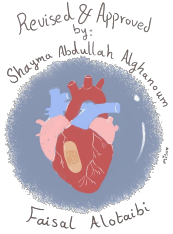
Anatomy Team
MED 439



MED439
KING SAUD UNIVERSITY

Anatomy of the lungs and pleura

Respiratory Block - Lecture 4

Color index:
Important
In male's slides only
In female's slides only
Extra information, explanation
Doctors notes

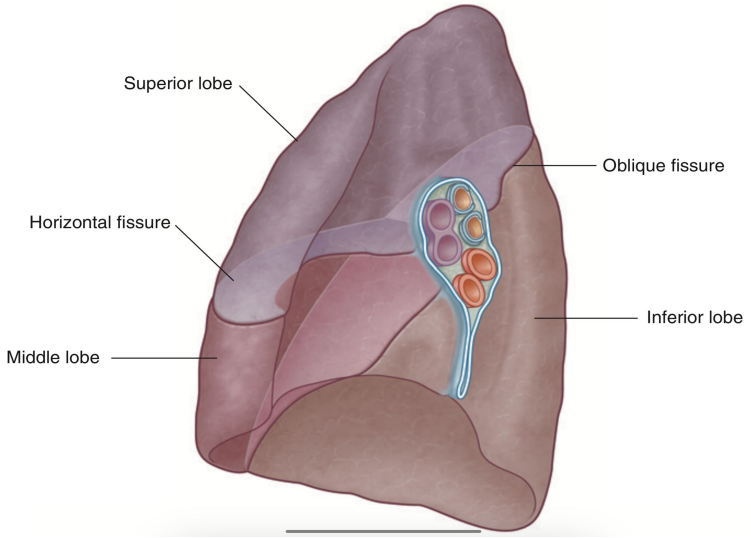
Editing File

Objectives:

- Describe the anatomy of the **pleura**: **subdivisions** in parietal & visceral, **nerve supply** of each of them
- List the **parts of parietal pleura** and its **recesses**
- Describe the **surface anatomy** of both pleura and lungs
- Describe the anatomy of the lungs: shape, relations, nerve supply & blood supply
- Describe the **difference between the right and left lungs**
- Describe the formation of **bronchopulmonary segments** and the **main characteristics** of each segment in the lung

Pleura

Double-layered serous membrane enclosing the lung Has two layers:	
Parietal layer	which lines the **thoracic walls.**
Visceral layer	which covers the **surfaces of the lung.**

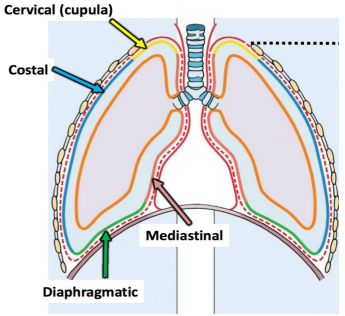


·The two layers continue with each other around the **root of the lung**, where it form a loose cuff **hanging down** called the **pulmonary ligament**.

·The **space** between the two layers, the **pleural cavity**, contains a thin film of pleural serous fluid (5-10 ml.).

Parietal pleura:

It is divided according to the region in which it lies and the surfaces it covers, into:



Cervical Pleura

·Projects up into the neck about one inch above the medial 1/3rd of clavicle.
·It **lines** the under surface
of the **suprapleural membrane.**

Costal pleura

lines, the back of the:
1- Sternum
2- Ribs & costa cartilages
3- Intercostal spaces &
4- Sides of vertebral bodies

Mediastinal pleura

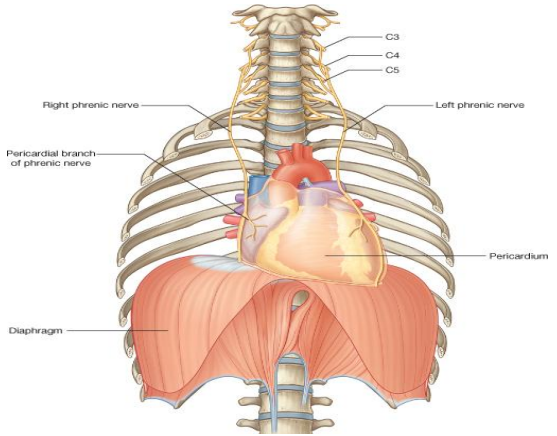
covers the mediastinum.
· **At the hilum**, it is reflected on to the **vessels** and **bronchi**, and continuous with the visceral pleura.

Diaphragmatic pleura

covers the thoracic (upper) surface of the diaphragm.

Pleural Recesses

Costodiaphragmatic	Costomediastinal
Slit like space **between** costal and diaphragmatic pleurae,along the inferior border of the lung which enters through it in deep inspiration	Slit like space **between** costal and mediastinal pleurae, along the anterior border of the lung which enters through it in deep inspiration.

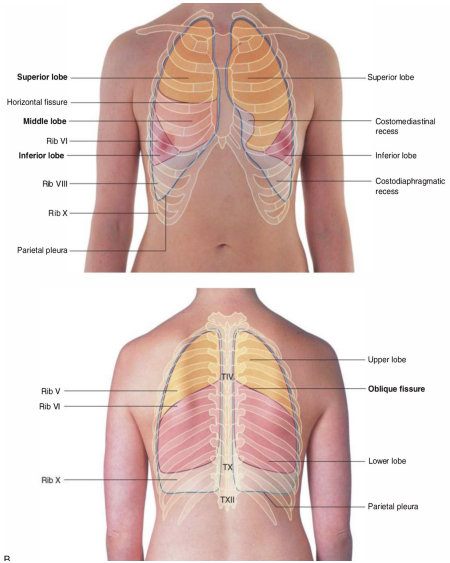


Pleura Nerve Supply

Parietal pleura	It is sensitive to pain, pressure, temperature, and touch ,It is supplied as follows: ❖ **costal pleura** is segmentally supplied by the **intercostal nerves**. ❖ **Mediastinal pleura** is supplied by **phrenic nerves.** ❖ **Diaphragmatic pleura** is supplied over the diaphragmatic domes by **phrenic nerves** (central part), around the periphery by lower 6 **intercostal nerves**.
Visceral pleura	sensitive to **stretch** only and is supplied by the **autonomic fibers** from the **pulmonary plexus.**

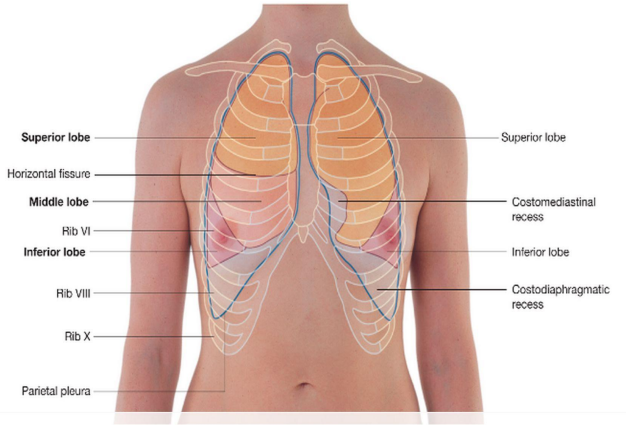
Surface anatomy of pleura

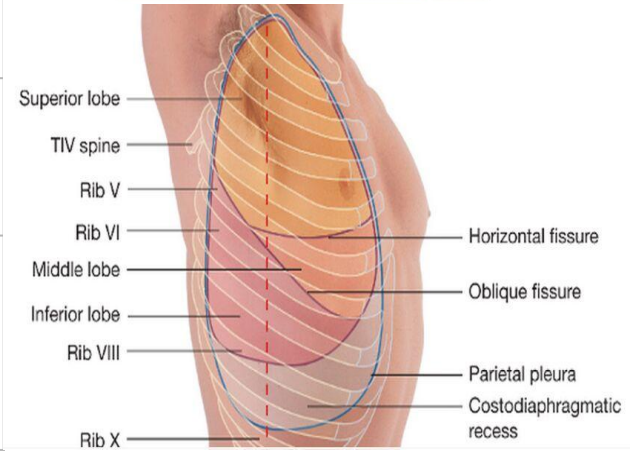
Apex	lies one inch above the medial 1/3 of the clavicle. (The anterior margin)
Anterior margin	**Right pleura**: extends vertically from sterno-clavicular joint to xiphisternal joint (6th costalcartilage).
	Left pleura: Simillar course but at the level the 4th costal cartilage deviates laterally and extends to lateral margin of the sternum to form **cardiac notch** then turns sharply downward to xiphisternal joint (6th costal cartilage). The anterior margin extends from the sternoclavicular joint to the 4th costal cartilage, then deviates for about 1 inch to the left at 6th costal cartilage to form the cardiac notch
Inferior margin	passes around the chest wall, on the 8th rib in midclavicular line, 10th rib in mid-axillary line and finally reaching to 12th rib adjacent to vertebral column posteriorly **(T12 spine)**/(the last thoracic spine)
Posterior margin	along the vertebral column from the apex (C7) to the inferior margin (T12 spine).



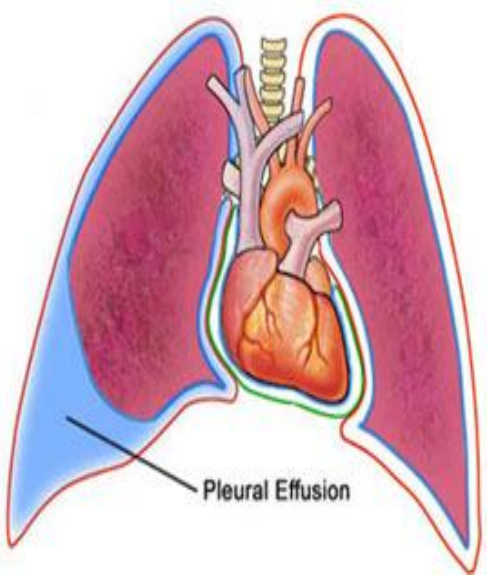
Surface anatomy of lung

Apex, anterior & posterior border	correspond nearly to the lines of pleura but are slightly away from the median plane.
Inferior margin	passes around the chest wall, on the 6th rib in midclavicular line, 8th rib in mid-axillary line and finally reaching to 10th rib adjacent to vertebral column posteriorly. as the pleura but more horizontally and finally reaching to the **10th thoracic spine.**
Posterior margin	along the vertebral column from the apex (C7) to the inferior margin **(T10 spine).**
Oblique fissure	Represented by a line extending from **4th thoracic/3rd thoracic** spine, obliquely ending at 6th costal cartilage.
Transverse fissure: Only in the right lung	represented by a line extending from **4th right costal cartilage to meet the oblique fissure.**





Pleural Effusion



·It is an **abnormal** accumulation of pleural fluid about 300ml, in the Costodiaphragmatic pleural recess , (**normally 5-10 ml fluid**).

Causes:

- inflammation
- TB
- congestive heart disease
- malignancy (mesothelioma of the pleural sac)

·The lung is **compressed** & **the bronchi are narrowed**.
·**Auscultation** would reveal only **faint** & **decreased breathing sounds** over compressed or collapsed lung lobe.
·**Dullness** on percussion over the effusion.

Lungs

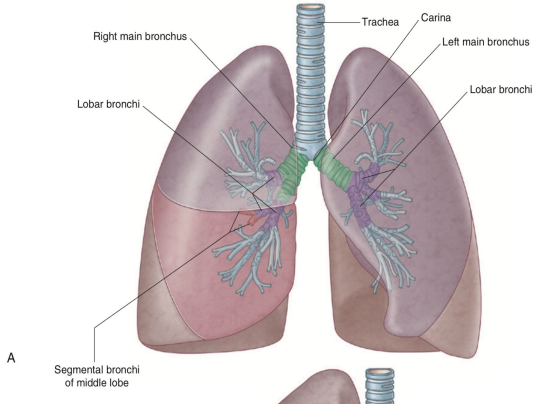
Located in the thoracic cavity, one on each side of the mediastinum.

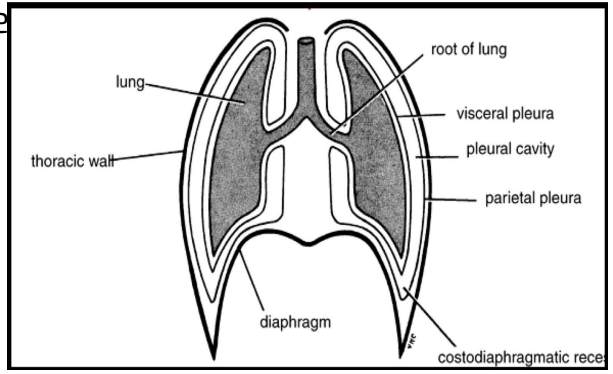
Each lung is:

- **Conical** in shape.
- **Covered** by the visceral pleura.
- **Suspended** free in its own pleural cavity.
- **Attached** to the mediastinum only by its root.

Each lung has:

- **Apex and Base:**
  Identify the top and bottom of the lung, respectively.
- **Costal surface(Lateral surface):**
  Surrounded by the ribs and intercostal spaces from front, side & back)
- **Medial (Mediastinal) surface:**
  - Where the bronchi, blood vessels and lymphatic vessels enter or leave the lung at the **hilum**.
  - It is also related to the **structures** forming the **mediastinum**.





Lungs

Apex:

- Projects into the root of the neck.
- 1/2 (1) inch above medial 1/3 of clavicle
- It is covered by cervical pleura
- It is grooved **anteriorly** by subclavian artery.

Base:

- Inferior or diaphragmatic surface, is **concave** and rests on the **diaphragm**

Borders

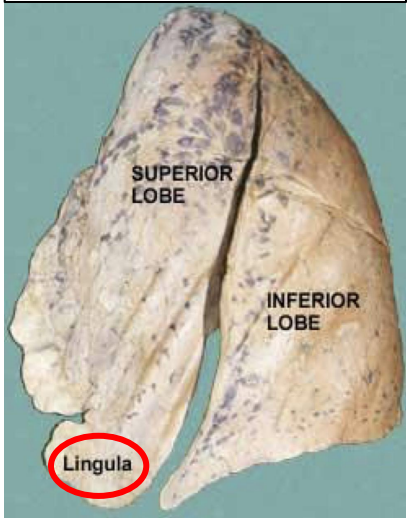
Anterior border:

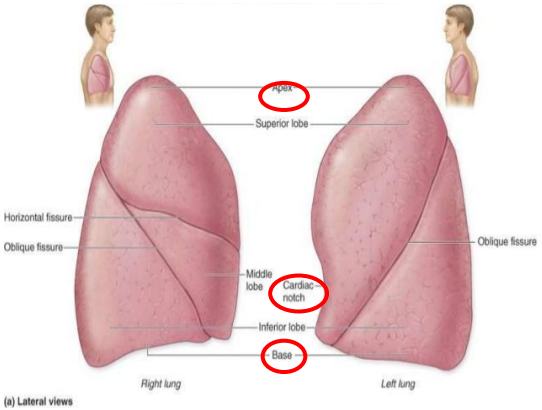
- It's sharp, thin, and **overlaps** the heart.
- Anterior border of the **LEFT** lung presents a cardiac notch at its lower end.
- And has a thin projection called the **lingula** below the cardiac notch.

posterior border:

- It is thick, rounded and lies along the vertebral column

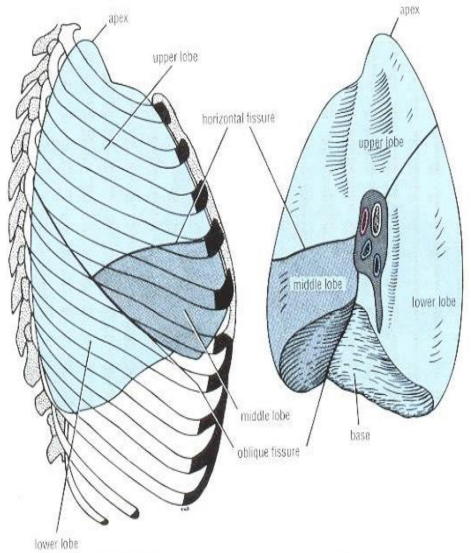
LEFT LUNG





Surfaces: Costal & Mediastinal

Costal surface	• Convex • Covered by costal pleura which separate the lung from(ribs, costal cartilages & intercostal muscles)	
Medial surface: it's divided into 2 parts	1- Anterior (Mediastinal) part	• Contains a **hilum** in the middle(it is a depression in which **bronchi**, **vessels** & **nerves** forming the root of the lung)
	2- Posterior (vertebral) part	it is related to: • Bodies of thoracic vertebrae • Intervertebral discs • Posterior intercostal vessels • Sympathetic trunk



Lateral (Costal) & Medial surfaces of right lung

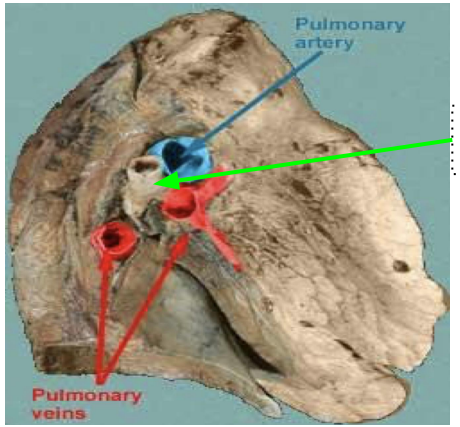
Lung Roots

Left lung

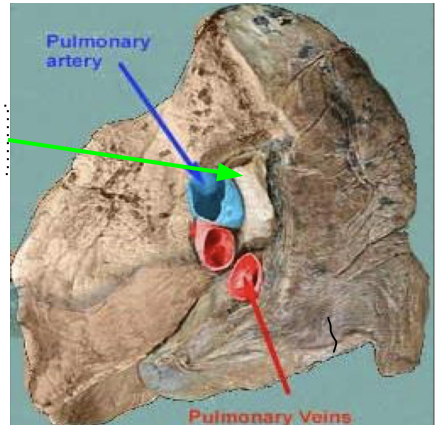
- **ONE bronchus** (most posterior)
- Pulmonary artery: most superior
- Pulmonary veins: are Anterior and Inferior

Right lung

- **TWO bronchi** (most posterior)
- Pulmonary artery: most superior
- Pulmonary vein: are Anterior and Inferior



bronchi



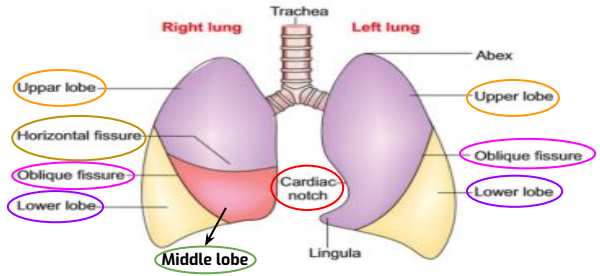
Lungs

Left lung

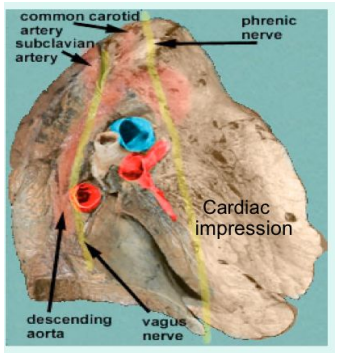
- Divided by **one oblique fissure** into **two** lobes (upper and lower)
- There is **No horizontal** fissure
- It has a cardiac notch at lower part of it's anterior border

Right lung

- Larger and shorter than left lung
- Divided by **two** fissures (**oblique** & **horizontal**) into **three** lobes (upper, middle and lower lobes)



Mediastinal surface



Left Lung

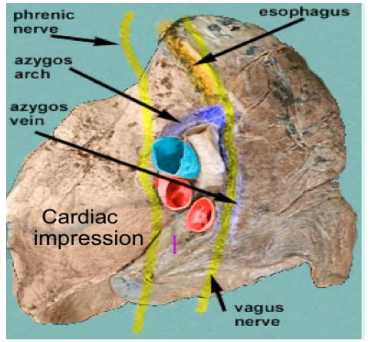
The following structures are found:

- **Descending aorta and its arches:** posterior and over to the root of the lung.
- **Vagus nerve:** posterior to the root of the lung.
- over the root of the lung
- **Phrenic nerve:** anterior to the root of the lung.
- **Cardiac impression:** impression related to left ventricle.
- Groove for left common carotid and left subclavian arteries

Right Lung

The following structures are found:

- **Azygos vein and its arch:** (posterior and over the root of the lung).
- **Vagus nerve:** posterior to the root of the lung.
- **Phrenic nerve:** anterior to the root of the lung.
- **Cardiac impression:** related to right atrium.
- **Esophagus:** posterior to Cardiac the root.
- Below hilum and in front of pulmonary ligament : groove for I.V.C.(inferior vena cava)



Blood supply of lung

Bronchial arteries

(From descending aorta)
It supplies oxygenated blood to bronchi , lung tissue & visceral pleura.

Bronchial veins

drain into azygos & hemiazygos veins.

Pulmonary artery

which carries non-oxygenated blood from right ventricle to the lung alveoli.

2 Pulmonary veins

carry oxygenated blood from lung alveoli to the left atrium of the heart.

Nerve Supply of the lung

Pulmonary plexus at the root of lung is formed of **autonomic N.S.** from sympathetic & parasympathetic fibers.

Sympathetic Fibers	Parasympathetic Fibers
From:**sympathetic trunk.**	From:**Vagus nerve**
Action: broncho-dilatation/and vasoconstriction.	Action: broncho-constriction and vasodilatation and secretomotor to bronchial glands.

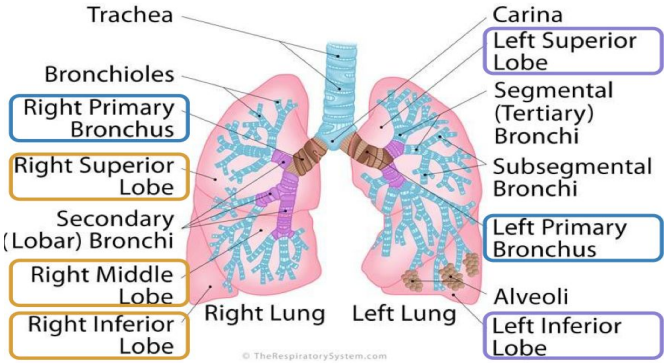
Bronchi

The **trachea** divides into **2 main bronchi:**

Right main bronchus:

-which divides before entering the hilum, it gives: superior lobar (secondary)bronchus.

- On entering hilum, it divides into middle & inferior lobar bronchi.



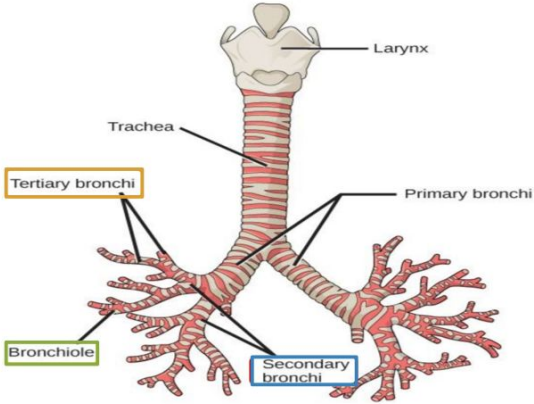
Left main bronchus:

On entering hilum, it divides into superior & inferior lobar bronchi.

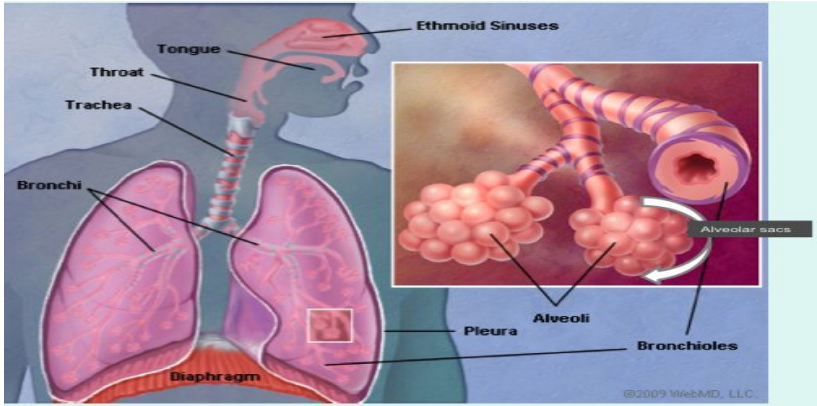
Bronchopulmonary segments

•They are the anatomic, functional, and surgical units of the lungs.

1. Each lobar(secondary)bronchus gives segmental (tertiary) bronchi.
2. Each segmental bronchus divides repeatedly into bronchioles.
3. Bronchioles divide into terminal bronchioles, which show delicate outpouchings 'the respiratory bronchioles'.



4. The respiratory bronchioles end by branching into alveolar ducts,which lead into alveolar sacs.
5. The alveolar sacs consist of several alveoli, each alveolus is surrounded by a network of blood capillaries for gas exchange.

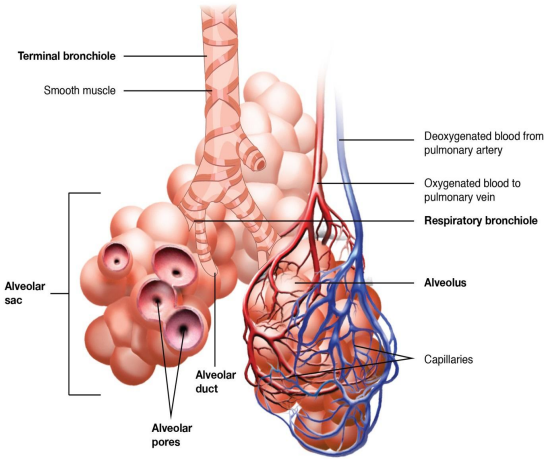


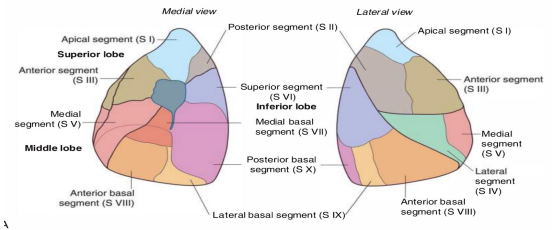
Bronchopulmonary segments

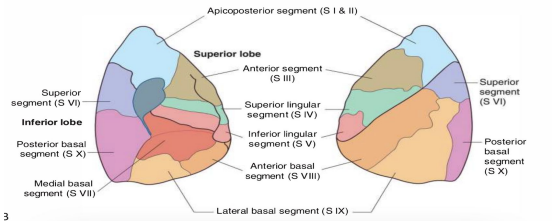
The main characteristics of a bronchopulmonary segment:

- It is a subdivision of a lung lobe.
- It is pyramidal shaped, its apex toward the lung root
- It is surrounded by connective tissue septa.
- It has a segmental bronchus, a segmental artery, lymph vessels, and autonomic nerves.
- The segmental vein lies in the inter- segmental C.T. septa between the segments.
- A diseased segment can be removed surgically, because it is a structural unit.

Note Med438:Segmental vein can't be removed, since it also gives the neighbor segment







MCQ

Q1: Which one of the parietal pleura is lines the under surface of the suprapleural membrane ?

A. Cervical pleura
B. Costal pleura
C. Mediastinal pleura
D. Diaphragmatic pleura

Q2: Which nerve is supply the costal pleura ?

A. Phrenic nerves
B. Intercostal nerves
C. Vagus nerve
D. Subcostal nerve

Q3: Which one of the following extends from apex (C7) to inferior margin (T12 Spine) ?

A. Right pleura of anterior margin
B. left pleura of anterior margin
C. Inferior margin
D. Posterior margin

Q4: Oblique fissure extend from.....to....?

A. (T4 spine) to 4th costal cartilage
B. (T4 spine) to 5th costal cartilage
C. (T4 spine) to 6th costal cartilage
D. (T4 spine) to 7th costal cartilage

Q5: Which of the following is surrounded by the ribs and intercostal spaces from front, side & back?

A. Apex and base
B. Costal surface
C. Mediastinal part of medial surface
D. Posterior part of medial surface

Q6: Which of the following is an exclusive feature of the right lung?

A. Divided by one fissure
B. Has anterior and inferior pulmonary veins
C. Has two bronchi
D. Has a cardiac notch

answer key:
1:A
2:B
3:D
4:C
5:B
6:C

MCQ

Q7: Where is the cardiac notch present at ?

A. Lower anterior border of right lung
B. Lower anterior border of left lung
C. Lower posterior border of right lung
D. Lower posterior border of left lung

Q8: Which of the following is a unique feature of the left lung?

A. Has two lobes
B. Larger than the right lung
C. Has no horizontal fissure
D. A & C

Q9: The right main bronchus

A. Before entering the hilum,it gives: superior lobar
B.After entering the hilum,it gives: superior lobar
C. Before entering the hilum,it gives:inferior lobar
D. After entering the hilum,it gives:inferior lobar

Q10: Which one is correct about Bronchial artery ?

A. Drain into azygos & hemiazygos veins.
B. Non-oxygenated blood from right ventricle to the left alveoli
C. It supplies oxygenated blood to bronchi ,lung tissue & visceral pleura.
D. Carry oxygenated blood from the lung alveoli to the left atrium of the heart

Q11: Which of the following is correct

A.Each lobar(secondary)bronchus gives segmental (tertiary) bronchi
B.Each lobar(secondary)bronchus gives bronchioles
C.Each lobar(secondary)bronchus gives terminal bronchioles
D.Each lobar(secondary)bronchus gives alveolar ducts.

Q12: In the right lung vagus nerve

A. Posterior to the root of the lung
B. Anterior to the root of the lung
C. Superior to the root of the lung
D. Lateral to the root of the lung

answer key:
7:B
8:D
9:A&D
10:C
11:A
12:A

SAQ :

1 : What are the causes of pleural Effusion?

2 : What is the posterior(vertebral) part of the medial surface of lungs is related to? mention 3 of them.

3 : What is the action of parasympathetic fibers?

SAQ Answers

1 :Inflammation, TB,congestive heart disease and malignancy.

2 :1- Bodies of thoracic vertebrae
2- Intervertebral discs
3- Sympathetic trunk

3 :Broncho-constriction and vasodilatation
and secretomotor to bronchial glands.

Team leaders
Abdullah Alsubaihi
Abeer Awwad

Team Members :

- Shayma Abdullah
- Sumo Abdulrahman
- **Fatimah Saad**
- **Shaden Alsaiedan**
- Ghada Jedaie
- Alaa Alsulmi
- **Sara alrashidi**
- Joud alnujaidi
- Shahad almezel
- Osama Alharbi
- Bassam Alasmari
- **Nawaf Al-Shahrani**
- **Bader Alrayes**
- Nawaf Alsaadi
- Mohammed Akresh
- Ibrahim Alabdulkarim

Contact us:
Anatomy439@gmail.com