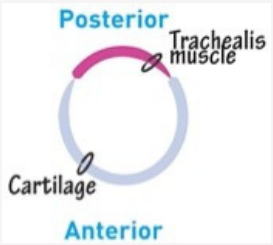
Trachea

Position:

Extends from C6 (The lower border of the cricoid cartilage) to the level between T4 and T5 (The level of the sternal angle)



Structure:

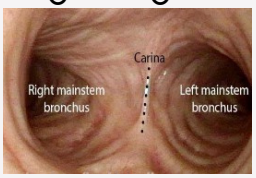
1. The trachea has 16-20 C-shaped hyaline cartilages.
2. Posteriorly, the trachea has a smooth muscle called Trachealis, which is complementary to the C-shaped cartilages.
3. The trachea is 4.5 to 5 inches long and has a diameter equal to that of the index.

Relations:

Anterior	Posterior	Right	Left
- Arch of aorta. - The origin of the brachiocephalic artery. - Thymus. - Thyroid gland. - Manubrium sterni.	- Esophagus. - Left recurrent laryngeal nerve. - Thoracic duct.	- The azygous arch. - The brachiocephalic artery. - Right vagus nerve. - Right phrenic nerve. - Right main bronchus.	- Arch of aorta. - Left subclavian artery. - Left common carotid artery. - Left vagus nerve. - Left phrenic nerve. - Left main bronchus.

Carina:

- fold of mucosa found at the beginning of the main bronchi (at the beginning of the bifurcation).
- very sensitive; when it is irritated, it causes coughing.



Emergency tracheostomy:

Making a suprasternal opening to allow him to breathe through this opening

The most vessel liable to injury are (present in suprasternal region):

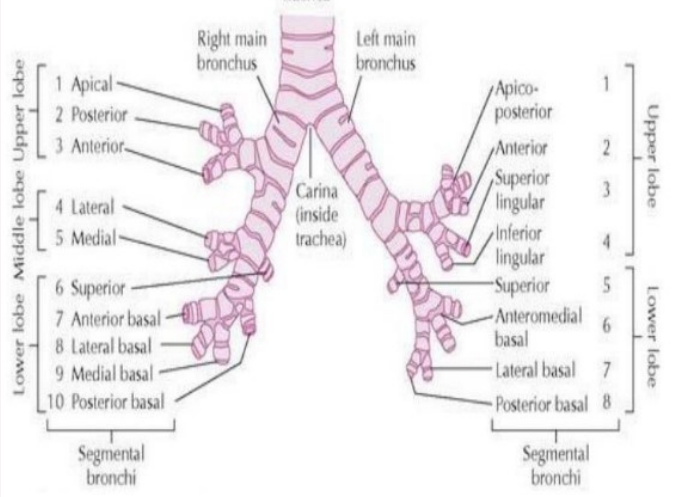
inferior thyroid vein, anterior jugular arch, thyroid ima artery.

Bronchi

	Right main bronchus	Left main bronchus
Length	Shorter	Longer
Lumen	Wider	Narrow
Alignment	More vertical	More horizontal
Importance	At the hilum it divides into eparterial and hyparterial bronci	At the hilum it remains as one main bronchus

The bronchial tree:

- The main bronchi = the primary bronchi
- The secondary bronchi = lobar bronchi, 3 on the right (the right lung has 3 lobes, and 2 lobar bronchi on the left (the left lung has 2 lobes.
- The tertiary bronchi = bronchopulmonary segments. There are 10 on the right and 10 on the left in adults



The importance of these bronchopulmonary segments -surgically:

if you need to remove a part of the lung, these segments are removed (Segmentomy) instead of removing the whole lobe.

The Pulmonary unit (functional segment inside the bronchopulmonary segment):

The pulmonary unit consists of alveolar ducts, atria, air sacs, and pulmonary alveoli.

Important clinical notes:

Any foreign body that enters the respiratory tract will usually go to the right bronchus.

- When a person is standing --> this foreign body enters the posterior segment of the lower lobe
- When a person goes to the dentist and lays down --> this foreign body enters the apicobasal segment of the lower lobe.

Bronchopulmonary segments in embryo:

In the embryo, there is an 8 in the left lung. In the upper lobe, the apical and posterior segments join together (apicoposterior). After delivery, they are separated to give the apical and posterior segments. In the lower lobe (the base), the anterior segment and the medial segment join together (anteromedial). After delivery, they are also separated to give the anterior and medial segments.

Lungs

Difference between the right and left lungs:

Right lung	Left lung
Shorter and wider (liver pushes the diaphragm upwards on the right side)	longer and narrower
Has three lobes	Has two lobes
Has oblique and horizontal fissures	Has oblique fissure only
----	Has lingula, cardiac notch and apical artery (in the apex

Some features of the lungs:

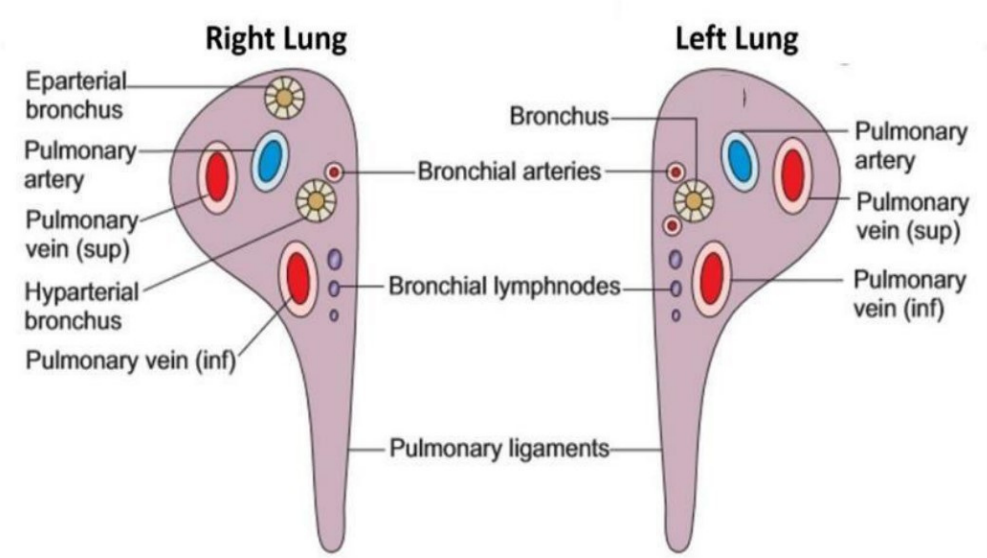
- The color of the lungs is red in normal people, while in smokers it becomes black.
- Lungs are filled with elastic tissue. This elastic tissue surrounds the alveoli.
- The lungs weigh about 600-800gm, 90% air & 10% tissue.
- The root of the lung is found between T5 and T7

3 Borders	2 Surfaces
1. Anterior (sharp) border: ▪ Not same in both lungs. The left lung has the cardiac notch between the 4th and 6th costal cartilages (1 inch in length). ▪ Apex → SC Joint → Sternal angle → 6th costal cartilage in the midline. 2. Posterior (rounded) border. From the apes to T10 3. Inferior (sharp) border.	1. Costal surface. 2. Mediastinal surface lies against the mediastinum anteriorly, and the vertebral column posteriorly.

Apex	Base
found 1 inch above the medial end of the clavicle	At the end of expiration, crosses the midclavicular line at the 6th rib, crosses the midaxillary line at the 8th rib, then posteriorly at the level of T10. May reach the level of T12 during respiration.

Oblique fissure	Horizontal fissure
Starts from the dorsal spine of T4 → runs along the 6th rib → until it reaches out anteriorly	Start from the 4th intercostal space anteriorly → go along the 5th rib.

The hilum



The pleura

- The pleura has two layers, visceral and parietal.
- At the midclavicular line, it reaches the 8th rib instead of the 6th.
- At the midaxillary line it reaches the 10th rib instead of the 8th.
- Reach T12 instead of T10.
- Below the hilum, they form the pulmonary ligament.

The difference between the lung and the pleura (Parietal pleura)...in term of position:

- At the anterior border, it reaches the 7th rib.
- The two layers are adherent at the apex of the lung and have a space between them at the base.
- Visceral layer is always adherent to the lung.
- They surround the content of the hilum.
- Below the hilum, they form the pulmonary ligament.

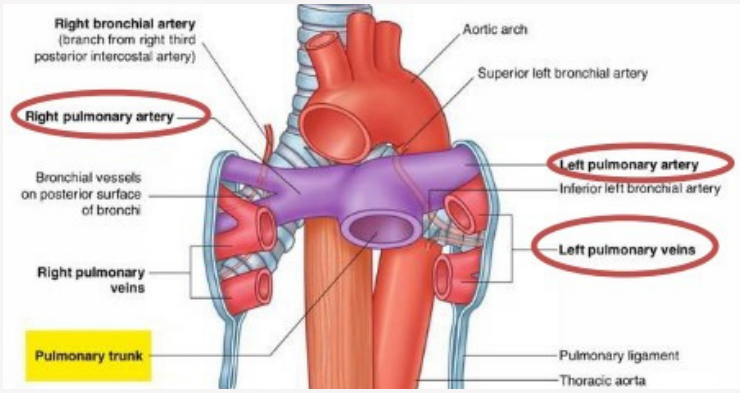
Impressions on the visceral surface:

Right lung	Left lung
1. Right atrium, SVC and IVC 2. Esophagus (posterior to the hilum) 3. Trachea 4. Contents of the hilum (2 pulmonary veins, pulmonary artery, ib-arterial hib-arterial bronchi).	1. Left ventricle 2. Descending aorta and the arch of the aorta with its branches 3. Esophagus (anterior to the descending aorta in the lower part of the lung)

Pulmonary vessels

The pulmonary trunk divides into right and left pulmonary arteries:

- Anteroinferiorly to the left of the bifurcation of the trachea
- Inferior to the level of sternal angle at T5
- Below the aortic arch



The right pulmonary artery:

- longer than the left.
- Relations:
  1. Anteriorly: SVC, ascending aorta, superior right pulmonary vein.
  2. Posteriorly: Right main bronchus.

The left pulmonary artery:

- The most superior structure in the hilum of the left lung.
- Relations:
  1. Anteriorly: superior pulmonary vein.
  2. Posteriorly: descending aorta.
  3. Inferiorly: Left main bronchus.

Pulmonary veins:

Begin at the hilum of the lung, pass through the root of the lung (2 on each sides).

Bronchial vessels

- The main nutritive blood supply of the pulmonary tissues (bronchial walls and glands, walls of large vessels, lungs and visceral pleura).
- We have one right and two left (superior & inferior) bronchial arteries.
- Bronchial arteries run on the posterior surfaces of bronchi.

The right bronchial artery:

Originates from the third posterior intercostal artery (branch of the descending thoracic aorta).

The left bronchial arteries:

1. Both arise directly from the anterior surface of the descending thoracic aorta.
2. The superior left bronchial artery arises at the level of T5.
3. The inferior left bronchial artery arises below left main bronchus.

The bronchial veins:

1. The left side drains into the hemiazygos vein or intercostal vein >> left atrium.
2. The right side drains into azygos vein >> right atrium.

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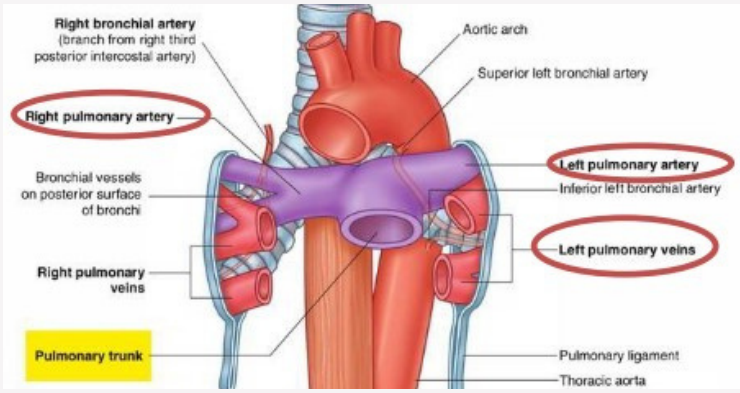

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Autonomic innervation of lungs and visceral pleura

Anterior and posterior pulmonary plexuses (sensitive to stretch):

- parasympathetic = bronchoconstriction
- sympathetic = bronchodilation

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Lymphatic drainage of lungs

Lymph nodes:

a-Parasternal LN

b-Paratracheal LN = tracheobronchial LN hilum

c-Bronchomediastinal LN

- LN on the Rt side drain into Rt lymphatic duct > Right brachiocephalic vein
- LN on the Lt side will drain into the thoracic duct > > Left brachiocephalic vein

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