Pleura

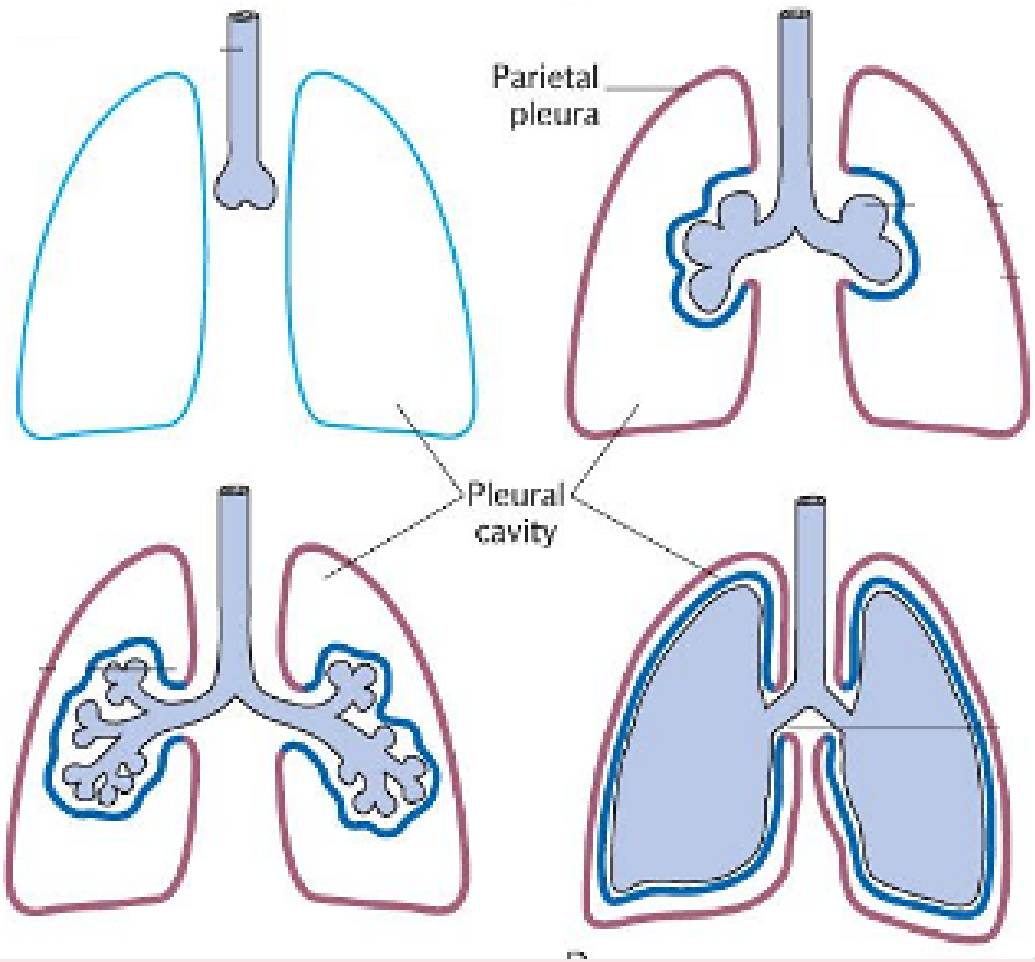
By

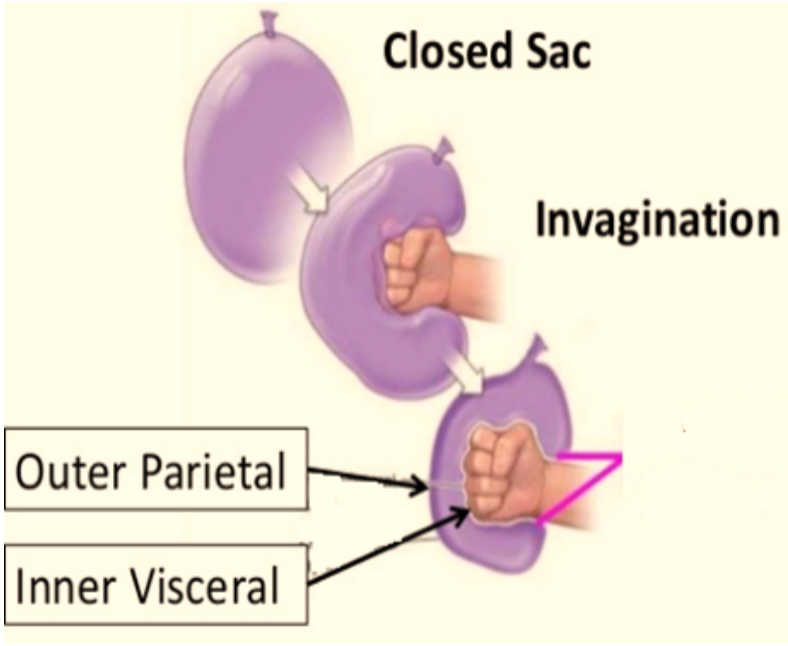
Basma Emad Aboulhoda

Lecturer of Anatomy and Embryology

Faculty of Medicine, Cairo University

Pleura





A closed serous sac, one on each side of the thoracic cavity, invaginated from its medial aspect by the lung forming 2 layers (visceral and parietal) separated by the pleural cavity, which is a potential space, empty except for a thin film of serous fluid which facilitates lung movement and minimizes friction.

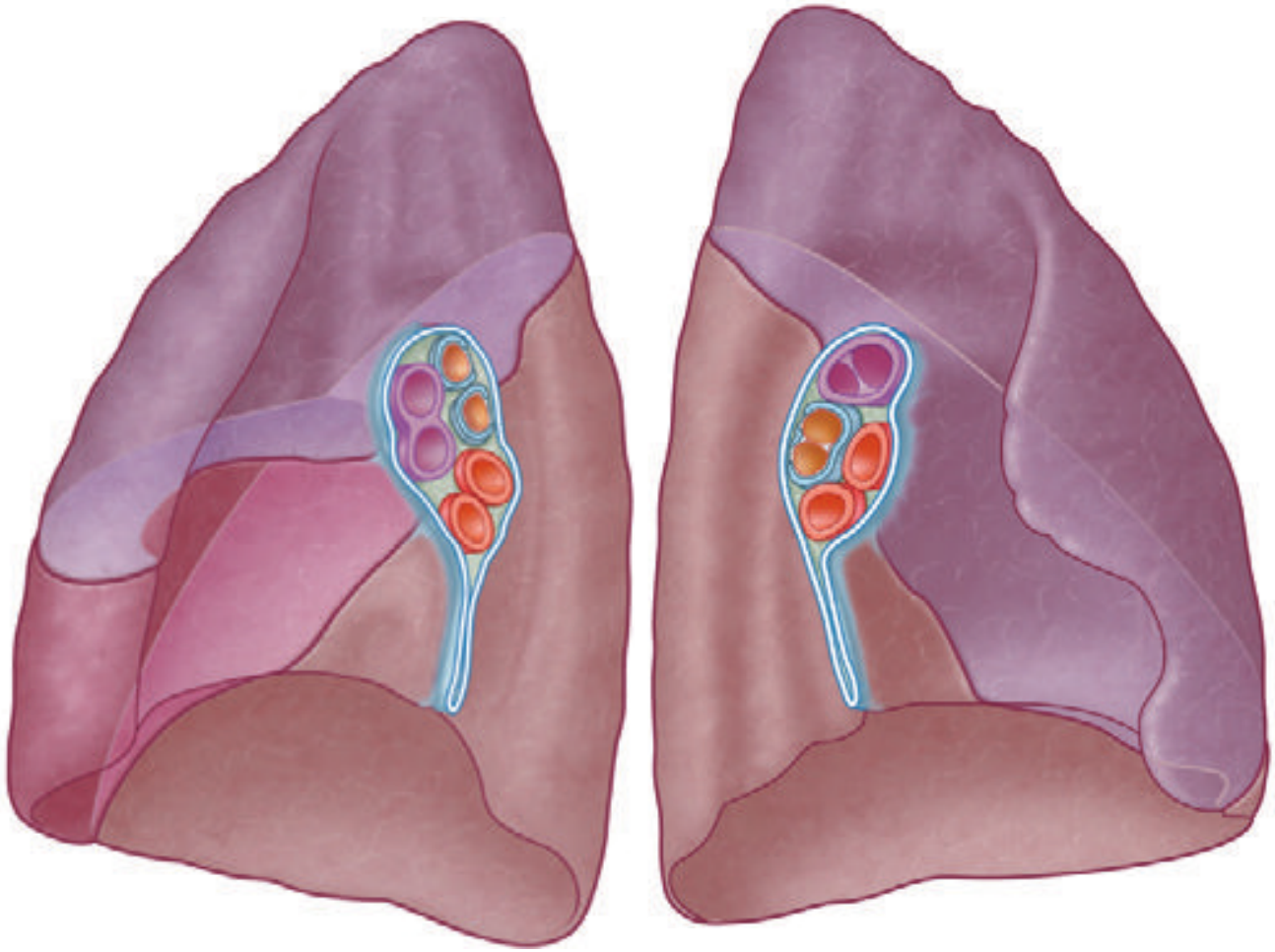
Visceral pleura--- Pulmonary pleura.

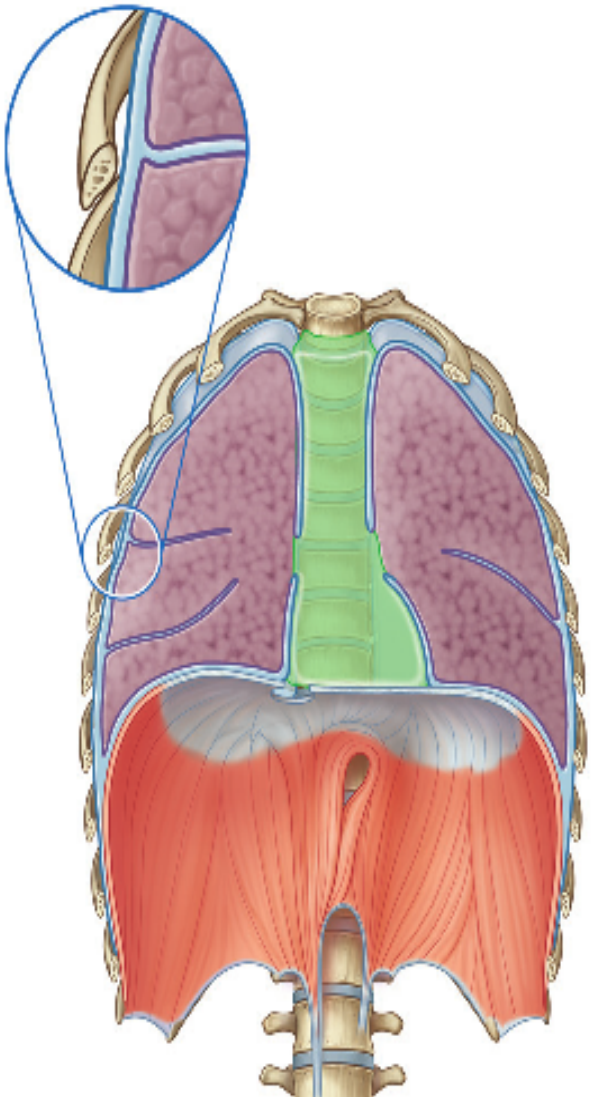
- **Same blood supply as the lung**
- **Same nerve supply as the lung**
- **Same lymphatic drainage as the lung**

Parietal pleura--- Thoracic pleura.

- **Same blood supply as the thoracic wall**
- **Same nerve supply as the thoracic wall**
- **Same lymphatic drainage as the thoracic wall**

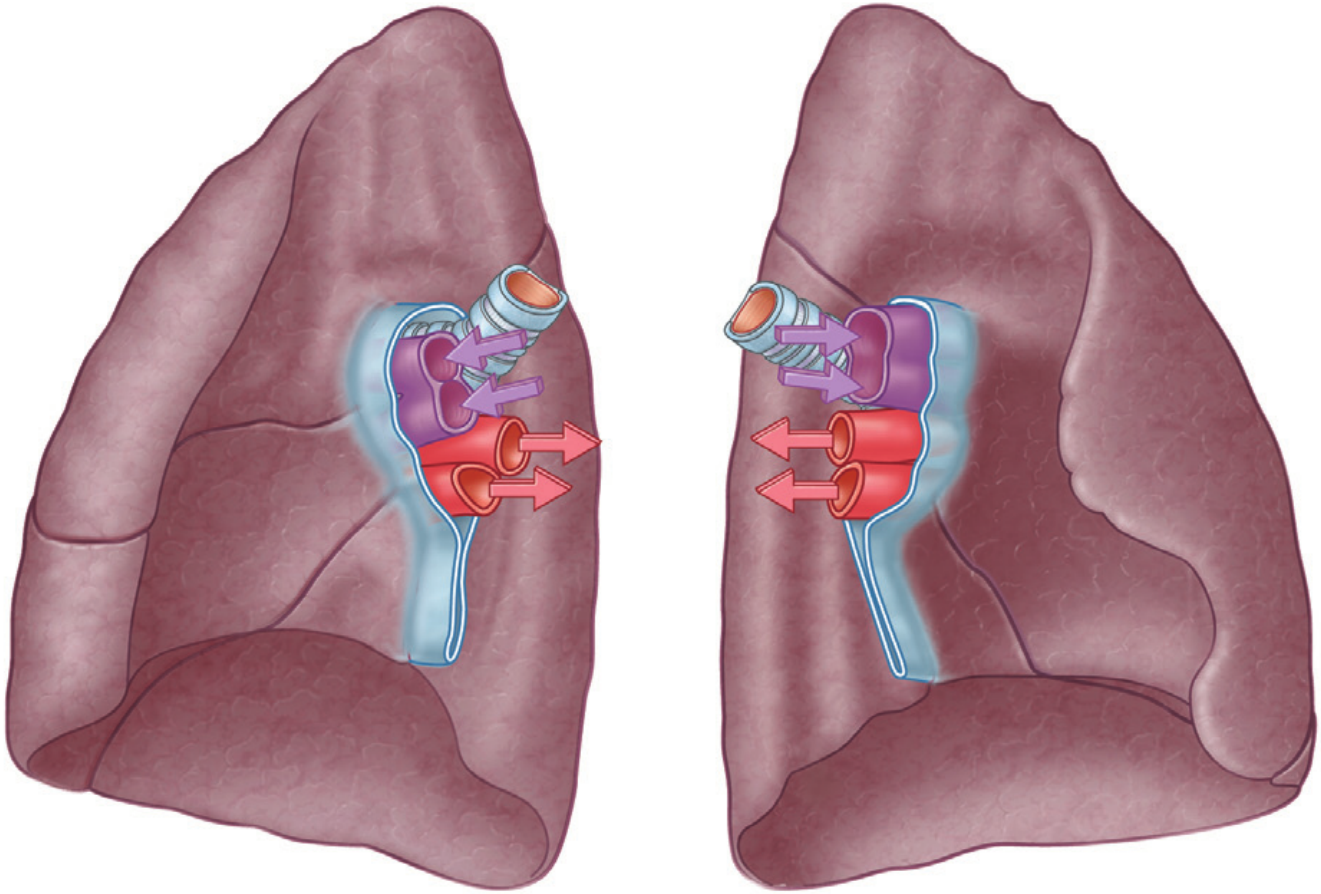
Pleura





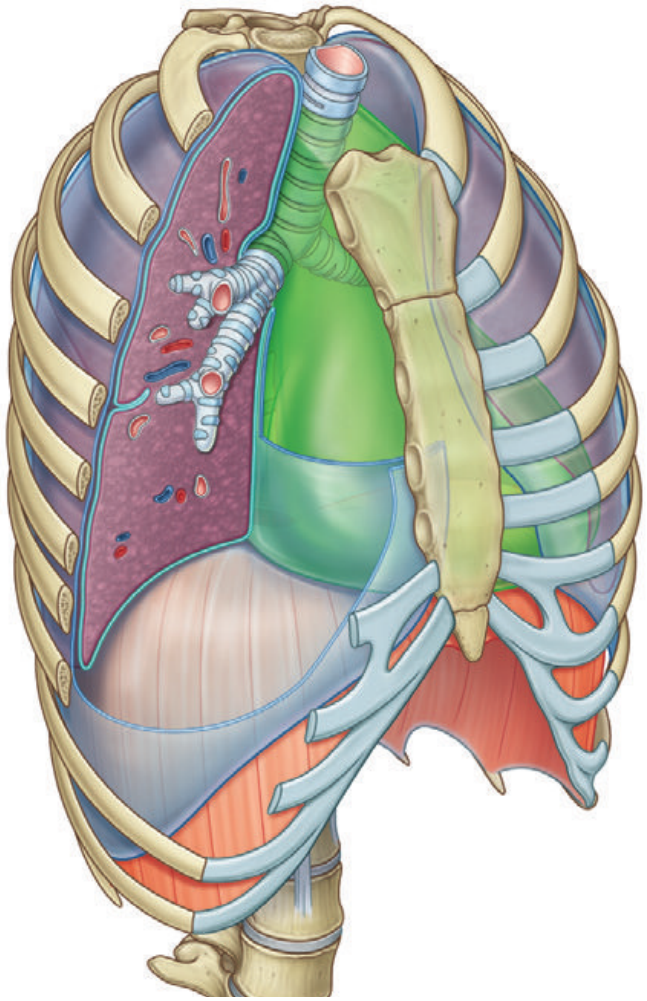
Visceral pleura lines the fissures

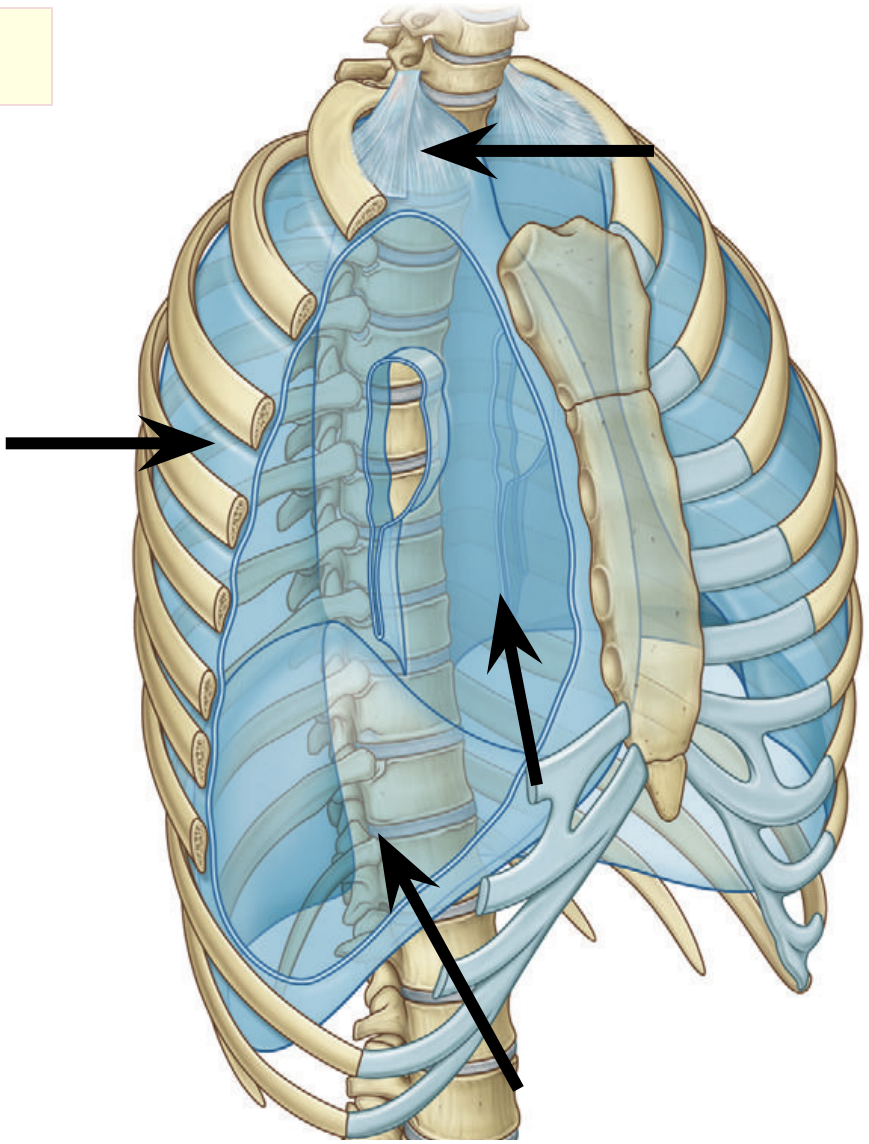
Pulmonary ligament



Mediastinal pleura: encloses structures of root of lung like a sleeve.
Pulmonary ligament is a loose, empty double-layer fold of pleura which spans between the esophagus medially and the lung laterally.
Its **function** is to provide a dead space which allows distention of pulmonary veins when the venous return from lung increases.

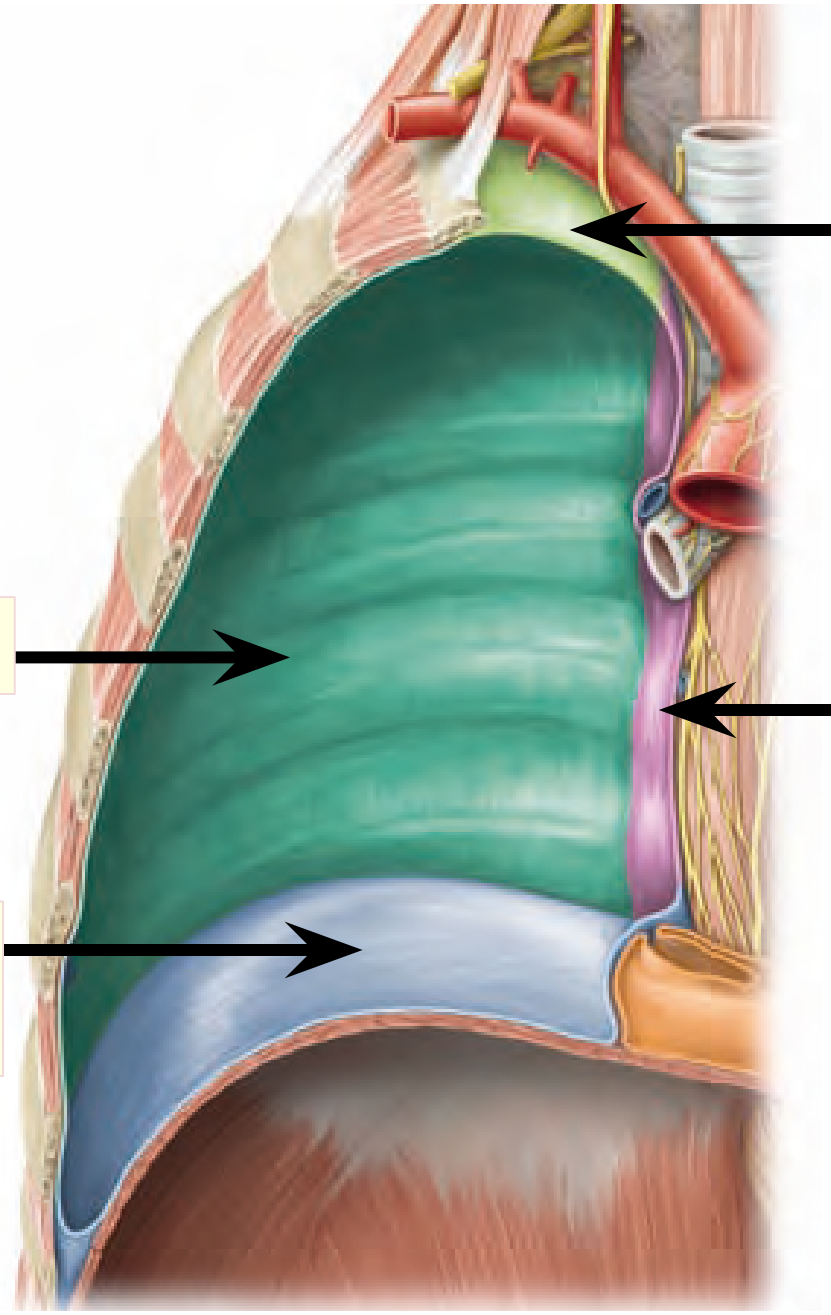
Subdivision of parietal Pleura





(1) Cervical pleura (dome of pleura): covers apex of lung.
(2) Costal pleura: lines inner surfaces of ribs and costal cartilages
(3) Mediastinal pleura: covers sides of mediastinum.
(4) Diaphragmatic pleura: covers upper surface of diaphragm

Subdivision of parietal Pleura



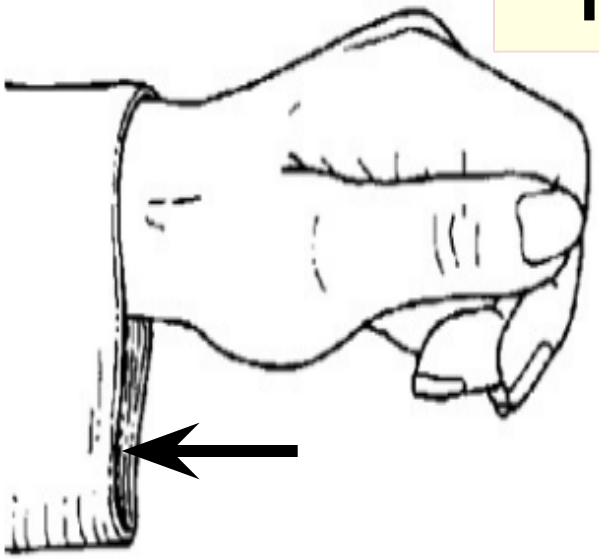
Cervical pleura

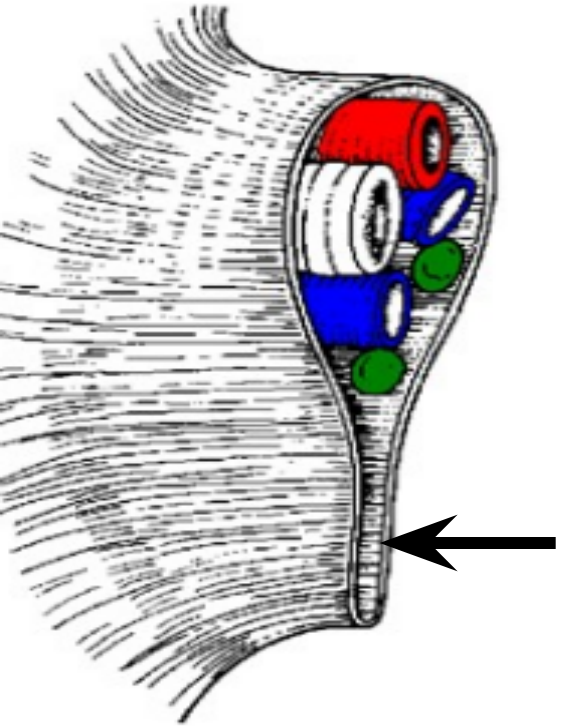
Costal pleura

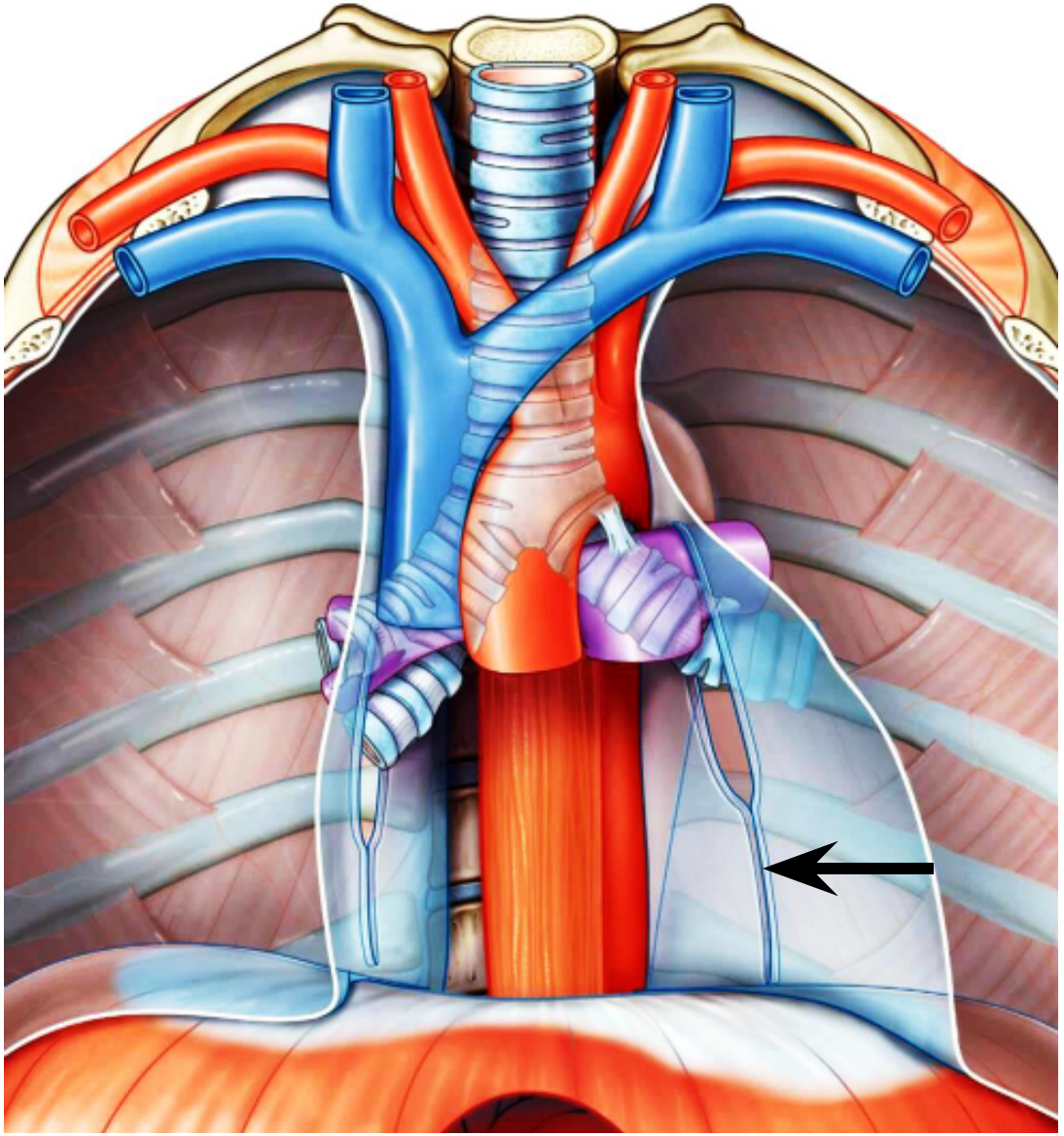
Mediastinal pleura

Diaphragmatic pleura

Pulmonary ligament



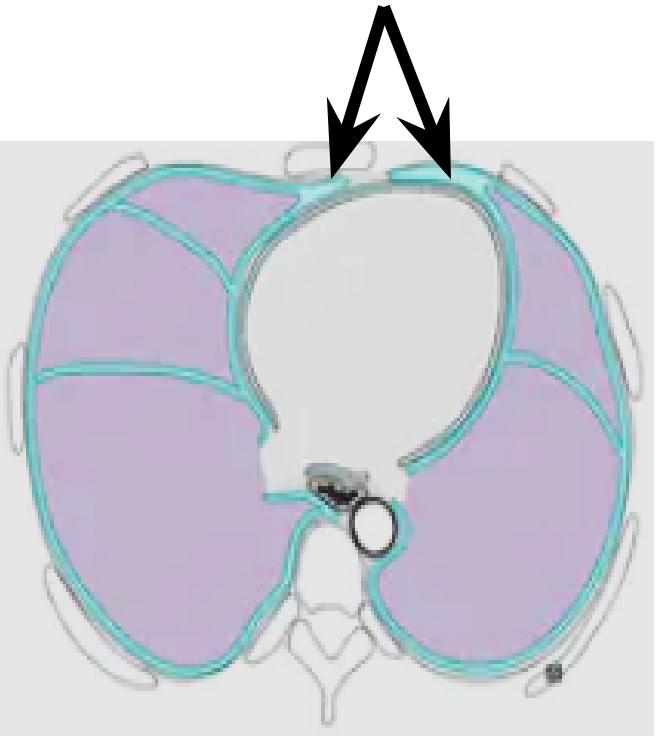


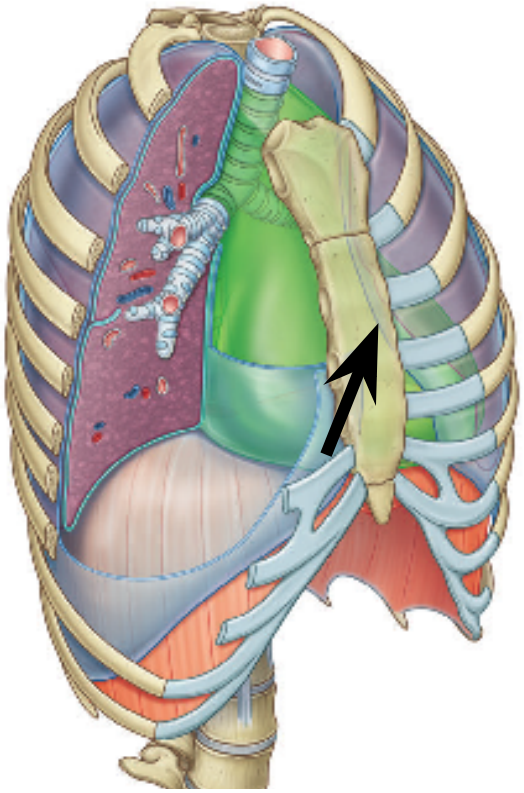


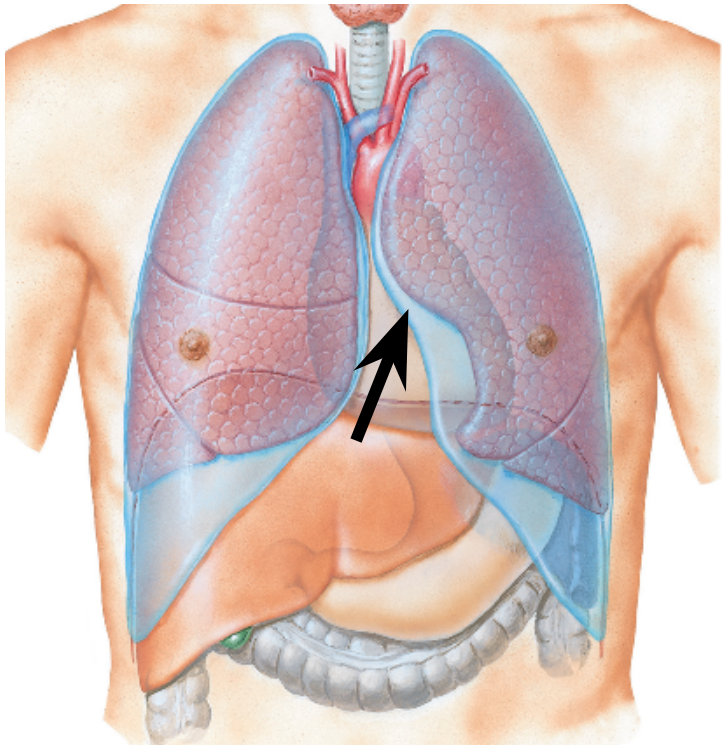
Very important

Discuss pleural recesses & surface anatomy of pleura

Costo-mediastinal recess

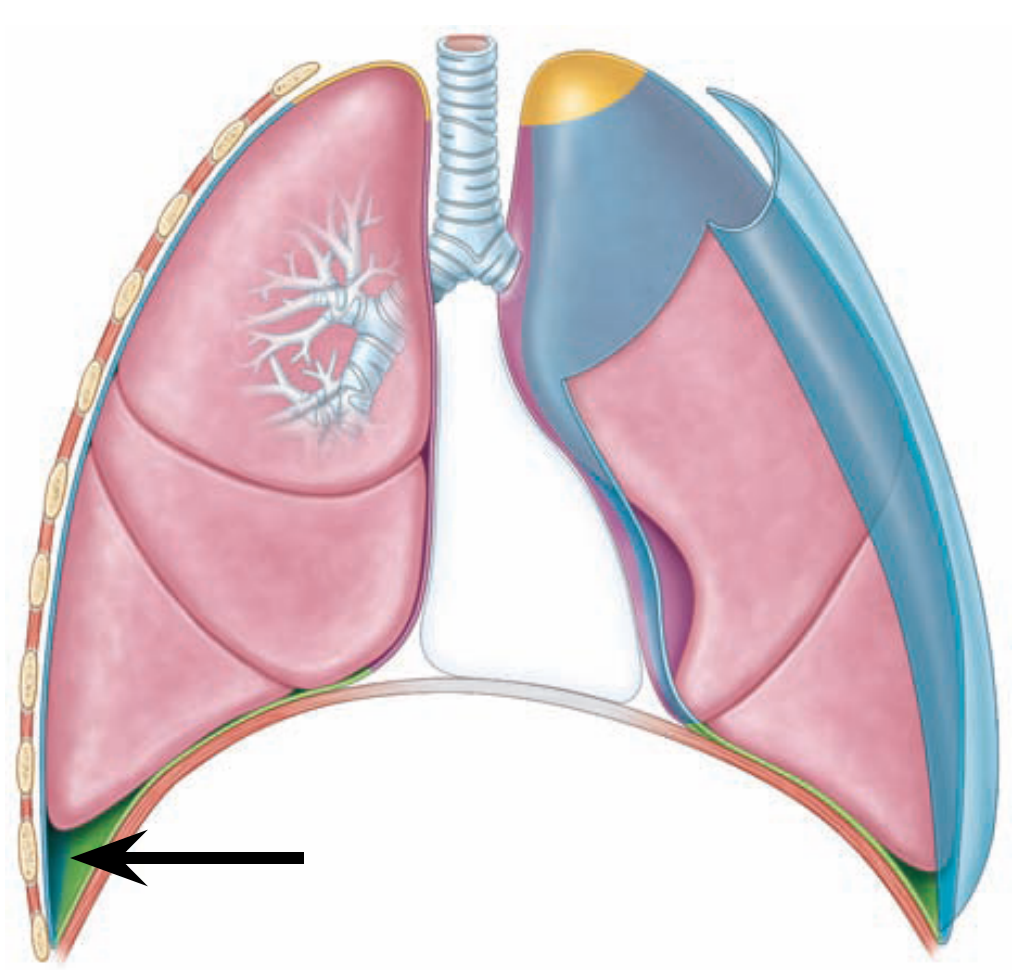


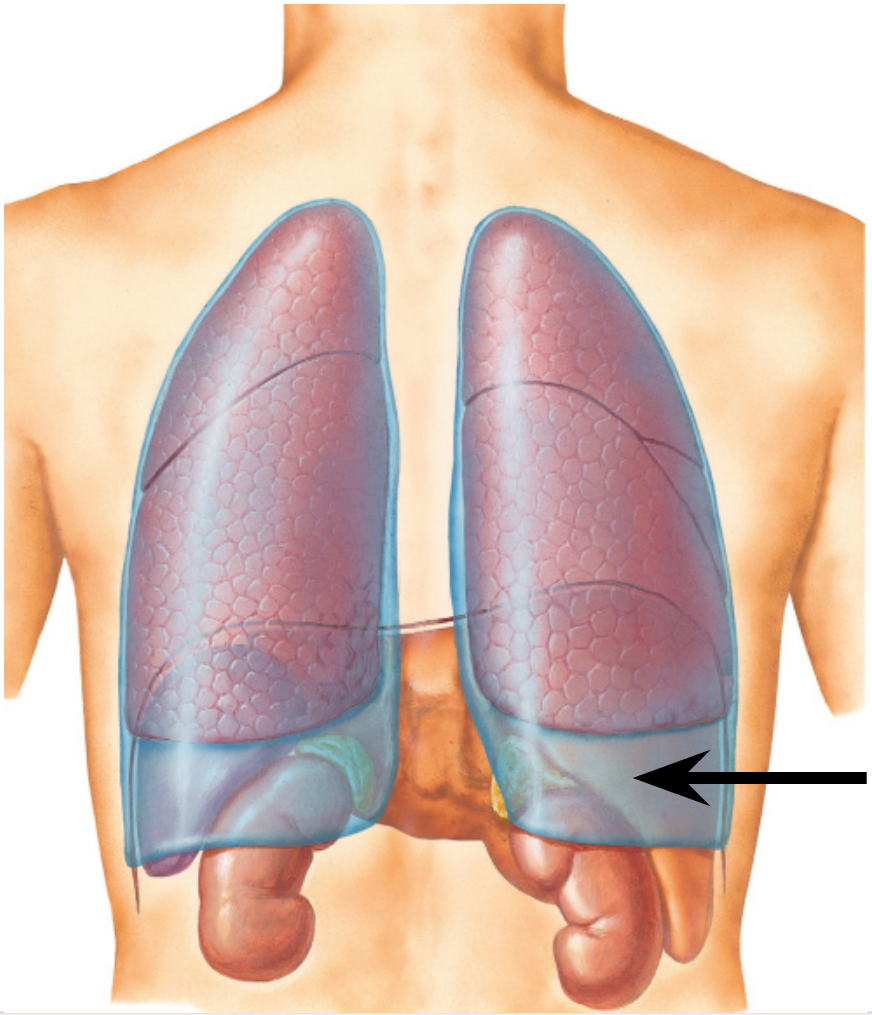




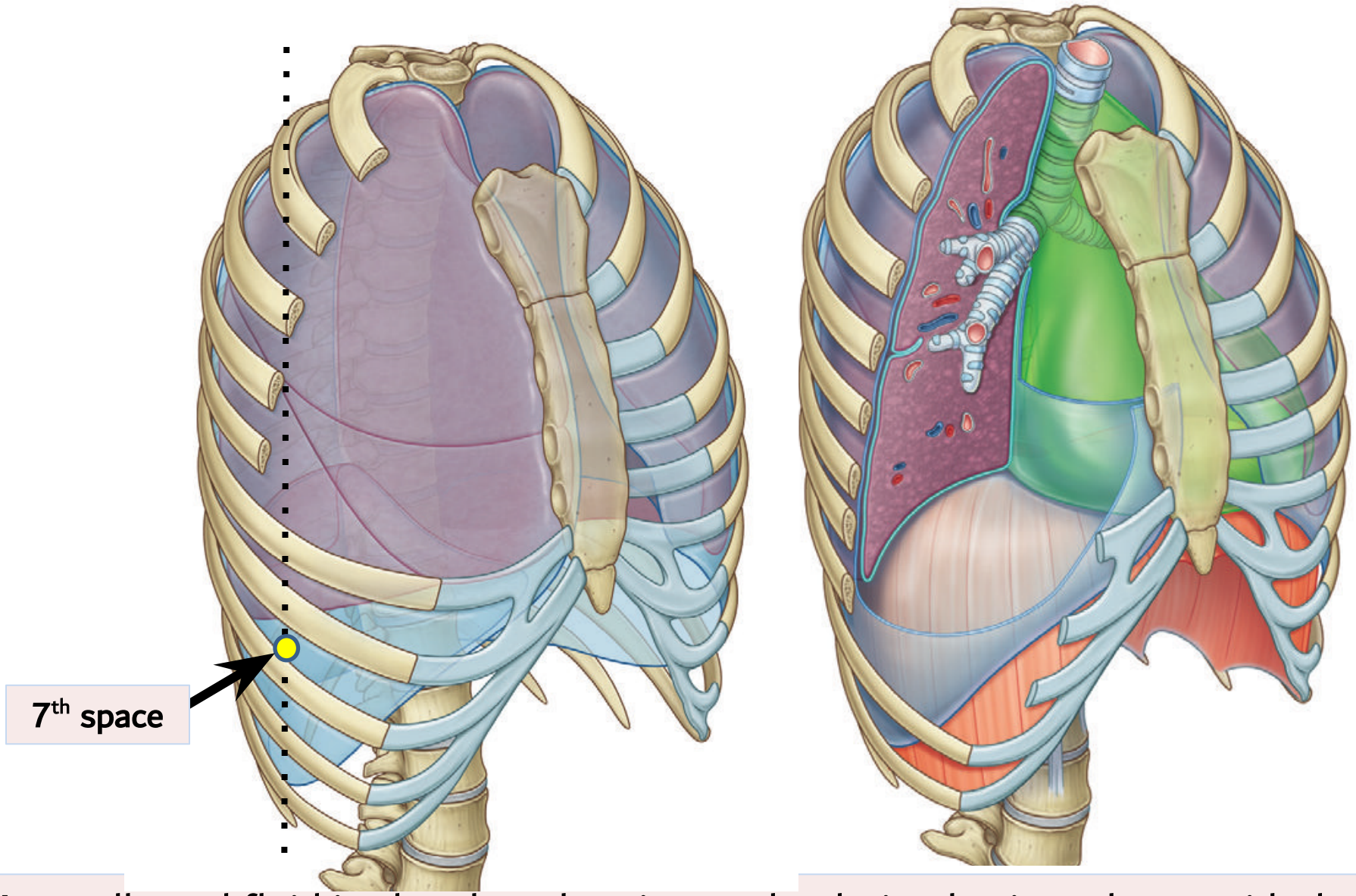
- Lies between the costal and mediastinal pleurae
- Along the anterior border of the pleura, directly behind the sternum.
- Receives the expanding anterior border of lung in forced inspiration.

Costo-diaphragmatic recess

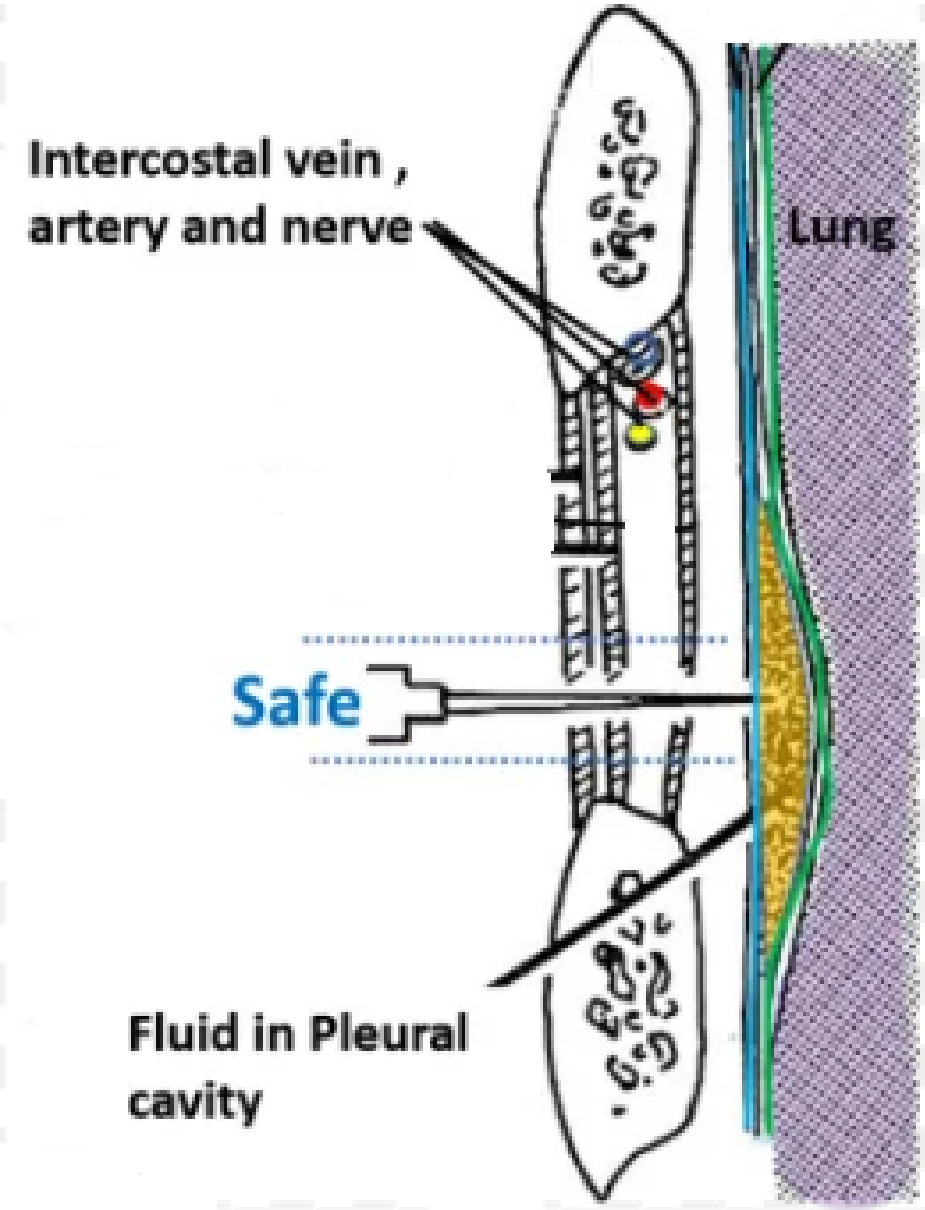


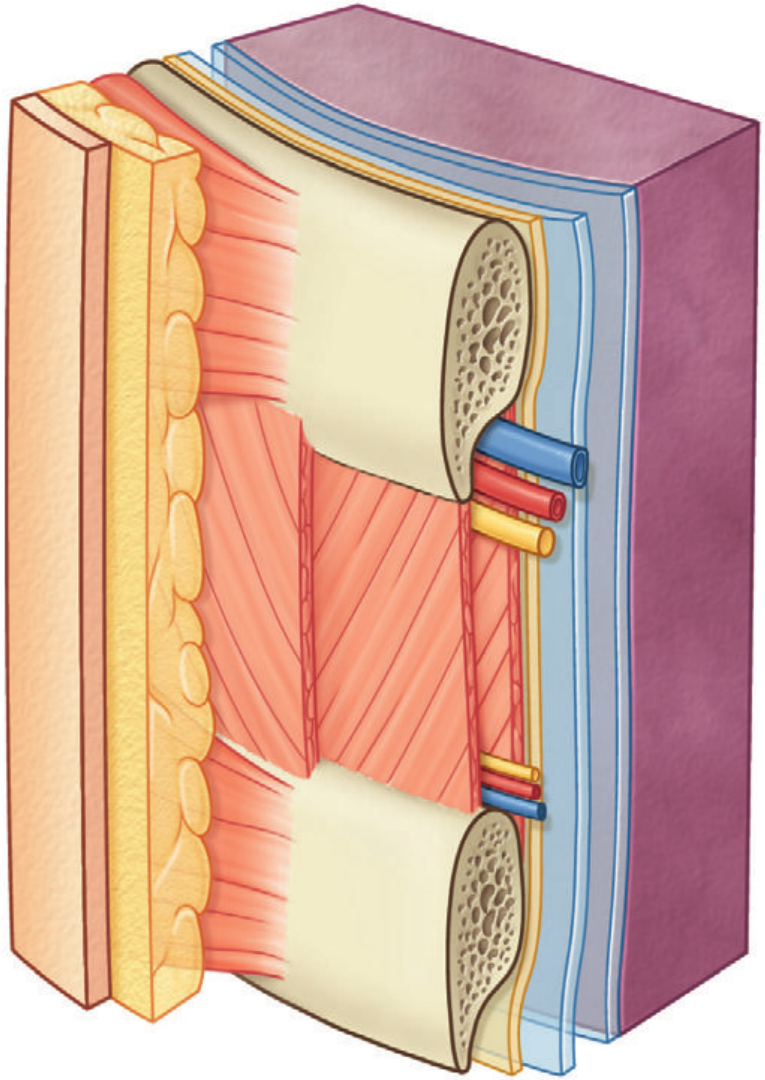


- Lies between the costal and diaphragmatic pleurae
- Along the inferior border of the pleura, at outlet of thorax.
- It receives the expanding inferior border of lung in forced inspiration.



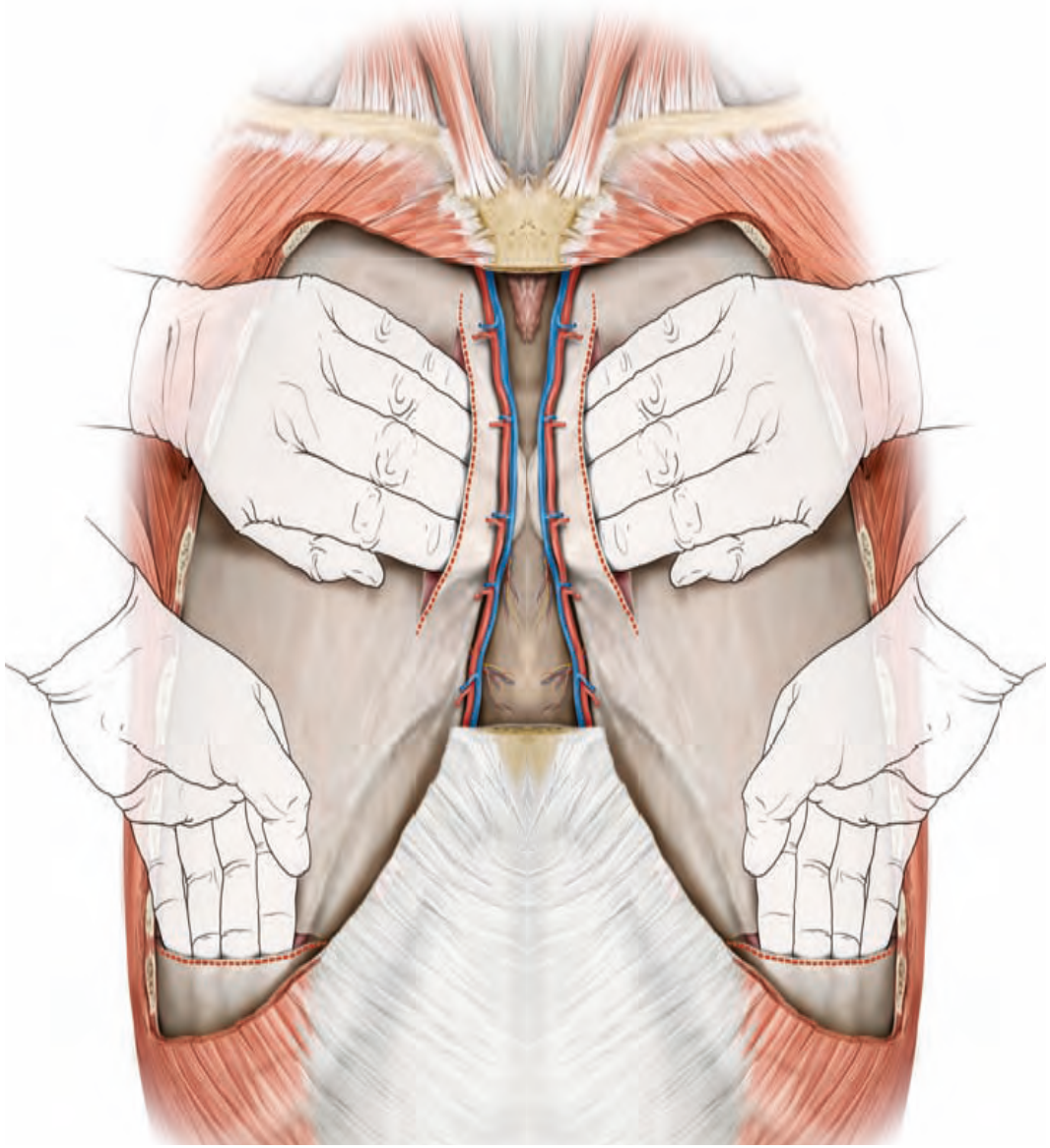
Any collected fluid in the pleural cavity can be drained using a large, wide-bore needle introduced in **7th intercostal space** in **midaxillary line.**
(not below this, to avoid injury of diaphragm).

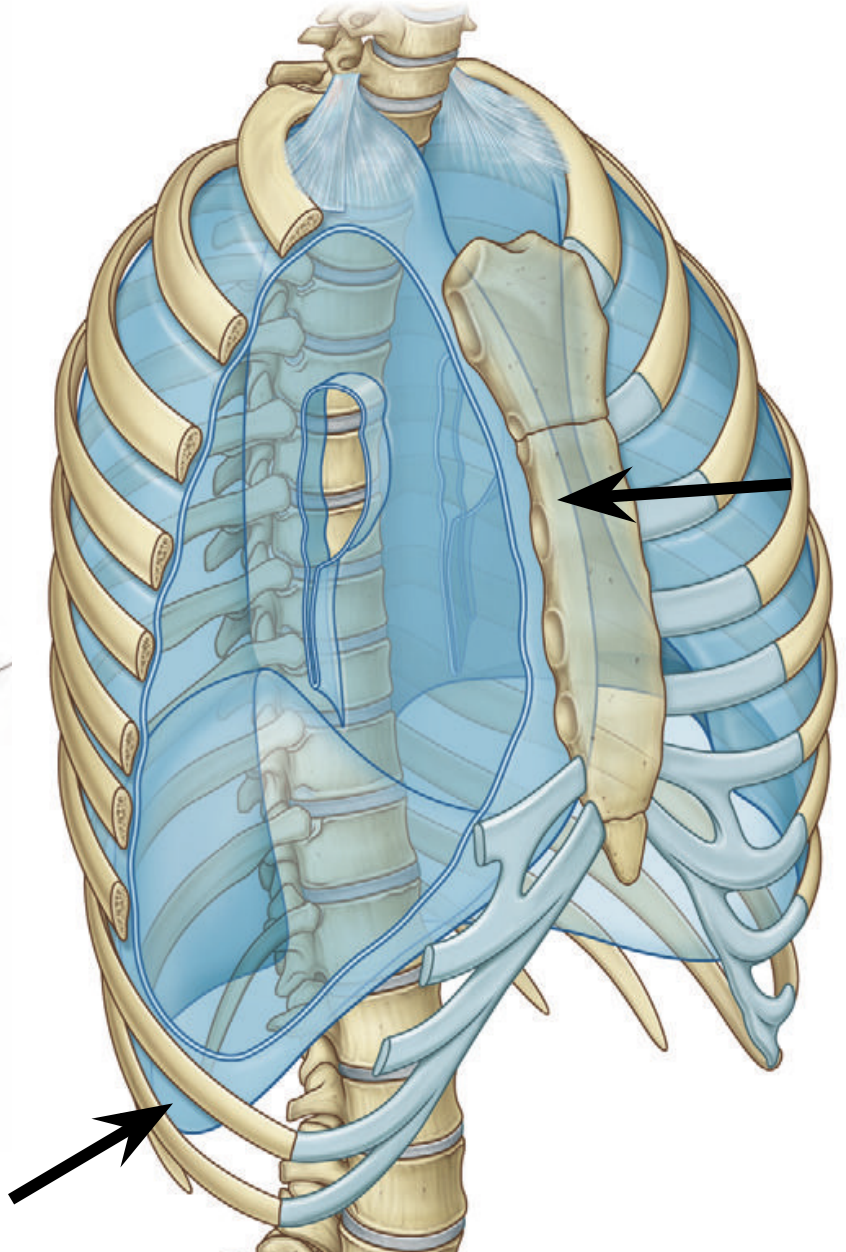


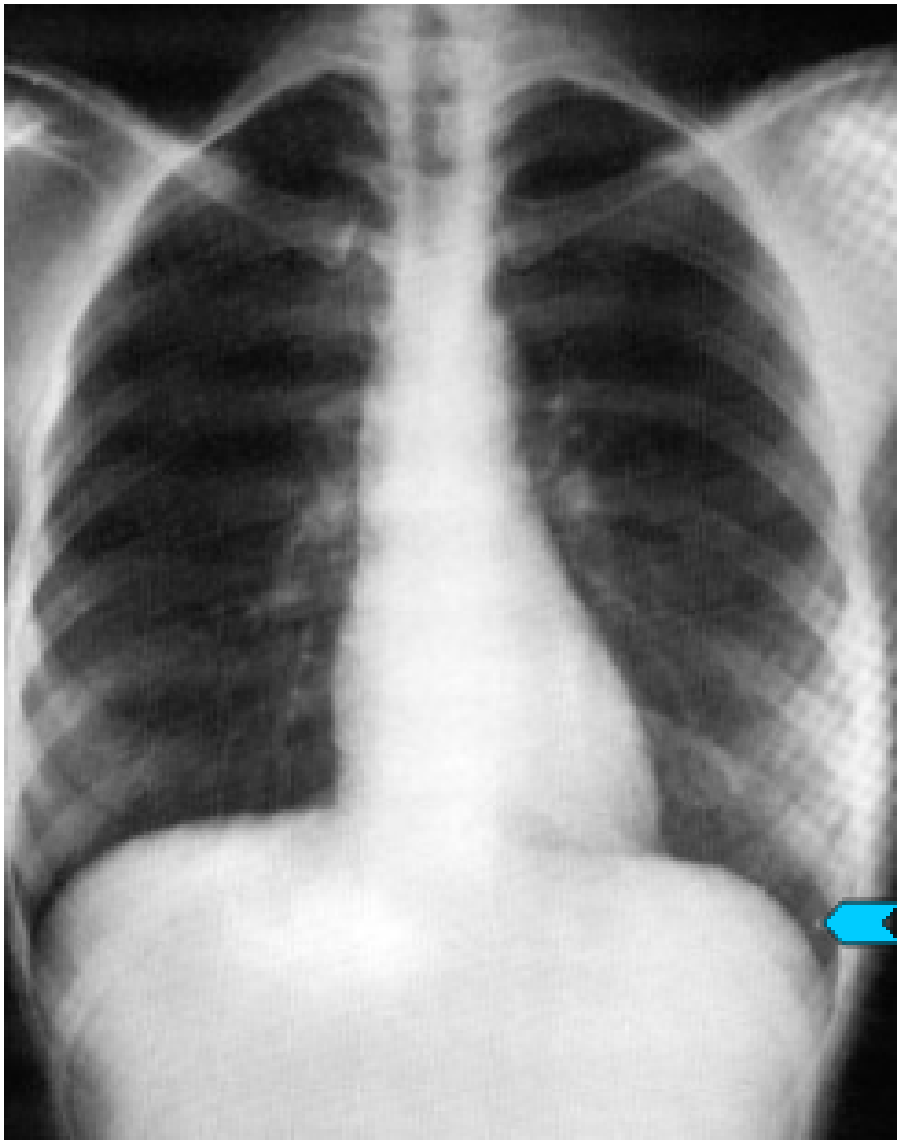


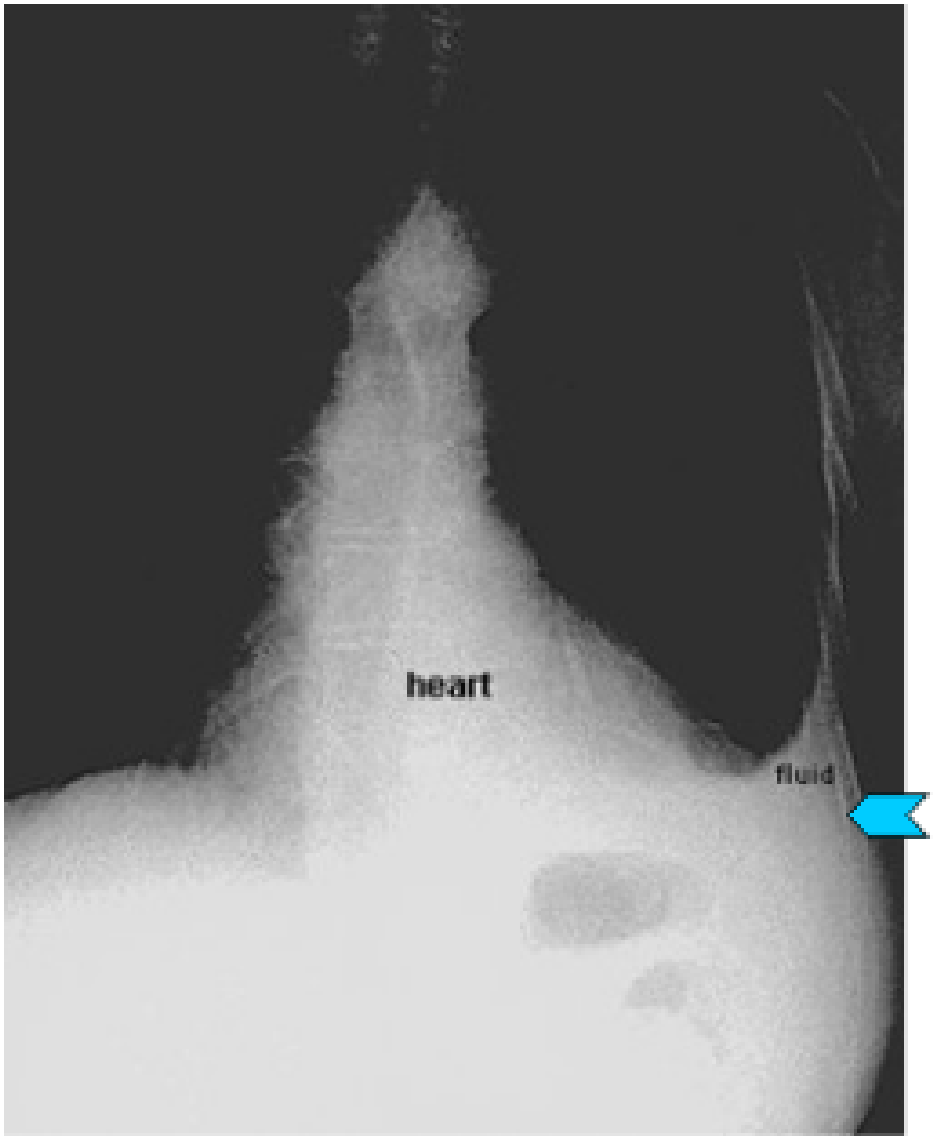
The puncture should be safely made **midway** between the upper and lower boundaries of the intercostal space, to avoid injury of the neurovascular bundle along the lower border of the rib above or the collateral branches along the upper border of rib below.

Costomediastinal and costodiaphragmatic recess









Excess fluid in the pleural cavity causes opacity which obliterates the recess.

Surface Anatomy of Pleura

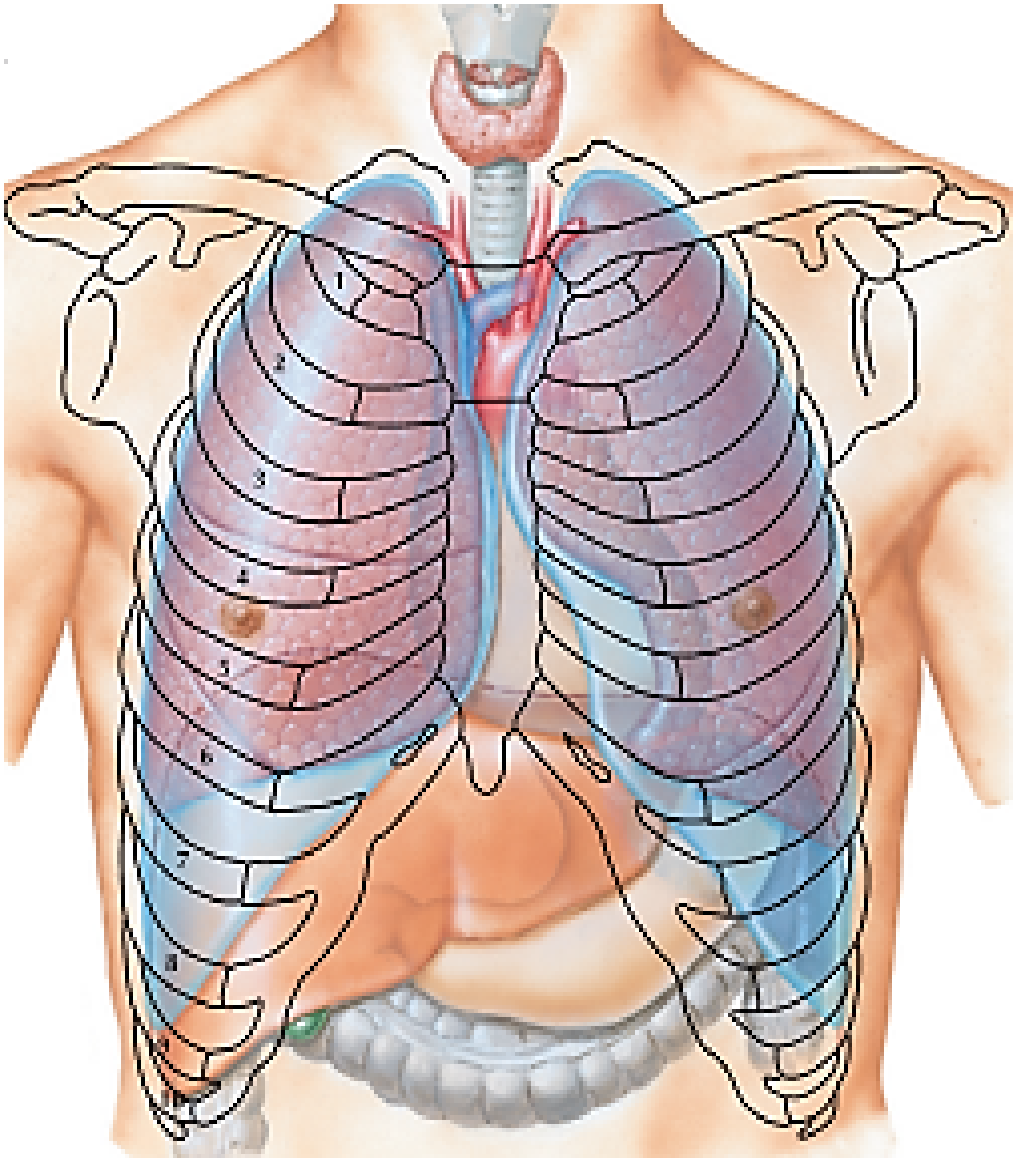
1- Cervical pleura: Curved line, convex upwards, from junction of medial & middle 1/3 of clavicle to sternoclavicular joint. Highest point of arch lies about 3 cm above medial 1/3 of clavicle.

2- Anterior border:

Upper part is same on both sides. descends obliquely downwards and medially from sternoclavicular joint to sternal angle.
Below this level, anterior borders are different:

On right side: vertical to **xiphisternal** junction.

On left side: vertical to **4th costal cartilage,** Then deviates laterally to left border of sternum---descends vertically to **6th costal cartilage**.



Surface Anatomy of Pleura

3- Inferior border:

Same on both sides.

Passes laterally then backwards around thoracic wall till vertebral column at level of **T12**. The line is oblique crossing:

a- 8th rib: in midclavicular line.

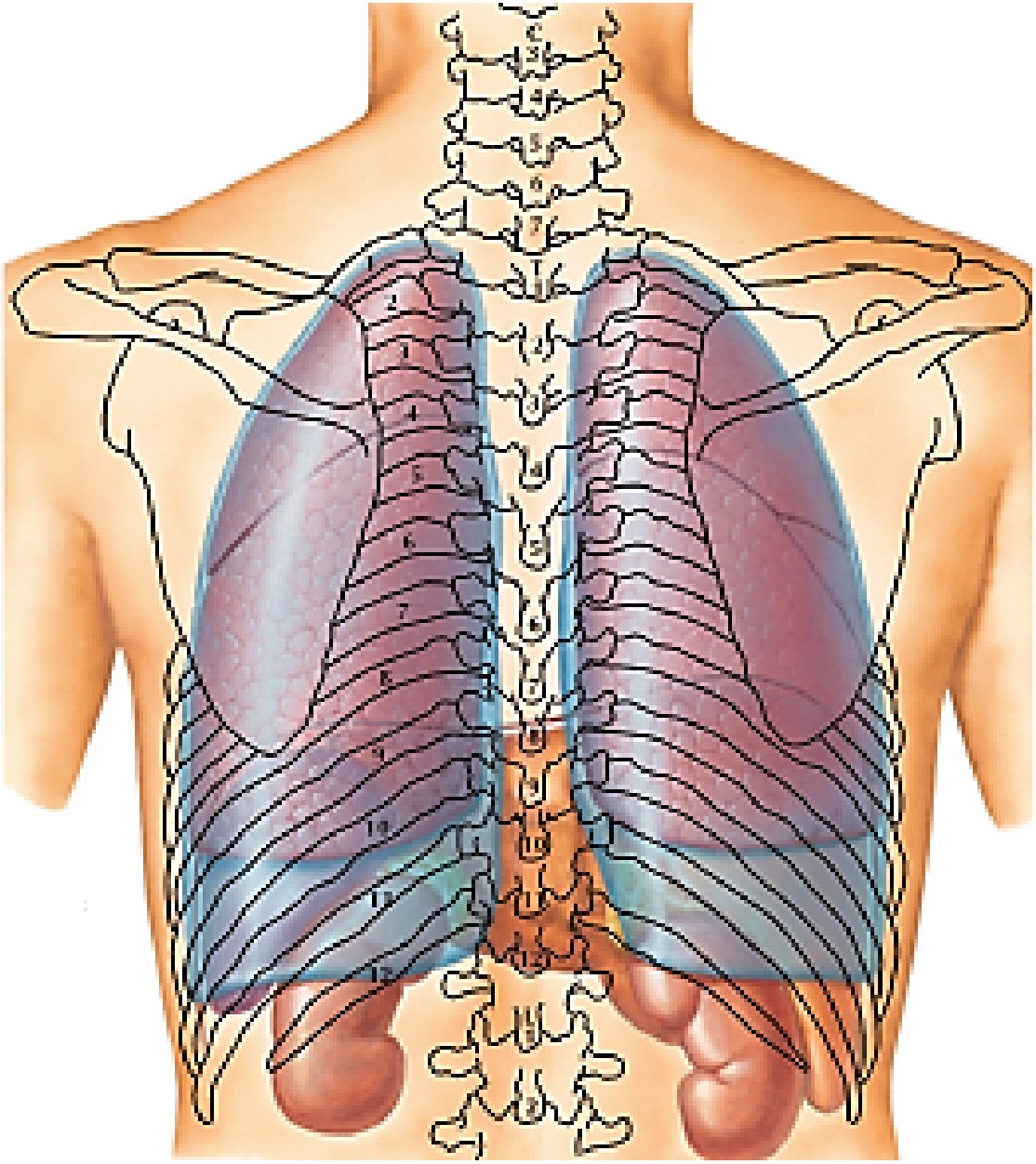
b-10th rib: in midaxillary line.

c-12th rib: opposite lateral border of sacrospinalis muscle.

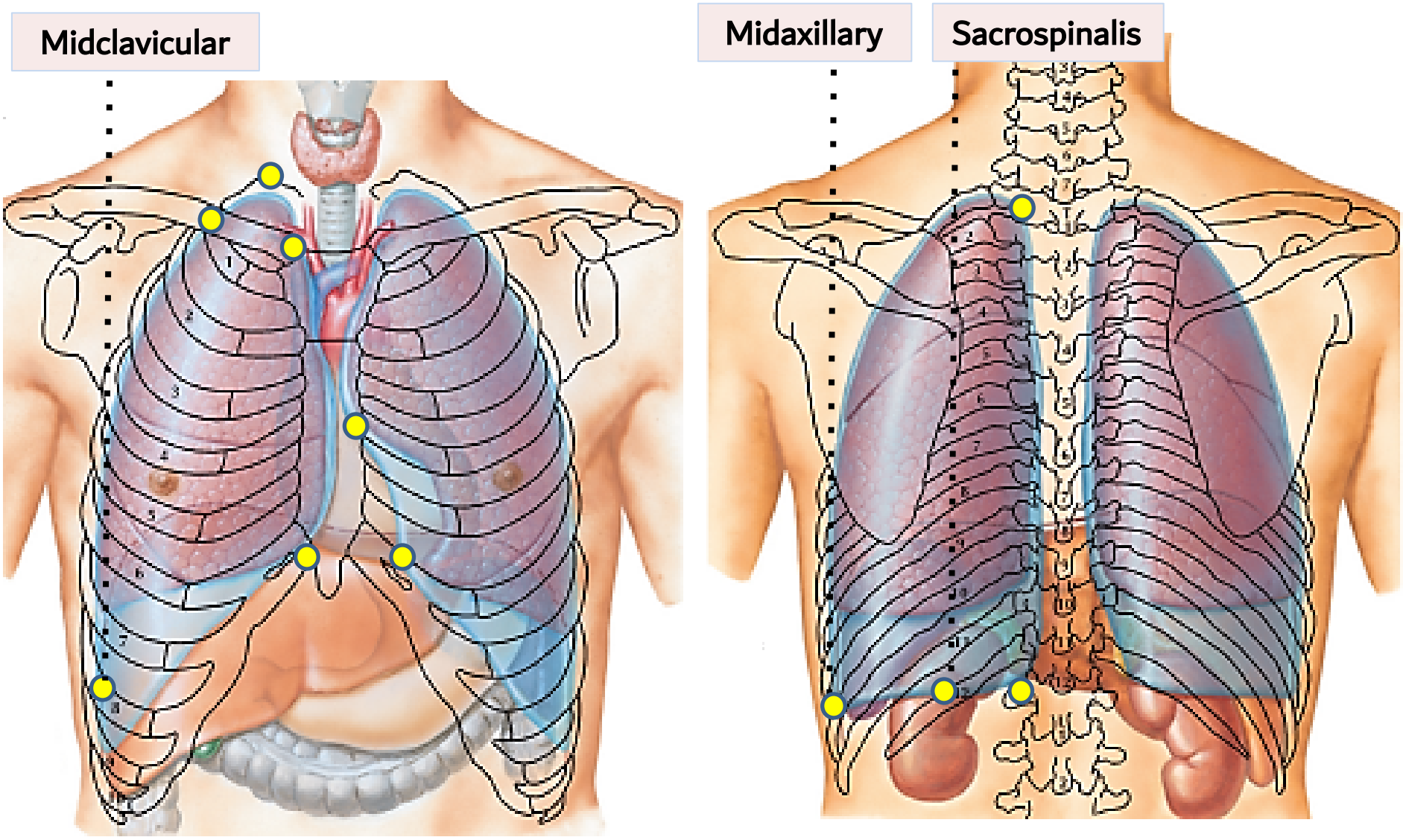
4- Posterior border:

The same on both sides.

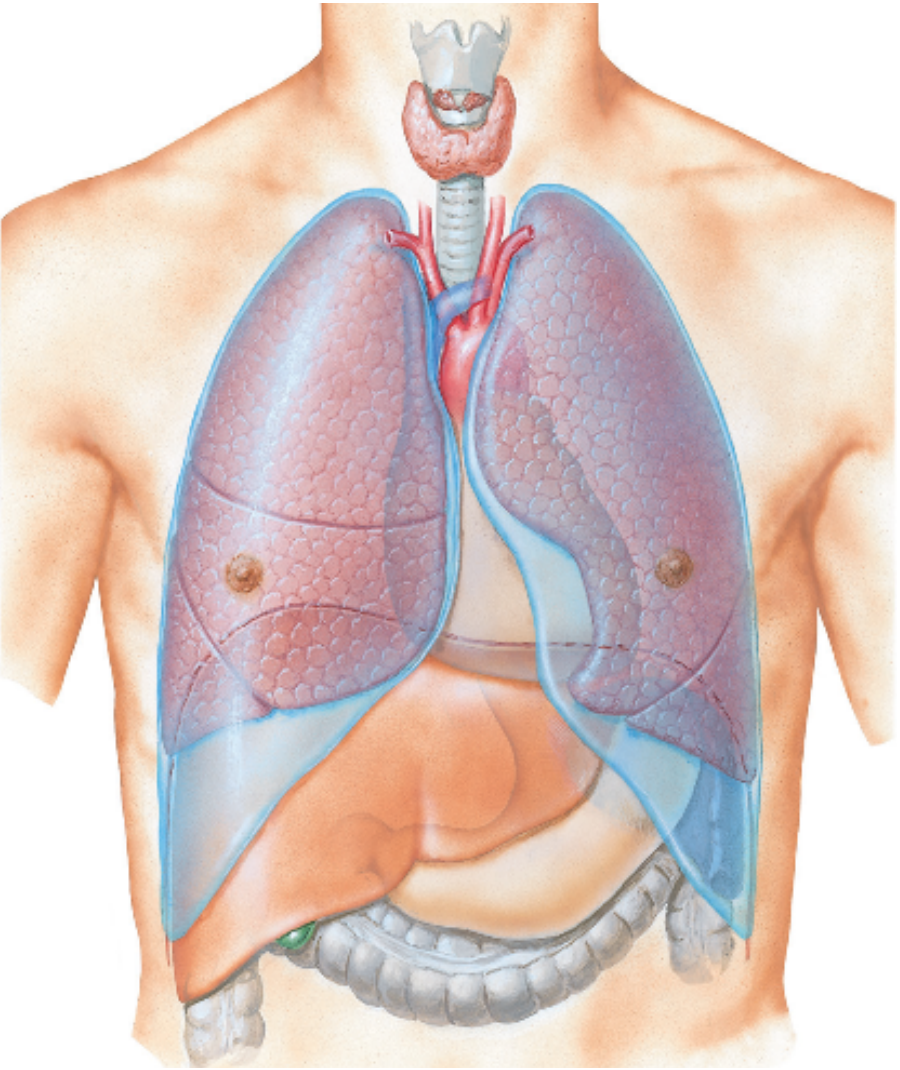
Represented by a vertical line starting close to 12th thoracic spine and extends upwards to 1st thoracic spine.

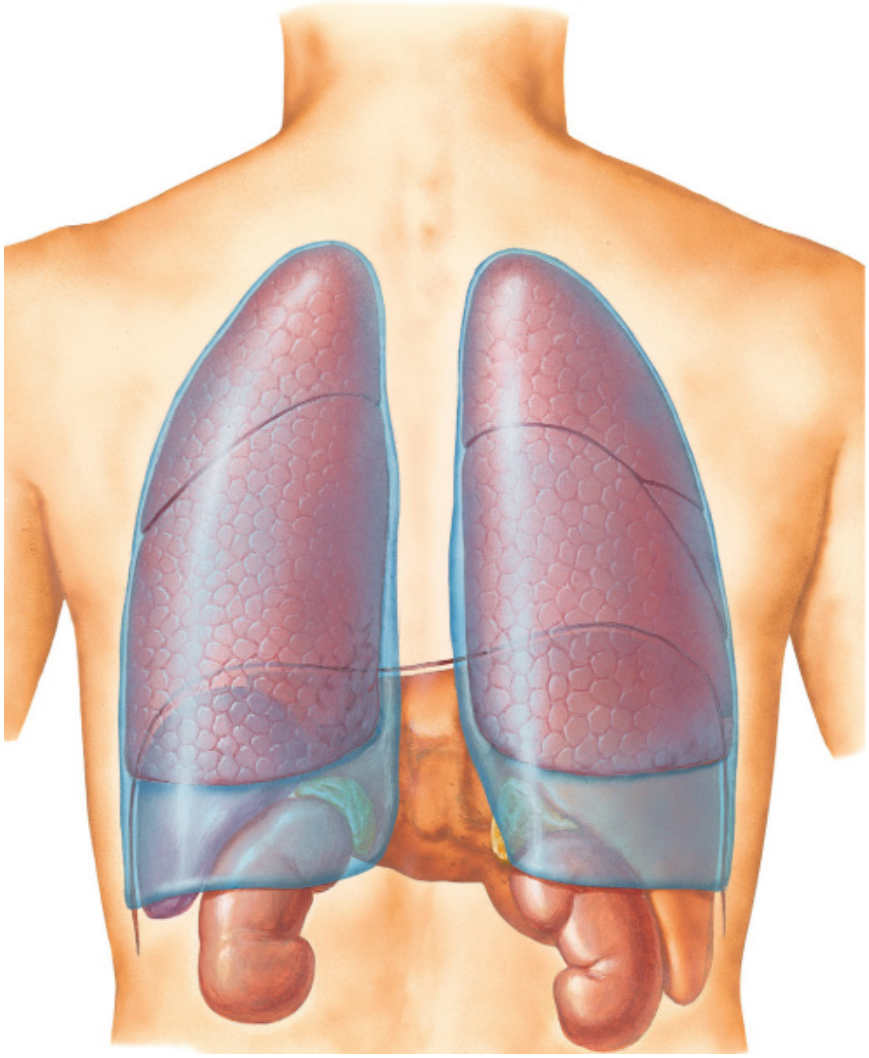


- 2 ribs difference between the lungs and the pleurae



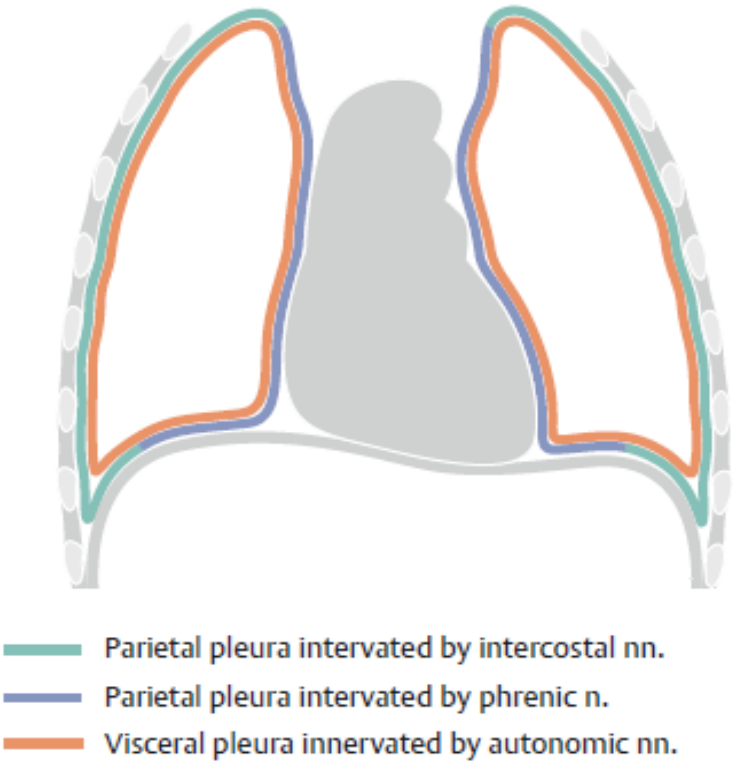
Sterno-clavicular joint---junction bet. Medial and middle 1/3 of clavicle--- xiphisternal junction---
4th costal cartilage--- 6th costal cartilage--- 8th rib--- 10th rib--- 12th rib--- 12th thoracic spine-- 1st thoracic

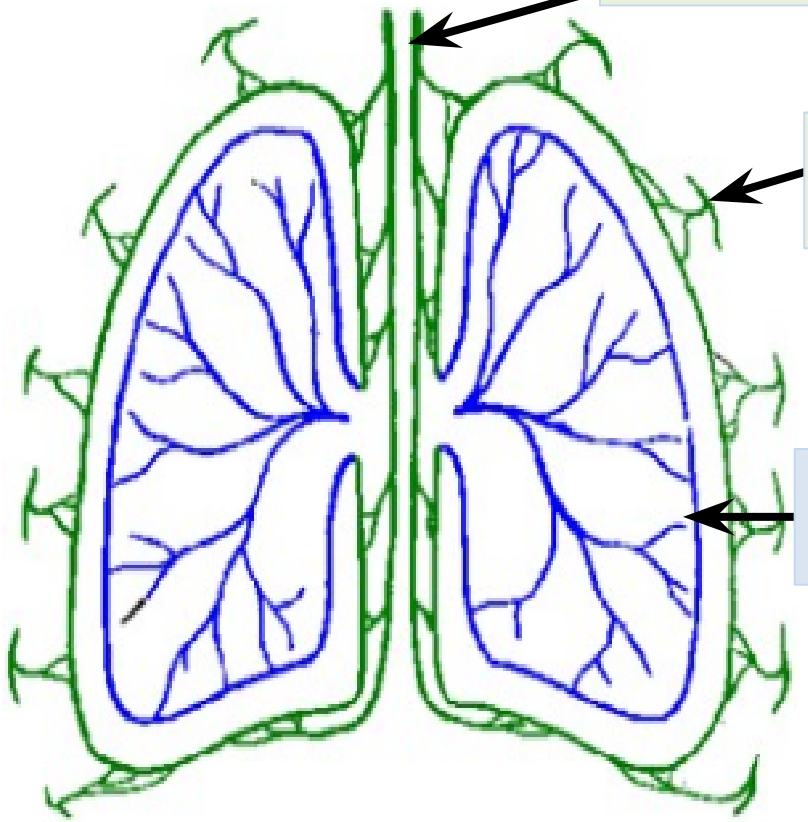




Surgeon must take care of pleural extension during incisions---- injury of pleura--- pneumothorax

Nerve supply of Pleura





Visceral (pulmonary) pleura:

Supplied by the same autonomic innervation of lung via anterior and posterior pulmonary plexuses.

It is not sensitive to somatic stimuli such as pain and temperature.

Parietal pleura:

Same somatic innervation of thoracic wall, mediastinum & diaphragm, according to part of pleura:

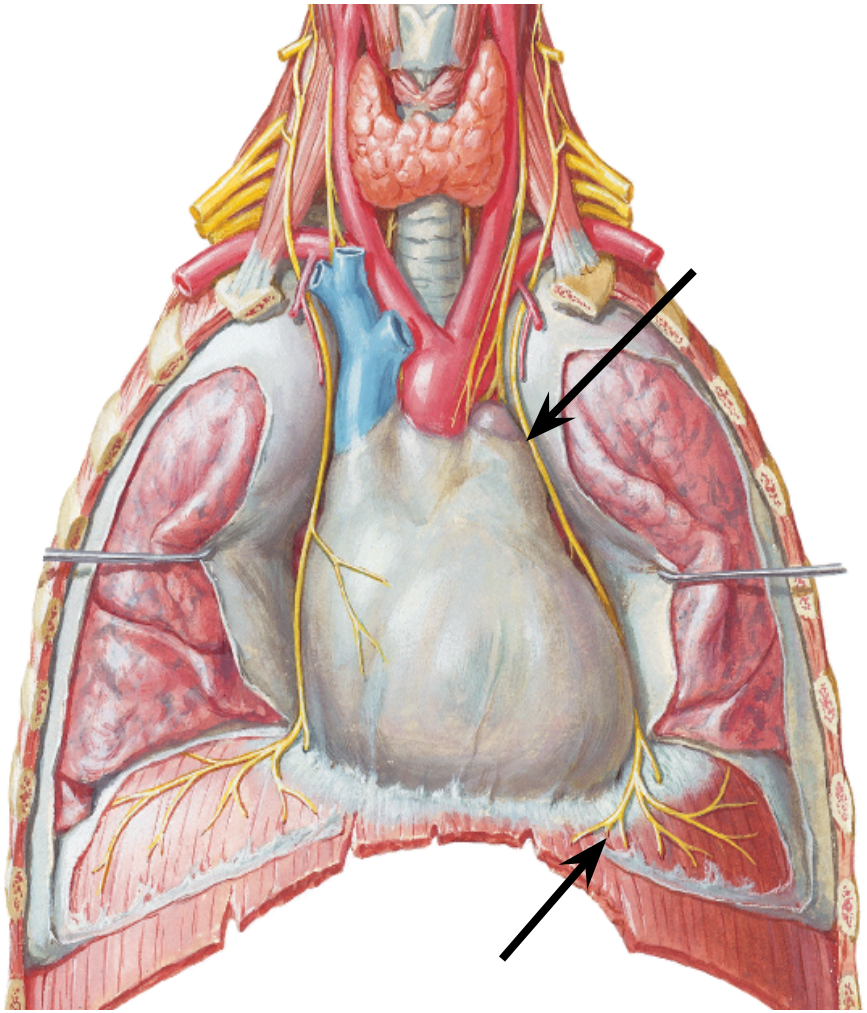
a- Cervical pleura: by 1st intercostal nerve.

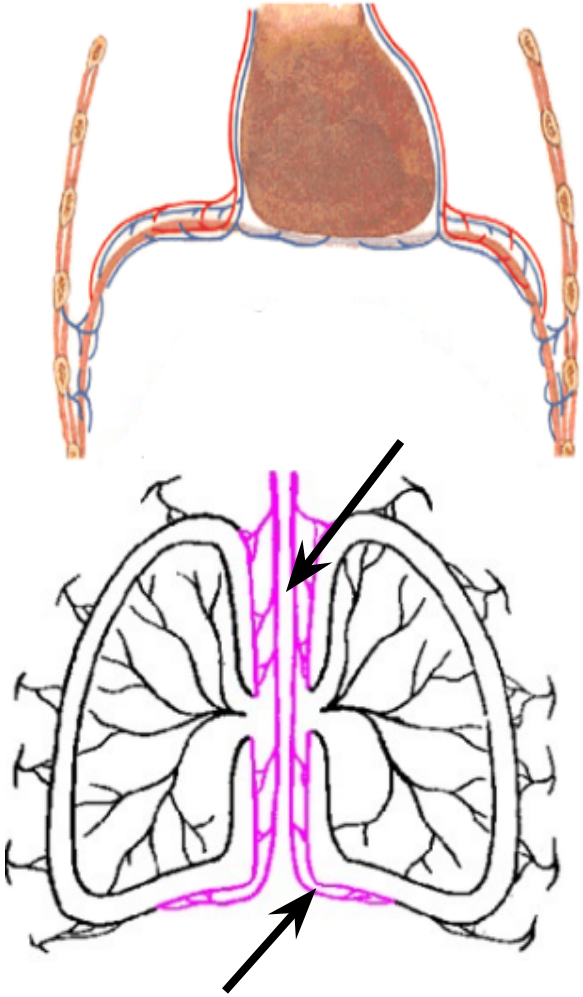
b- Costal pleura, segmentally by corresponding intercostal nerve.

c- Mediastinal and **central** part of **diaphragmatic** pleura: by phrenic nerve.

d- Peripheral part of **diaphragmatic** pleura: by lower intercostal nerves.

Parietal pleura





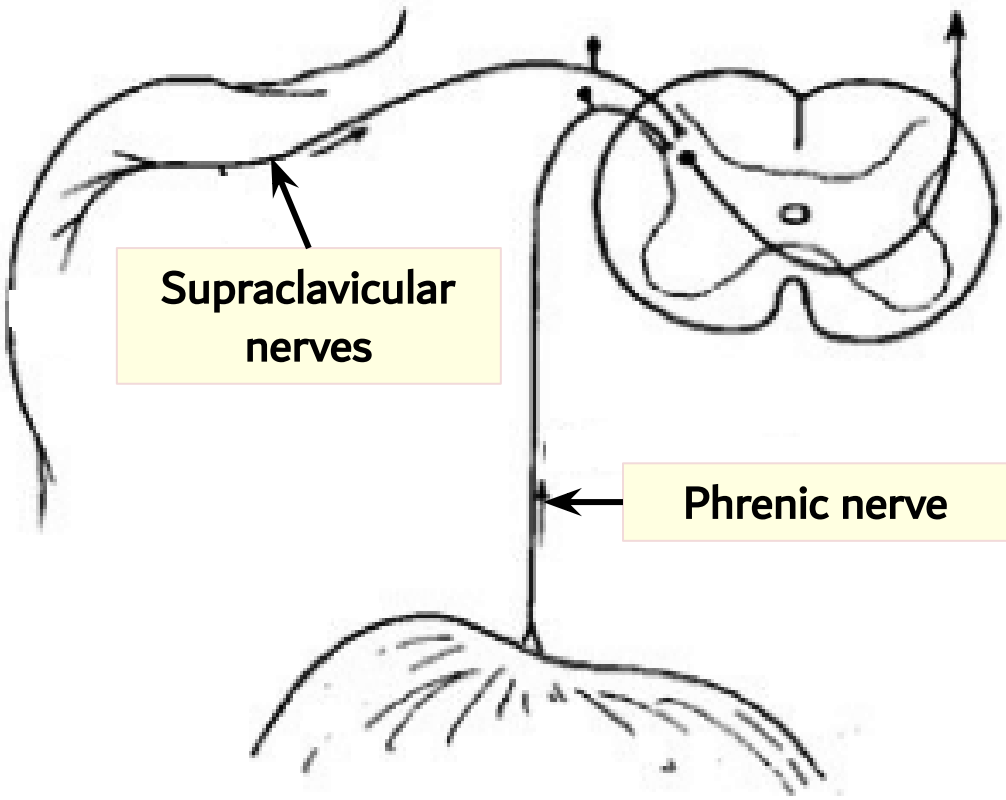
Same somatic innervation of thoracic wall, mediastinum & diaphragm, according to part of pleura:

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b- Costal pleura, segmentally by corresponding intercostal nerve.

c- Mediastinal and **central** part of **diaphragmatic** pleura: by phrenic nerve.

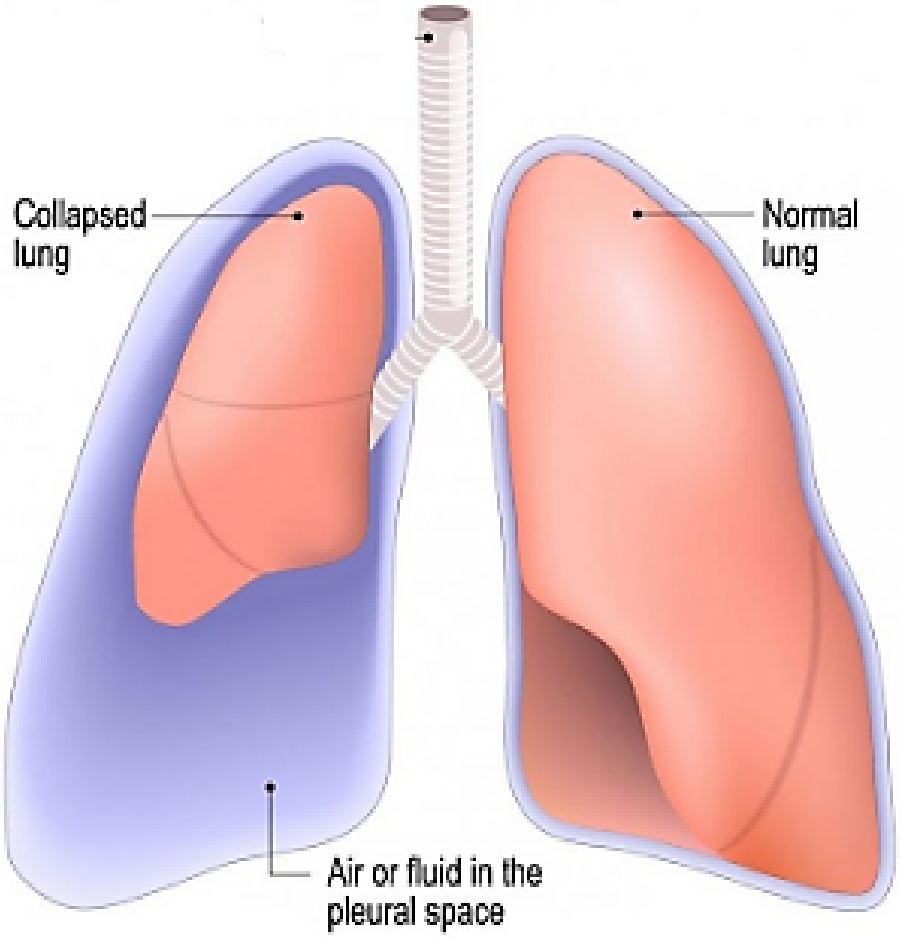
d- Peripheral part of **diaphragmatic** pleura: by lower intercostal nerves.

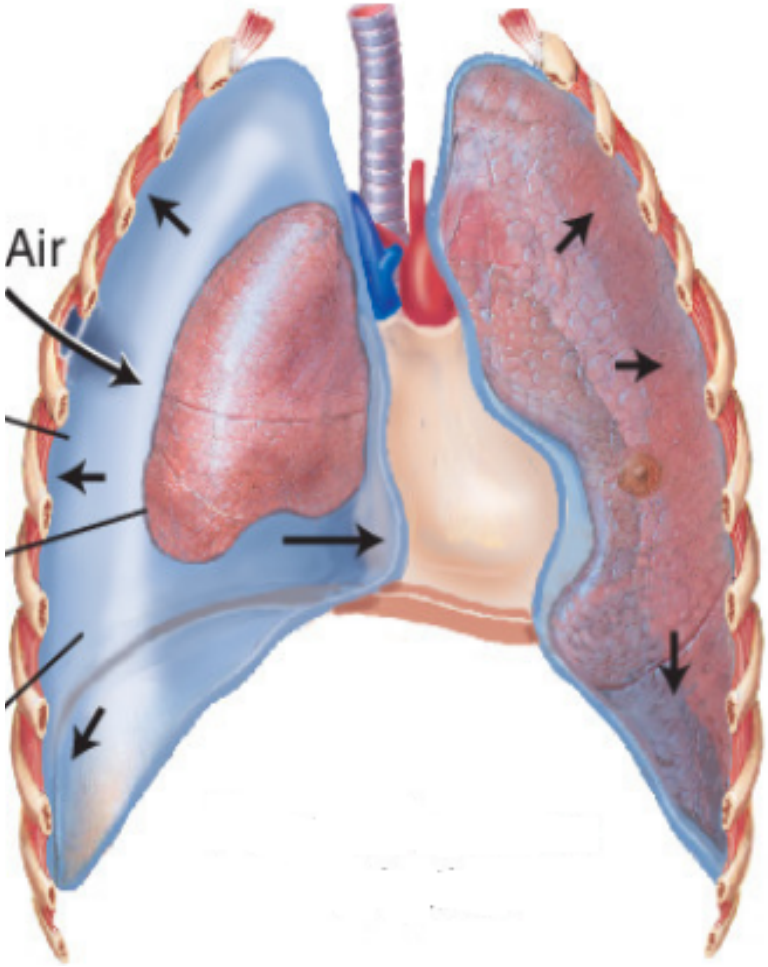




- Irritation of mediastinal pleura or central part of diaphragmatic pleura----**referred pain** at tip of shoulder
- Phrenic nerve (C3,4,5) shares the same cervical spinal segments as supraclavicular nerves (C3,4).

Abnormal fillings of the pleural cavity





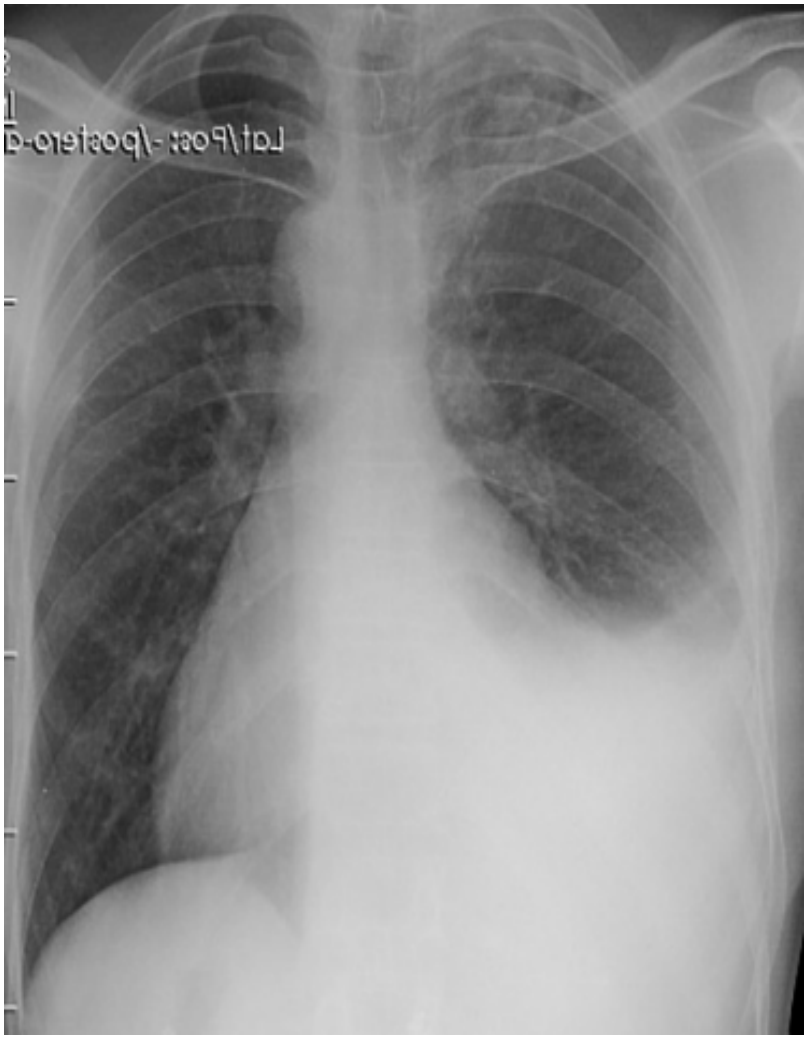
a- Pneumothorax: air in pleural cavity from perforation in lung or a wound in thoracic wall. This will lead to collapse of the lung.

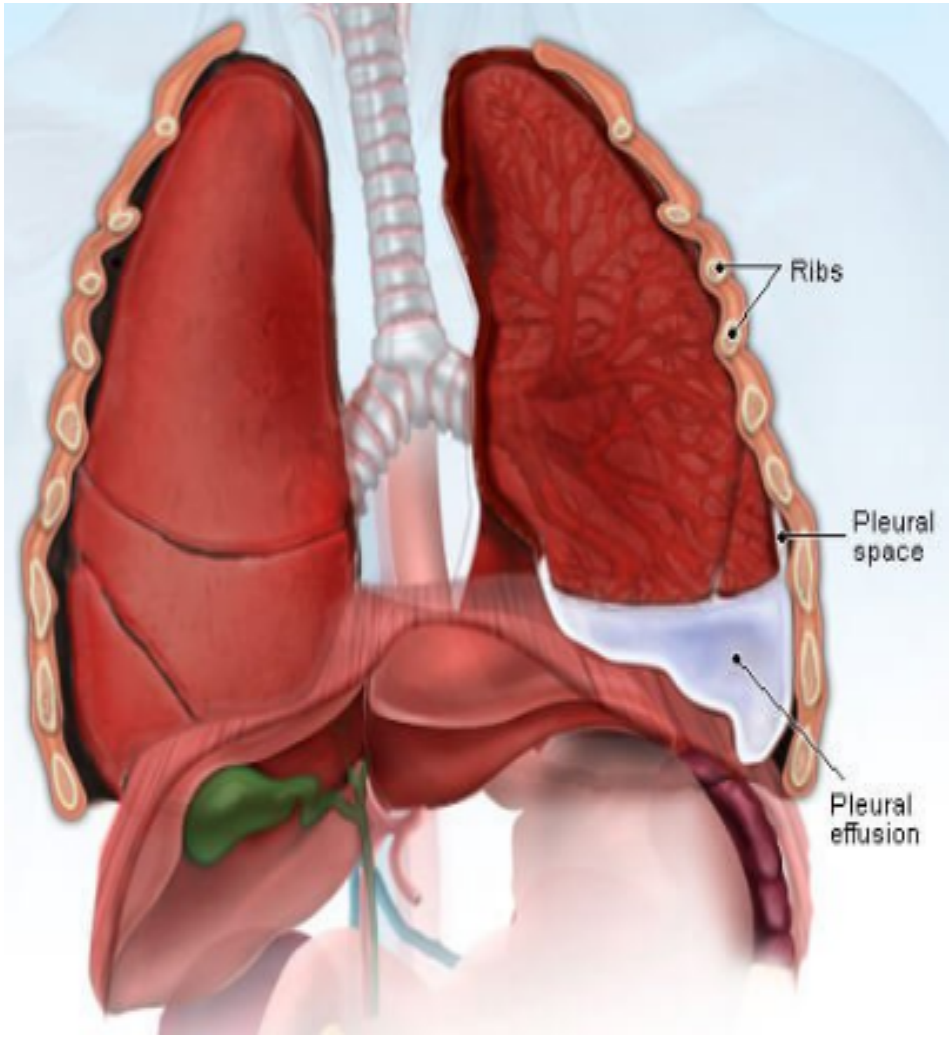
b- Haemothorax: the pleural cavity becomes filled with blood.

c- Pyothorax (or empyema): the pleural cavity becomes filled with pus.

d- Pleural effusion: the pleural cavity becomes filled with excess serous fluid.

Pneumothorax





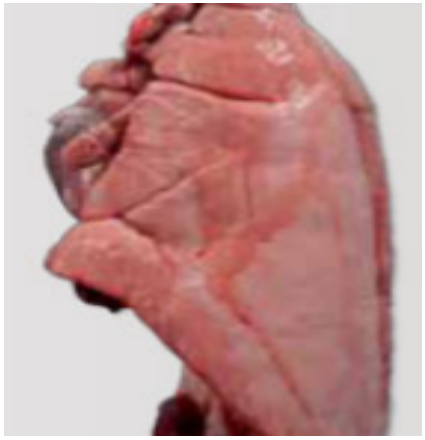
b- Haemothorax: the pleural cavity becomes filled with blood.

c- Pyothorax (or empyema): the pleural cavity becomes filled with pus.

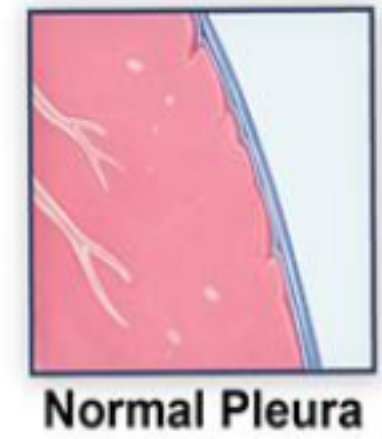
d- Pleural effusion: the pleural cavity becomes filled with excess serous fluid.

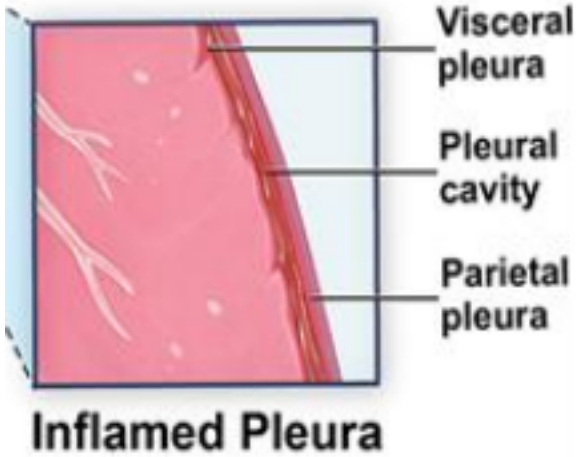
Pleurisy





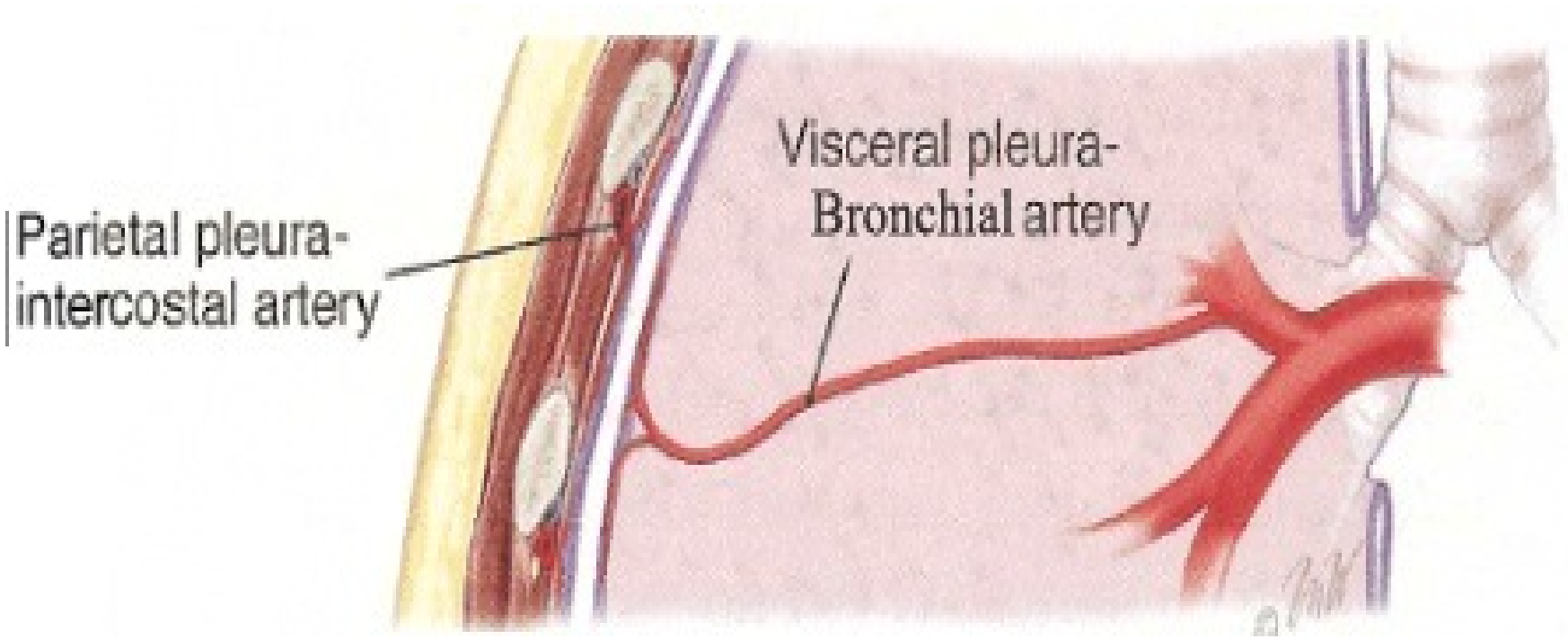






- The parietal pleura has a rich sensory nerve supply. If pleural surfaces become dry and rough, friction results in severe pain with movements of respiration.
- Inflammation of costal pleura or peripheral part of diaphragmatic pleura leads to pain **referred** to the thoracic wall or anterior abdominal wall according to the intercostal nerve

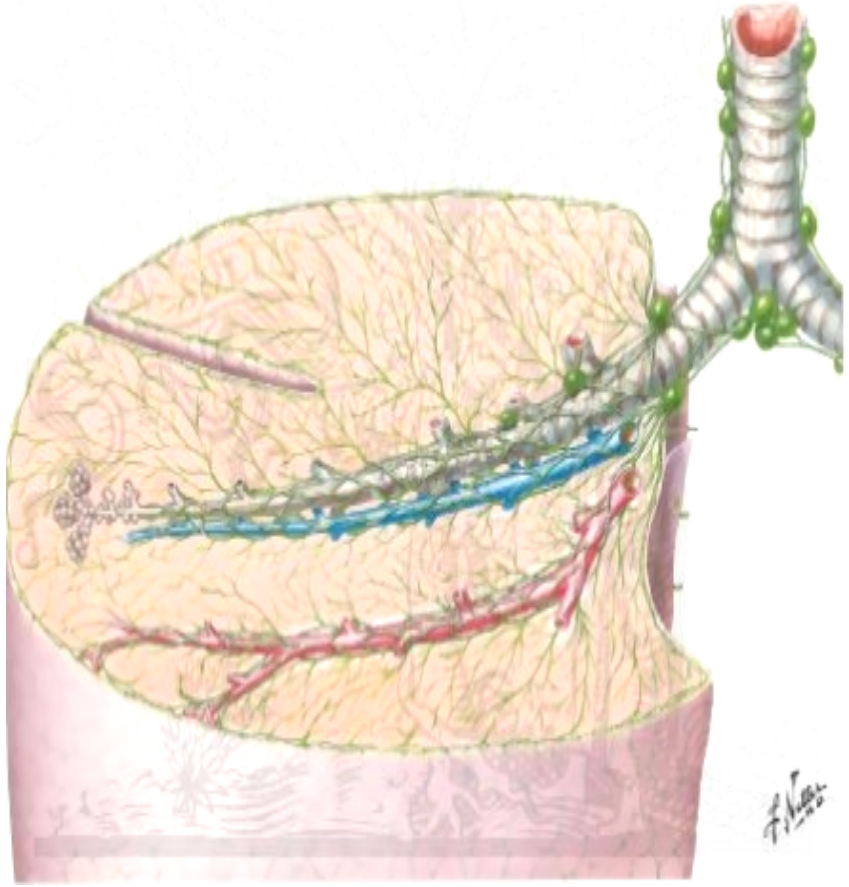
Blood supply of pleura



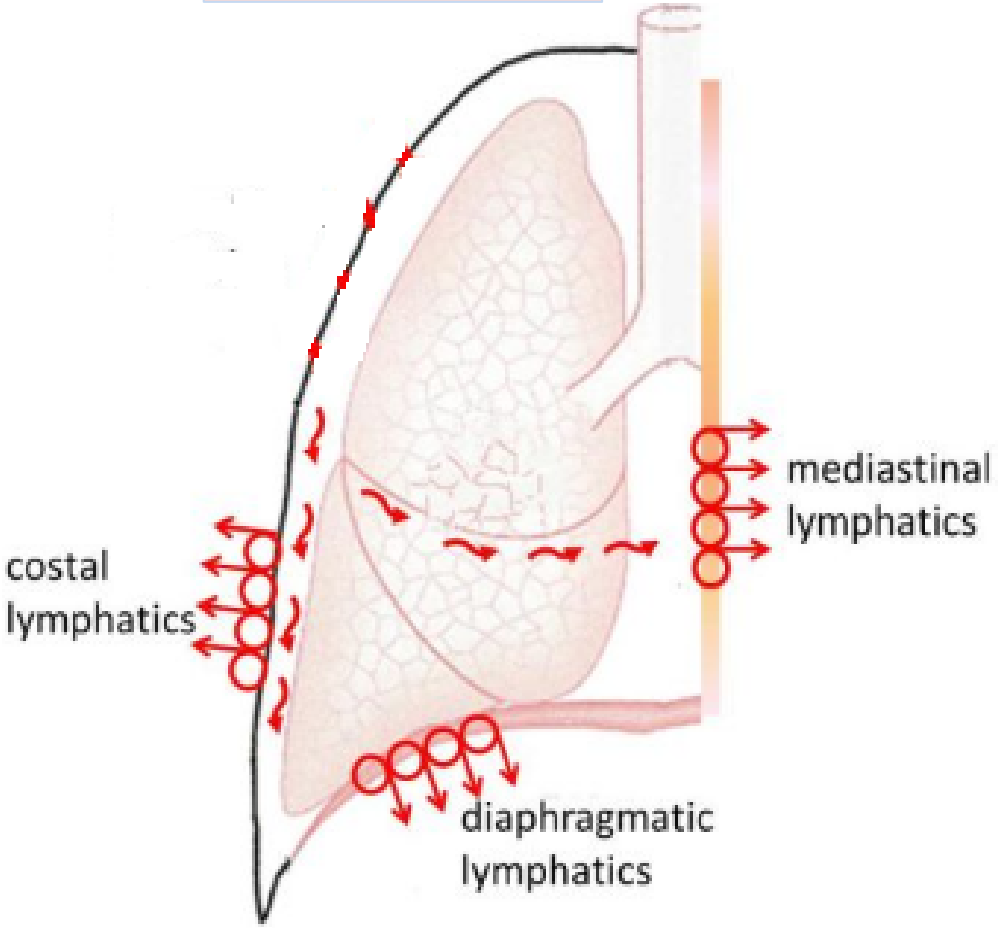
Visceral pleura--same vessels supplying lung i.e. **bronchial vessels.**
Parietal pleura--same vessels supplying thoracic wall i.e. **internal thoracic and intercostal art.**

Lymph drainage of pleura

Visceral pleura



Parietal pleura



Visceral pleura--same LNs draining lung i.e. **bronchopulmonary & tracheobronchial LNs.**
Parietal pleura--same LNs draining thoracic wall i.e. **parasternal, intercostal, posterior mediastinal and diaphragmatic nodes** (lymph nodes have same names as parts of parietal pleura).

Lung

By

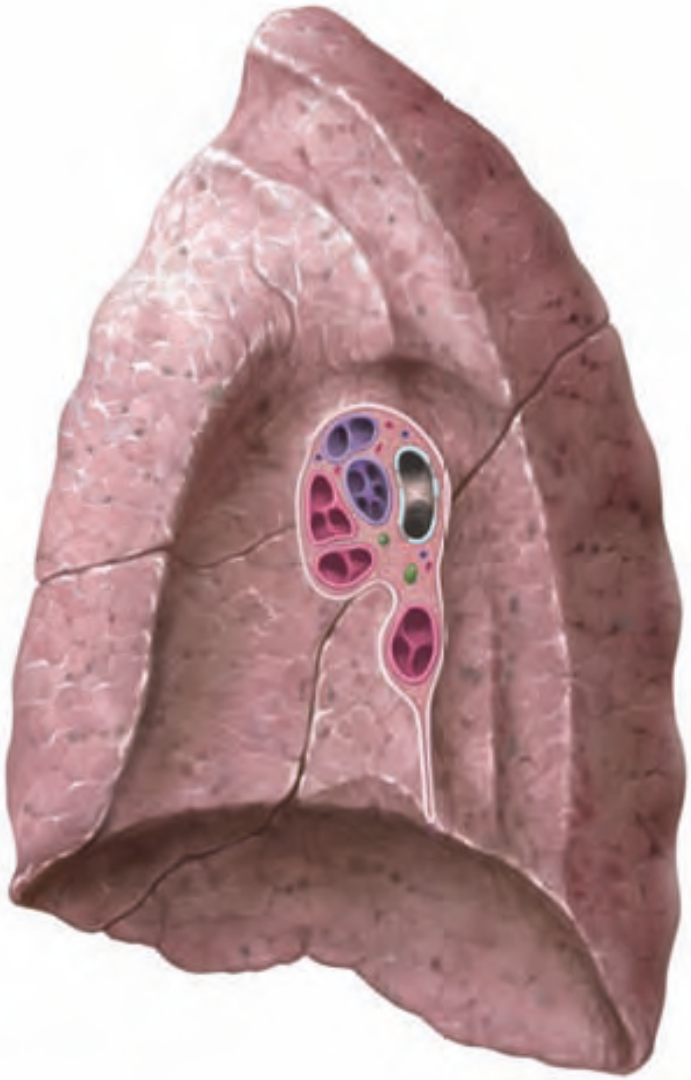
Basma Emad Aboulhoda

Lecturer of Anatomy and Embryology

Faculty of Medicine, Cairo University

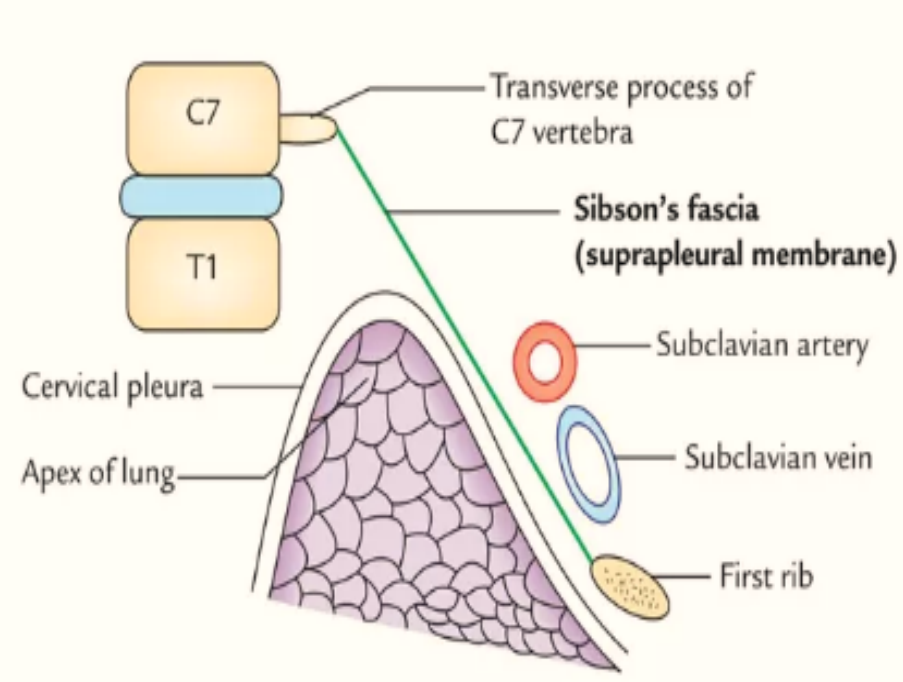
Lungs

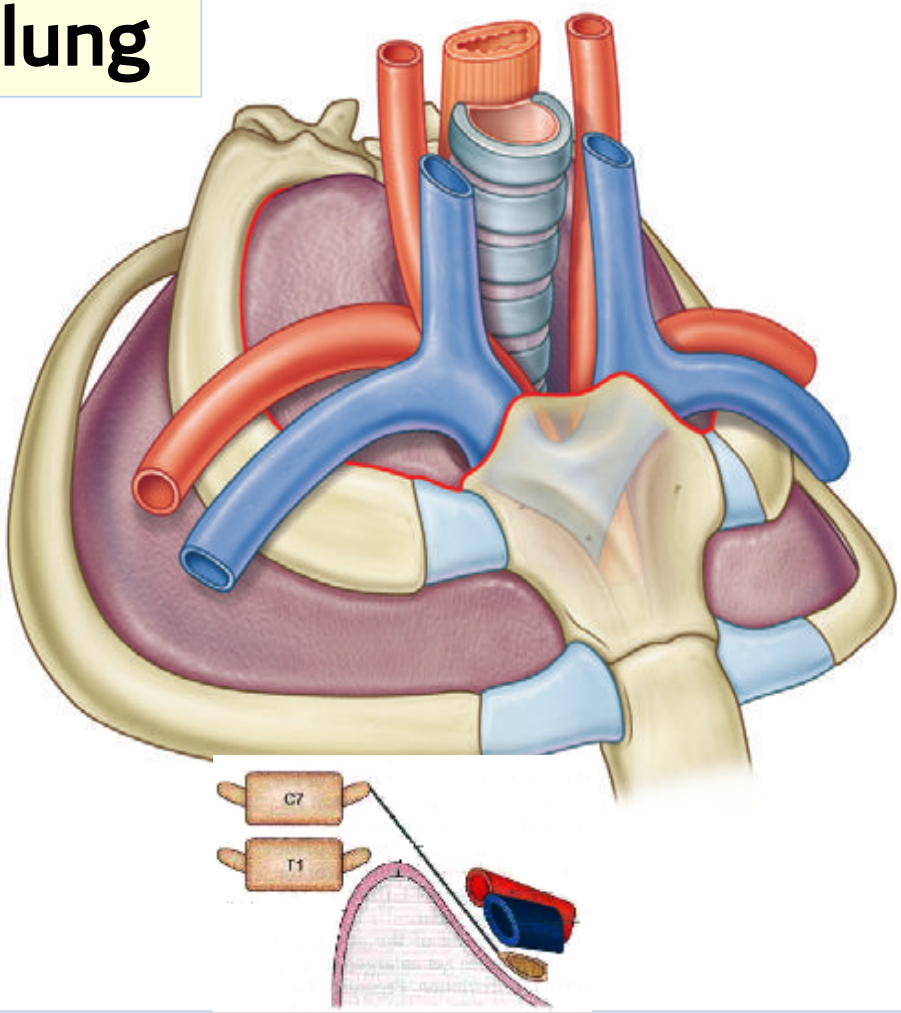




- The lungs are the organs of gaseous exchange between the blood and the atmospheric air.
- Before birth, the lung is firm and sinks when put in water.
- Each lung resembles half a cone. It has an apex, a base**, 2 surfaces** (costal and medial) and **3 borders** (anterior, posterior and inferior).

Apex of lung





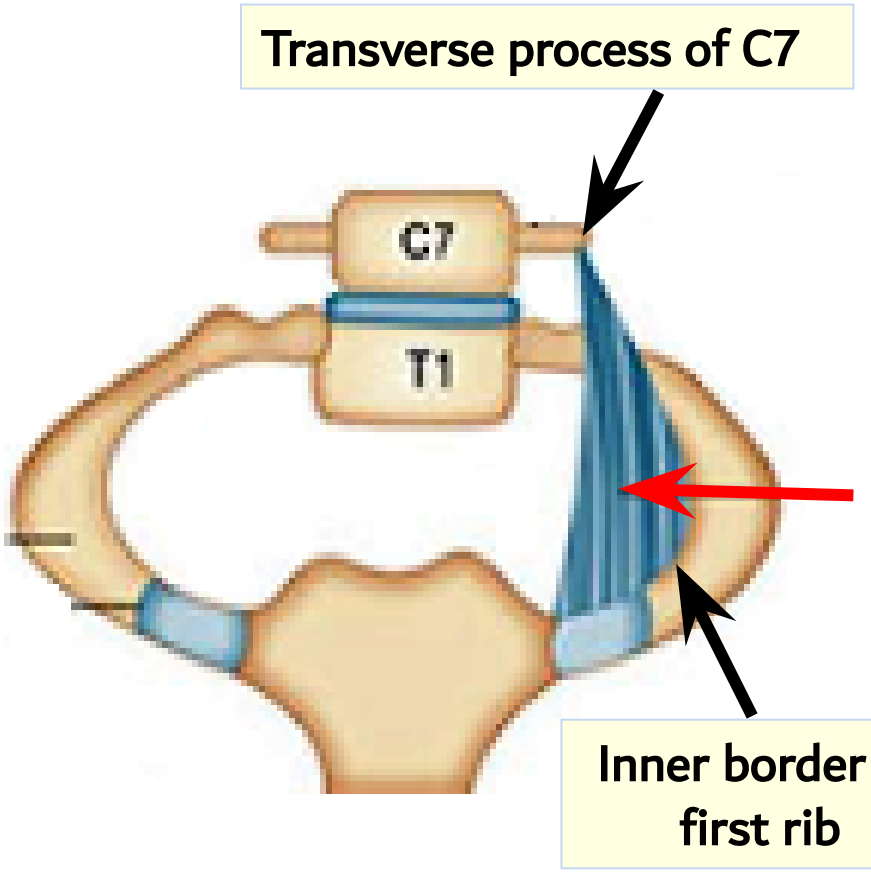
- Rounded, upper end which projects upwards, through thoracic inlet, into root of neck.
- It reaches neck of 1st rib (behind) but lies about 1 inch above medial 1/3 of clavicle (in front).

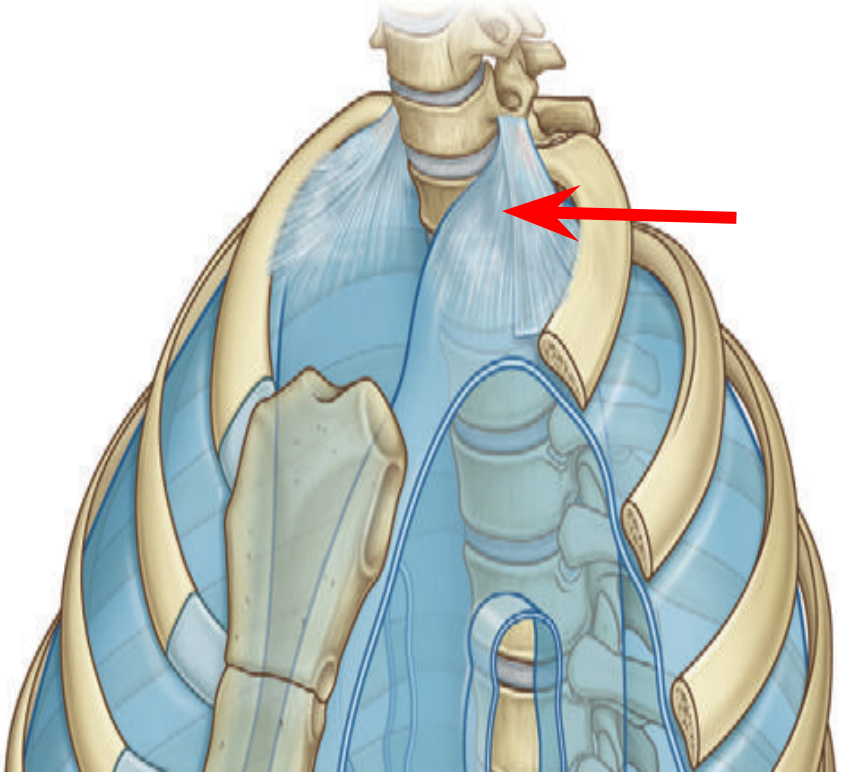
Relations:

 Above and in front: apex is covered by cervical pleura and supra-pleural membrane.

It is grooved by the subclavian artery arching upwards and laterally.

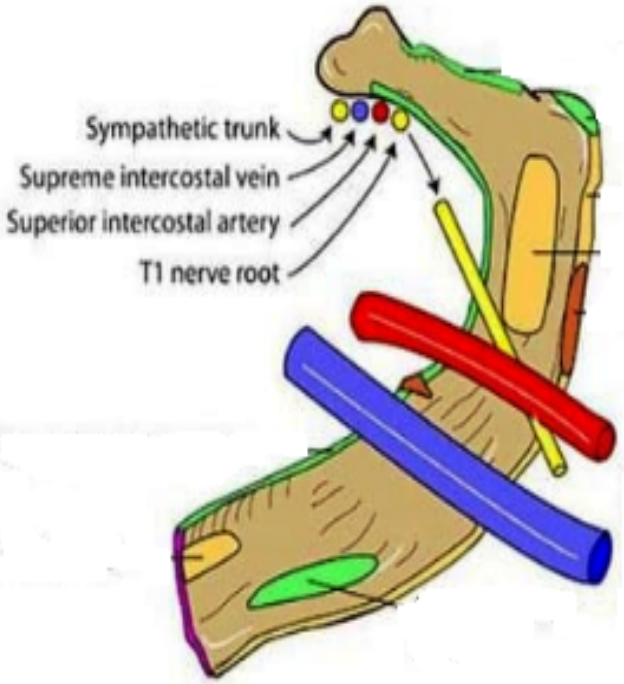
Suprapeural membrane

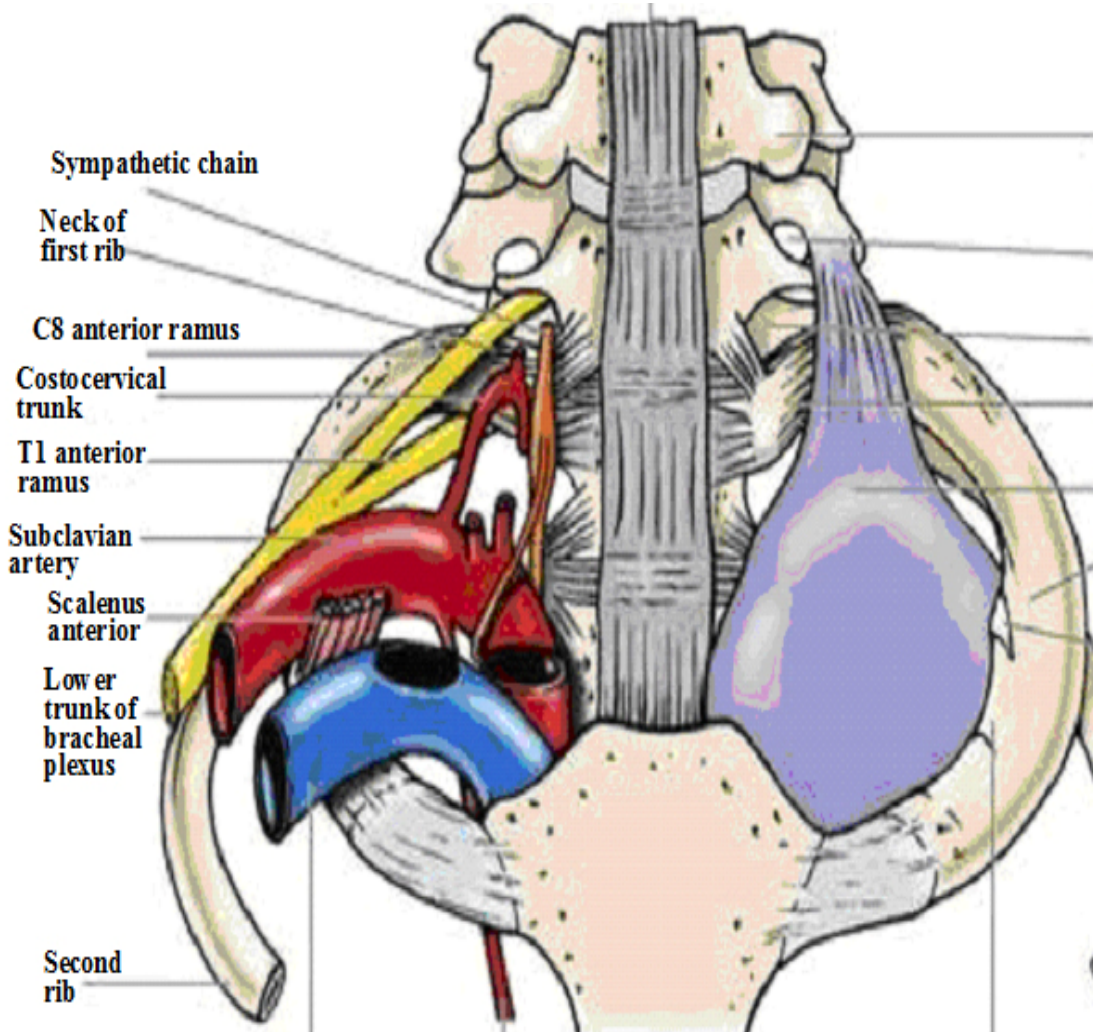




Apex: is attached to transverse process of C7 vertebra.
Base: is attached to inner border of the 1st rib and its costal cartilage.
(Protects cervical pleura and apex of lung-prevents inward suction of structures at root of neck during inspiration-prevents upward bulging of apex of lung during forcible expulsive)

RELATIONS AND ATTACHMENTS OF LEFT FIRST RIB





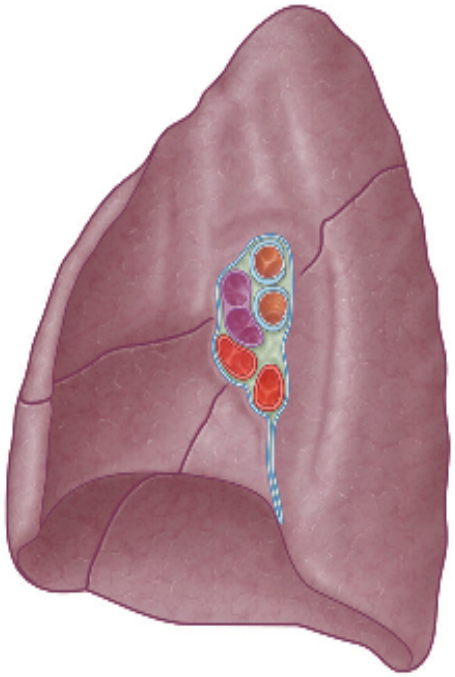
Relations:

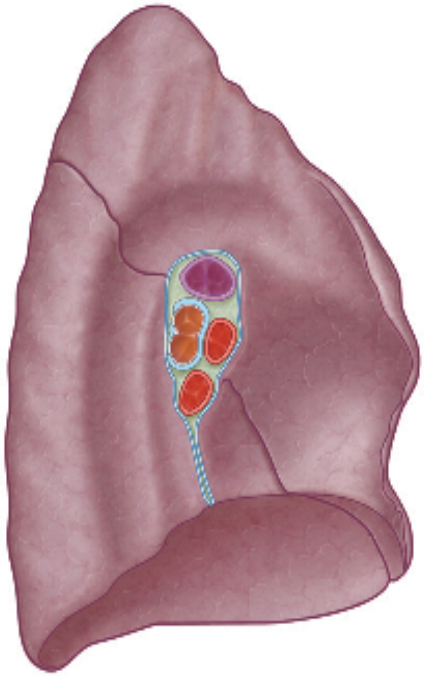
- **Above and in front:** apex is covered by cervical pleura and supra-pleural membrane.

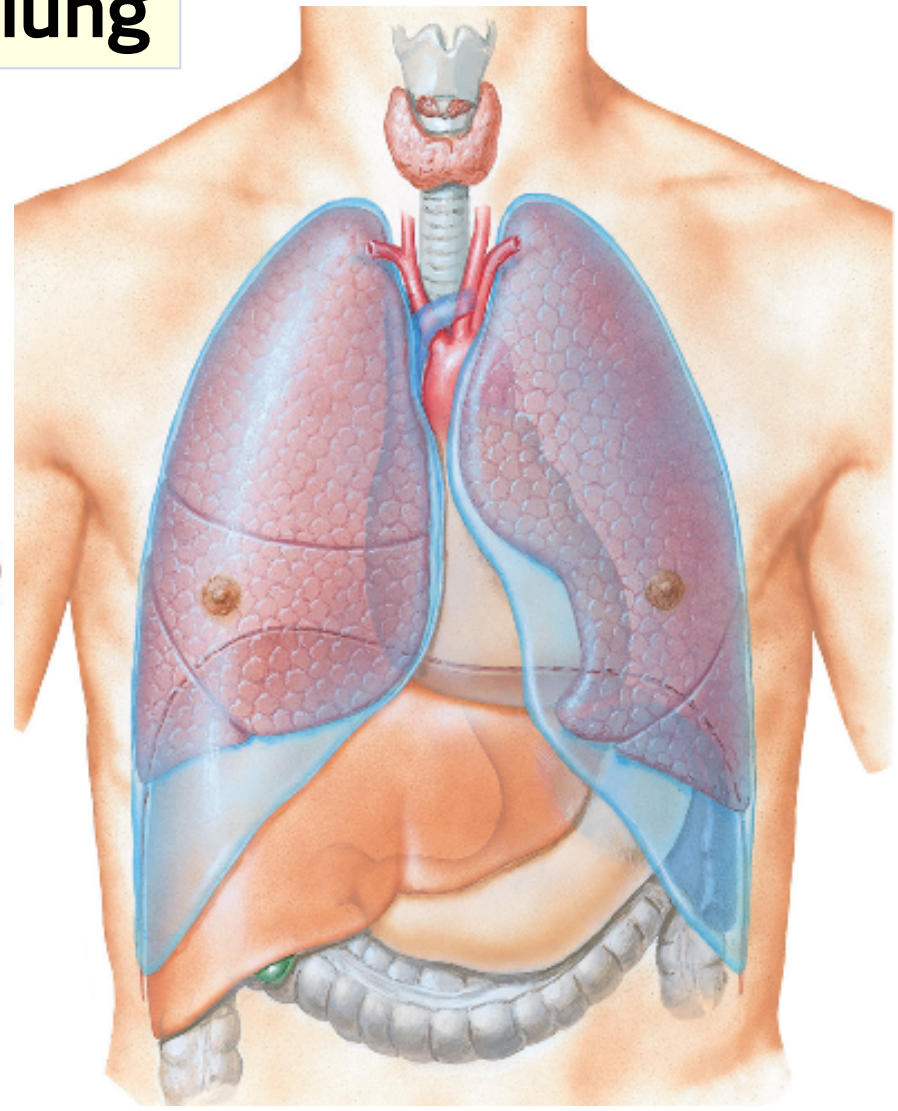
It is grooved by the subclavian artery arching upwards and laterally.

- **Behind:** apex is separated from neck of 1st rib by 3 structures which lie in front of neck(6)

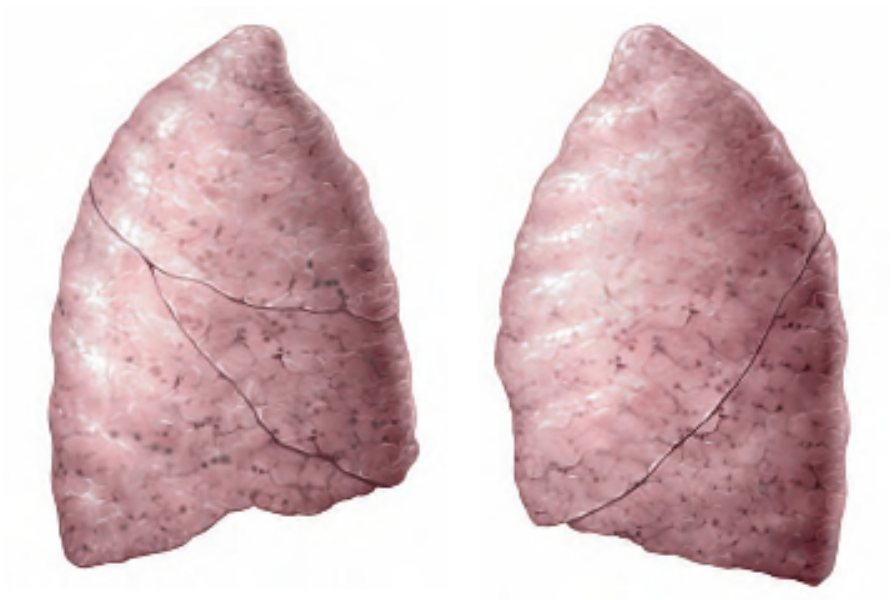
Base of lung

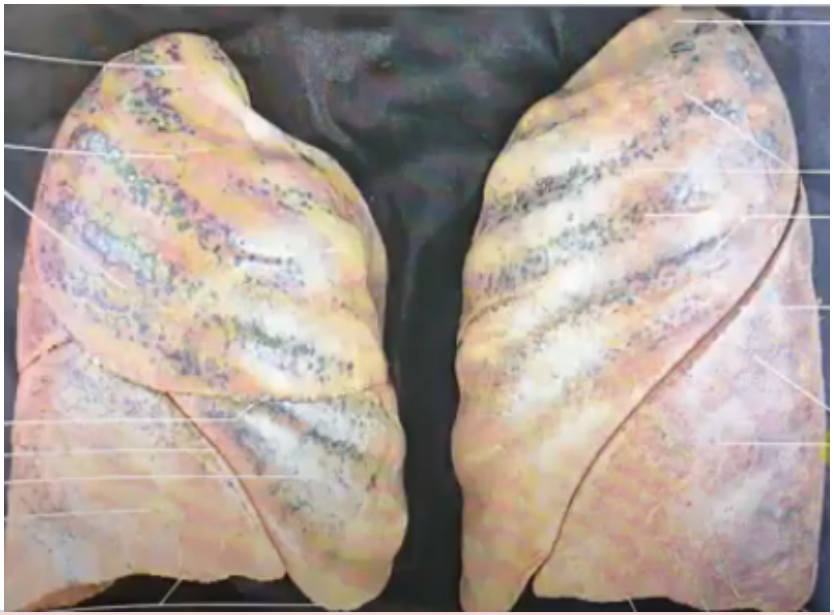
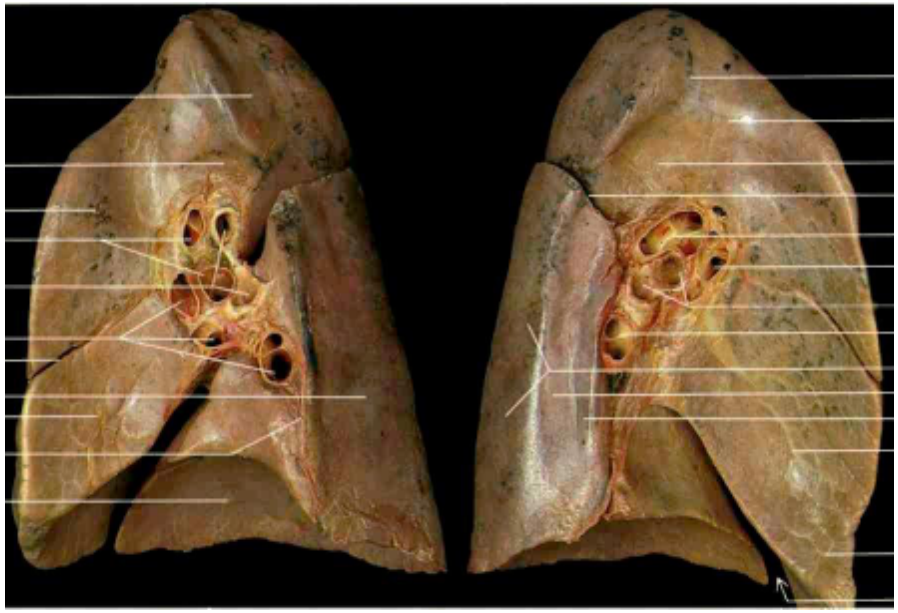






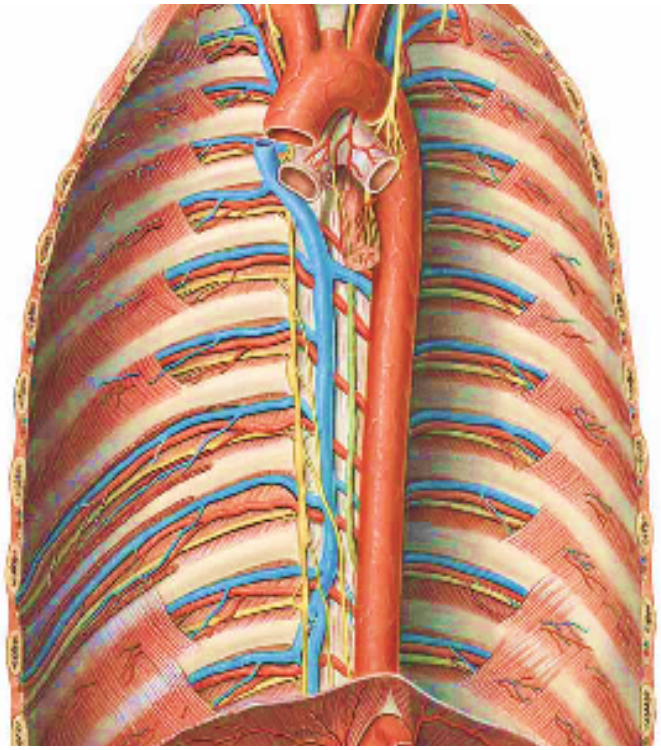
- Concave, lower surface which rests on cupola of diaphragm.
- Base is separated by diaphragm from right lobe of liver (right lung) or left lobe of liver, fundus of stomach and spleen (left lung).**(Base is more deep in right lung)**

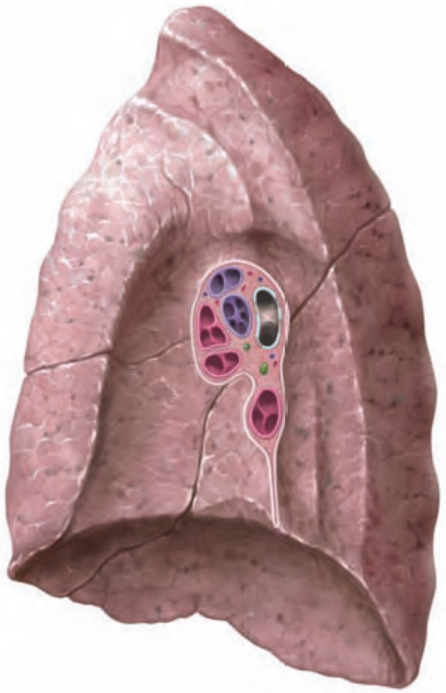


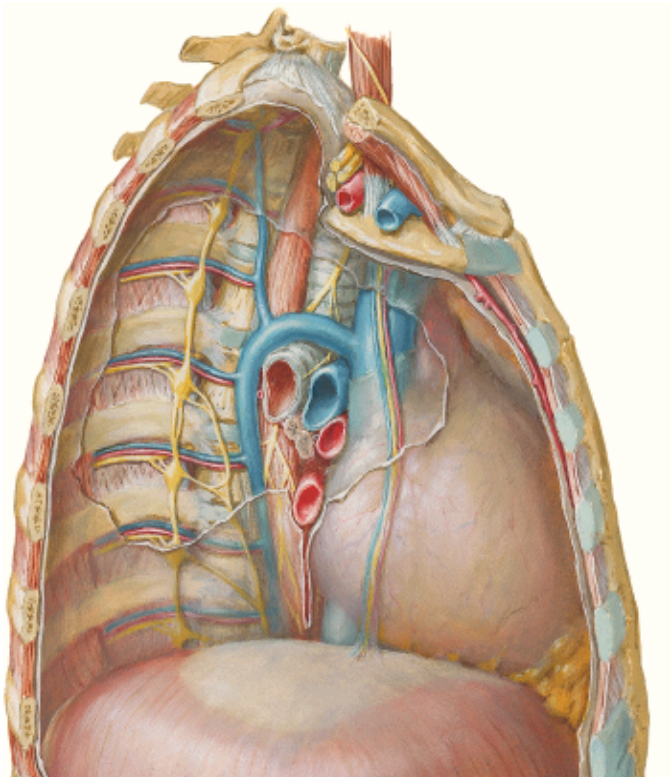



Costal surface: wide, smooth convex; related to ribs, costal cartilages intercostal spaces.
Medial surface: marked by the presence of hilum of lung. divided into 2 parts:
a- Vertebral (posterior part): has same relations in both lungs
b- Mediastinal (ant. part): presents hilum and impressions which differ bet. Right & left lungs.

Medial Surface of Lung







Medial surface: divided into 2 parts:

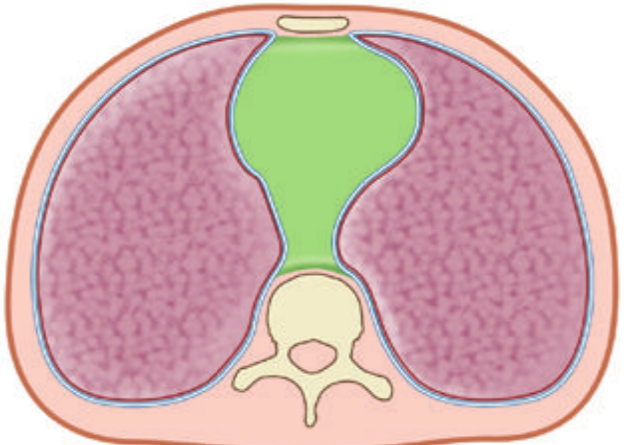
a- Vertebral (posterior part): has same relations in both lungs

(i) Bodies of thoracic vertebrae and intervertebral discs.

(ii) Intercostal nerves and posterior intercostal vessels.

(iii) Sympathetic chain and splanchnic nerves.

b- Mediastinal (ant. part): presents hilum .



Borders of Lung

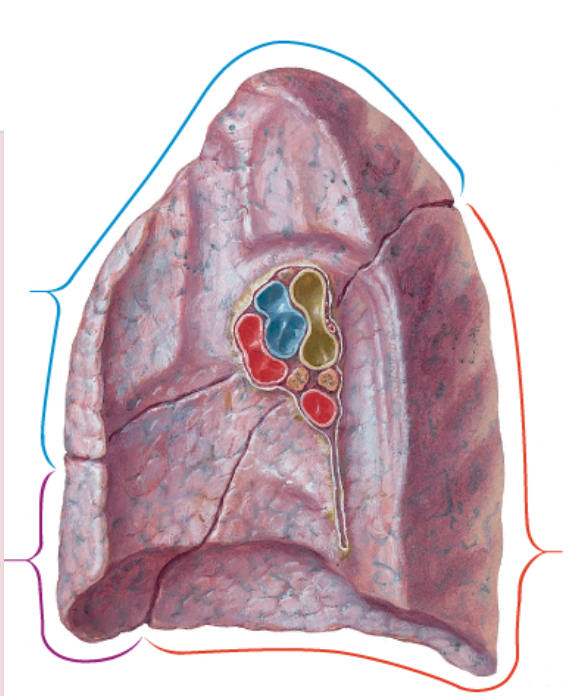
1- Anterior border:
thin sharp,
separates costal surface from mediastinal surface.
It has a notch in its upper part caused by 1st rib.

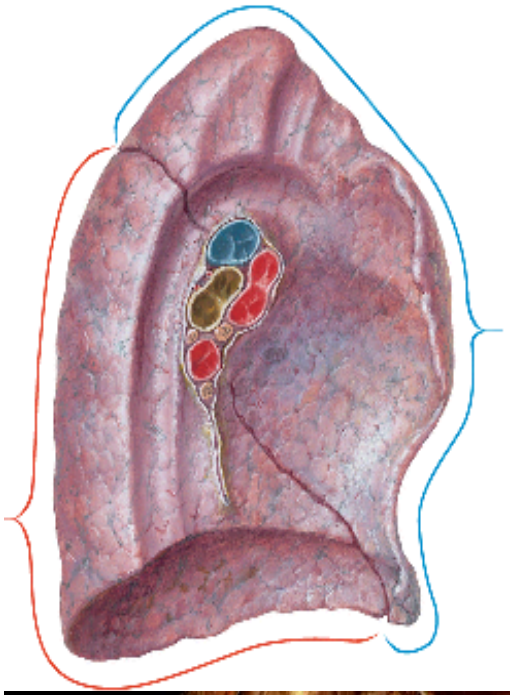
a- right lung, straight-corresponds to anterior border of pleura.

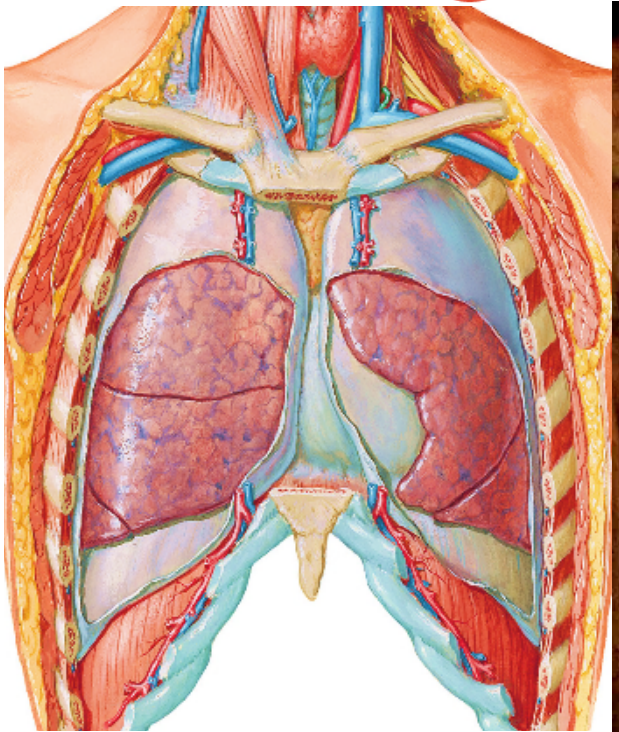
b- left lung, lower part has **cardiac notch-**
tongue-like process, **lingula**.

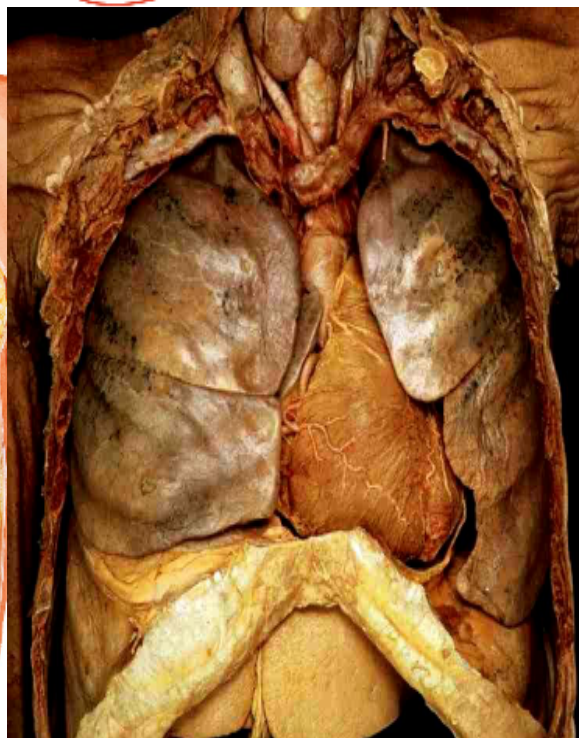
2- Inferior border: encircling diaphragmatic surface, forming boundary of base of lung.

3- Posterior border:
Thick, rounded, separates costal surface from vertebral part of medial surface.



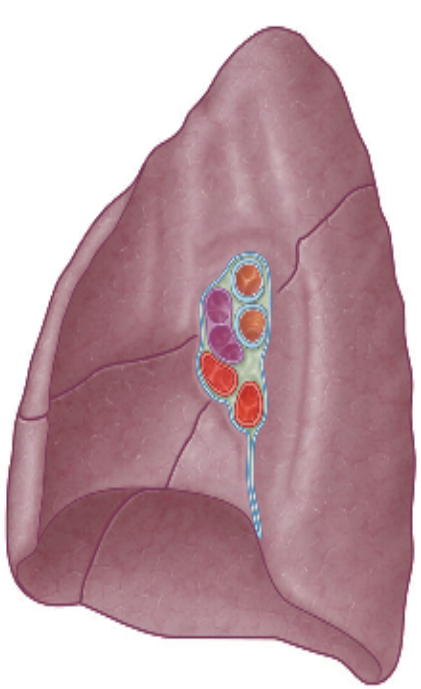


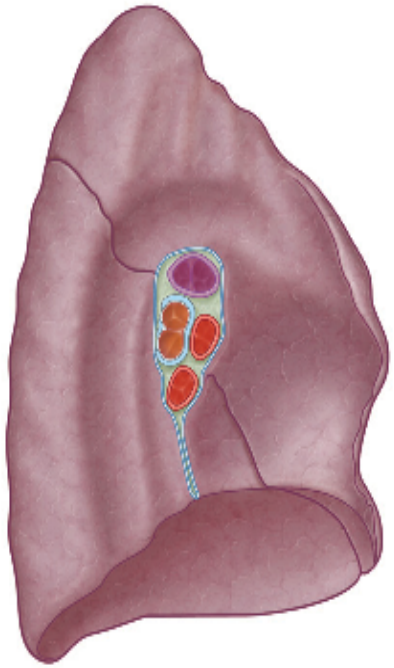




Hilum of lung

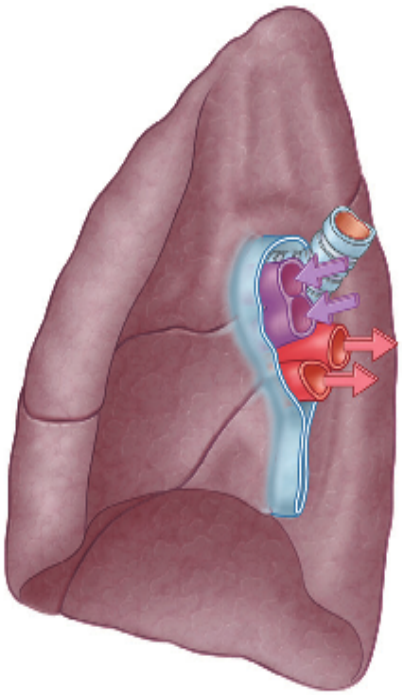
Opening

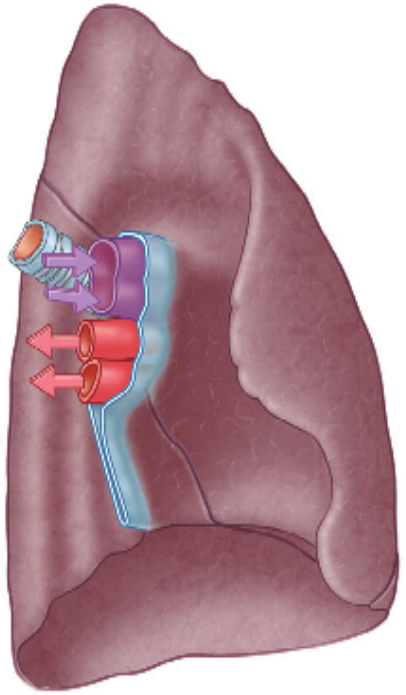




Root of lung

Structures





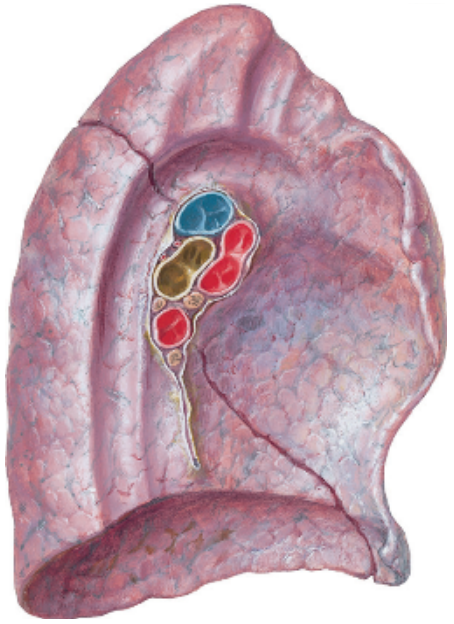
Right lung





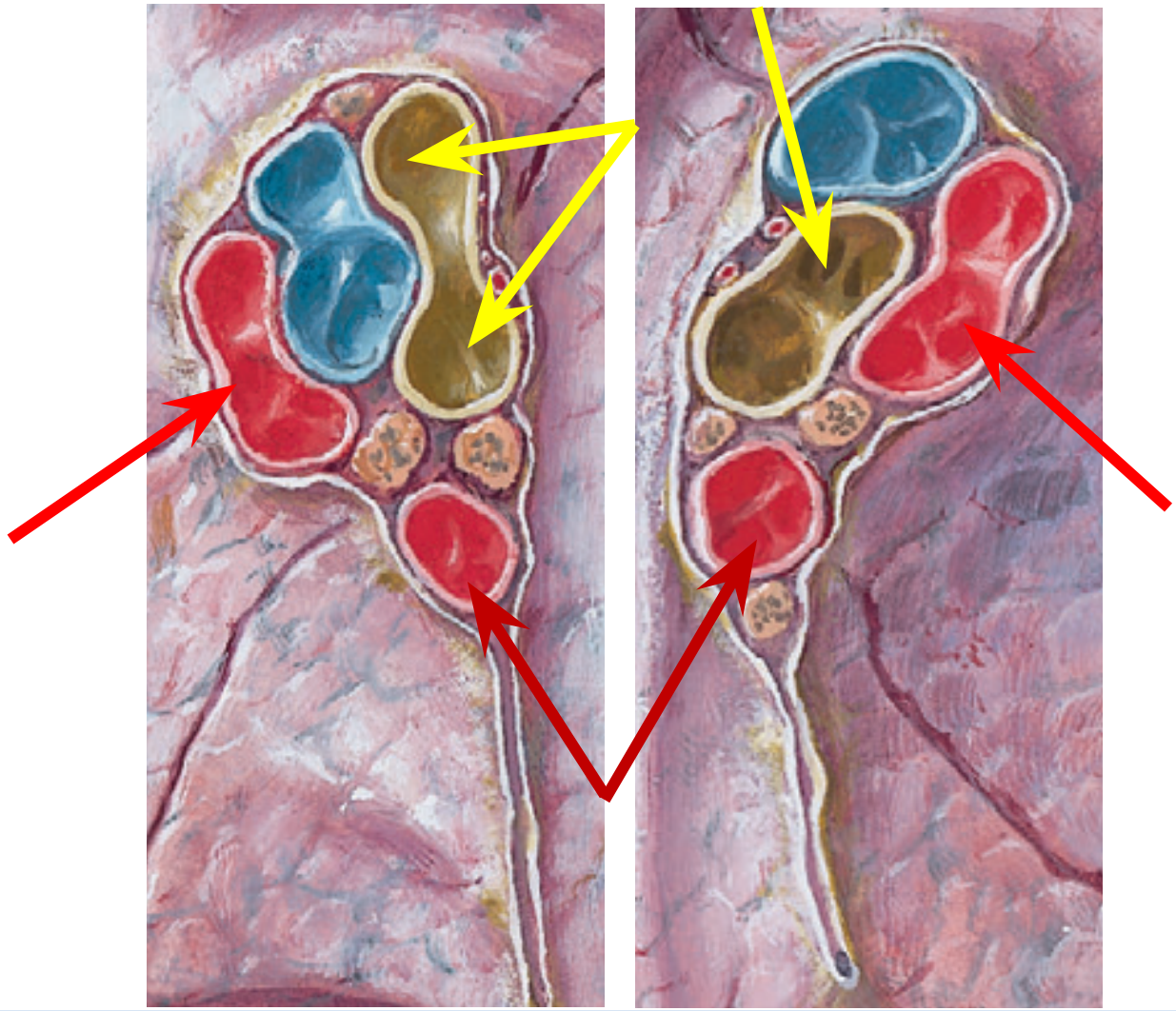


Left lung



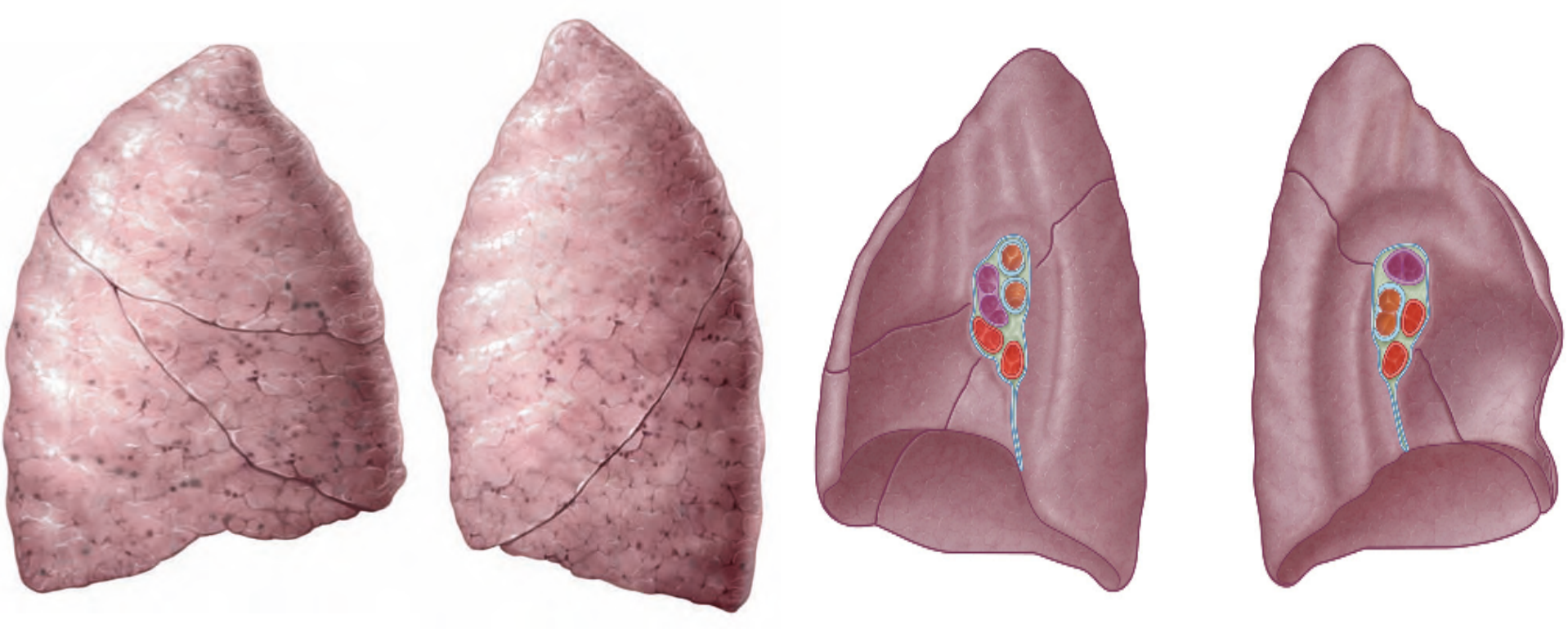
a- In **right lung**:
Principal (or hyparterial) bronchus (most posterior).
Superior pulmonary vein (most anterior).
Inferior pulmonary vein (most inferior).
Pulmonary artery (bet principal bronchus&superior pulm. V.).
Superior lobar (eparterial) bronchus (above principal bron.)
Branch from pulmonary artery (in front of eparterial bron.)

b- In **left lung:**
Principal bronchus (most posteriorly).
Superior pulmonary vein (most anteriorly).
Inferior pulmonary vein (most inferiorly).
Pulmonary artery (above and in front of principal bronchus).



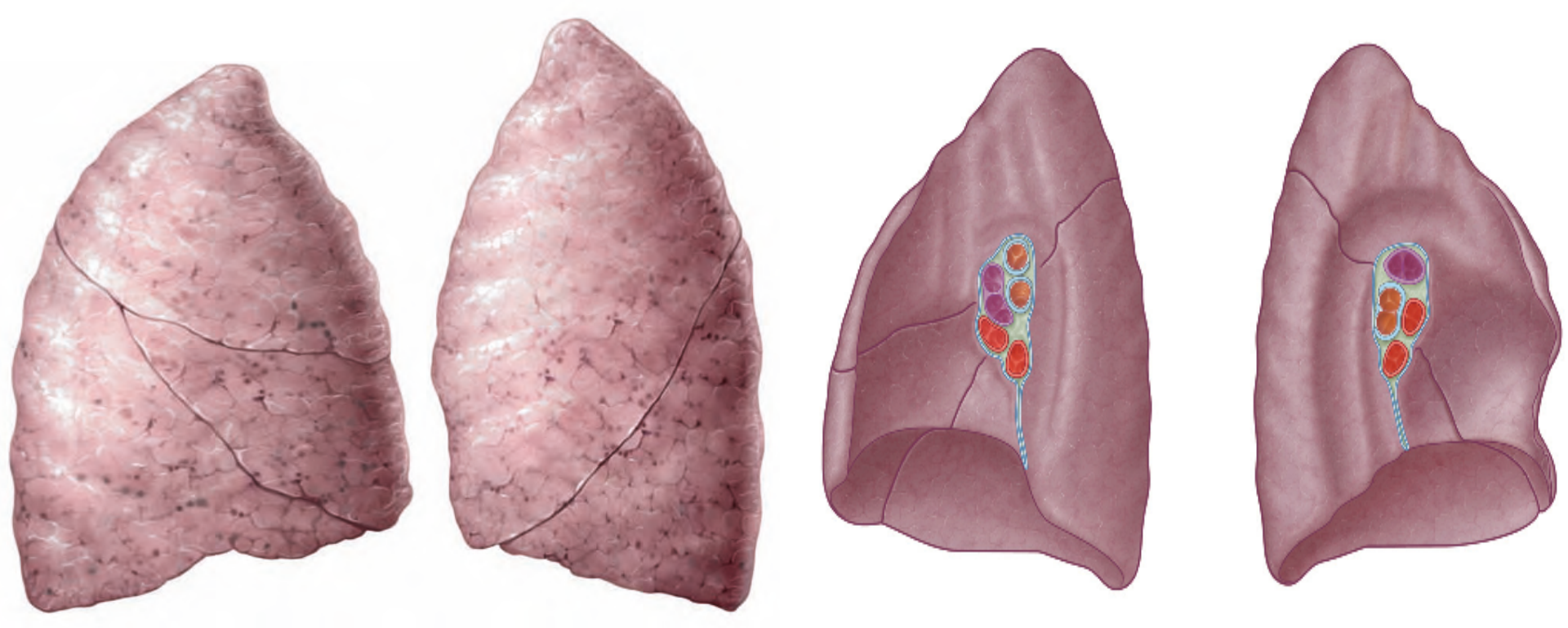
Superior pulmonary vein: most anterior
Inferior pulmonary vein: most inferior
Principal bronchus: most posterior

Fissures of lung



1- Oblique fissure (in both lungs):
Cuts into the costal then the mediastinal surface of the lung as far as the hilum.
Begins at posterior border of lung, **6 cm** below apex and extends downwards, forwards and medially to reach inferior border where it **ends**.
2- Horizontal fissure (in right lung only):
Cuts into costal and mediastinal surfaces of the right lung separating the upper lobe from the middle lobe. It **Begins** at anterior border of right lung-**extends** to right and slightly upwards to **end** by meeting oblique fissure

Lobes of lung



Lobe of right lung:

1- Upper lobe: Lies above and in front of the oblique fissure, above horizontal fissure.
It includes apex of lung and upper part of anterior border down to level of the 4th costal cartilage.

2- Middle lobe: Lies in front of the oblique fissure and below the horizontal fissure.
It includes lower parts of the front of costal surface and anterior border of right lung as well as anterior part of its base.

3- Lower lobe: Larger than the **two** other lobes together, it lies below and behind the oblique fissure.
It includes most of the base of the lung and the greater part of the posterior border.

Lobes of left lung:

1- Upper lobe: Lies above and in front of oblique fissure, it is equivalent to upper & middle lobes of right lung together.
It includes apex of the lung and the whole anterior border including cardiac notch and lingula.

2- Lower lobe: Identical to that of the right lung.

وَقُلِ الْحَمْدُ لِلَّهِ