Respiratory system
(Part 2)

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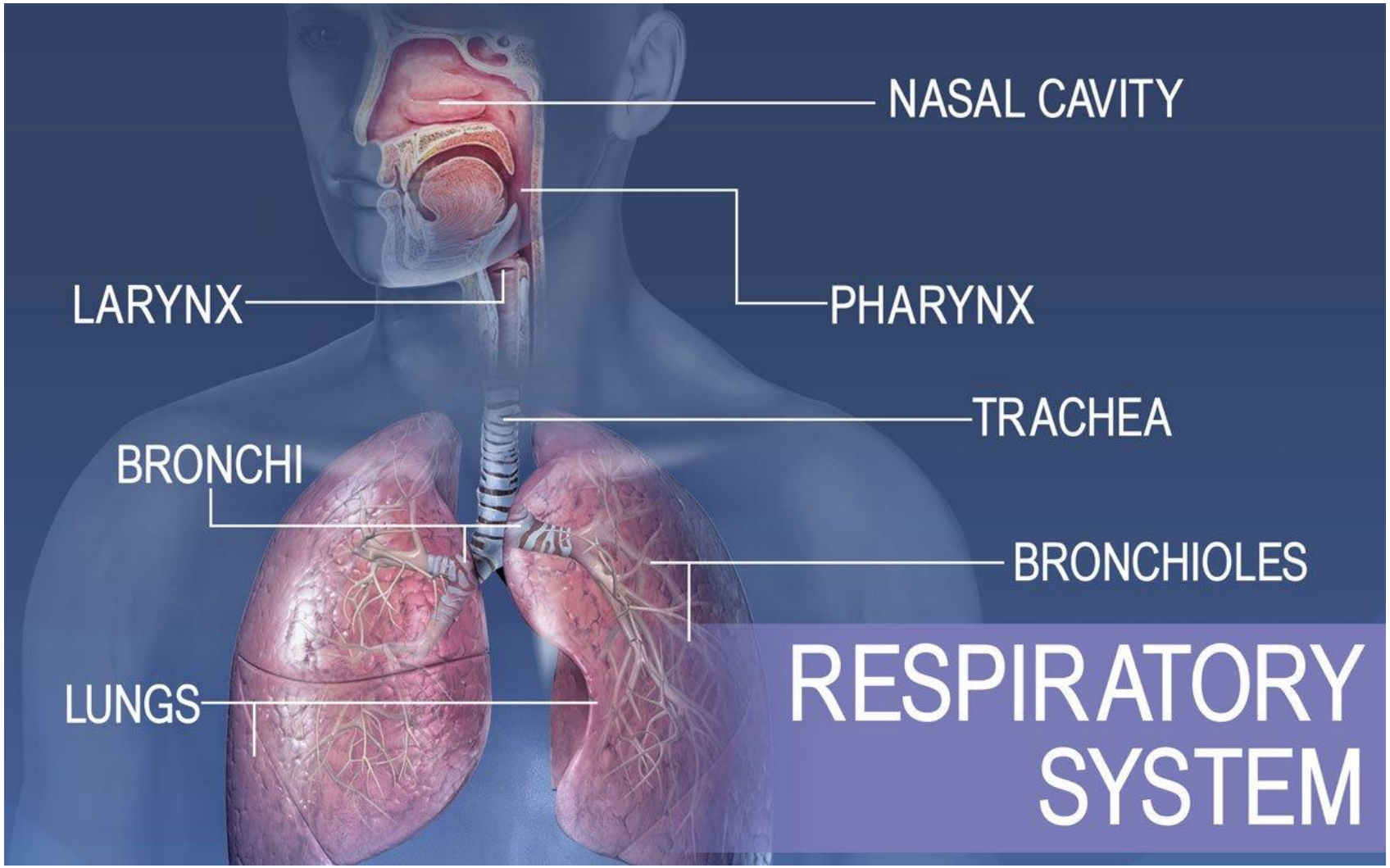
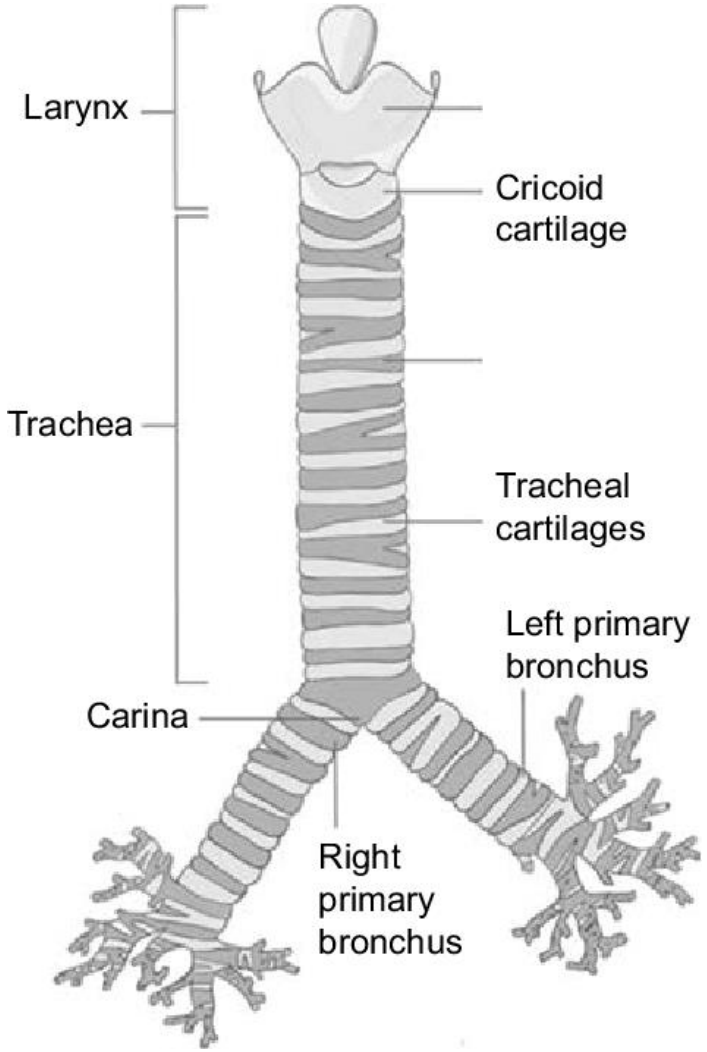
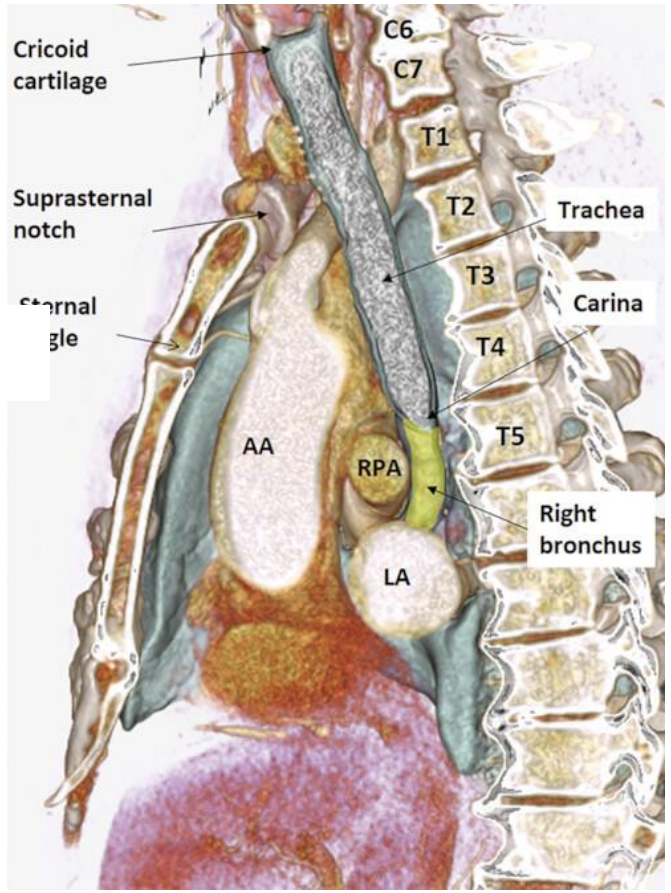


Trachea

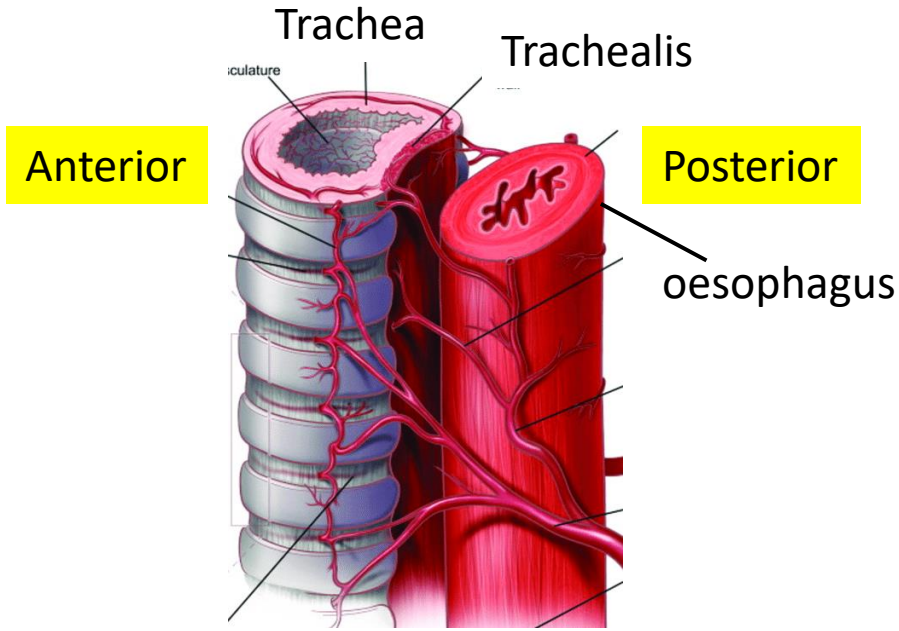
- Descends from the cricoid cartilage of the larynx and ends in the thorax (C6-T4)
- Lies anterior to the oesophagus
- Adult trachea is a 11 cm long
- It is located approximately in the midline sagittal plane but its point of bifurcation is a little to the right.
- Divides into right and left main bronchi (T5)

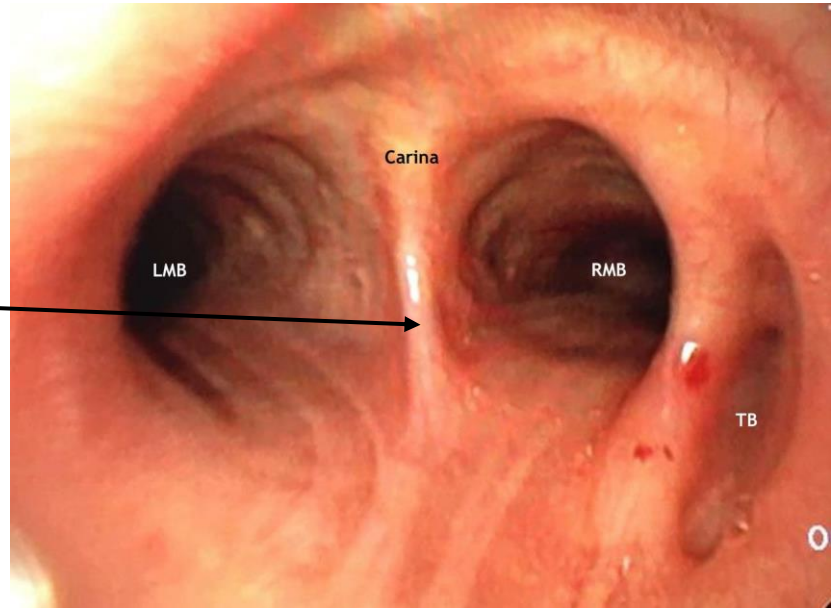




Trachea

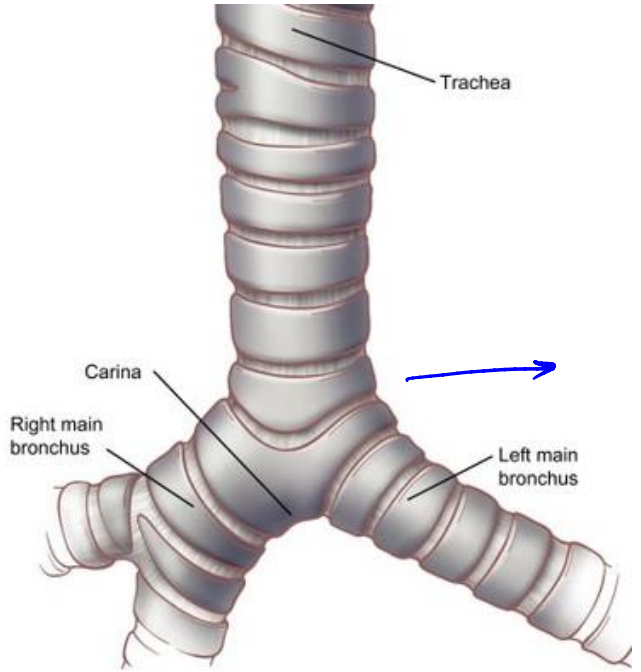
- Formed of cartilage and fibromuscular membrane and lined internally by mucosa.
  - The anterior and lateral surfaces of the trachea consist of 15-20 incomplete C-shaped hyaline cartilage to keep it open.
  - The posterior wall is a fibromuscular structure containing smooth muscle (**trachealis**).
- The tracheal bifurcation is marked by a cartilaginous spur, **the carina**.





Bronchi

- The right main bronchus is approximately 2.5 cm long, and is **wider, shorter and more vertical than the left.**
- Inhaled foreign bodies enter the right main bronchus more often than the left.
- The left main bronchus is **narrower, less vertical and twice as long** (5 cm) as the right main bronchus



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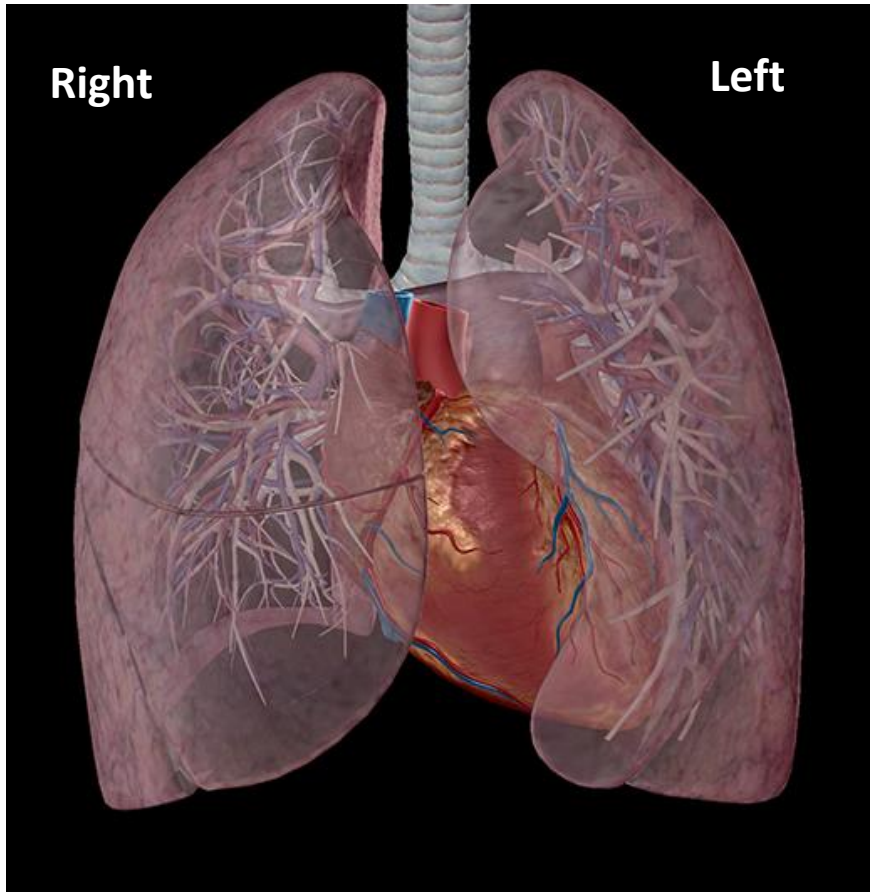
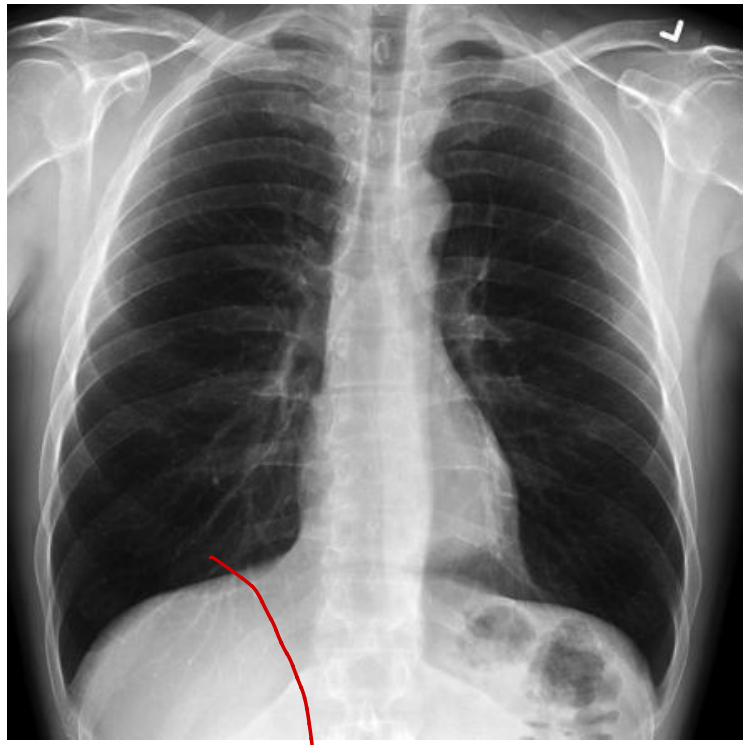
على مستوى T 5

Lungs

- The lungs are the organs of respiration.
- When removed from the thorax, a fresh normal lung is spongy, can float in water → لكن بالجبن رح تغرق
- Situated on either side of the heart and occupy most of the thoracic cavity.
- Each lung is covered with pleura.





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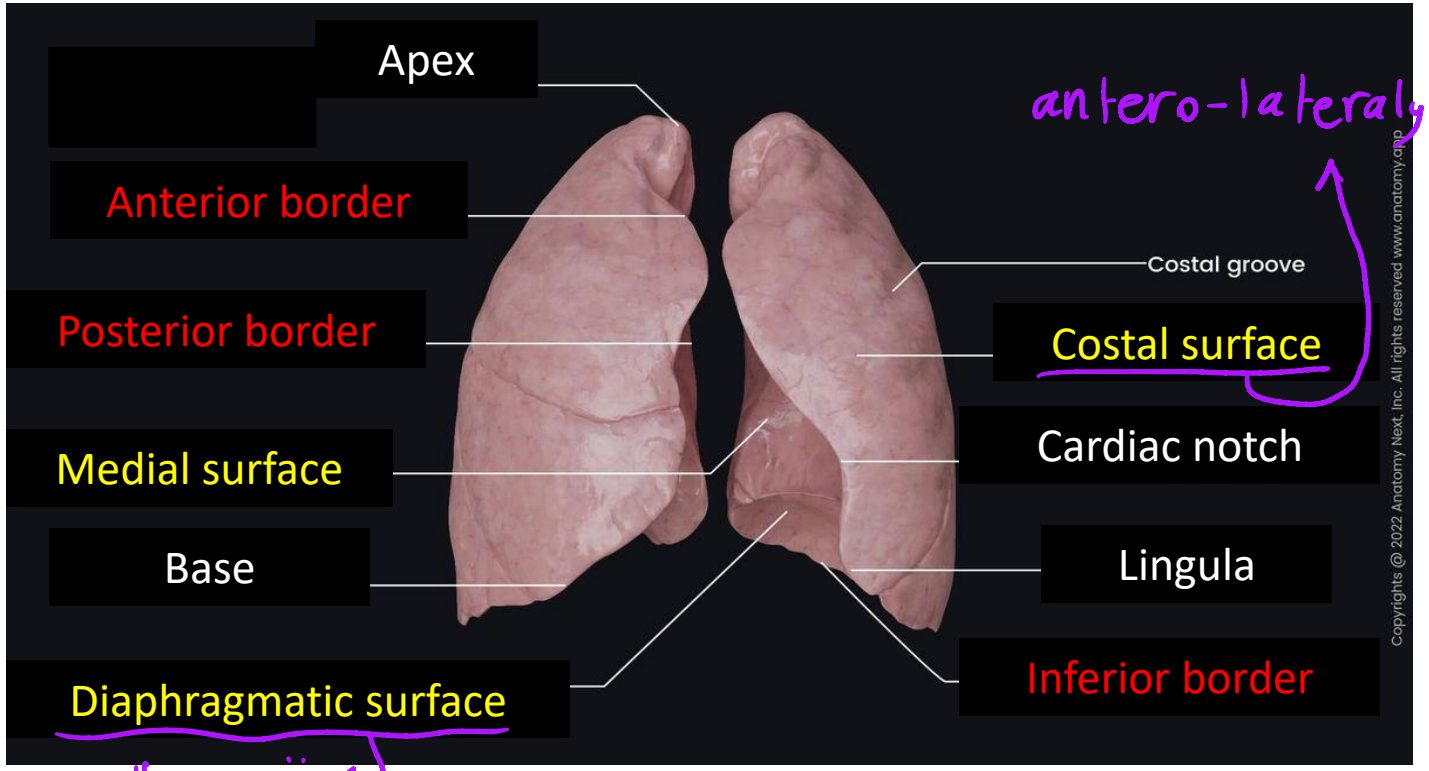
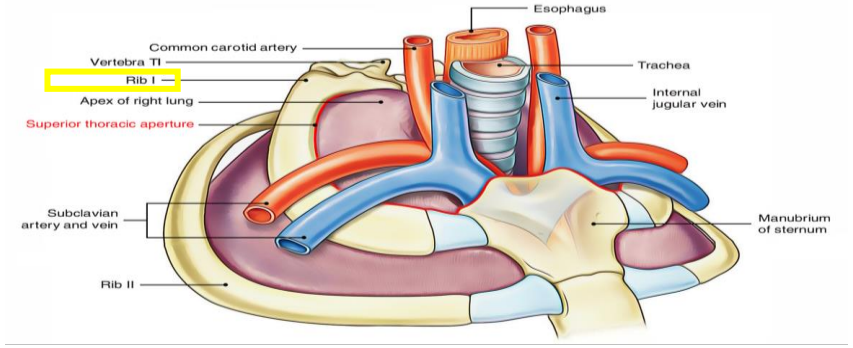
Surfaces and borders

- Each lung has an **apex** (above), **base** (below), three borders; **anterior, posterior and inferior borders** and **three outer surfaces; costal, diaphragmatic, mediastinal (or medial).**

- **The apex** is rounded , extends above the superior thoracic aperture where it contacts the cervical pleura.
- **The base (diaphragmatic surface)** is concave, directed inferiorly.



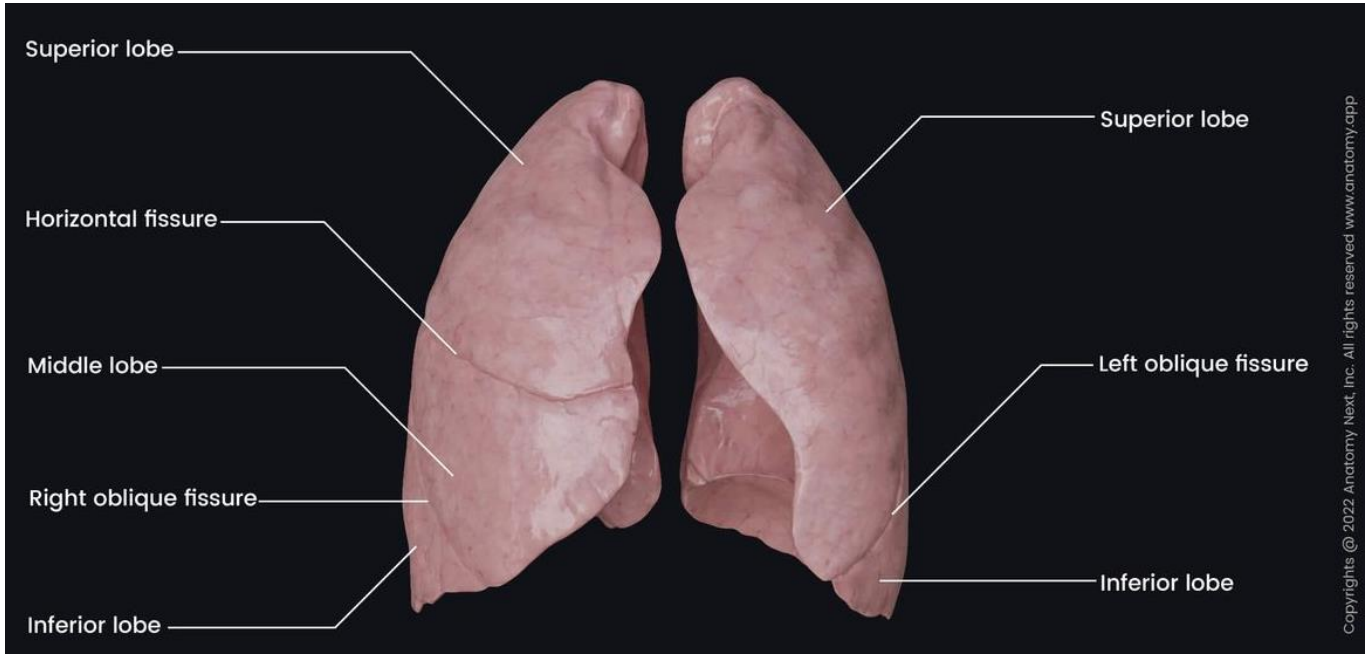


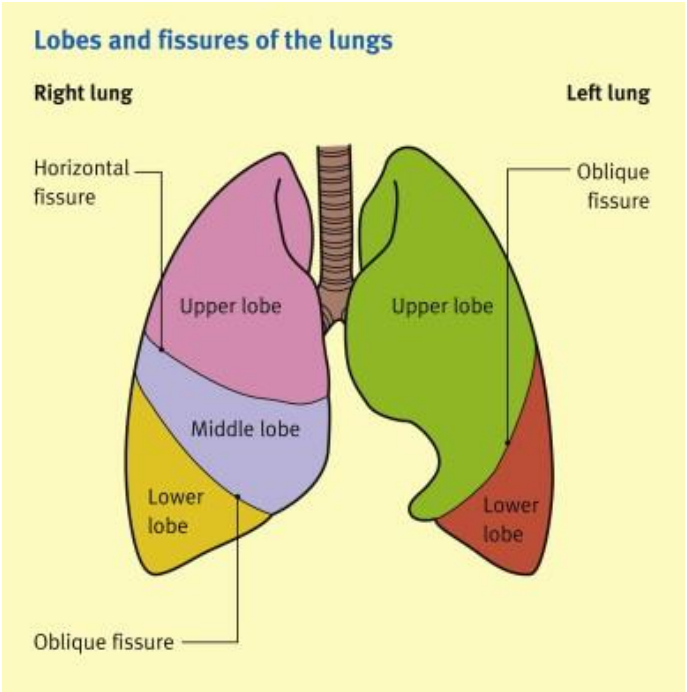
Costal surface

- Smooth and convex
- Its shape is adapted to that of the thoracic wall

- The left lung is commonly divided into **superior** and **inferior** lobes by an **oblique fissure**
- **Cardiac notch**
- A small process, **the lingula**, is usually present at the inferior end of the cardiac notch.
- The inferior lobe is larger than superior lobe.

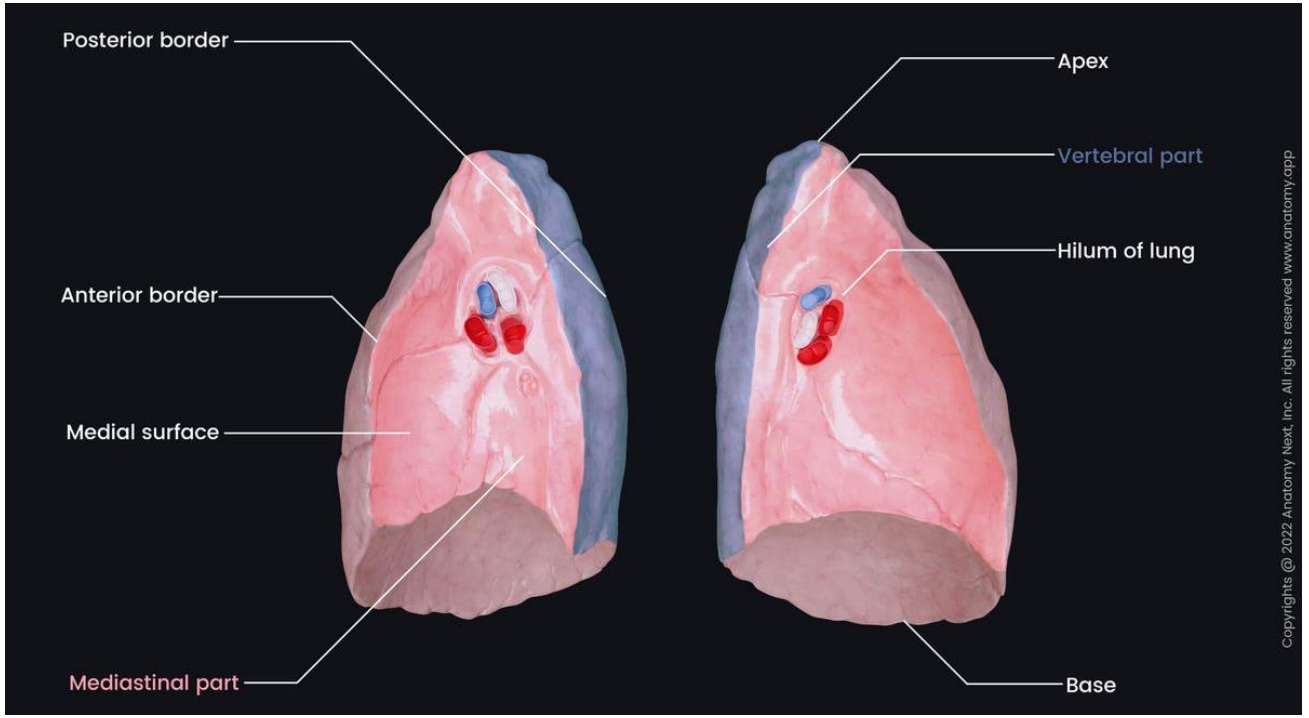
The right lung is divided commonly into **superior**, **middle** and **inferior** lobes by its **oblique** and **horizontal** fissures





Mediastinal surface

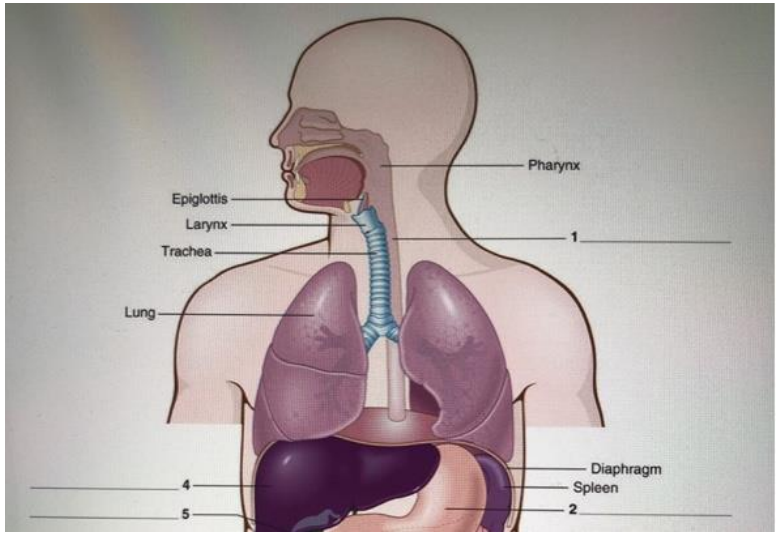
- Concave because it is adapted to the heart at the cardiac impression: the impression is much larger and deeper on the left lung where the heart projects more to the left of the median sagittal plane.
- **The hilum** of the lung, is the area where various structures of the lung root enter or leave the lung.
- The mediastinal surface and vertebral part of the costal surface are sometimes collectively termed the medial surface (border) of the lung.

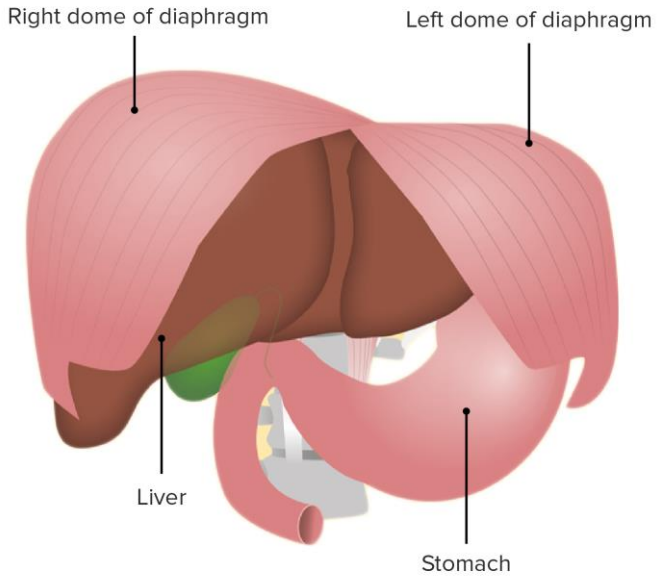


Diaphragmatic surface

- **The base (diaphragmatic surface)** is concave, directed inferiorly.
- The concavity is deeper on the base of the right lung.
- Bounded by the sharp inferior border.

- The right dome of diaphragm separates the right lung from right lobe of liver. While, the left dome of diaphragm separates the left lung from the left lobe of liver, the gastric fundus and spleen.





Root of the lung

- Consists of the following structures:
  1. Bronchi
  2. Pulmonary artery
  3. Two pulmonary veins
  4. Bronchial vessels (one bronchial artery to the right lung and two small bronchial arteries to the left lung)
  5. Autonomic nerves and lymphatics

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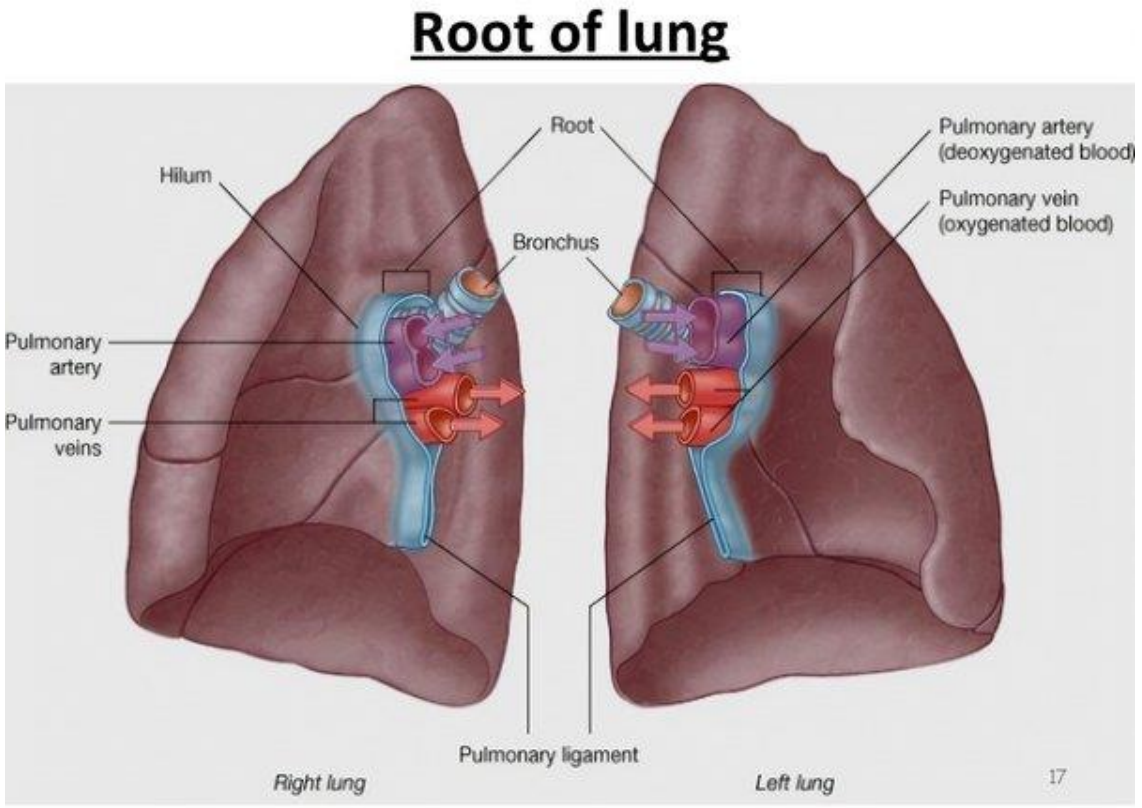
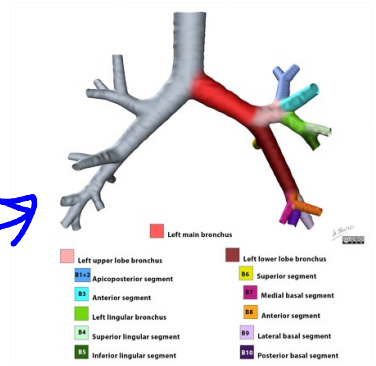


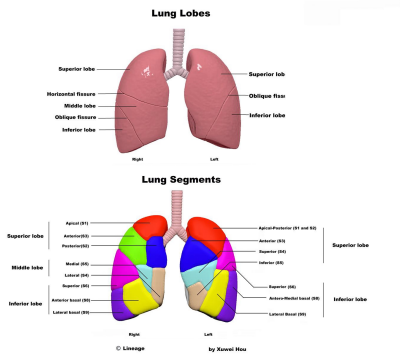
Bronchopulmonary segments

- The left and right main bronchi divide into **lobar bronchi** (3 on the right and 2 on the left) that subsequently divide into **segmental bronchi**.
- A segmental bronchus supplies a structurally separate and functionally independent unit of lung tissue called **a bronchopulmonary segment.**

each color is supplid by one segmental bronchi and one segmental artery

each color called bronchopulmonary segment



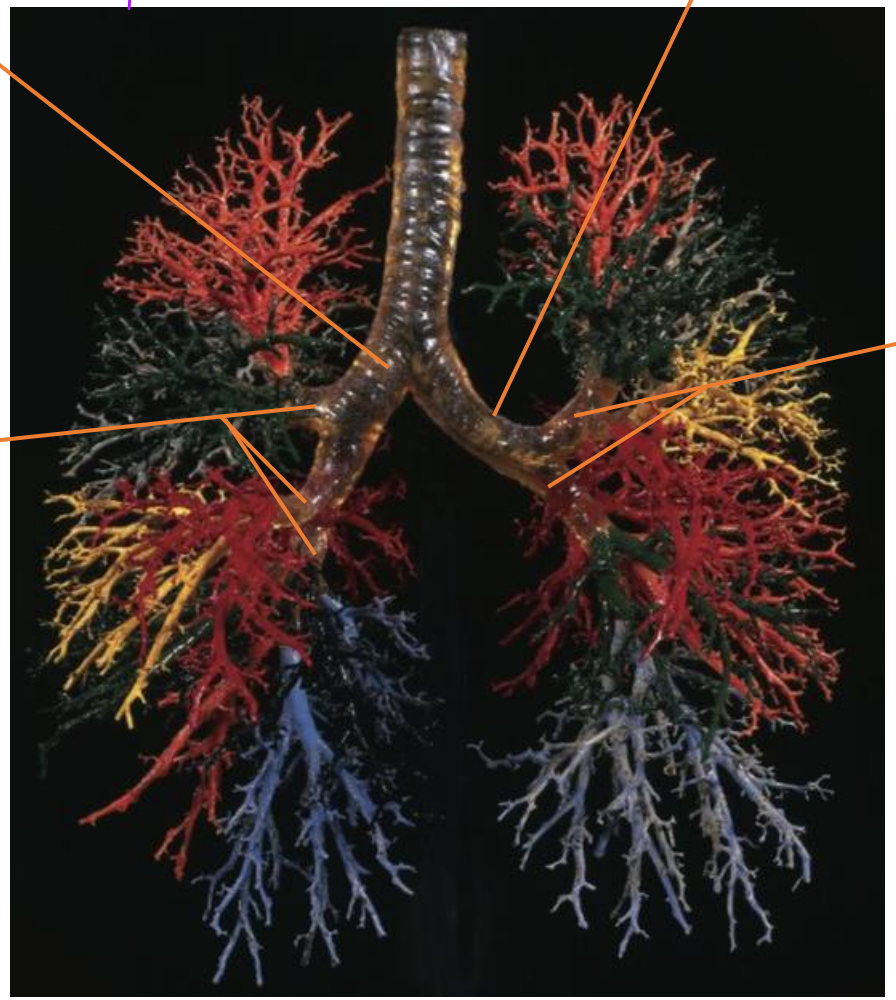


Right main bronchus

Left main bronchus

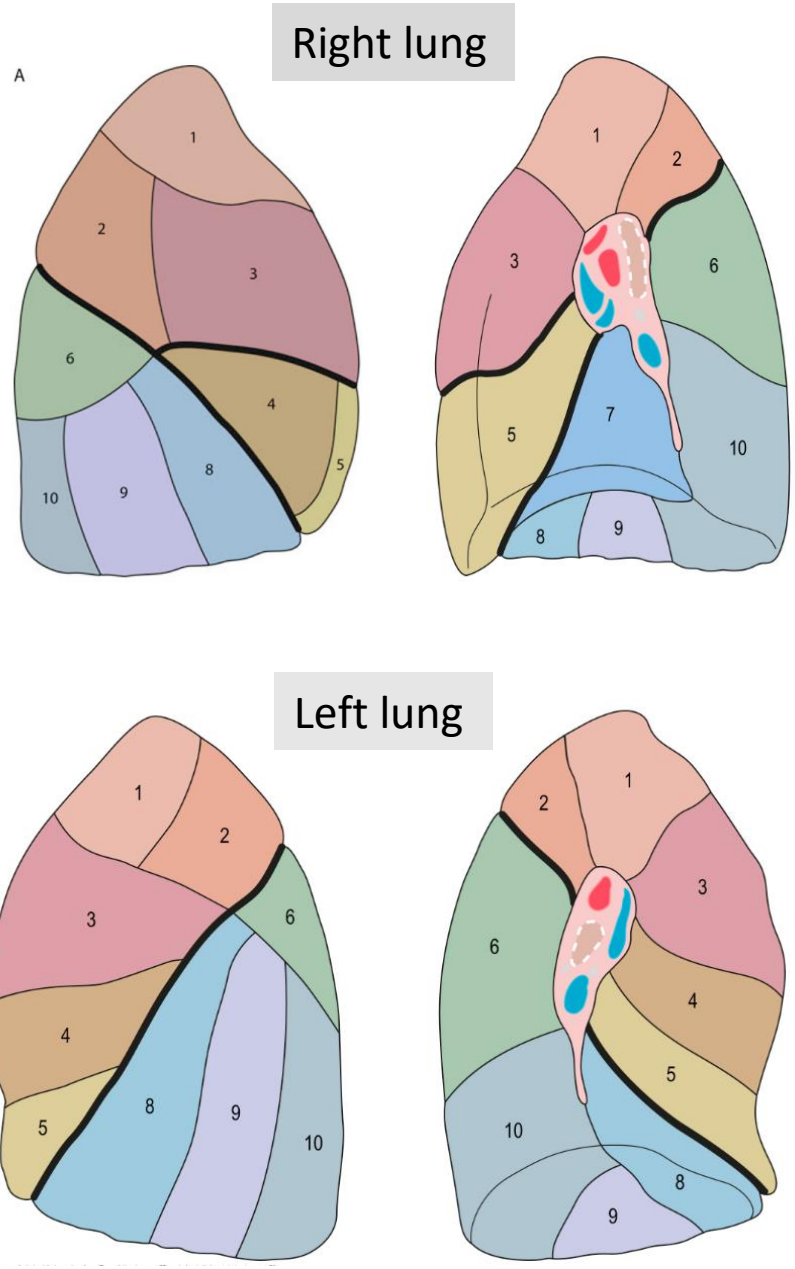
Right lobar bronchi

Left lobar bronchi



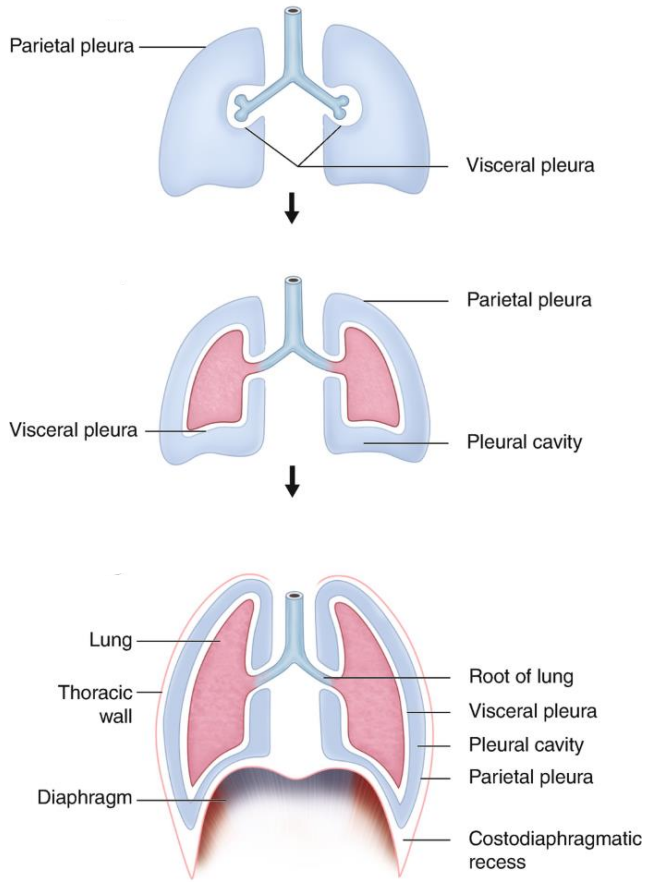
Bronchopulmonary segments

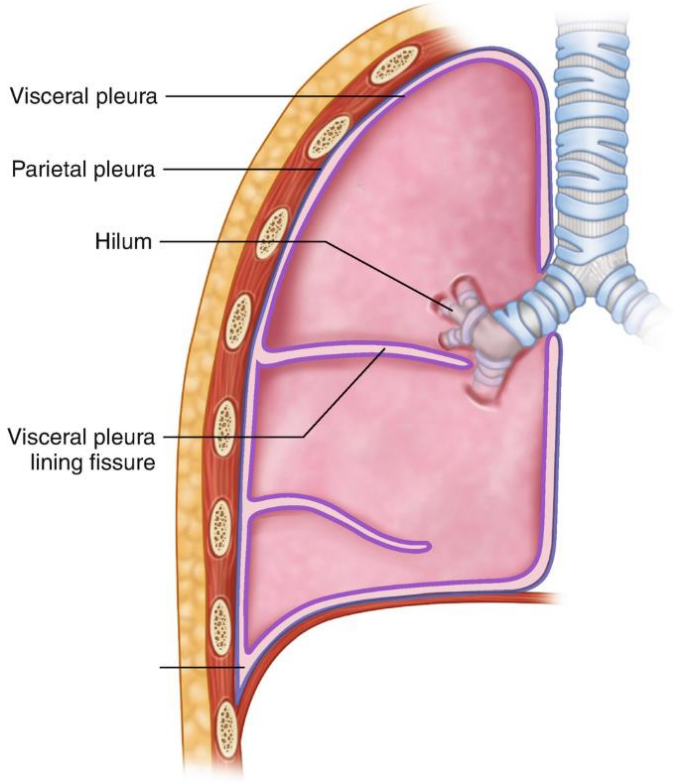
- Each lung has 10 segments
- Each segment is pyramidal in shape (has apex and base), with its apex directed toward the lung root.
- Each segment has its own segmental bronchus and segmental artery
- The arrangement of bronchopulmonary segments permit **the removal of abscesses and localized primary lung malignancy**, whilst retaining the normal functioning parts of the lung.



Pleura

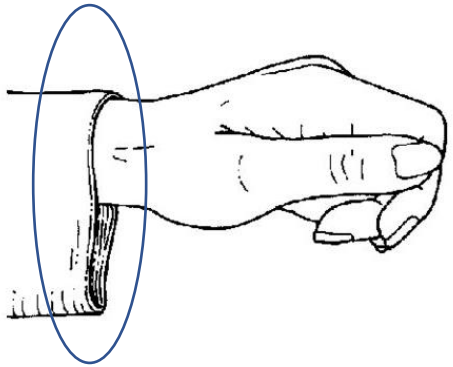
- Each lung is covered by a double-layered serous membrane, the **parietal and visceral pleura,** arranged as a closed, invaginated sac.
- Parietal and visceral pleura are one continuous sheet.
- The visceral pleura adheres closely to the lung surface and follows the interlobar fissures.
- The **pleural cavity** represents the potential space between the parietal and visceral pleura. This space is filled with a thin film of pleural fluid that facilitates normal movement of the lungs and protects against friction.

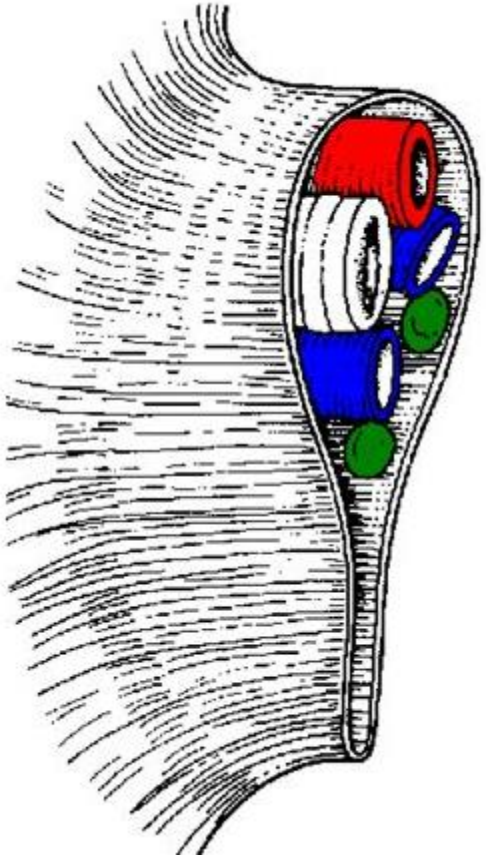




Pleura

- The parietal and visceral pleura are continuous via the cuff of pleura at the hilum of the lung, this cuff hangs down as a loose fold called **pulmonary ligament**.





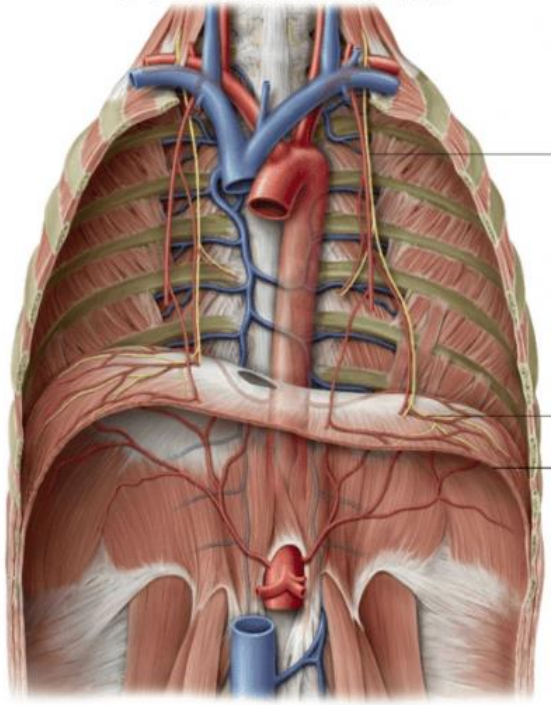
Subdivisions of the parietal pleura

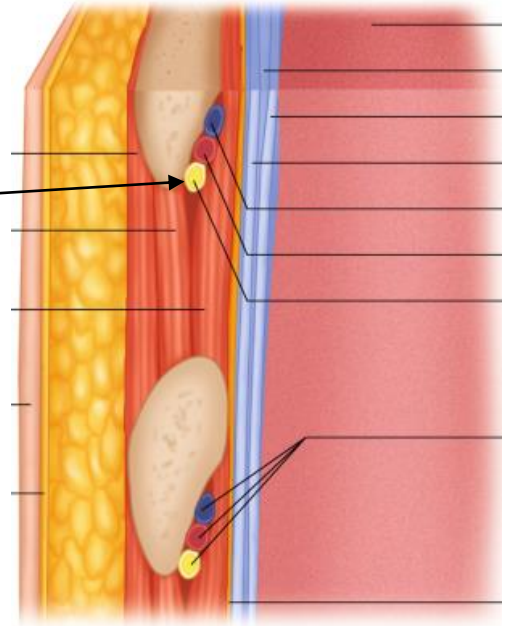
- Different regions of parietal pleura are customarily distinguished by name according to the region they contact.

1. **The cervical part**: part of pleura bulging up through the thoracic aperture.
2. **The costal part**
3. **The Mediastinal part**
4. **The diaphragmatic part**

Nerve supply of the parietal pleura

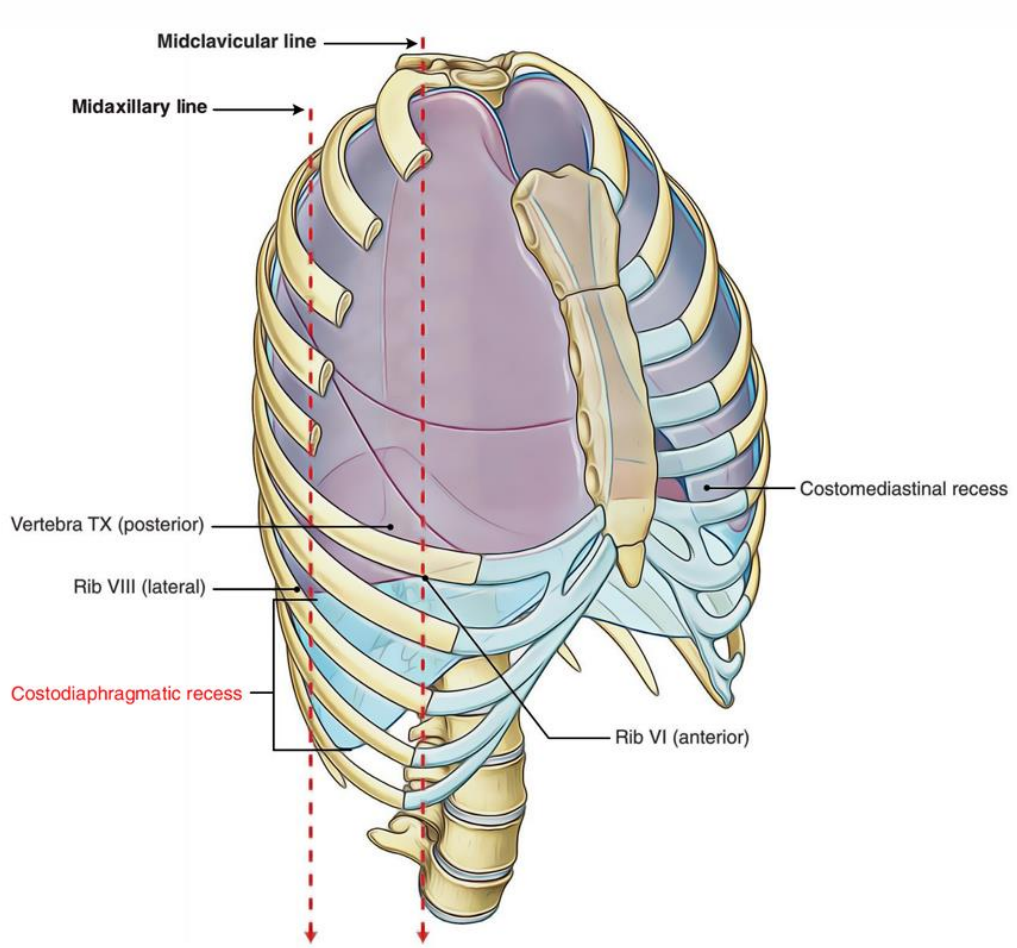
- The visceral pleura is not sensitive to pain.
- Parietal pleura is sensitive to pain.
- Visceral pleura is supplied by **autonomic nerve plexuses**
- Parietal pleura is supplied as somatic afferent nerves as following:
  - **Intercostal nerves** (costal part)
  - **Phrenic nerve** (mediastinal and diaphragmatic)





- The lungs do not occupy the full extent of the pleural cavity during quiet breathing, but are free to move into recesses such as the **costodiaphragmatic** and **costomediastinal recesses**, during deep breathing.

- Costodiaphragmatic recess is a slitlike space between costal and diaphragmatic pleura



Clinical conditions of pleura

- **Pleural effusion** and **pneumothorax** occur when an infection, medical condition, or chest injury causes fluid, pus, blood, air, or other gases to build up in the pleural space.