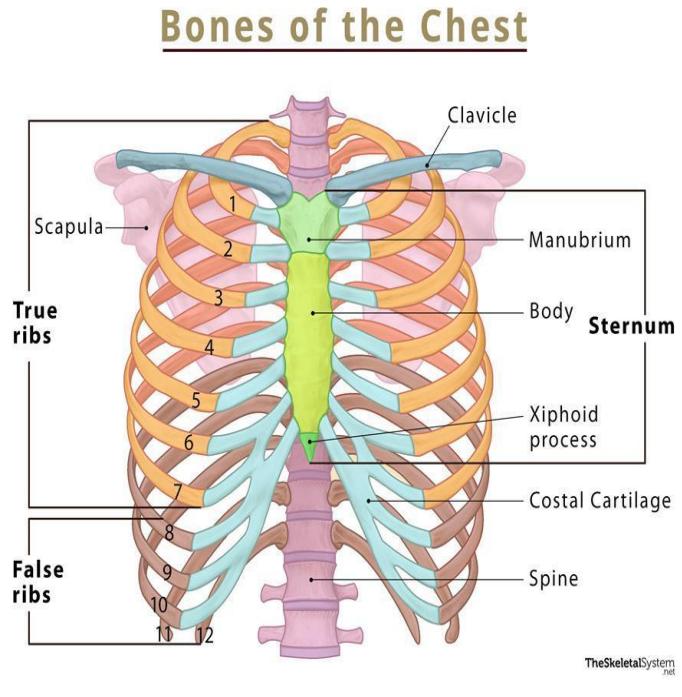
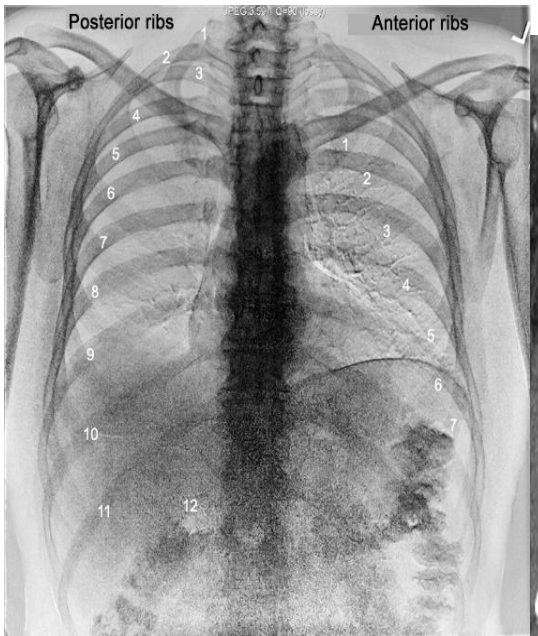
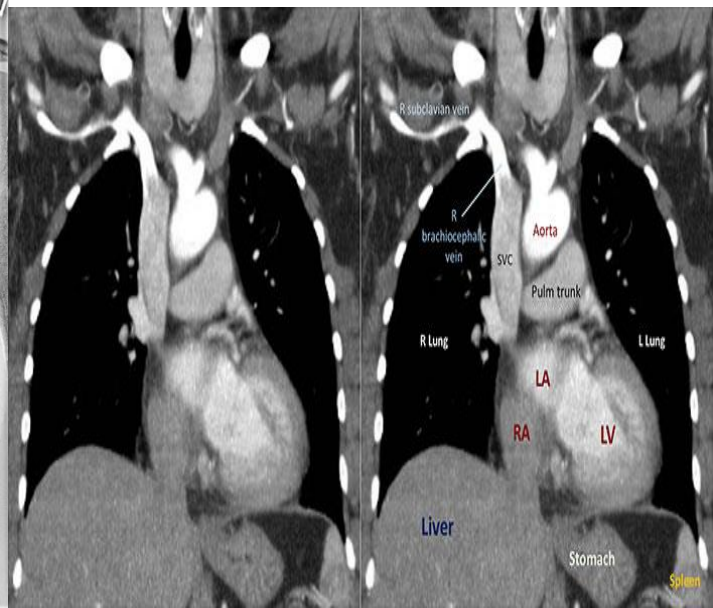
Thorax or chest

Thorax or the chest is part of the human body which is located between the neck (above) and the abdomen (below). The **thorax** includes an outer thoracic wall **(ribs , thoracic spine, sternum , muscles and breast)** and an inner thoracic cavity **(heart , lungs and other structures in the mediastinum) .**

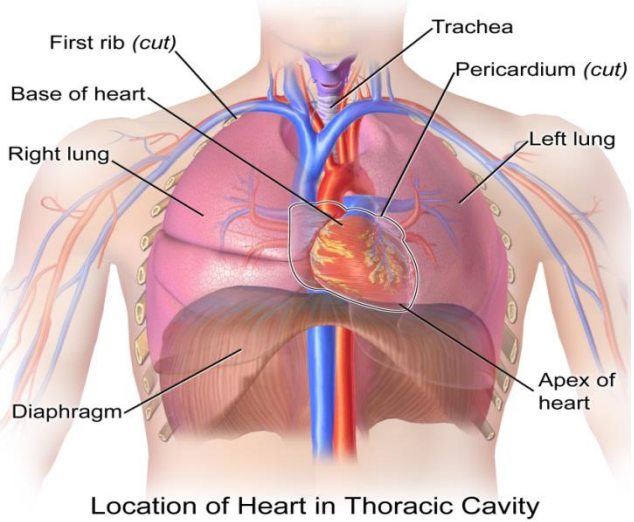
There are 12 pairs of ribs. The **first seven** being **true ribs**, while remaining **five** being **false ribs.** True ribs are connected directly to the **sternum via their costal cartilages**. Whereas, the false ribs are either **indirectly connected to sternum via the costal cartilage** of the seventh rib or they are free floating ribs **(eleventh and twelfth ribs)**



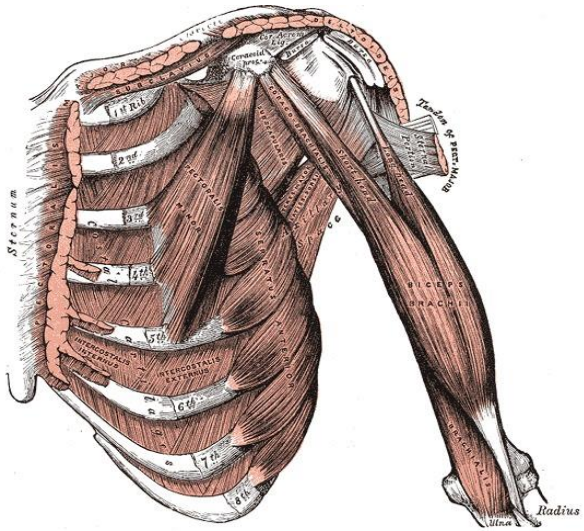


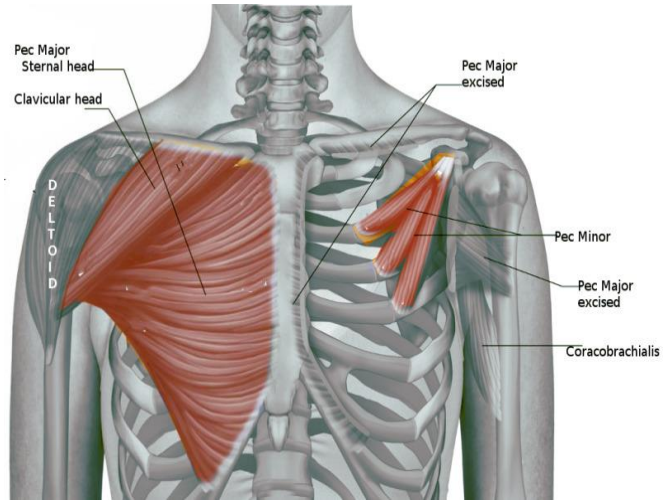


<u>Thoracic cavity</u>: The thoracic cavity extends from the diaphragm (below) to the thoracic inlet (above). The latter is formed by first thoracic vertebrae, manubrium of sternum and the first ribs. The cavity is protected by the thoracic wall and can be further sub-divided into mediastinum in the center and pleural cavities on the sides.



Location of Heart in Thoracic Cavity





Intercostal muscles can be found situated within the **intercostal spaces (between successive ribs).** all helping in **respiration. Other muscles** attached to the thoracic wall include the **pectoralis major and minor muscles in the front, serratus anterior on the sides and various muscles of the back region, such as, trapezius, rhomboids and erector spinae muscles .**

Important functions of the thorax include breathing, protecting vital organs (including the lungs, heart and big vessels) and serving as a conduit for structures passing from one body region to the other body regions.

lungs

lung which is the organ for respiration is a paired cone shaped organs lying in the thoracic cavity separated from each other by **the heart** and **other structures in the mediastinum**.

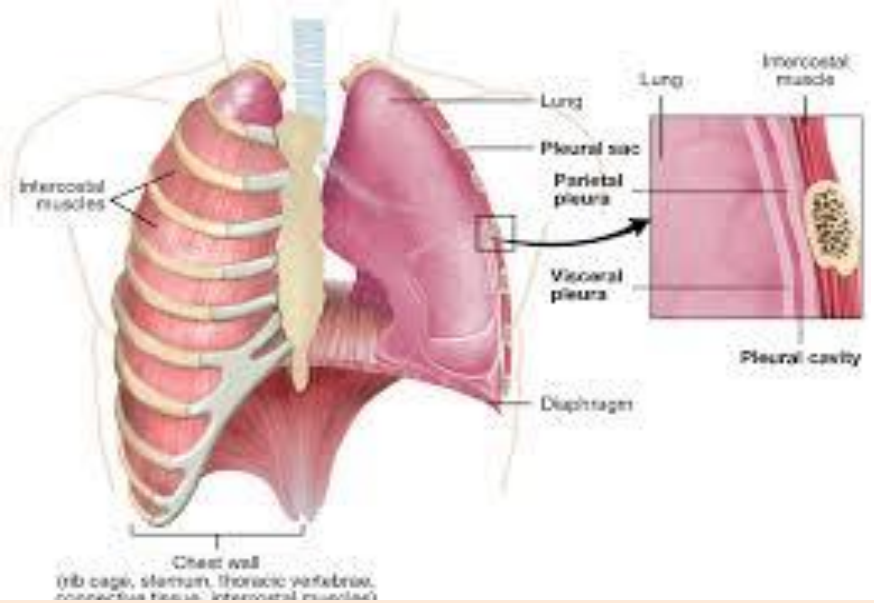
Each lung has a **base** resting on the **diaphragm** and an **apex** extending superiorly to a point approximately **2.5 cm superior to the clavicle**· It also has a **medial surface** and with three borders- anterior, posterior and inferior. The **broad coastal surface** of the lungs is pressed **against the rib cage**, while the smaller mediastinal surface faces medially. The lungs receives the bronchus, blood vessels, lymphatic vessels and nerves through a slit in the mediastinal surface called the hilum, and the structures entering the **hilum constitutes the lungs root**

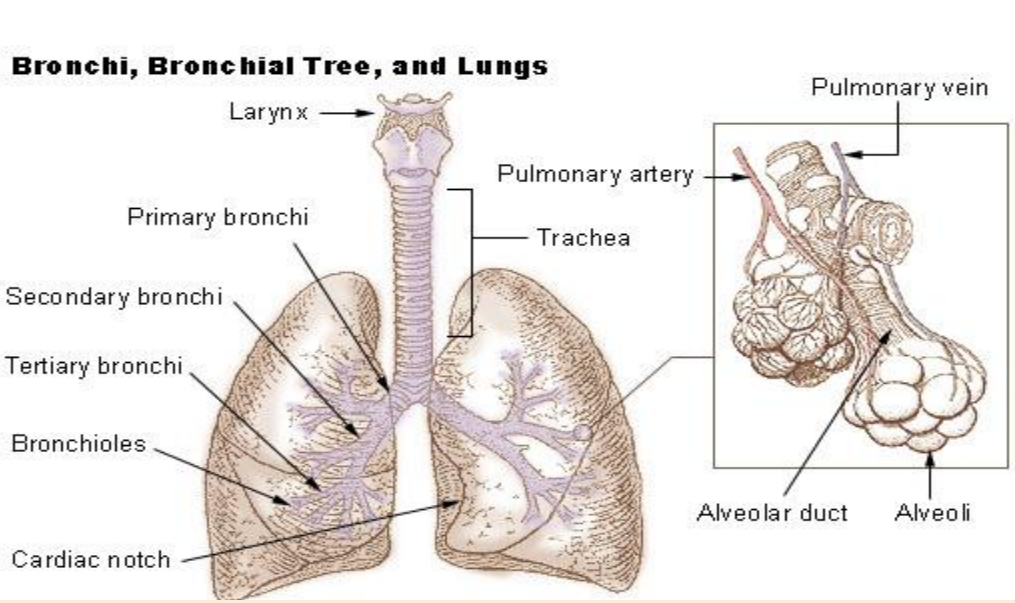
The **right lung** is larger and weighs more than the **left lung**, Since the **heart** tilts to the left, the left lung is smaller than the right

Each lung is invested by and enclosed in a serous **pleural sac** that consists of two continuous membranes.

visceral pleura or pulmonary pleura invest the lungs,

The **parietal** pleura line the pulmonary cavities and adhere to the thoracic wall, mediastinum and diaphragm.

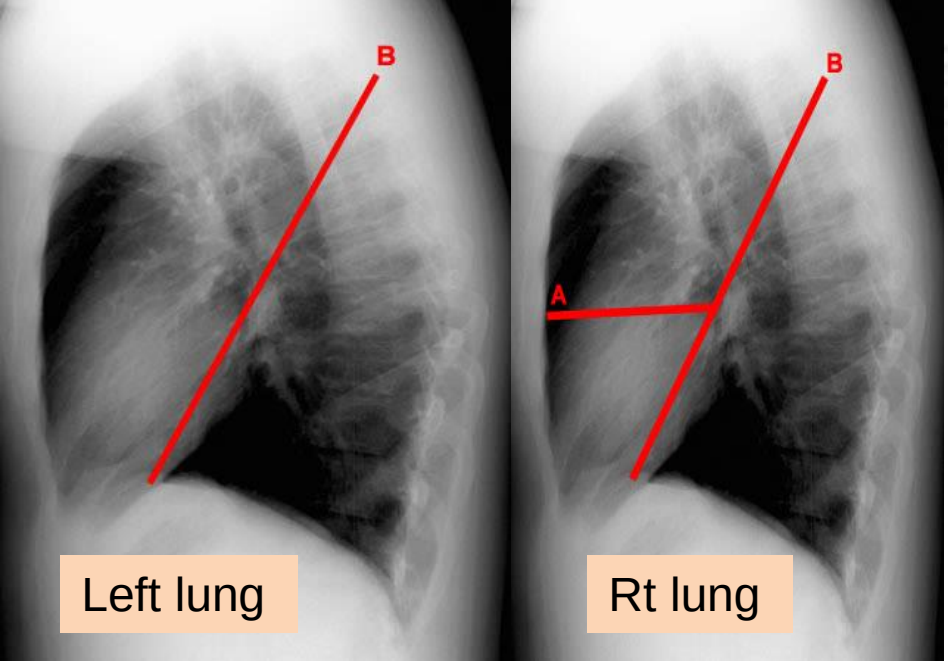


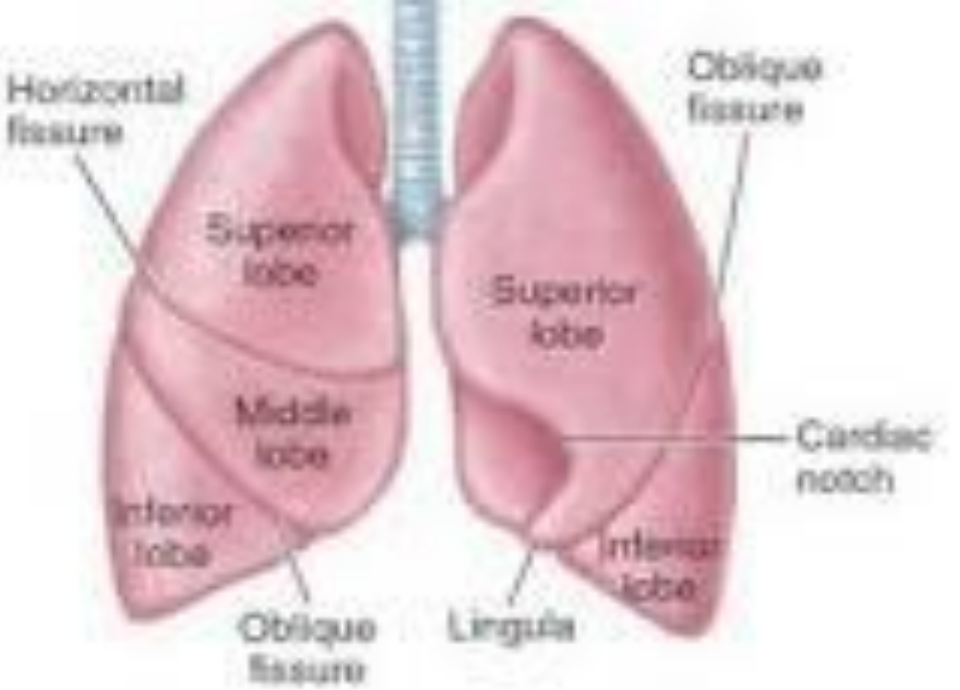


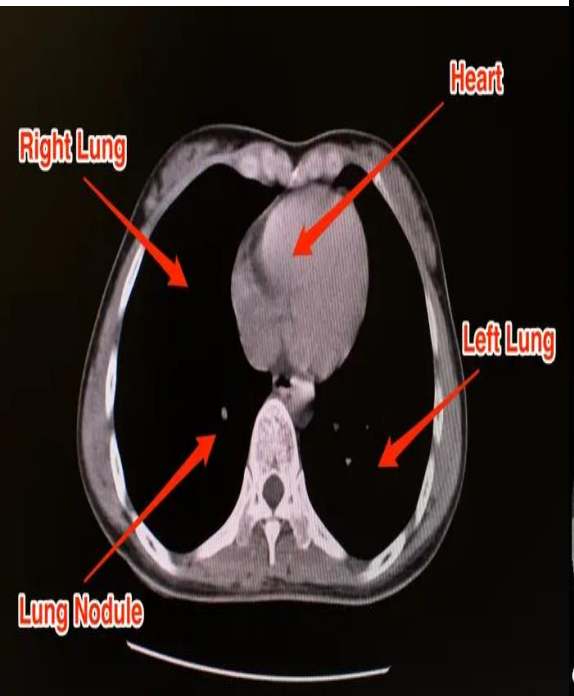
pleural cavity is the potential space between the **visceral and parietal layers** of the pleural and it **contains** a capillary layer of **serous pleural fluid** which lubricates the pleural surfaces and allows the layers to slide smoothly over each other during respiration.

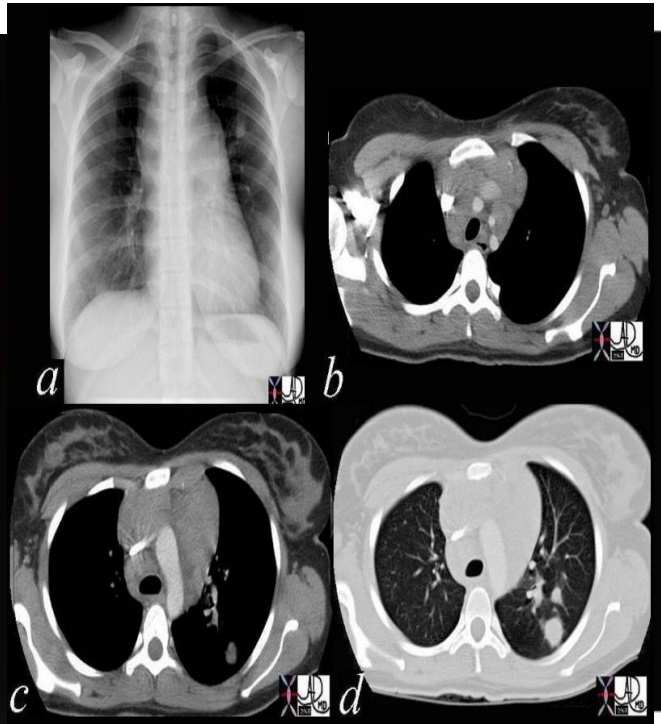
Both lungs have **oblique fissure** and the **right** is further **divided by a transverse fissure**. The oblique fissure in the left lung separates the **superior and the inferior lobe**. The **oblique and horizontal fissure divides the lungs into superior, middle and inferior lobes**. Thus the right lung has three lobes while the left has two.

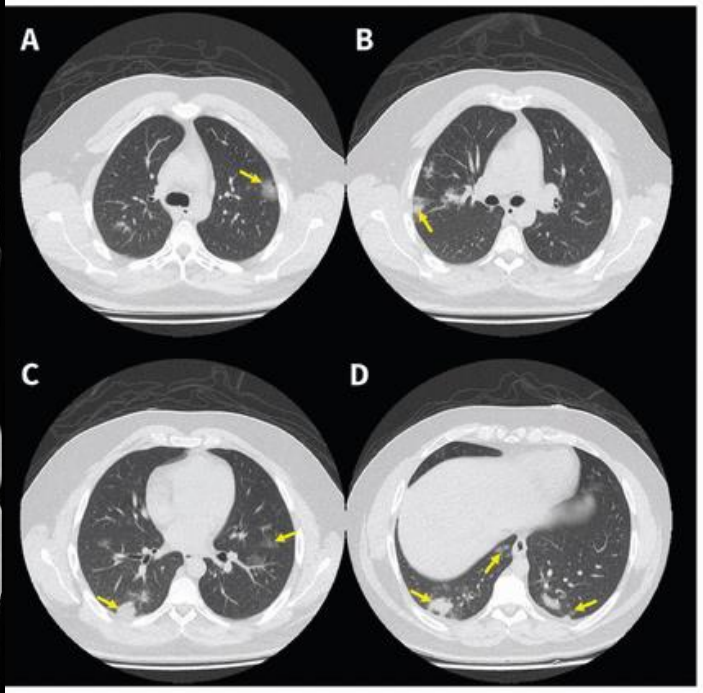
Each lobe is supplied by a lobar bronchus. The lobes are subdivided by bronchopulmonary The right lung consists of three lobes: the right upper lobe (RUL), the right middle lobe (RML), and The left lung consists of two lobes: the left upper lobe (LUL) and the left lower lobe (LLL). the The lobes further divide into segments that are associated with specific segmental bronchi. Segmental bronchi are the third-order branches off the second-order branches (lobar bronchi) that come off the main bronchus right lower lobe (RLL). segments which are supplied by the segmental bronchi.


B
A
B
Left lung
Rt lung


Horizontal fissure
Oblique fissure
Superior lobe
Superior lobe
Middle lobe
Cardiac notch
Inferior lobe
Oblique fissure
Lingula


Heart
Right Lung
Left Lung
Lung Nodule

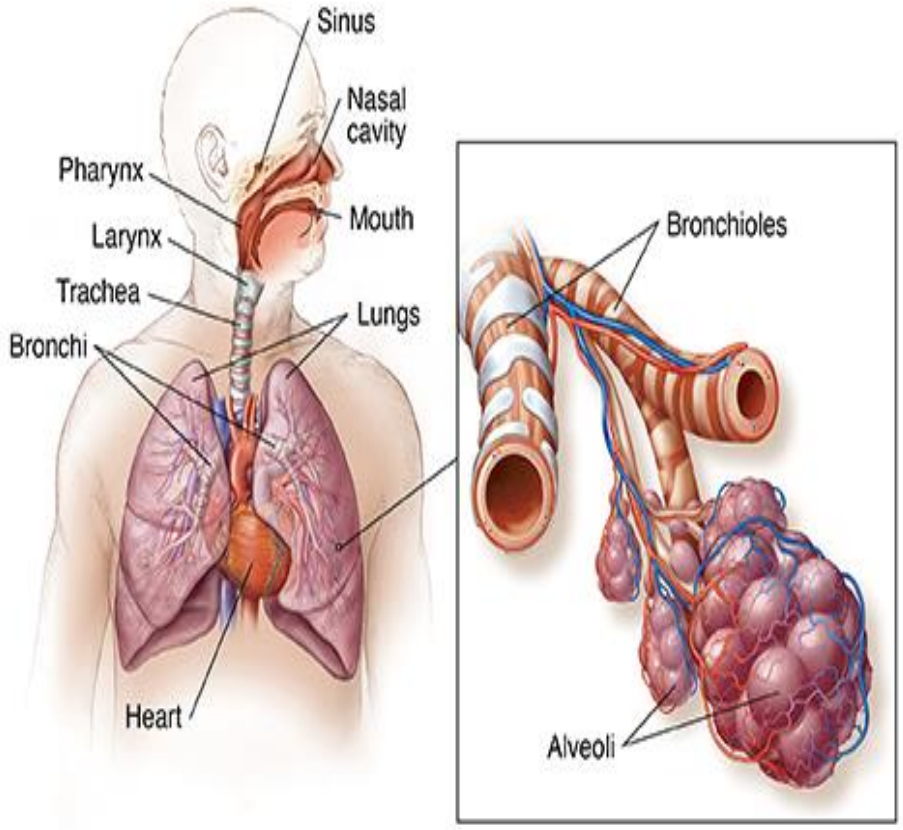

a
b
c
d


A
B
C
D

Tracheobronchial Tree

All the **respiratory passages** from the trachea to the respiratory bronchioles are called the **tracheobronchial tree** .The **trachea divides at the sternal angle** into right and left primary bronchus which goes into the right and left lungs. Each bronchus enters the lung at a notch called the **hilum**. Blood vessels and nerves also connect with the lungs here and together with the bronchus forms a region called the **root of the lungs.**

The **right main bronchus** is larger in diameter and **more vertical** making it directly in line with the trachea than the left main bronchus .Thus swallowed objects that accidentally enter the lower respiratory tract are most likely to become lodged in the right main bronchus



The bronchi further divides, finally giving rise to the **bronchioles** which are **less than 1mm** in diameter. **Each bronchioles divides into 50 to 80 terminal bronchioles**, the final branches of respiratory bronchioles. **The functional unit of the lungs** which is the acinus includes the respiratory bronchioles, alveolar ducts, and sacs and the alveoli. Approximately 16 generations of branching occur from the trachea to the terminal bronchioles . As the air passageways of the lungs become smaller, the structure of their walls changes

Fig 1: Image reconstruction using mediastinum enhancement algorithm

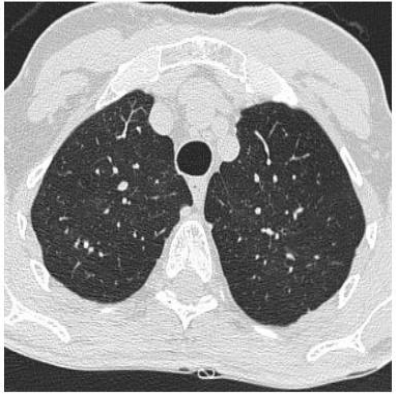


Fig 2: Image Reconstruction using lung enhancement algorithm

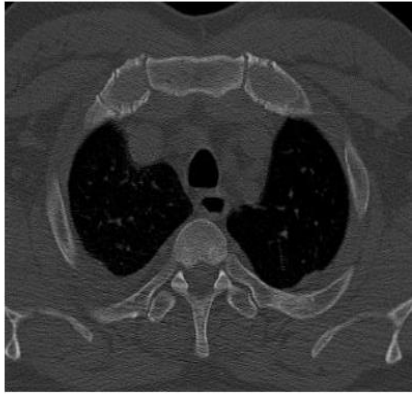
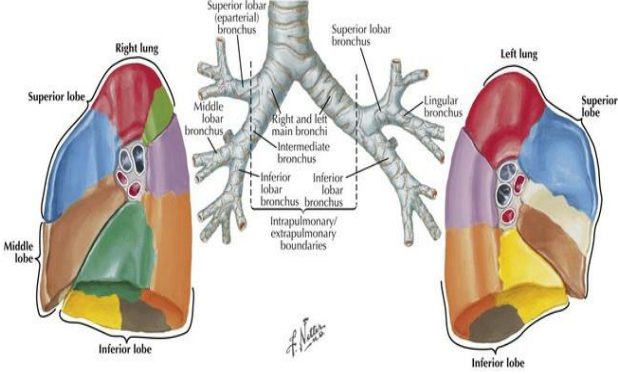
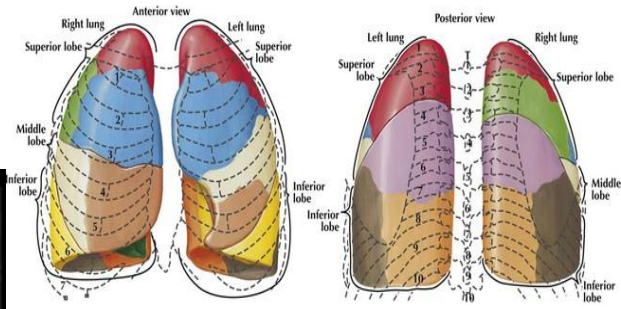
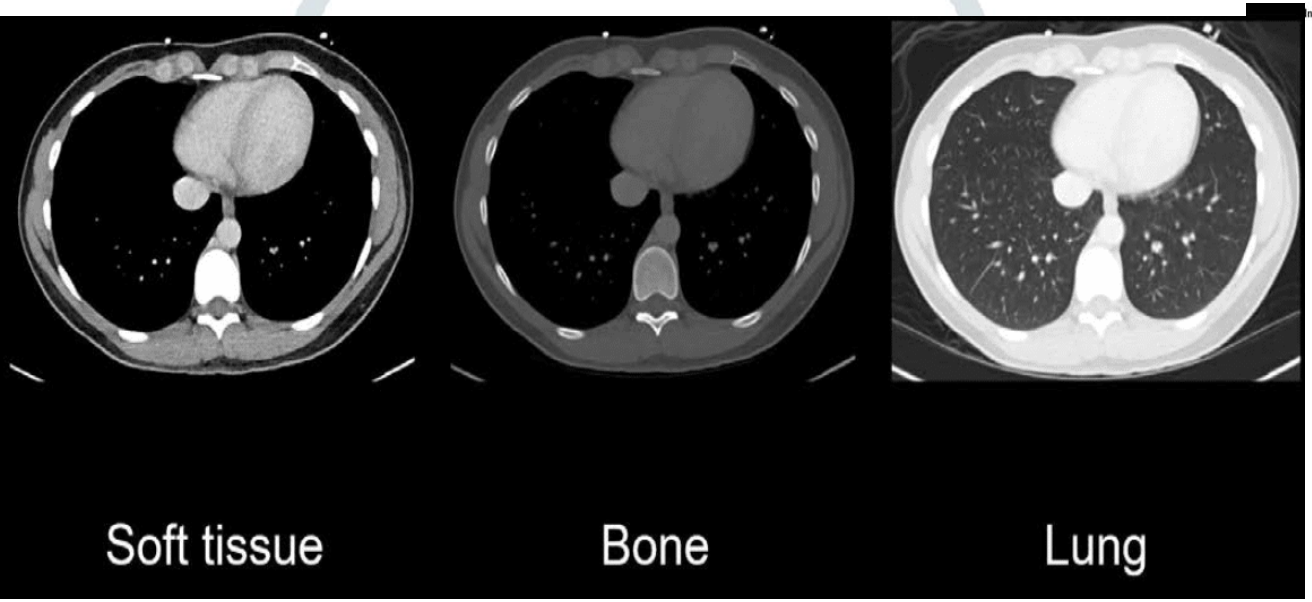


Fig 3: Image reconstruction using bone enhancement algorithm





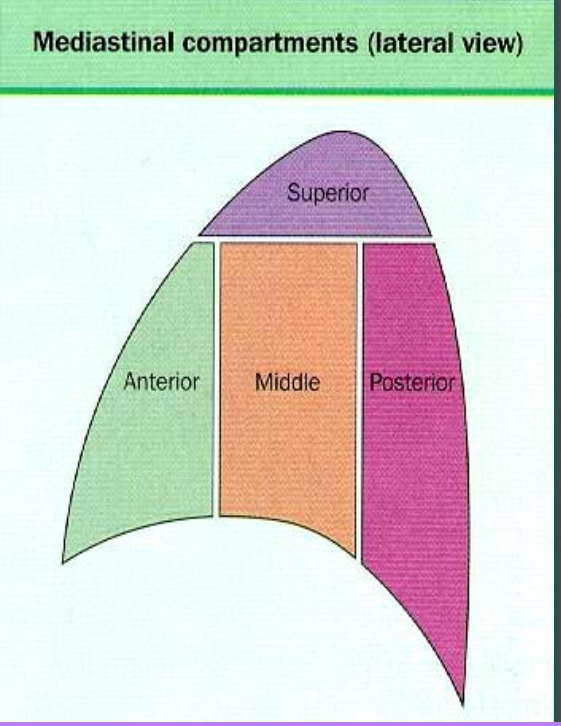


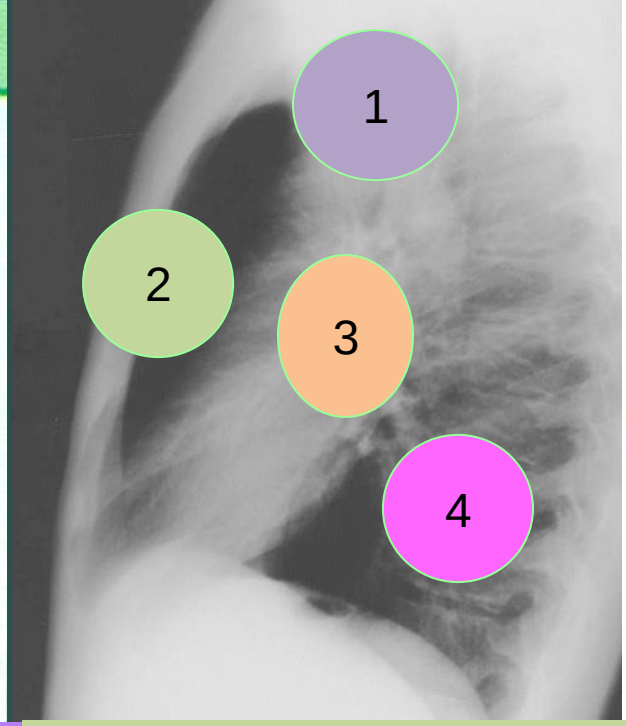
mediastinum

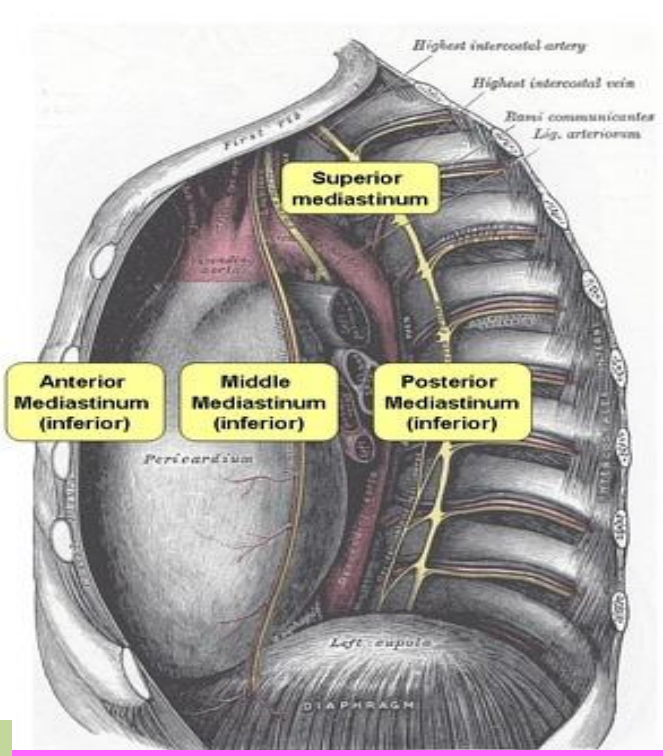
mediastinum :-is a space in the thorax that contains a group of structures within the **thorax** namely the **heart** and its vessels, **esophagus , trachea** ,**phrenic** and **cardiac nerves , thoracic duct** , **thymus** , **lymph nodes** and their surrounding connective tissue. It lies in the midline of the **chest** between the **pleura** of each **lung** and extends from the **sternum** to the **vertebral column**
is the central compartment of the **thoracic cavity**.

and is enclosed on the right and left by **pleura** . It is surrounded by the chest wall in front, the **lungs** to the sides and the **spine** at the back. It extends from the **sternum** in front to the **vertebral column** behind . It contains all the organs of the thorax except the lungs.

he mediastinum can be divided into an upper (or superior) and lower (or inferior) part:
The **superior mediastinum** bordered by the thoracic outlet superiorly, transverse thoracic plane or sternal angle inferiorly, medial border of the pleural sacs laterally, dorsal surface of the sternum anteriorly, and ventral surface of the first four thoracic vertebral bodies posteriorly
The **inferior mediastinum** from this level to the **diaphragm** . This lower part is subdivided into three regions, all relative to the **pericardium** the anterior mediastinum being in front of the pericardium, the middle mediastinum contains the pericardium and its contents, and the posterior mediastinum being behind the pericardium.







superior mediastinum contains :-

- aortic arch and branches;
- brachiocephalic veins and superior vena cava;
- trachea;
- oesophagus;
- thoracic duct;
- lymph nodes; and
- nerves

The anterior mediastinum contains :

- thymus;
- mammary vessels; and
- lymph odes

middle mediastinum contains the:

- heart and pericardium:
- nerves;
- lymph nodes; and
- great vessels

posterior mediastinum contains the:

- descending aorta;
- oesophagus;
- azygos venous system;
- thoracic duct; and
- para-aortic, oesophageal and paraspinal nodes