DESCRIBE THE LUNGS UNDER FOLLOWING HEADINGS A) PARTS B) FISSURES C) BRONCHO-PULMONARY SEGMENTS (LE)

a) Parts of lungs:

Apex

Base

Borders: 3 borders
Anterior
Posterior
Inferior

Surfaces: 2 surfaces
Costal
Medial

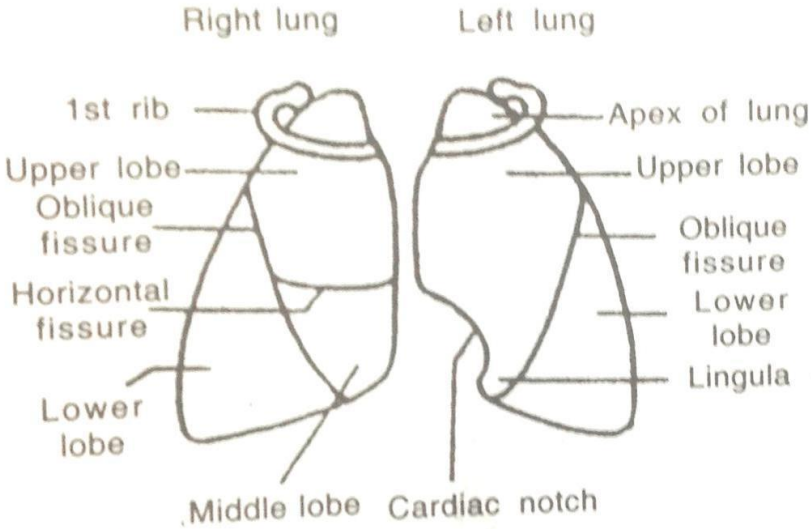


Fig. 2.10 *Lungs (viewed from the front).*

Apex: Blunt
2.5 cm above the medial end of clavicle
Covered by cervical pleura & suprapleural membrane Grooved by subclavian artery

Base:
Concave and semilunar Rests on diaphragm
On the right side related to Right lobe of liver below the diaphragm
On the left side related to Left lobe of liver, fundus of stomach and spleen below the diaphragm.

Borders:

Anterior border:
Very thin
Right side – Straight
Left side – wide cardiac notch, below left 4th costal cartilage
Lingula- tongue like projection below the cardiac notch

Posterior border:
Thick and ill-defined

Inferior border:
Separates base from costal and medial surfaces

Surfaces:

Costal surface:
Large and convex
It is in contact with the costal pleura and thoracic wall

Medial surface: 2 parts
Posterior – vertebral part
Anterior- Mediastinal part

Fissures:

Right lung divided into **3 lobes by 2 Fissure**
Oblique fissure and Horizontal fissure

Left lung is divided into 2 lobes by one fissure Oblique fissure

Oblique Fissure:

Present in both lungs

Cuts into whole thickness of lung except at the hilum Cuts posterior border of lung 2.5cm lateral to T4 spine

Follows downward and forward crosses 5th intercostal space in mid-axillary plane

Cuts inferior border at 6th costochondral junction about 7.5cm lateral to the middle line.

Horizontal Fissure:

Present only in the right lung

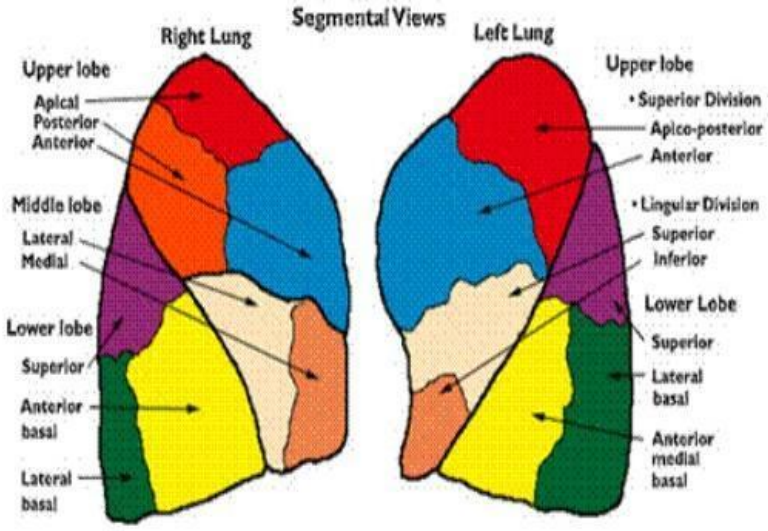
Extends horizontally from the oblique fissure at the midaxillary line upto 4th costal cartilage.

Broncho-pulmonary segments Bronchopulmonary segments are -

Well defined sectors of lungs, each one is **aerated by a tertiary or segmental bronchus**. Broncho-pulmonary segments are the anatomical, surgical and functional units of lungs

Bronchopulmonary segments of Right Lung

Lobes	Segments
Upper lobe	1. Apical 2. Anterior 3. Posterior
Middle lobe	4. Medial 5. Lateral
Lower lobe	6. Superior 7. Anterior Basal 8. Posterior Basal 9. Medial Basal 10. Lateral Basal



Bronchopulmonary segments of Left Lung

Lobes	Segments
Upper lobe	1. Apical 2. Anterior 3. Posterior Superior
Lingula	4. Lingular Inferior 5. Lingular
Lower lobe	6. Superior 7. Anterior Basal 8. Posterior Basal 9. Medial Basal 10. Lateral Basal

Describe the lungs under the following headings:

a) **Labelled diagram of mediastinal surfaces showing position of related structures including structures in both hila**
b) **Development**
c) **One congenital anomaly** **(LE)**

a)Diagram of Mediastinal Surface of Right lung

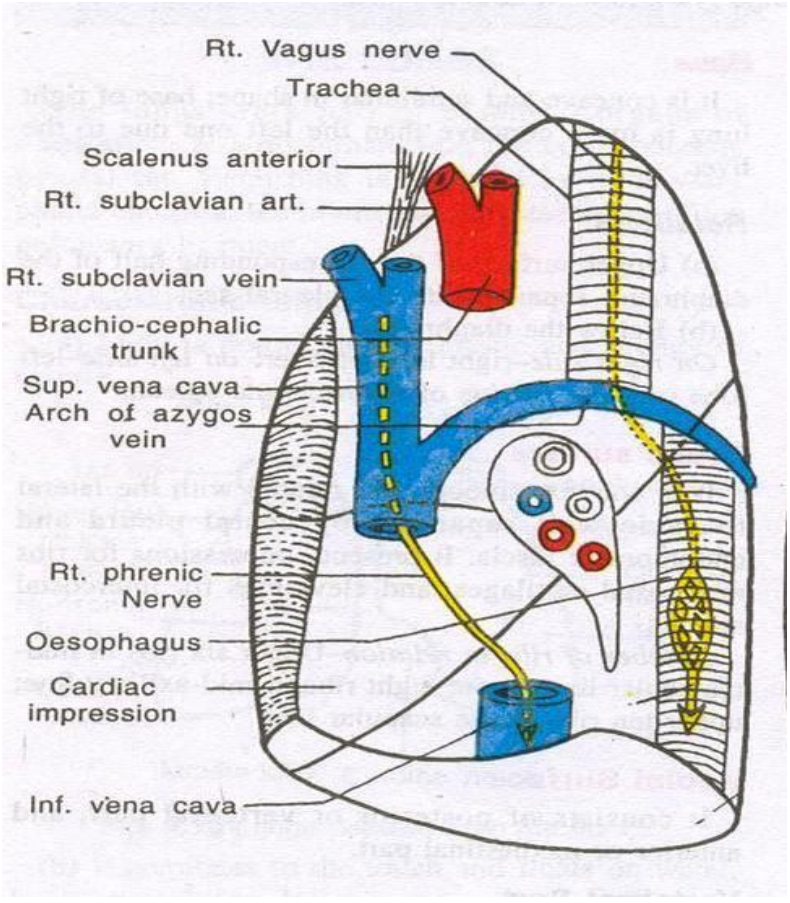
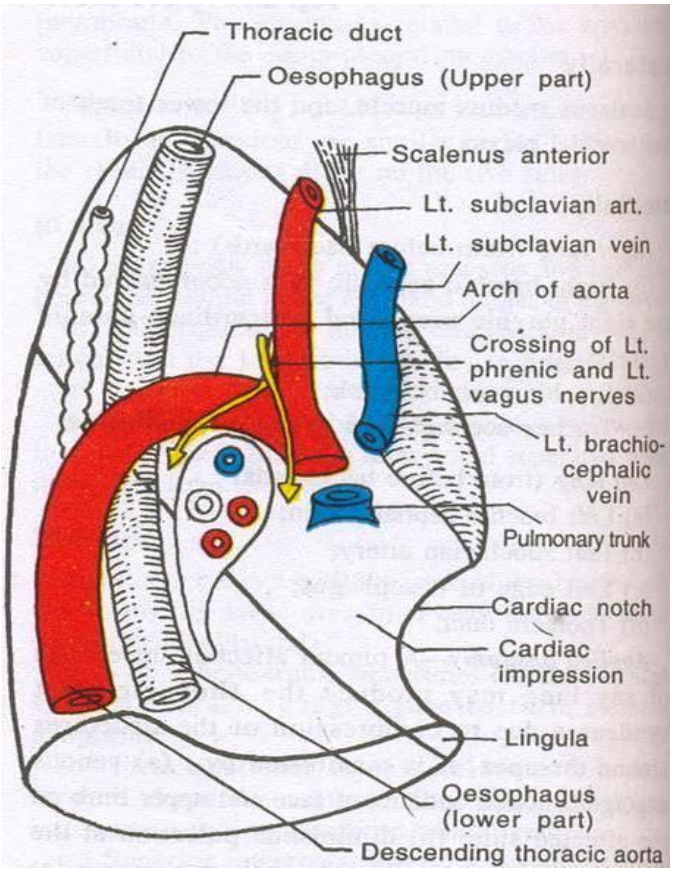
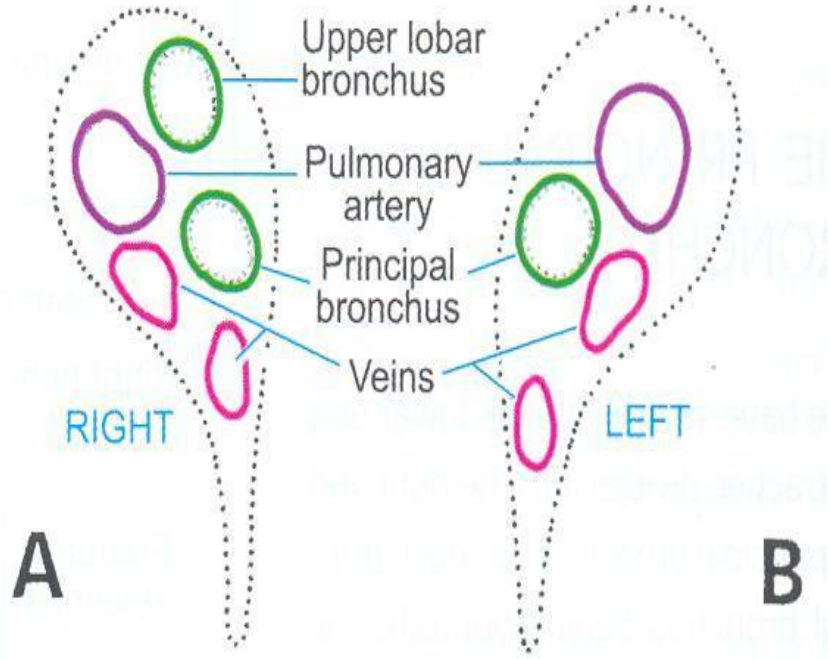


Diagram of Mediastinal surface of left lung:



Structural arrangements at the hilum of right and left lungs



B&C) Development- refer embryology book

Define Broncho-pulmonary segment. Describe the segments of both the lungs, add a note on applied anatomy (Long Essays/10 marks)

Bronchopulmonary segments are -

Well defined sectors of lungs, each one is **aerated by a tertiary or segmental bronchus**. Broncho-pulmonary segments are the anatomical, surgical and functional units of lungs Each segment is pyramidal in shape with apex directed towards root of lung

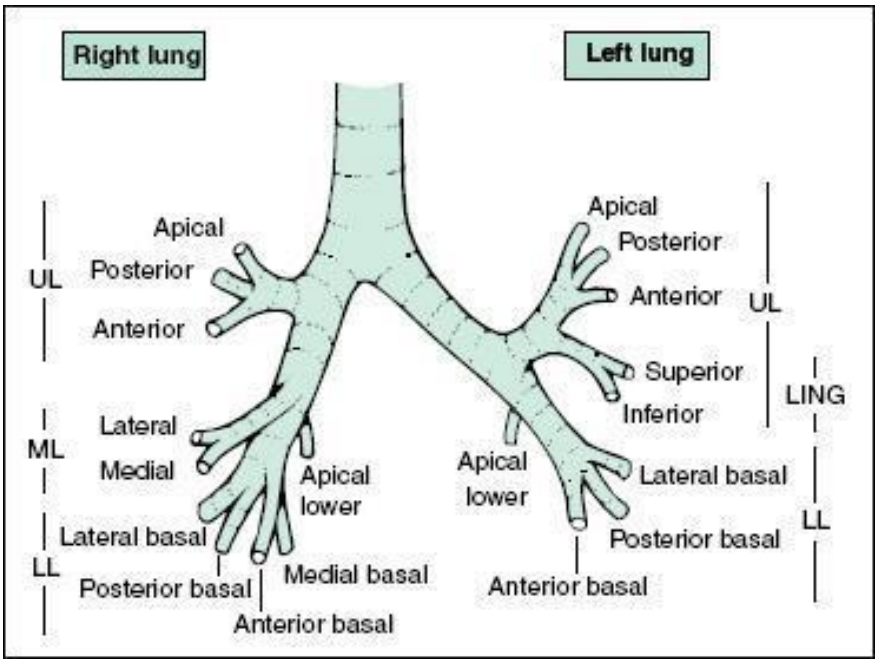
Each segment is surrounded by connective tissue which is continuous with pulmonary pleura

Thus Bronchopulmonary segments are **independent respiratory units**

Each segment **has its own artery**

But segmental **vein runs in the intersegmental plane**

Thus each segment has more than one vein and each vein drains more than one segment Both Right and Left lungs have 10 bronchopulmonary segments each



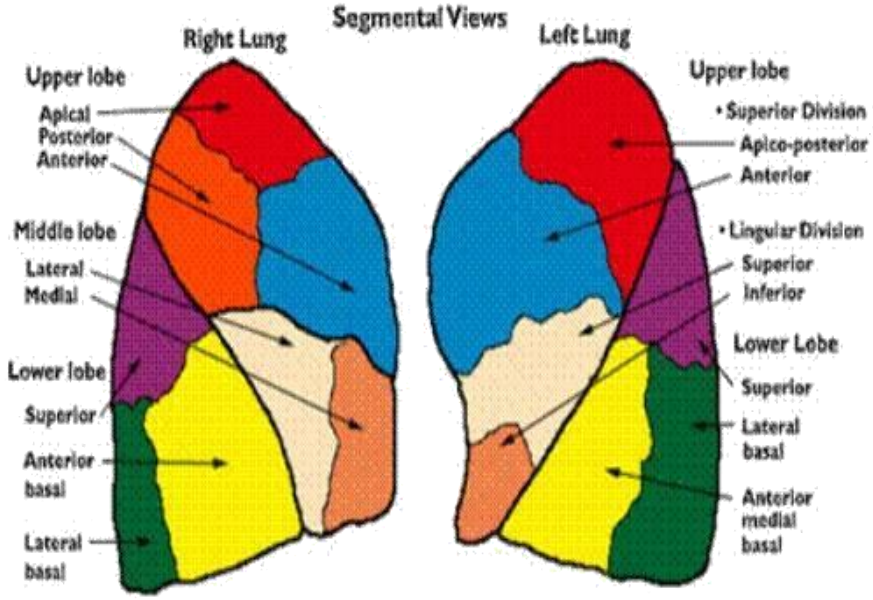
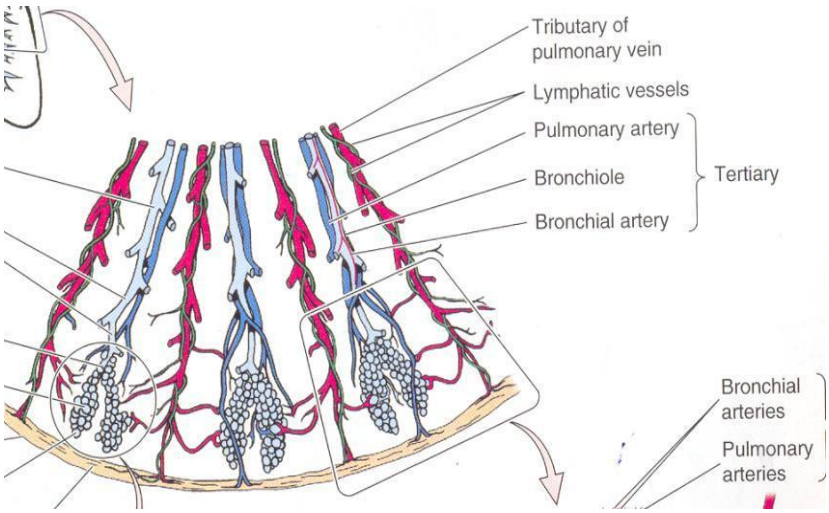


Diagram of Bronchopulmonary segments of both right and left lung



Bronchopulmonary segments of Right Lung

Lobes	Segments
Upper lobe	1. Apical 2. Anterior 3. Posterior
Middle lobe	4. Medial 5. Lateral
Lower lobe	6. Superior 7. Anterior Basal 8. Posterior Basal 9. Medial Basal 10. Lateral Basal

Bronchopulmonary segments of Left Lung

Lobes	Segments
Upper lobe	1. Apical 2. Anterior 3. Posterior
Lingula	Superior 4. Lingular Inferior 5. Lingular
Lower lobe	6. Superior 7. Anterior Basal 8. Posterior Basal 9. Medial Basal 10. Lateral Basal

Applied Anatomy:

- Connective tissue septa around the segments acts as a natural barrier and prevents spread of infection to other segments
- So infection is confined to the segment
- Apical segment of the lower lobe and the posterior segment of upper lobe are the most dependent in the supine position.

  Hence aspiration pneumonia involves mainly the apical segment of lower lobe.

DEFINE BRONCHO-PULMONARY SEGMENTS. NAME THE BRONCHO-PULMONARY SEGMENTS PRESENT IN LEFT LUNG AND ADD A NOTE ON ITS APPLIED ANATOMY. DRAW A LABELLED DIAGRAM OF THE MEDIAL SURFACES OF BOTH THE LUNGS. (LE)

B**ronchopulmonary segments are** well defined sectors of lungs, each one is **aerated by a tertiary or segmental bronchus**. o Broncho-pulmonary segments are the anatomical, surgical and functional units of lungs o Each segment is pyramidal in shape with apex directed towards root of lung

Each segment is surrounded by connective tissue which is continuous with pulmonary pleura

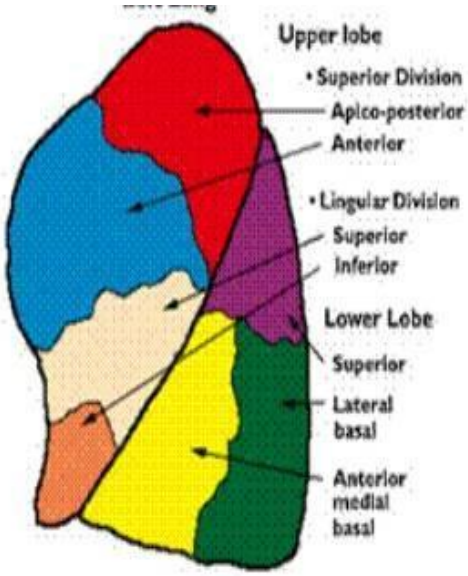
Thus Bronchopulmonary segments are **independent respiratory units**

Each segment **has its own artery**

But segmental **vein runs in the intersegmental plane**

Thus each segment has more than one vein and each vein drains more than one segment

Diagram showing Bronchopulmonary segments of left lung



Bronchopulmonary segments of Left Lung

Lobes	Segments
Upper lobe	Apical Anterior Posterior Superior
Lingula	Inferior
Lower lobe	Superior Anterior Basal Posterior Basal Medial Basal Lateral Basal

Diagram showing Medial surface of right lung:

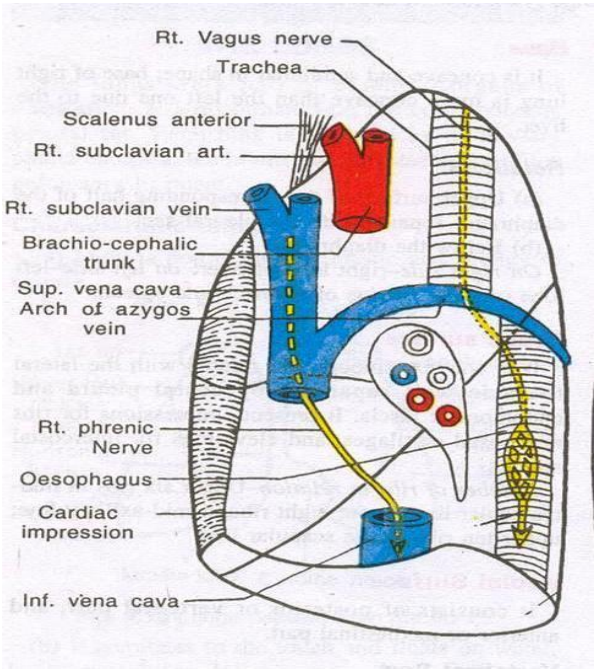
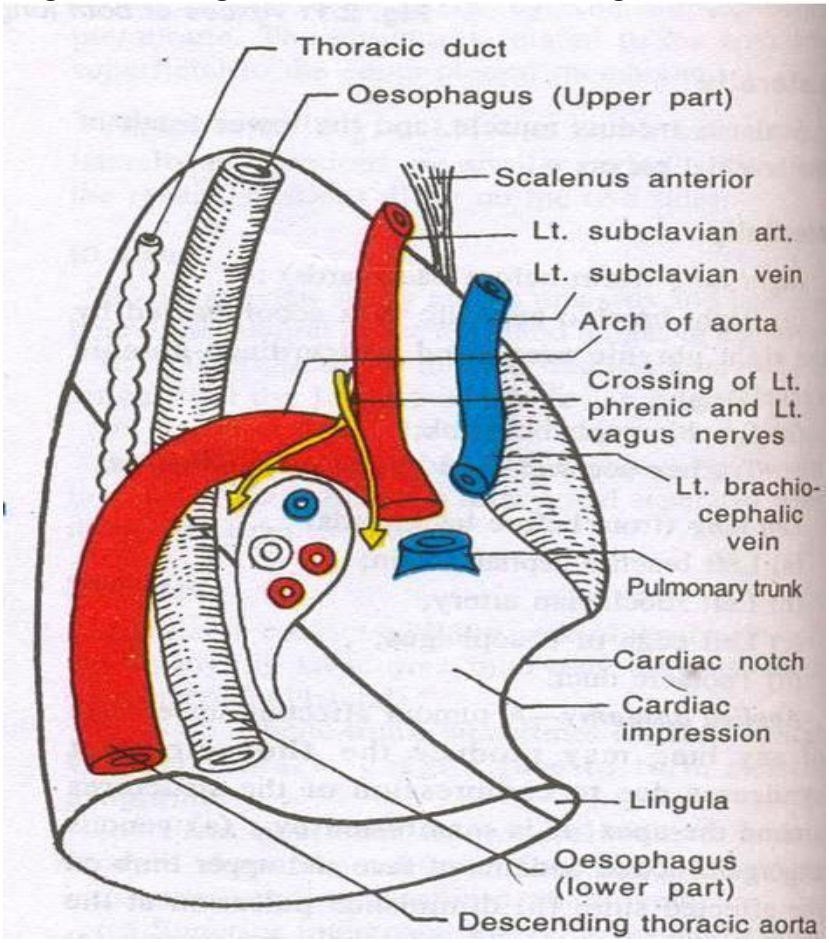


Diagram showing medial surface of left lung:



RIGHT LUNG (SE)

Right lung:

<u>Parts:</u>

Apex

Base

3 Borders- Anterior, posterior and inferior borders

2 Surfaces- Costal and medial surfaces

2 fissures namely oblique fissure and horizontal fissure divide the right lung into 3 lobes.

Lobes of right lung: Upper lobe, middle lobe and lower lobe.

Diagram showing medial surface of right lung:

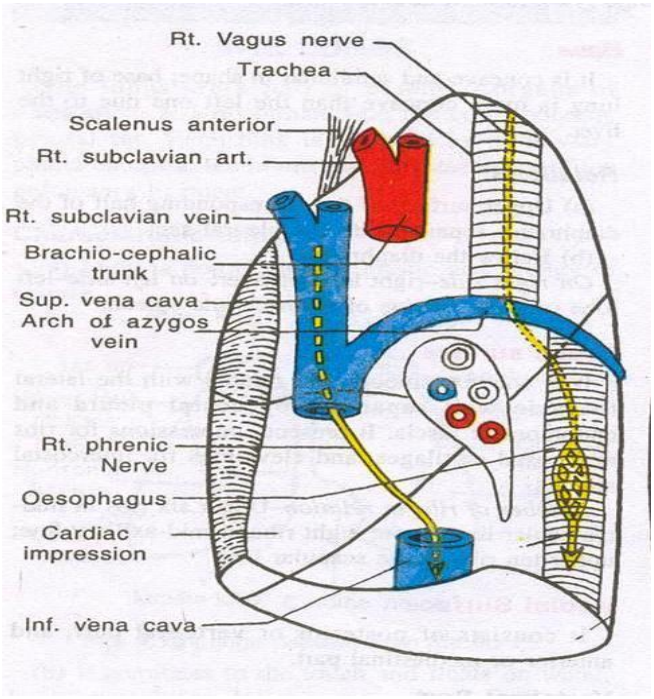
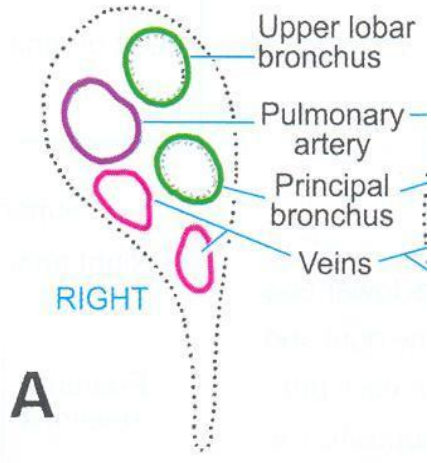


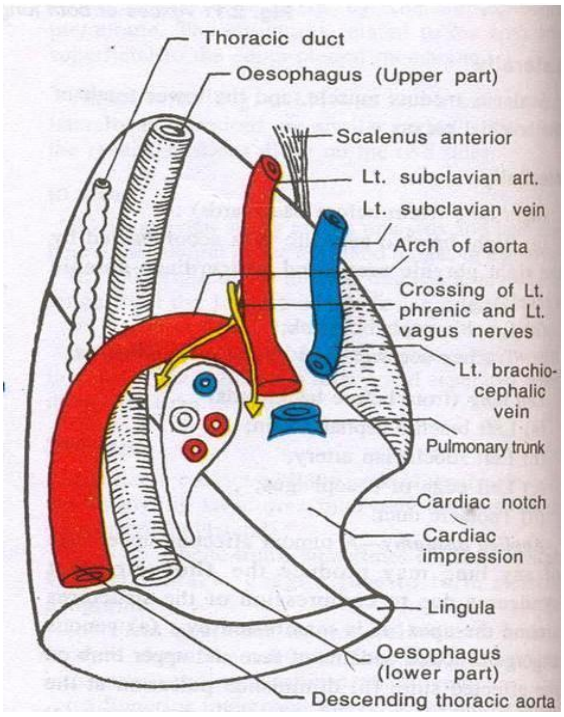
Diagram showing structural arrangement of right hilum:



Differences between right and left lung:

Right lung	Left lung
Large, shorter and wider	Smaller, Longer and narrower
Weight: 700gm	Weight: 600-650gm
3 lobes, 2 fissures	2 lobes, 1 fissure
Anterior border- straight	Anterior border- cardiac notch present Presence of lingula below cardiac notch
Cardiac impression shallow	Cardiac impression is deep
Supplied by one bronchial artery	Supplied by two bronchial arteries

MEDIASTINAL SURFACE OF LEFT LUNG WITH THE AID OF DIAGRAM (SE)



Hilum of left lung-

Structures at the hilum of Left Lung:

From before backwards:

Superior pulmonary vein
Pulmonary artery
Bronchus

From Above Downwards

Pulmonary artery
Bronchus
Inferior pulmonary vein

Cardiac impression:

Deeply concave

Structures related- Left ventricle, part of right ventricle, left auricle

A groove in front of hilum along upper part of cardiac impression for **pulmonary trunk**

A well defined groove above the hilum- **for arch of aorta**

A vertical groove behind the hilum- **for descending thoracic aorta**

A vertical groove from aortic arch towards apex- **for left subclavian artery**

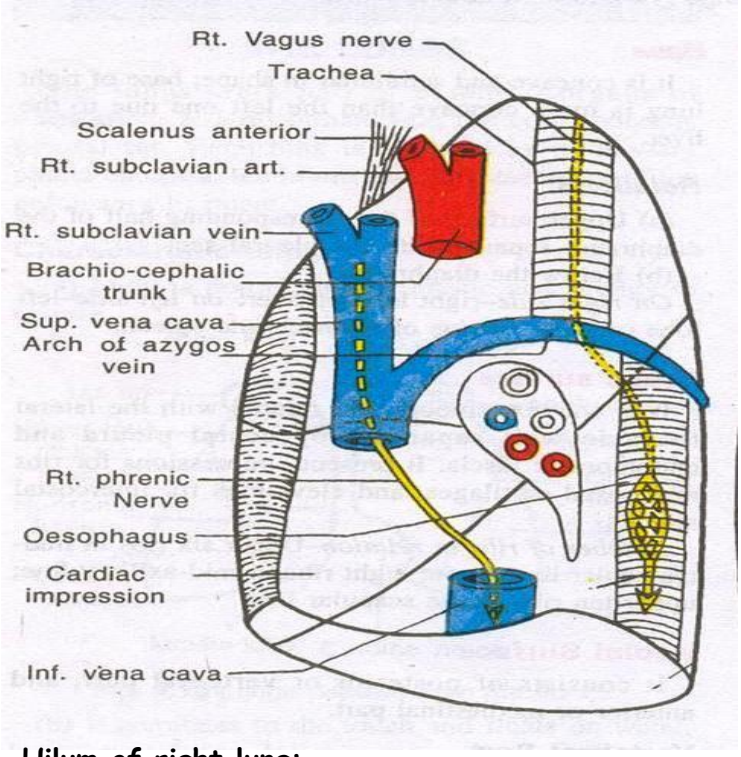
Aove the hilum behind groove for subclavian artery- **impression for oesophagus and thoracic duct**

A groove between the impression for descending thoracic aorta and pulmonary ligament- **for oesophagus**

Left phrenic nerve is related anterior to the hilum

Left vagus nerve is related posterior to the hilum

Mediastinal surface of right lung with the aid of diagram (SE)



Hilum of right lung:

Structures at the hilum of Right Lung:

From before backwards:

Superior pulmonary vein
Pulmonary artery
Bronchus

From Above downwards

Eparterial bronchus
Pulmonary artery
Hyparterial bronchus
Inferior pulmonary vein

Cardiac impression:

Shallow and concave

Structures related-Right auricle, right atrium, right ventricle.

A groove posterior and inferior to cardiac impression and in front of pulmonary ligament- for **inferior vena cava**

A groove along upper part of cardiac impression- for **superior vena cava in the lower part and right brachiocephalic vein in the upper part**

A groove above the hilum- for **arch of azygos vein**

Along the apex – impression for **trachea**

Behind the hilum- impression for **oesophagus**

Right phrenic nerve is related anterior to the hilum

Right vagus nerve is related posterior to the hilum

Root of right lung- relations and structures forming it (Short Essay/5marks)

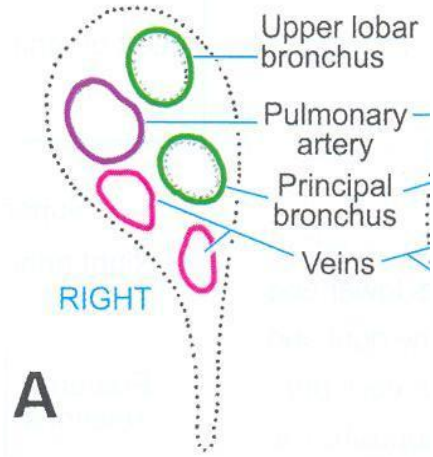
Structures at the hilum of Right Lung:

From before backwards:

Superior pulmonary vein
Pulmonary artery
Bronchus

From Above downwards

Eparterial bronchus
Pulmonary artery
Hyparterial bronchus
Inferior pulmonary vein



Relations of root of right lung:

Anterior: Right phrenic nerve
Anterior pulmonary plexus
Posterior: Right vagus nerve
Posterior pulmonary pexus
Above: Arch of azygos vein
Below: Pulmonary Ligament

Hilum of lungs (SE)

Hilum is a large depressed area.
Structures enter and leave the lung at the hilum.
Lies near the centre of the medial surface.

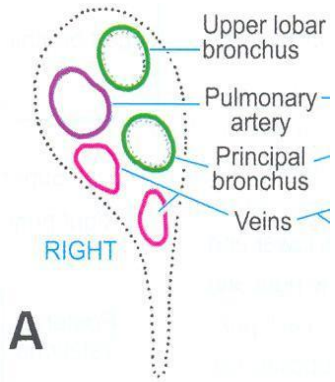
<u>Structures at the hilum of Right Lung</u>:

From before backwards:

Superior pulmonary vein
Pulmonary artery
Bronchus

From Above downwards

Eparterial bronchus
Pulmonary artery
Hyparterial bronchus
Inferior pulmonary vein



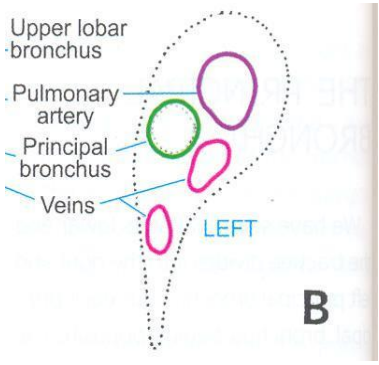
<u>Structures at the hilum of Left Lung</u>:

From before backwards:

Superior pulmonary vein
Pulmonary artery
Bronchus

From Above Downwards

Pulmonary artery
Bronchus
Inferior pulmonary vein



BRONCHOPULMONARY SEGMENTS **(SE)**

Bronchopulmonary segments are -

Well defined sectors of lungs, each one is **aerated by a tertiary or segmental bronchus**. o Broncho-pulmonary segments are the anatomical, surgical and functional units of lungs o Each segment is pyramidal in shape with apex directed towards root of lung

Each segment is surrounded by connective tissue which is continuous with pulmonary pleura

Thus Bronchopulmonary segments are **independent respiratory units**

Each segment **has its own artery**

But segmental **vein runs in the intersegmental plane**

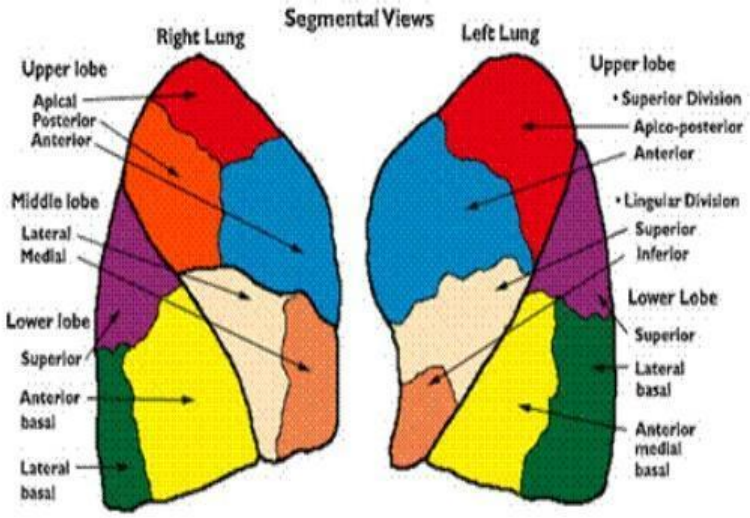
Thus each segment has more than one vein and each vein drains more than one segment Both Right and Left lungs have 10 bronchopulmonary segments each

Bronchopulmonary segments of Right Lung

Lobes	**Segments**
Upper lobe	1. Apical 2. Anterior 3. Posterior
Middle lobe	4. Medial 5. Lateral
Lower lobe	6. Superior 7. Anterior Basal 8. Posterior Basal 9. Medial Basal 10. Lateral Basal

Bronchopulmonary segments of Left Lung

Lobes	**Segments**
Upper lobe	1. Apical 2. Anterior 3. Posterior
Lingula	Superior 4. Lingular Inferior 5. Lingular
Lower lobe	6. Superior 7. Anterior Basal 8. Posterior Basal 9. Medial Basal 10. Lateral Basal



Applied Anatomy:

Connective tissue septa around the segments acts as a natural barrier and prevents spread of infection to other segments
So infection is confined to the segment

Apical segment of the lower lobe and the posterior segment of upper lobe are the most dependent in the supine position.

Hence aspiration pneumonia involves mainly the apical segment of lower lobe.

Contents of root of lung
(right) Draw and label hilum of right lung

Hilum of right lung (structures present)(SA)

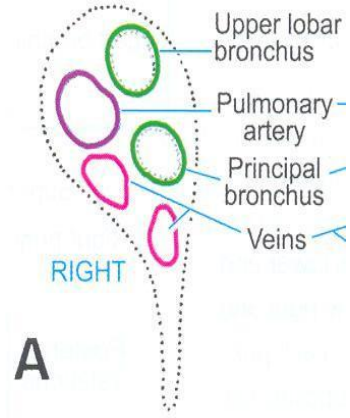
<u>Structures at the hilum of Right Lung</u>:

From before backwards:

Superior pulmonary vein
Pulmonary artery
Bronchus

From Above downwards

Eparterial bronchus
Pulmonary artery
Hyparterial bronchus
Inferior pulmonary vein



Blood supply of lungs (SA)
Arterial Supply:

Pulmonary artery- supply respiratory part

Bronchial artery- supply conducting part of bronchial tree Bronchial Artery:

Right side: One artery ,

Arises as a branch of right 3rd *posterior intercostal artery* Or from *upper left bronchial artery*

Left side: There are 2 bronchial arteries,

Arise from *Descending thoracic aorta*

Venous Drainage:

Bronchial Veins – drain venous blood from *first one or two divisions of bronchi*

There aretwo bronchial veins on each side.

Right Bronchial veins drain into Azygos vein

Left Bronchial veins drain into left superior intercostal vein or hemiazygos vein

Pulmonary Veins - Drain Greater part of venous blood from lungs.

Mention the lymphatic drainage of lungs (SA)

There are two sets of Lymphatics which drain the lungs

Superficial Lymphatics – Drain peripheral lung tissue

Ramifies beneath the pulmonary pleura

Deep Lymphatics –Drain bronchial tree, pulmonary vessels and connective tissue septa

Arranged around the intrapulmonary bronchi and bronchioles and around pulmonary vessels

These lymphatics converge towards hilum and drain into Bronchopulmonary lymph nodes.

Applied Anatomy: Cancer cells in the lungs spread mostly by the lymphatics and involve the hilar and Mediastinal lymph nodes

Bronchial arteries (SA)

Bronchial arteries supply - Conducting part of bronchial tree

Right side: One artery ,

Arises as a branch of right 3rd *posterior intercostal artery* or from *upper left bronchial artery*

Left side: There are 2 bronchial arteries,

Arise from *Descending thoracic aorta*

Differences between right and left principal bronchus and its clinical significance (Short answer)

Right Principal Bronchus	Left Principal Bronchus
2.5 cm long	5 cm in length
Shorter, wider	It is more longer, narrower
More in line with trachea	More oblique than right bronchus
Makes an angle of 25^0 from median plane at the tracheal bifurcation	Makes an angle of 45^0 from median plane at the tracheal bifurcation
Passes below arch of azygos vein	Passes below arch of aorta
At the hilum: Upper lobe (Eparterial) bronchus arises from the main bromchus before it enters the hilum	At the hilum: The whole bronchus enters the hilum

Applied Anatomy: Since the right bronchus is shorter, wider and more vertical a foreign body is more likely to be aspirated into the right lung

Define a Bronchopulmonary segment (Short answers/3marks) Bronchopulmonary segments are -

Well defined sectors of lungs, each one is **aerated by a tertiary or segmental bronchus**. o Each segment is pyramidal in shape with apex directed towards root of lung

Each segment is surrounded by connective tissue which is continuous with pulmonary pleura

Thus Bronchopulmonary segments are **independent respiratory units**

Each segment **has its own artery**

But segmental **vein runs in the intersegmental plane**

Thus each segment has more than one vein and each vein drains more than one segment Both Right and Left lungs have 10 bronchopulmonary segments each

Bronchopulmonary segments of left lung (upper lobe) (SA)

Bronchopulmonary segments of Left Lung-

Upper lobe
1. Apical
2. Anterior
3. Posterior

Lingula
4. Superior Lingular
5. Inferior Lingular