PLEURA



- **Apex:** lies one inch above the medial 1/3 of the clavicle.
- **The anterior margin**
- **Right pleura:** extends vertically from **sterno-clavicular joint** to **xiphisternal joint (6th costal cartilage)**.
- **Left pleura:** Similar course but at the level the **4th costal cartilage** deviates laterally and extends to lateral margin of the sternum to form **cardiac notch** then **turns sharply downward** to **xiphisternal joint (6th costal cartilage)**.
- **Inferior margin :** passes around the chest wall, on the 8th rib in midclavicular line, 10th rib in **mid-axillary line** and finally reaching to 12th rib adjacent to vertebral column posteriorly (**T12 spine**).
- **Posterior margin :** along the vertebral column from the **apex (C7)** to the **inferior margin (T12 spine)**.

SURFACE ANATOMY OF LUNG



- **Apex, anterior border** correspond nearly to the lines of pleura but are slightly away from the median plane.
- **Inferior margin** : passes around the chest wall, on the 6th rib in midclavicular line, 8th rib in mid-axillary line and finally reaching to 10th rib adjacent to vertebral column posteriorly.
- as the pleura but more horizontally and finally reaching to the 10th thoracic spine.
- **Posterior margin** : along the **vertebral column** from the **apex (C7)** to the **inferior margin (T10 spine)**.

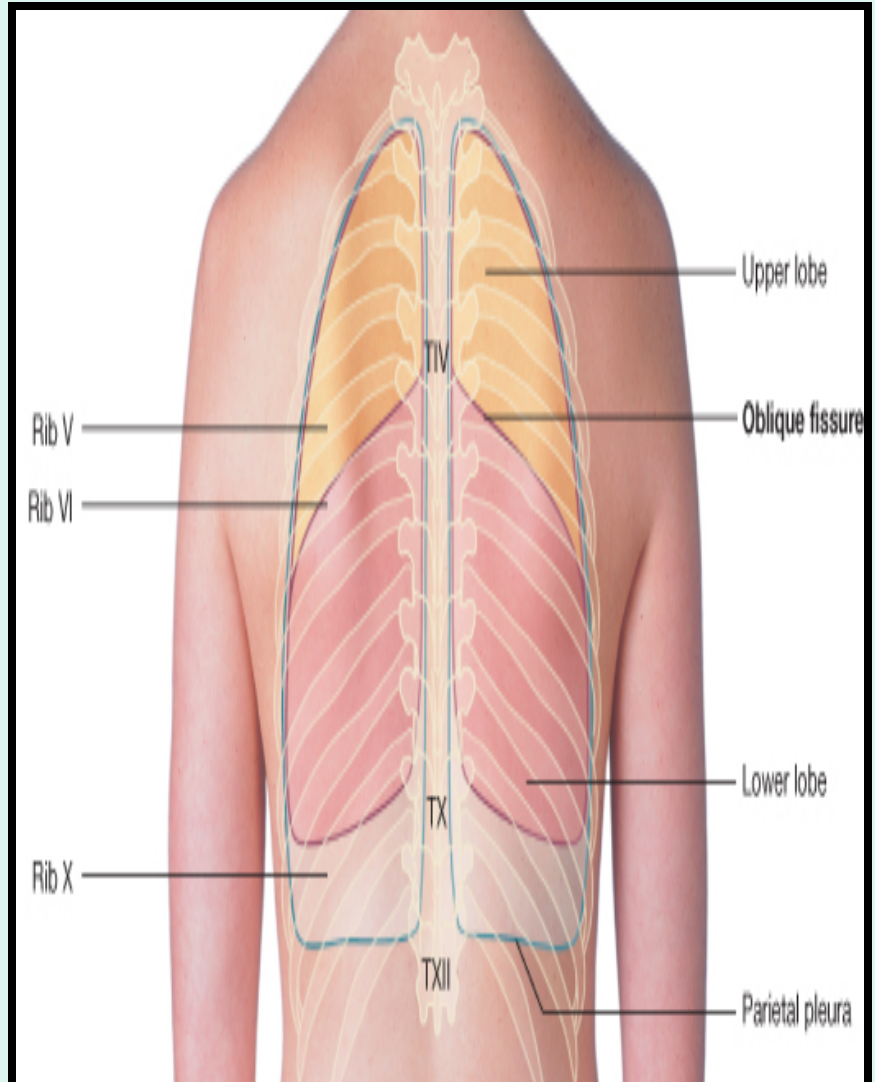
SURFACE ANATOMY OF LUNG

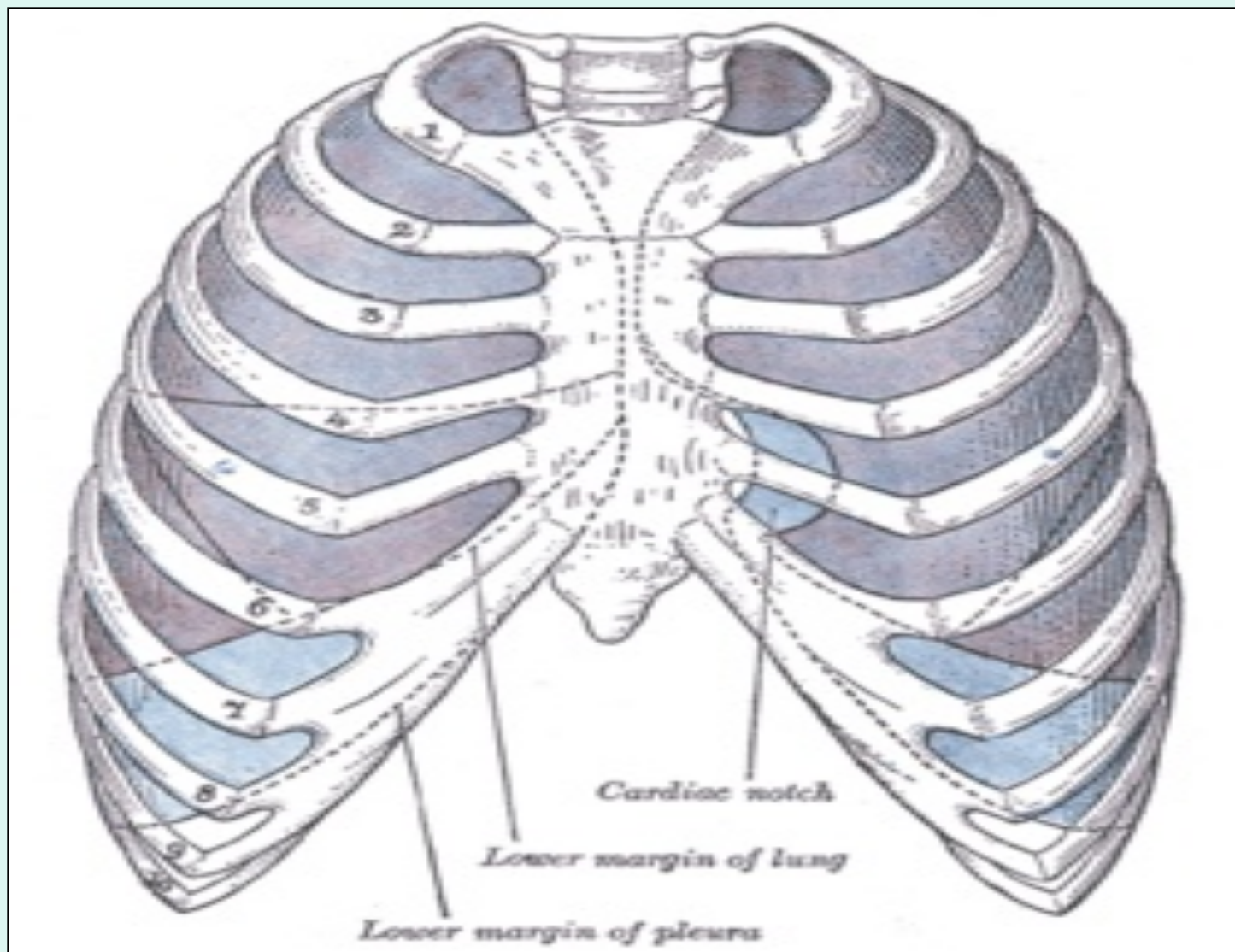
Oblique fissure:

- Represented by a line extending from 4th thoracic spine, obliquely ending at 6th costal cartilage.

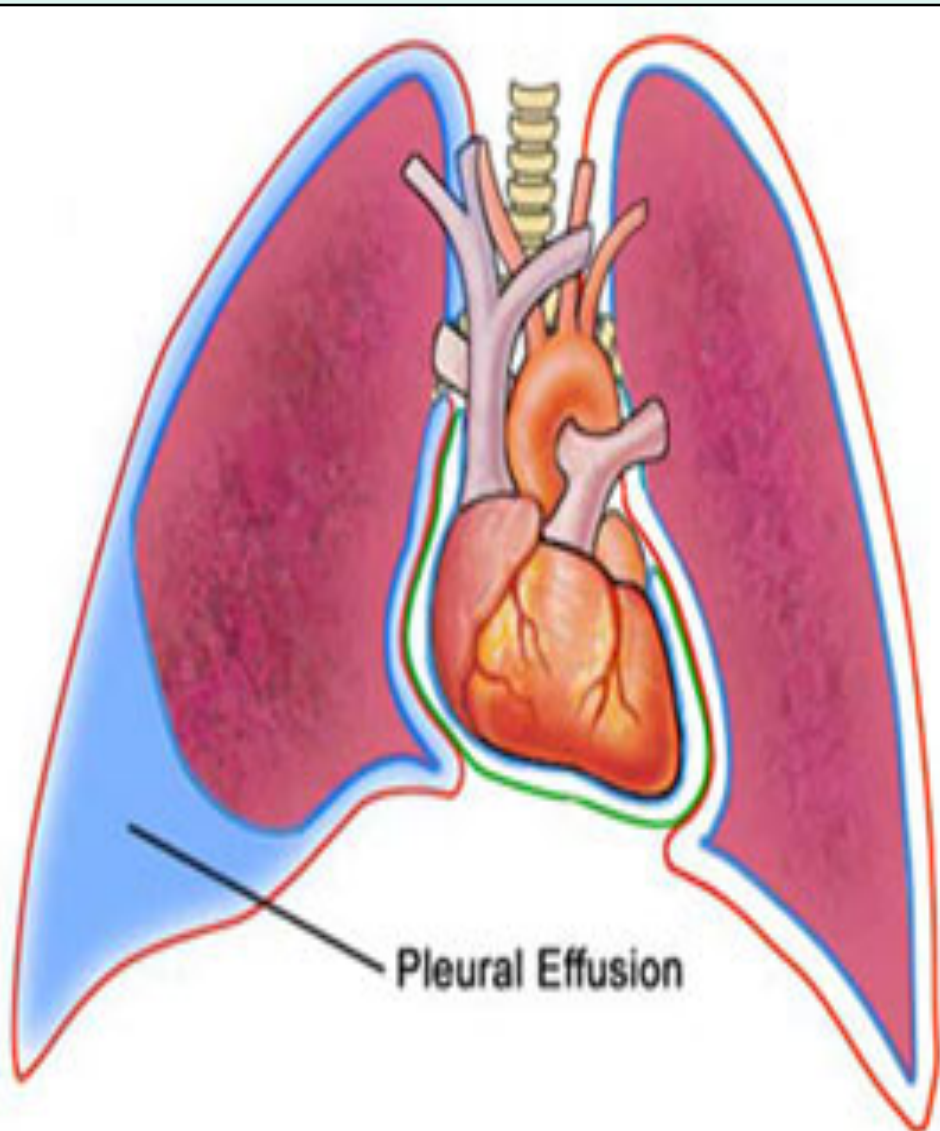
Transverse fissure: Only in the right lung:

represented by a line extending from 4th right costal cartilage to meet the oblique fissure.





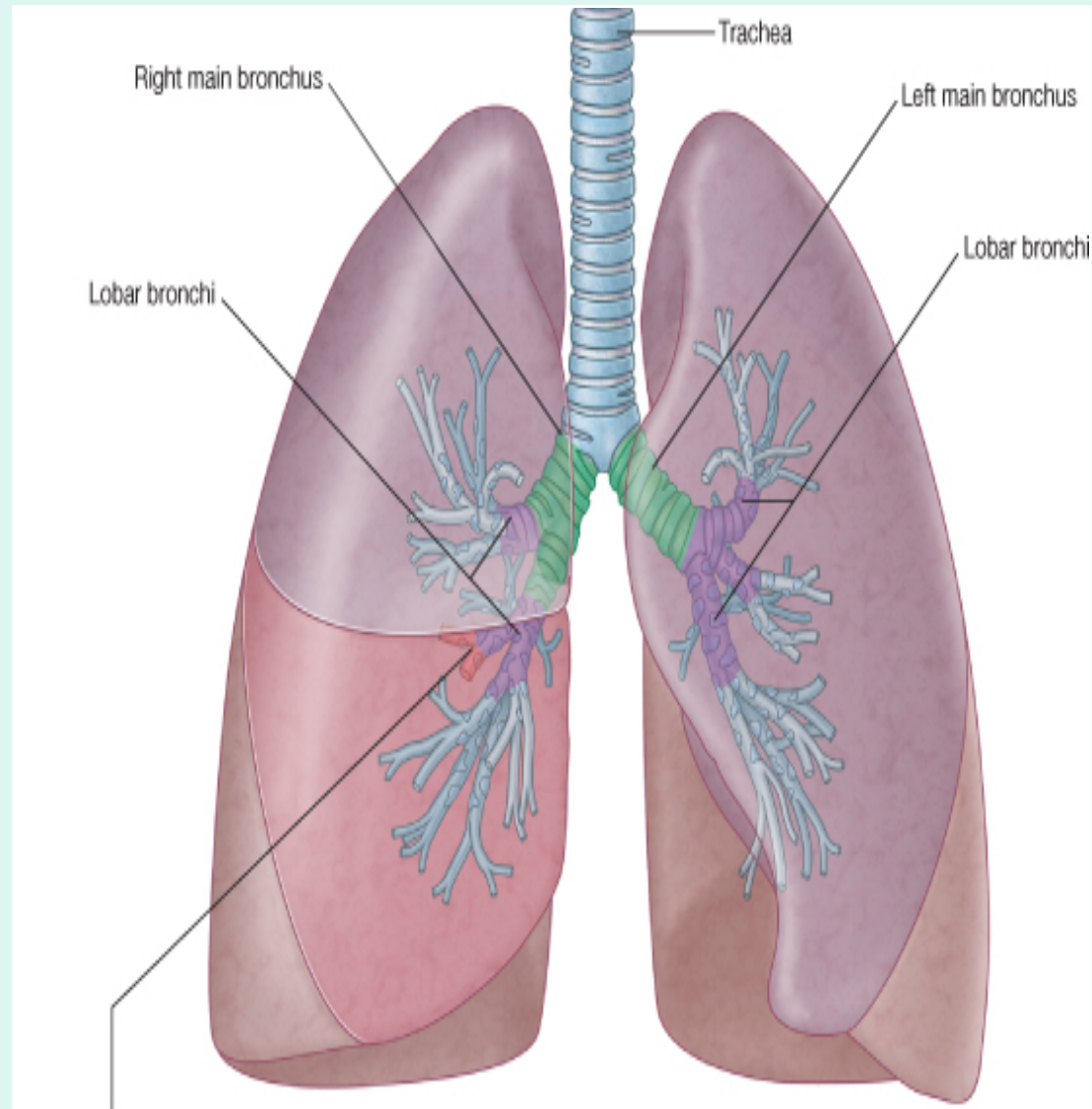
Pleural Effusion



- 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.

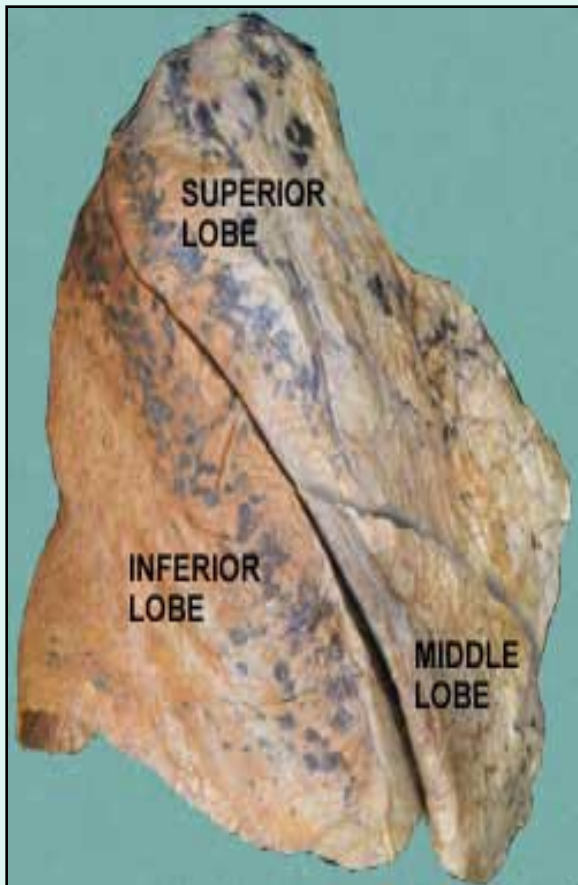
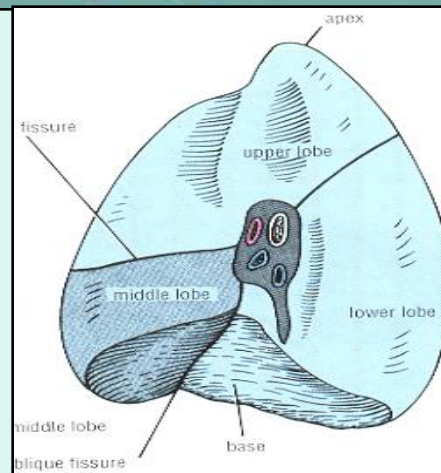
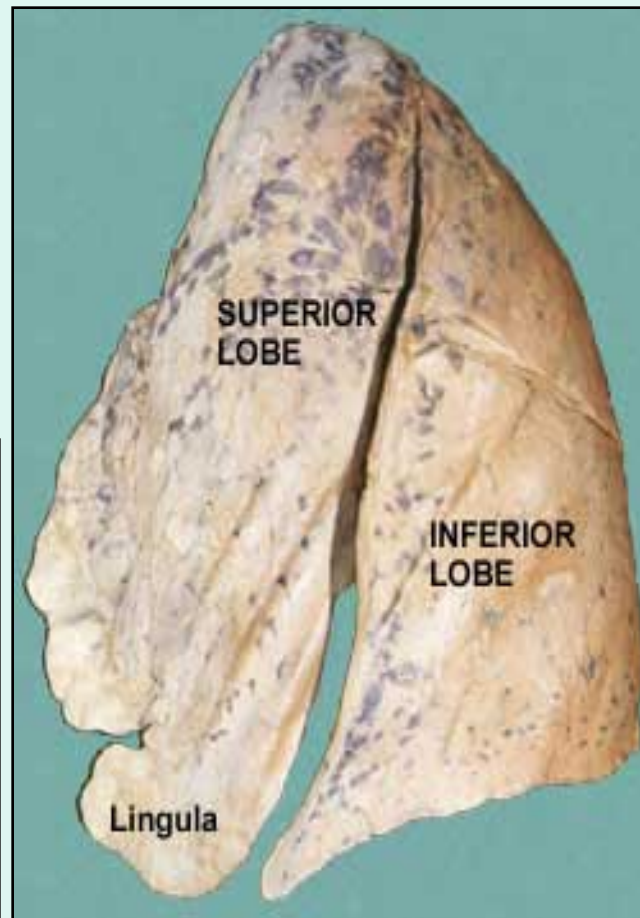
Lungs

- **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.**

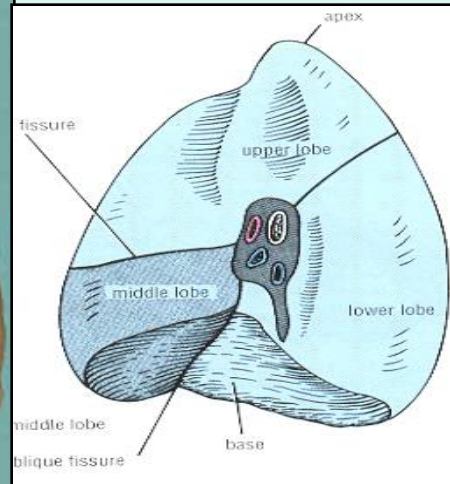
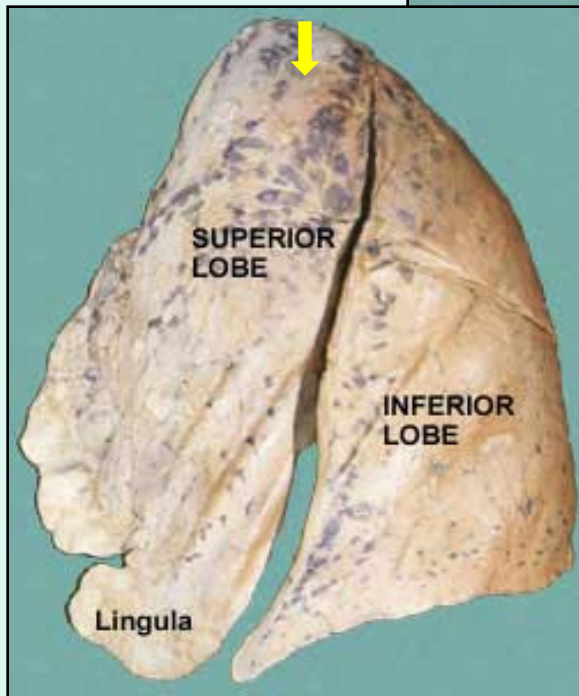
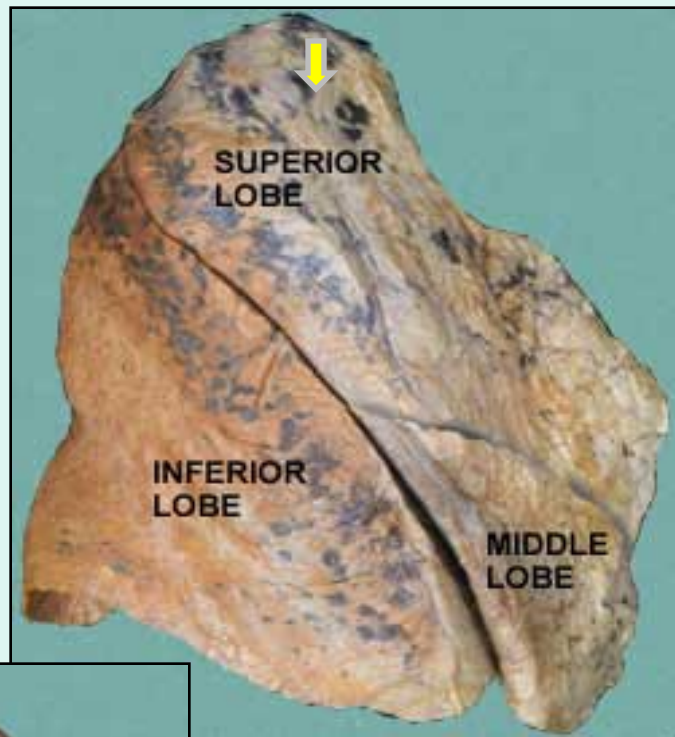


LUNGS

- Each lung has:
- **Apex and base:** identify the **top** and **bottom** of the lung, respectively.
- **Costal (lateral) surface:** surrounded by the **ribs** from front & back).
- **Medial (mediastinal) 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**.

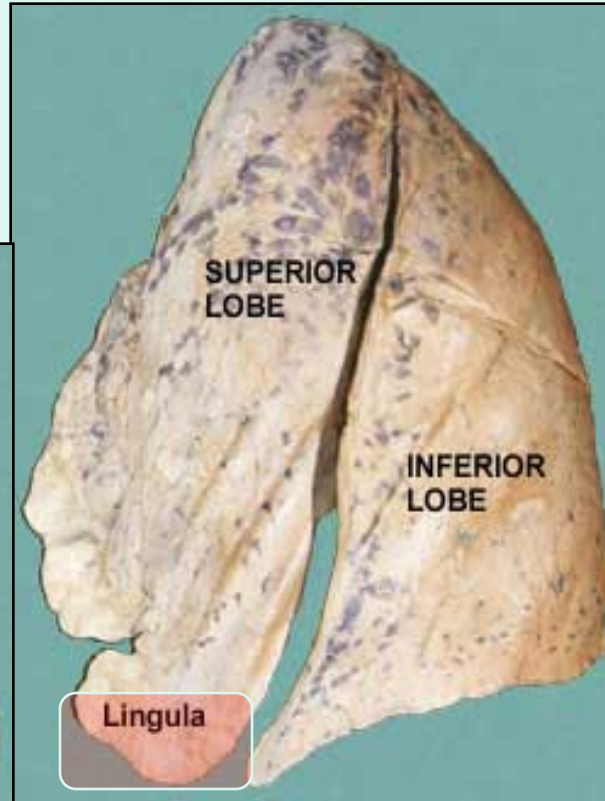
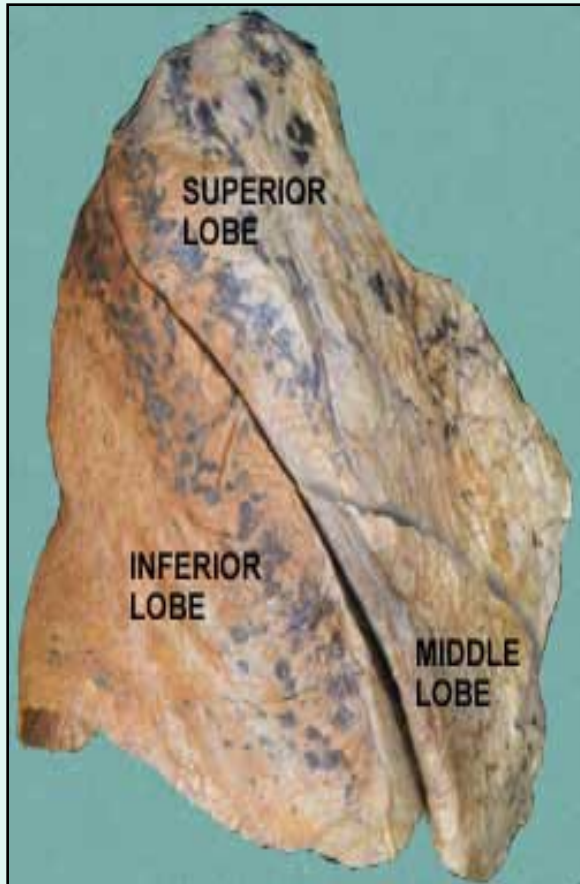


LUNGS



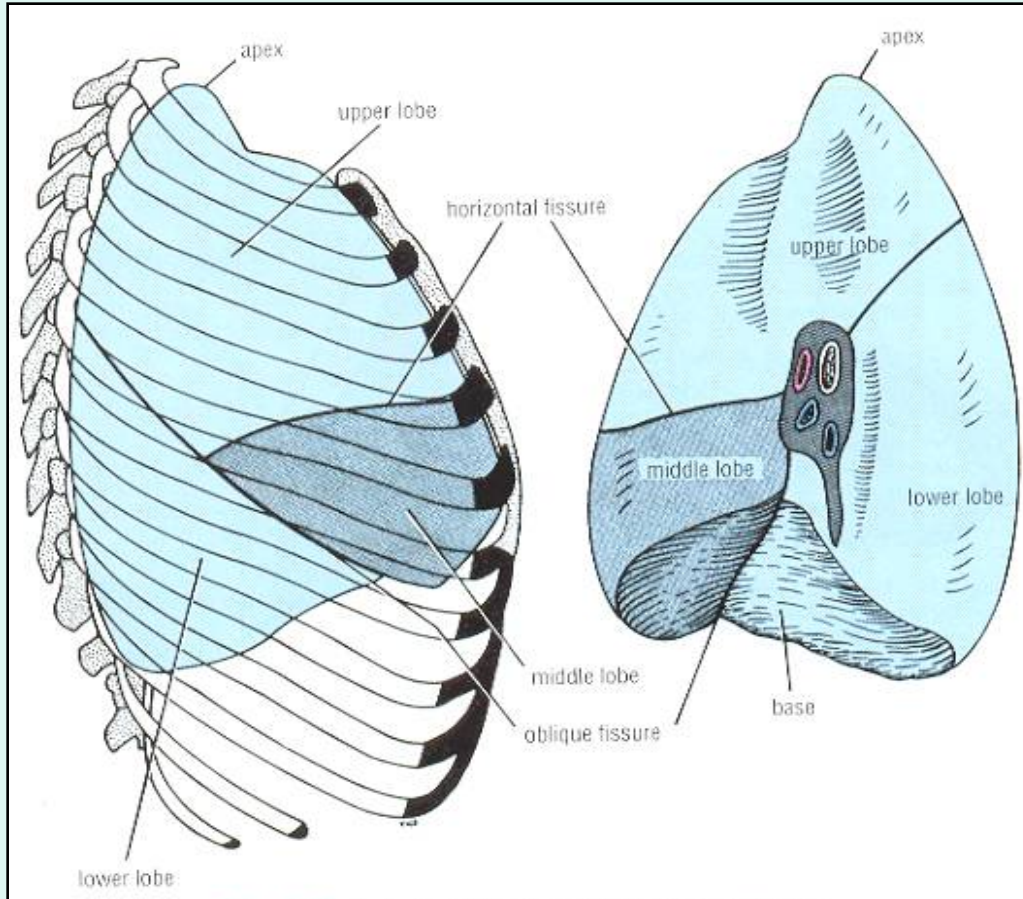
- Apex:
- Projects into the root of the neck
- (1 inch above medial 1/3 of clavicle).
- It is covered by cervical pleura.
- It is grooved anteriorly by subclavian artery.
- Base:
- inferior or diaphragmatic surface) is concave and rests on the diaphragm.

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.

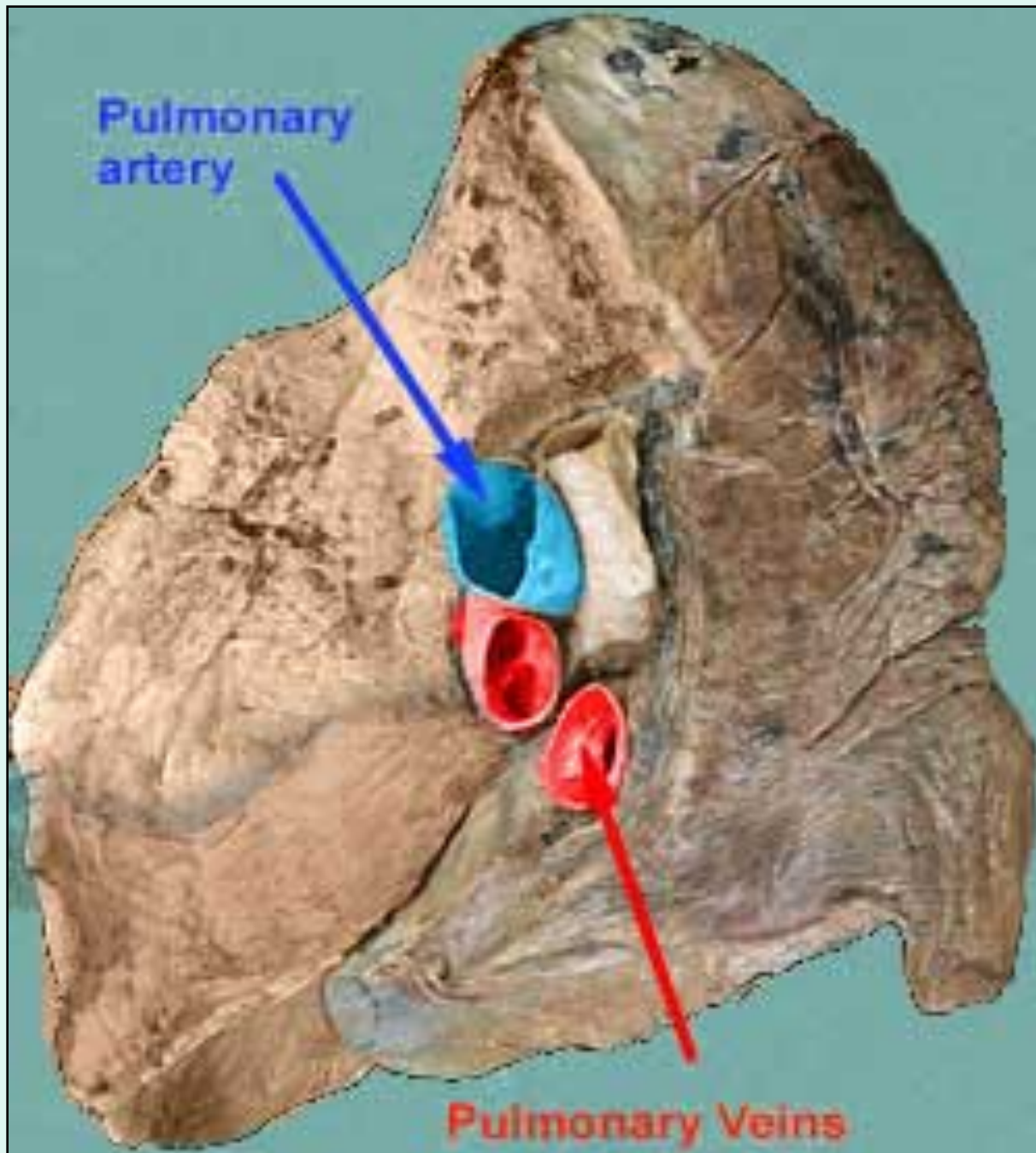
Surfaces: Costal & Mediastinal



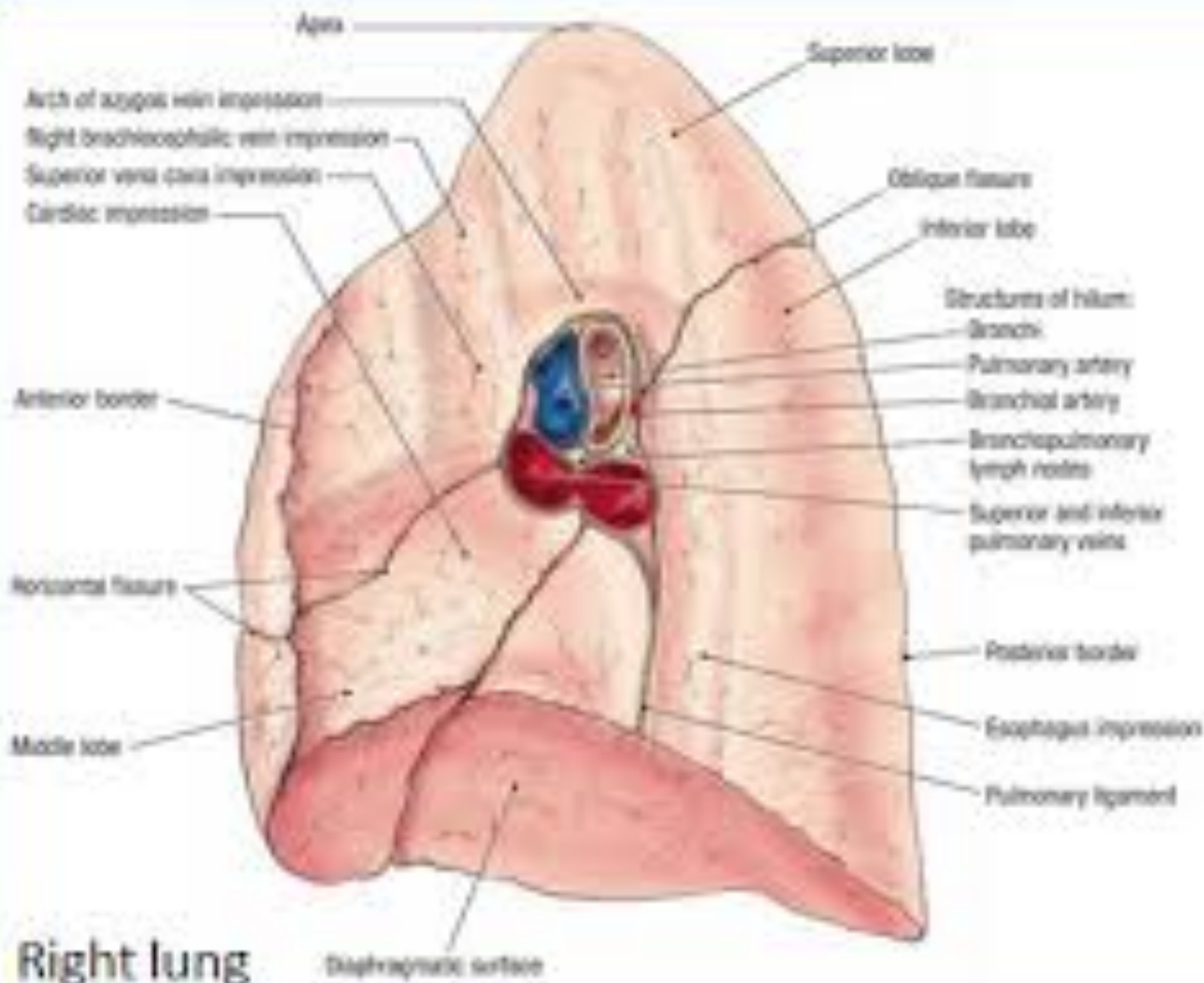
Lateral (costal) & medial surfaces of right lung

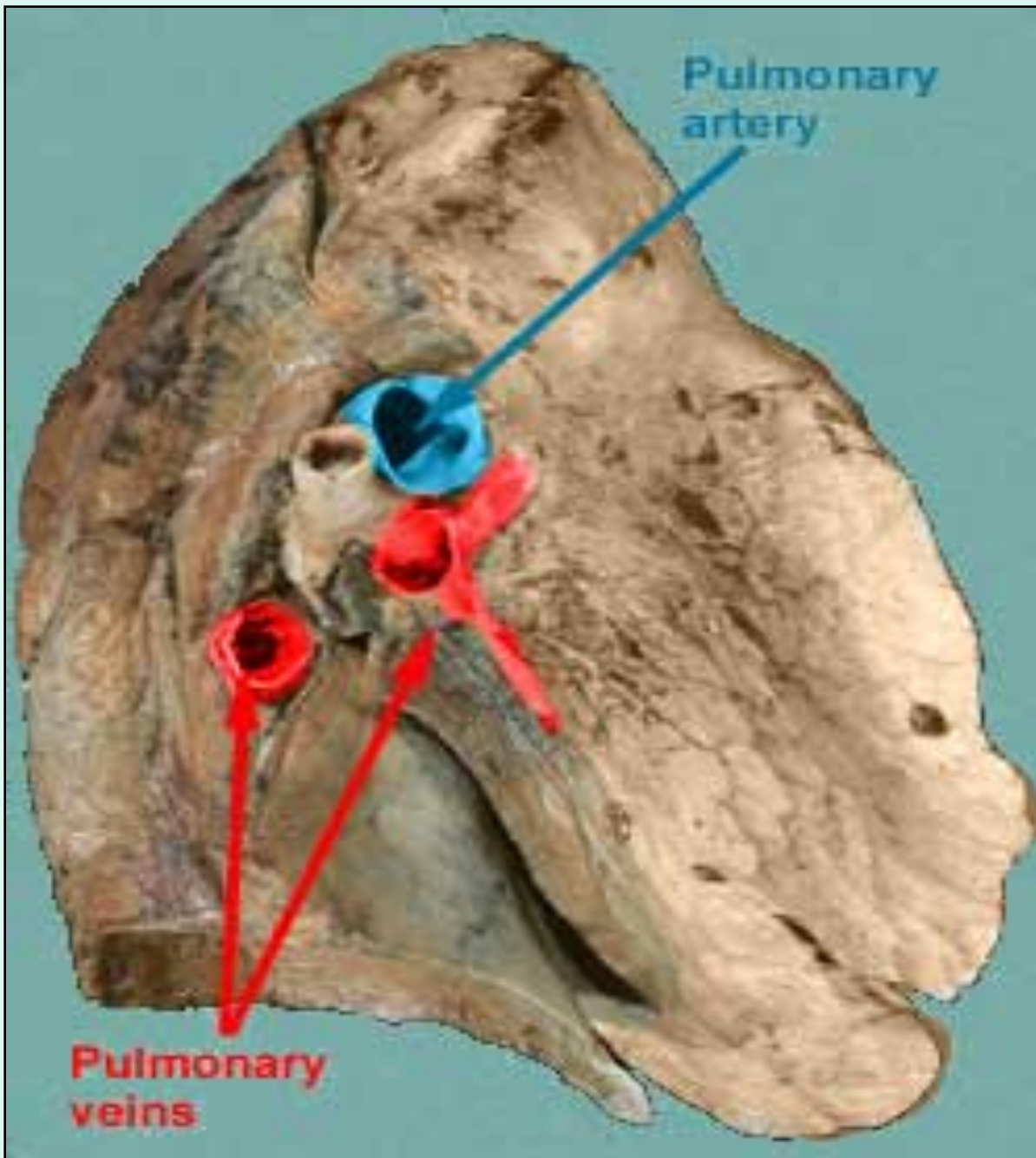
- **Costal surface:**
- Convex.
- Covered by costal pleura which separates lung from: ribs, costal cartilages & intercostal muscles.
- **Medial surface:**
- It is divided into 2 parts:
- **Anterior (mediastinal) part:**
- Contains a hilum in the middle (it is a depression in which bronchi, vessels, &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



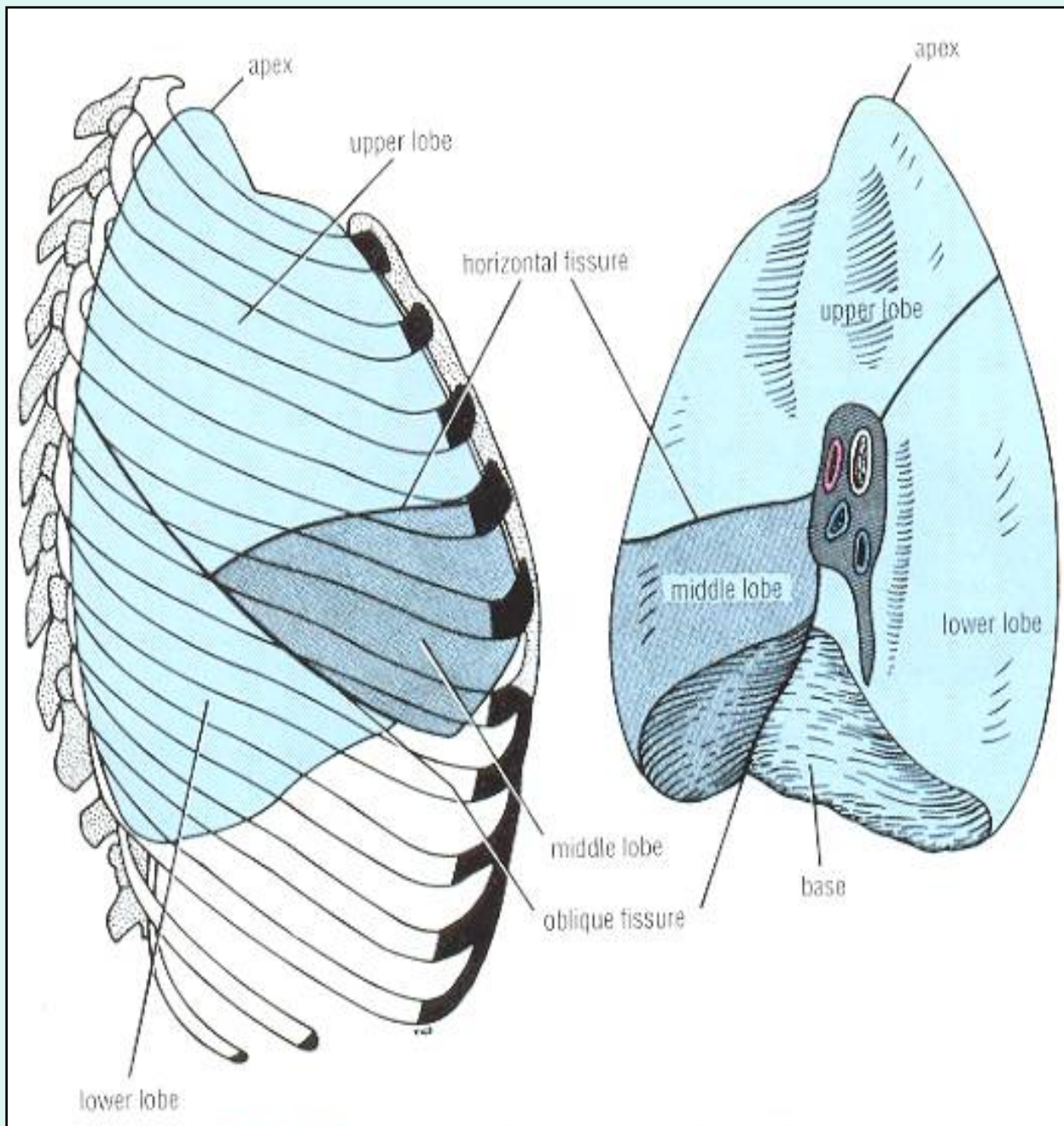
- **2 bronchi:**
- Lie posterior.
- **Pulmonary artery:**
- Is superior
- **Pulmonary veins:**
- Are inferior and anterior.





LEFT LUNG ROOT

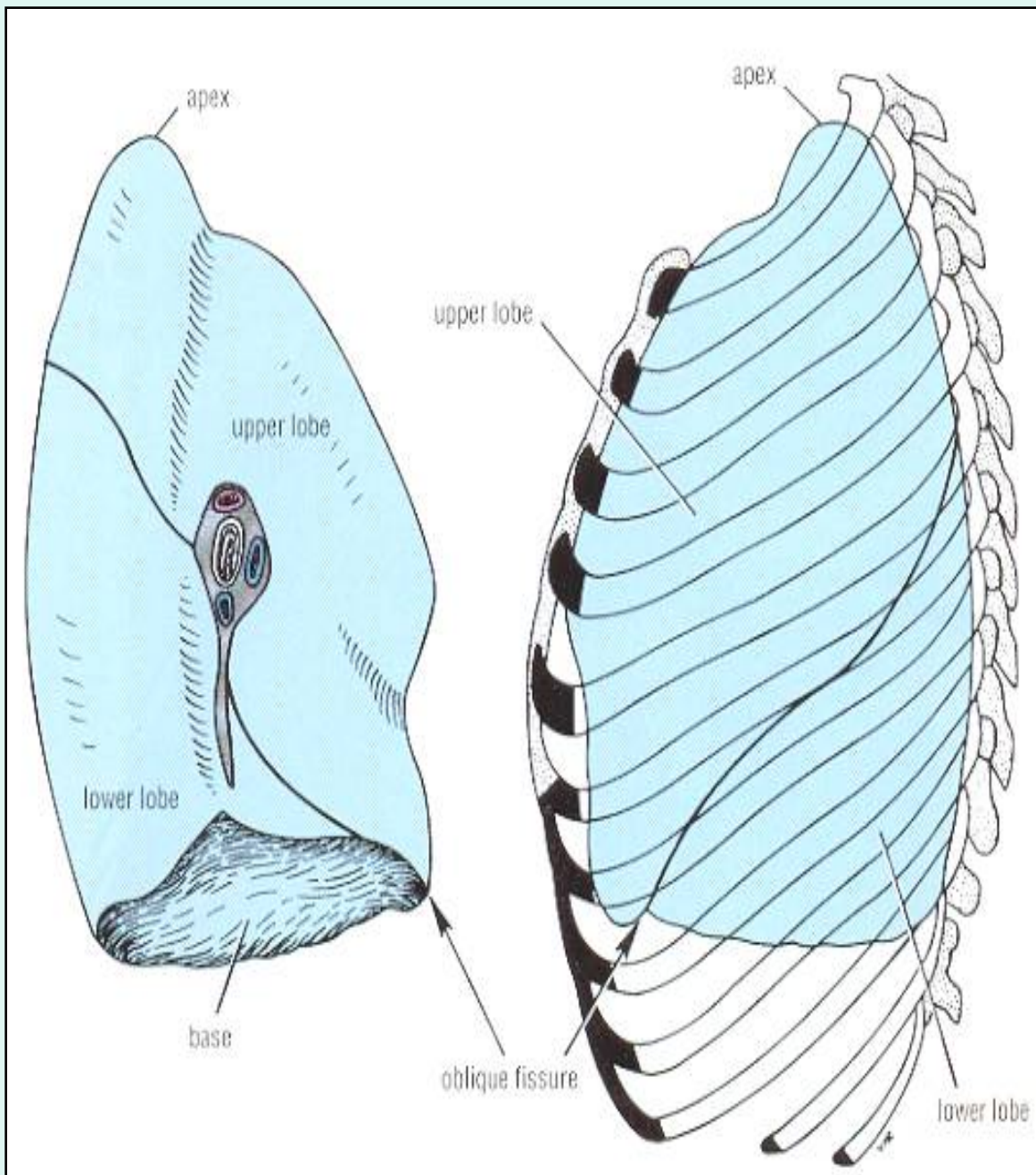
- **One bronchus:**
- Lies posterior
- **Pulmonary artery:**
- Is superior
- **Pulmonary veins:**
- Is inferior and anterior



Right lung

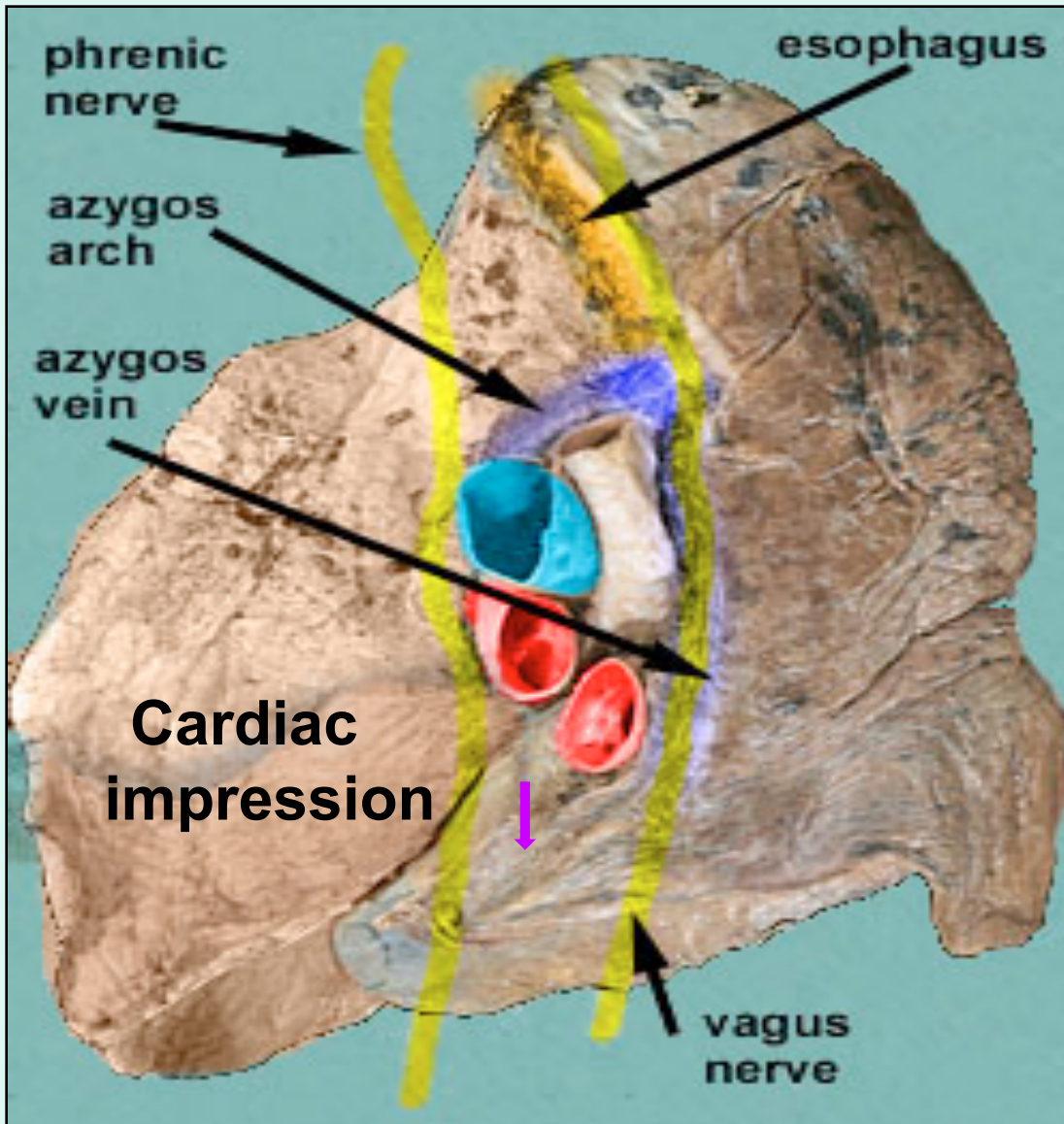
- **Larger & shorter** than left lung.
- Divided by **2 fissures** (**oblique & horizontal**) into **3 lobes** (upper, middle and lower lobes).

Left Lung



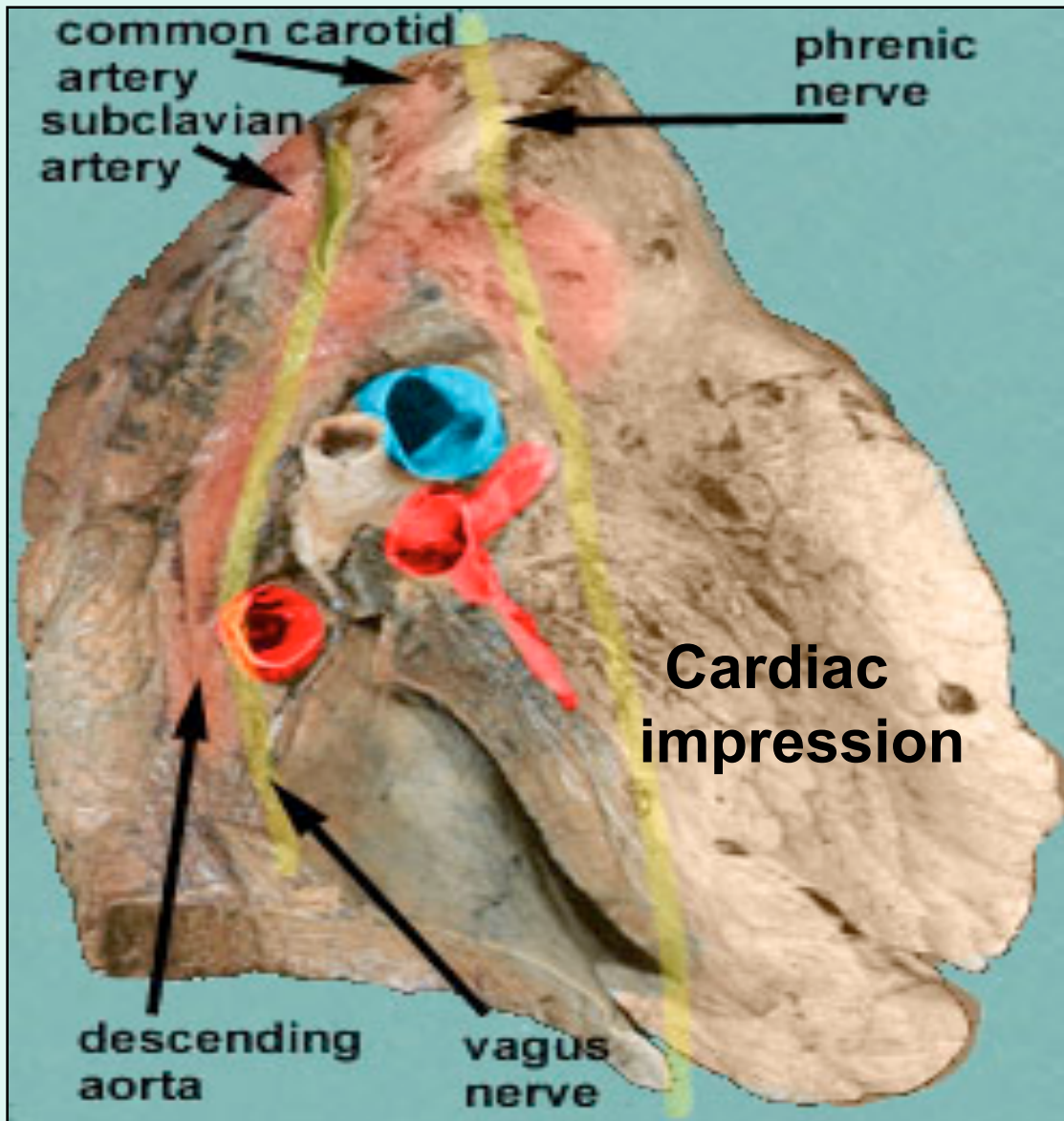
- Divided by **one oblique fissure** into **-2 lobes**, Upper and lower.
- There is **No** horizontal fissure.
- It has **a cardiac notch** at **lower part** of its **anterior border**.

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.
- Phrenic nerve anterior to the root of the lung.
- Cardiac impression: related to right atrium.
- Esophagus posterior to the root.
- Below hilum and in front of pulmonary ligament : groove for I.V.C.

Mediastinal surface of left lung



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

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

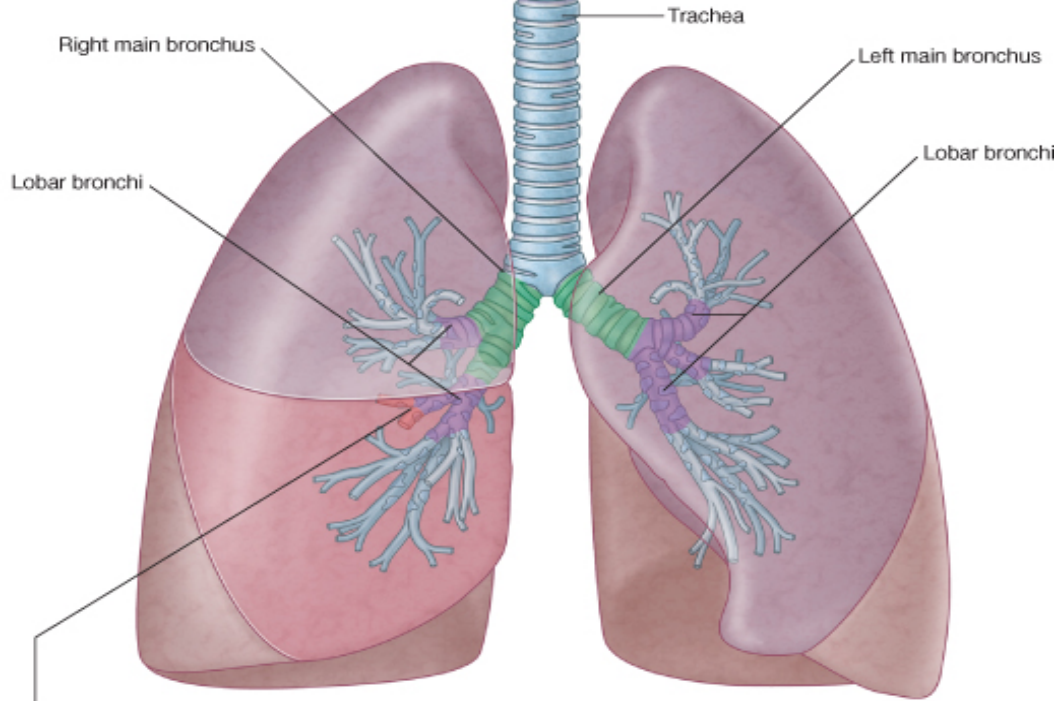
From ... *sympathetic trunk*...

Action: broncho-dilatation/and vasoconstriction.

2- Parasympathetic Fibers

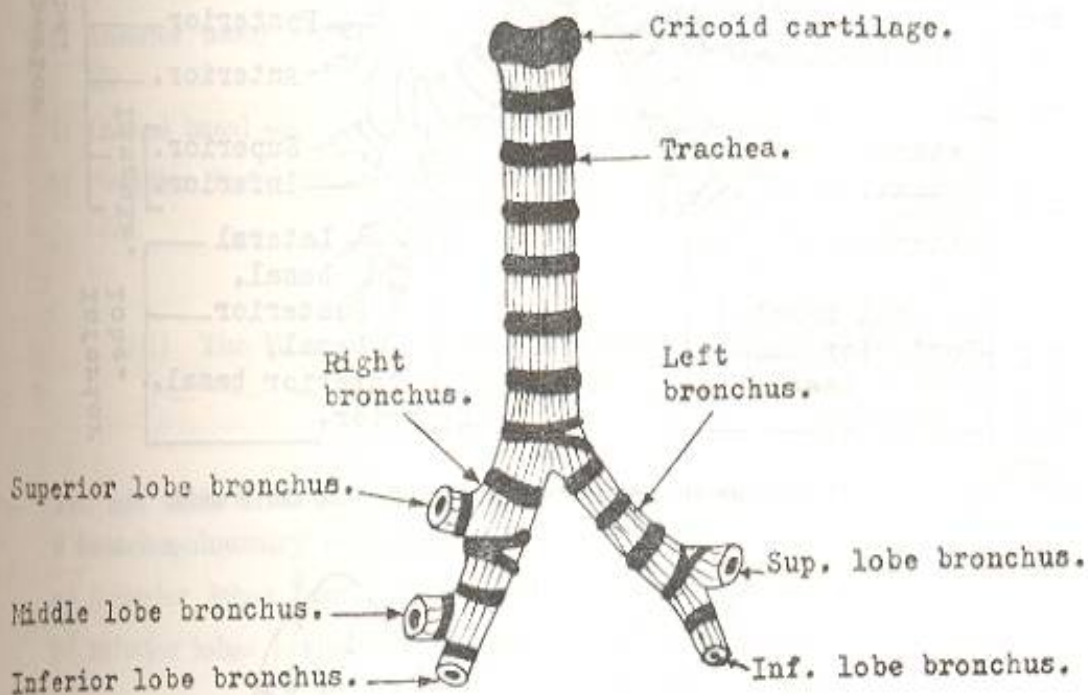
From.....*Vagus nerve*

Action: broncho-constriction and vasodilatation and secretomotor to bronchial glands.

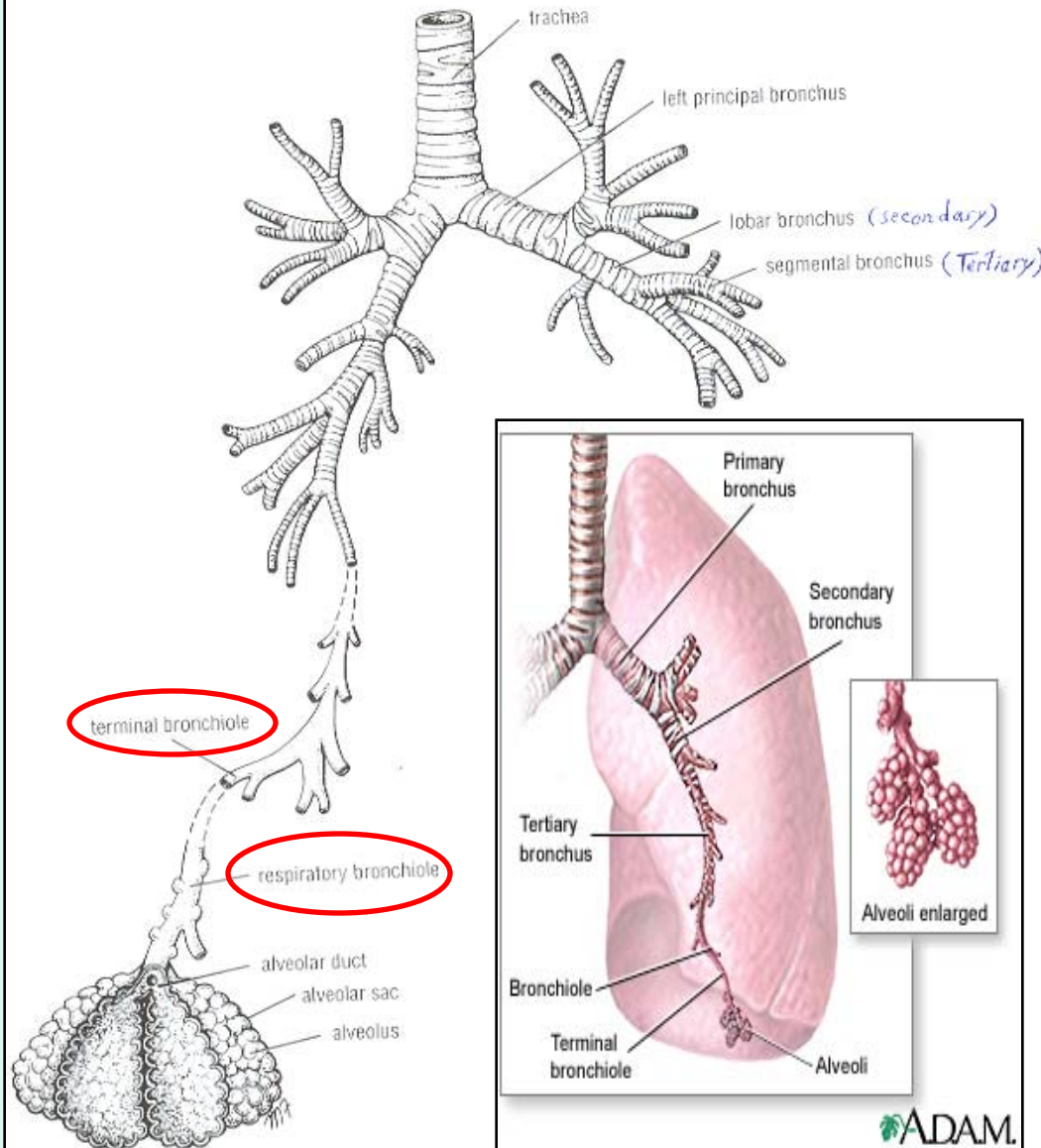


Bronchi

- 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.

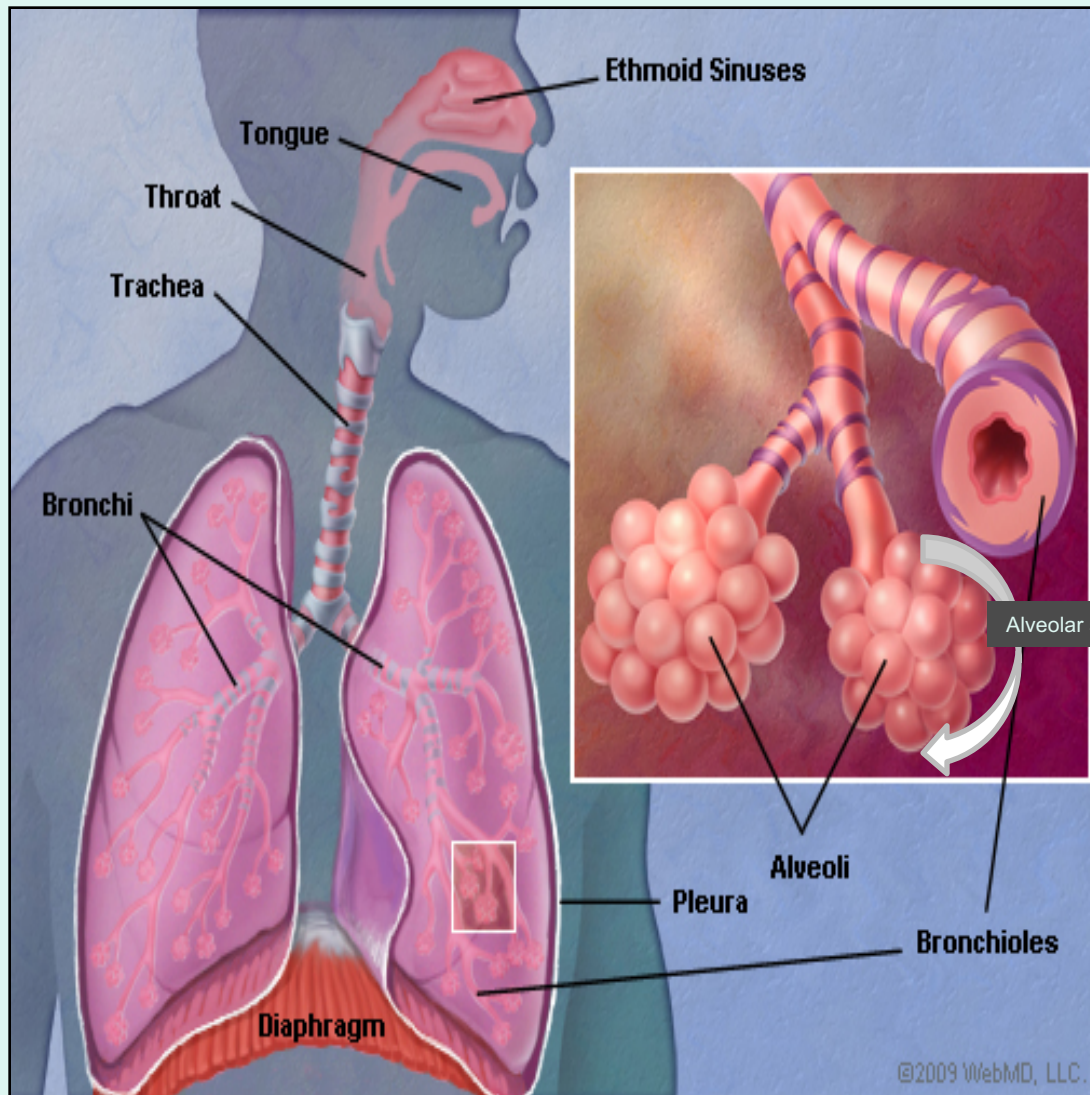


Bronchopulmonary segments



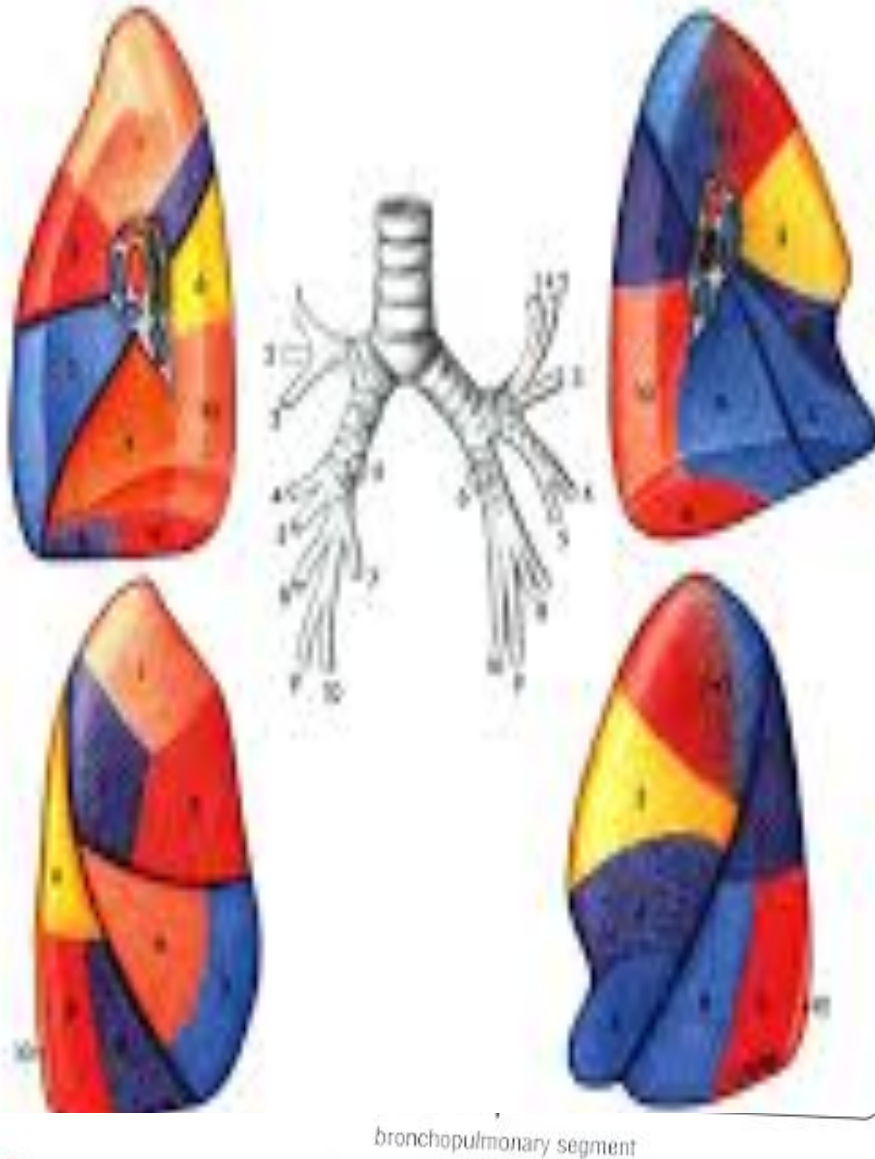
- They are the **anatomic**, **functional**, and **surgical** units of the lungs.
- Each lobar (secondary) bronchus gives **segmental (tertiary) bronchi**.
- Each segmental bronchus divides repeatedly into **bronchioles**.
- Bronchioles divide into **terminal bronchioles**, which show delicate outpouchings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