



MED437
KING SAUD UNIVERSITY



Lung & Pleura

Lecture ٤



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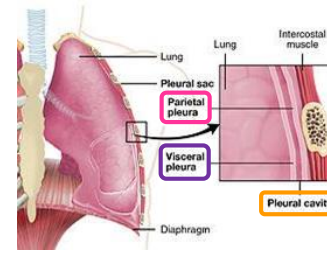
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Objectives

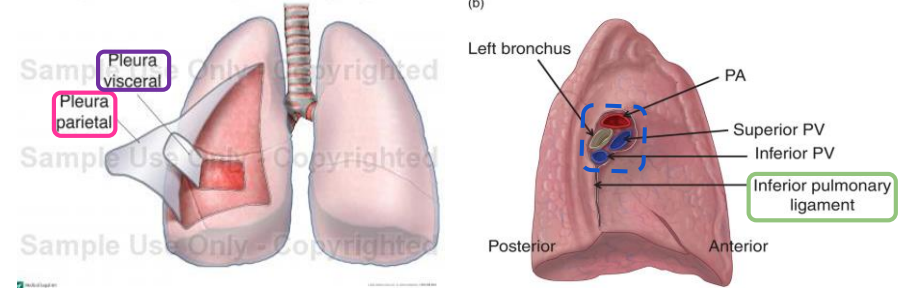
- Describe the anatomy of the pleura:
- Subdivisions into parietal & visceral pleura, nerve supply of each part.
- List the parts of parietal pleura and its recesses.
- Describe the surface anatomy of both pleura and lungs.
- Describe the anatomy of lungs: shape, relations, nerve supply, blood supply.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

- Text in **BLUE** was found only in the boys 'slides
- Text in **PINK** was found only in the girls 'slides
- **Text in RED is considered important**
- Text in **GREY** is considered extra notes

What is Pleura?



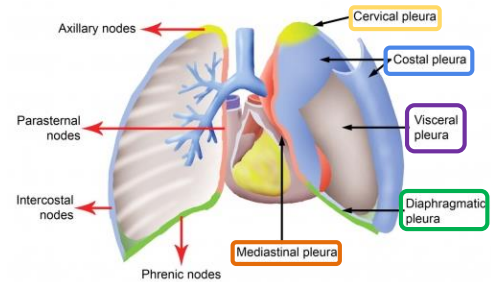
- **Double-layered** serous Membrane / Membranous sac enclosing the lung.
- **Has two layers:**
 - **Parietal layer**.slaw cicaroh t eht senil hcihw ,
 - **Visceral layer** .gnul eht fo secafus eht srevoc hcihw ,
- The two layers **continue with each other around the root*** of the lung, where it forms a loose cuff hanging down called the:
 - **Pulmonary ligament.**
- The **space between the 2 layers:**
 - Is the **Pleural cavity.**
 - It contains a **very thin film of pleural fluid** (1-2) ml**.(



*ال ROOT مكون من الأشياء التي تدخل و تطلع من ال **Hilum of Lung** زي الأعصاب و الأوعية الدموية.
 ** ال FLUID يسهل الحركة و يمنع التصاق الغشائين مع بعضهم البعض.

Parietal Pleura

- It is divided according to the **region** in which it lies and the surfaces it covers, into:
 - **Cervical.**
 - **Costal.**
 - **Mediastinal.**
 - **Diaphragmatic.**



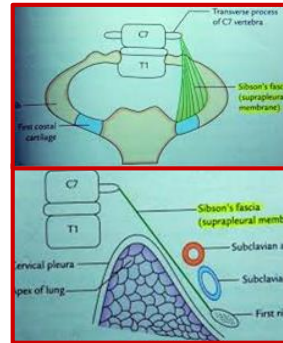
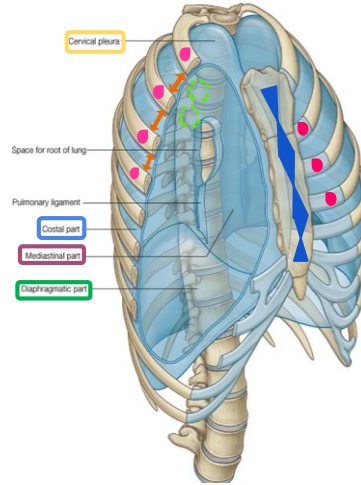
Parietal Pleura

- **Cervical Pleura:**

- Projects upward into the root of 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:
 - **Sternum.**
 - **Ribs.**
 - **Costal cartilages.**
 - **Intercostal spaces.**
 - **Sides of vertebral bodies.**



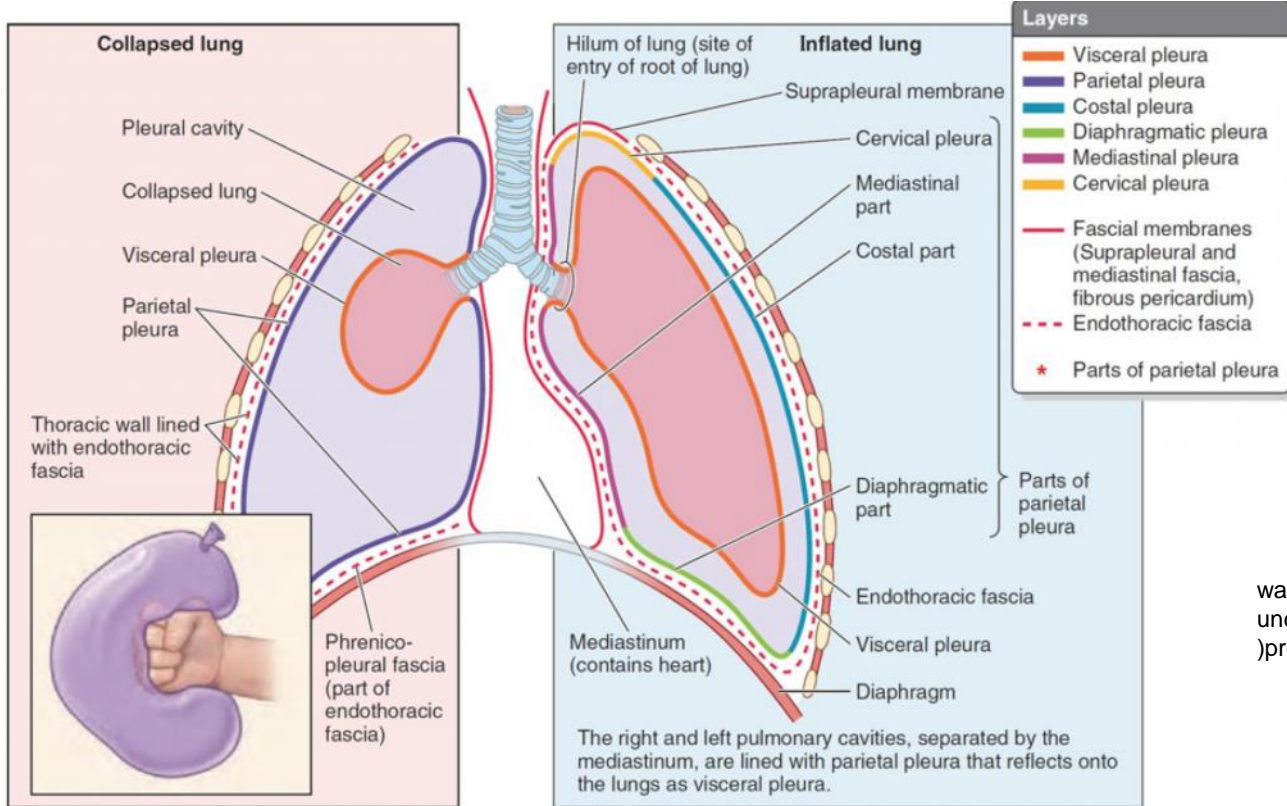
- **Mediastinal pleura:**

- Covers the **Mediastinum**:
 - At the **Hilum**.
 - It is reflected on to the vessels and bronchi, that enter the hilum of the lung.
- It is continuous with the visceral pleura.

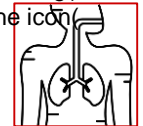
- **Diaphragmatic pleura:**

- Covers the:
 - **Upper** eht fo ecafrus (**cicarohht**) .mgarhpaid

Making It Clear...



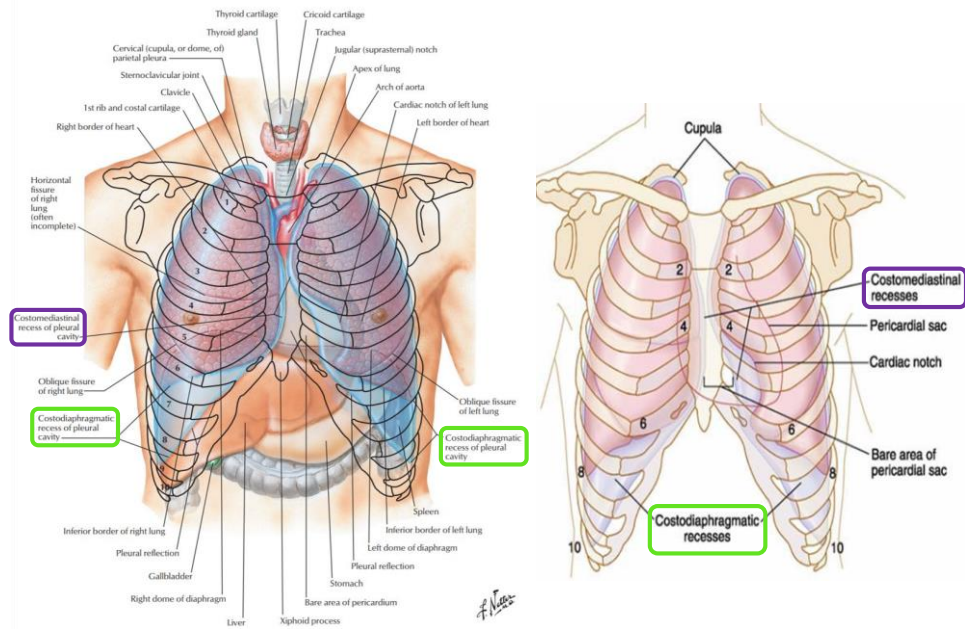
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Pleural Recesses

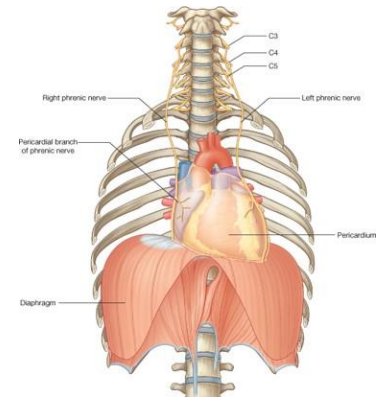
- **Costodiaphragmatic Recess:**
 - Slit like space* between **Costal & Diaphragmatic Pleurae**
 - Along the **inferior border** of the lung.
 - The lung enters through it in deep inspiration.
- **Costomediastinal Recess :**
 - Slit like space between **Costal and Mediastinal Pleurae** ,
 - .gnul eht fo **redrob roiretna** eht gnola
 - The lung enters through it in deep inspiration.

*فراغ يشبه الشق



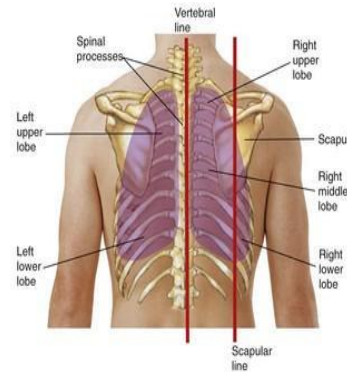
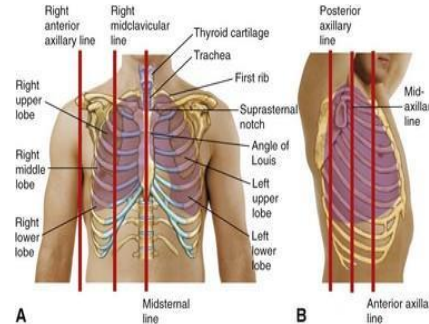
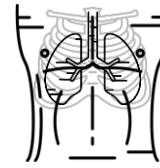
Pleura: Nerve Supply

- **Parietal pleura: (PPTT).**
 - 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 as follow:
 - Central part (over diaphragmatic domes) by **phrenic nerves**.
 - Around the periphery by **lower 1 intercostal nerves**.
- **Visceral pleura:**
 - sensitive to **stretch** only and is supplied by the autonomic fibers from the pulmonary plexus.



Surface Anatomy of the Pleura

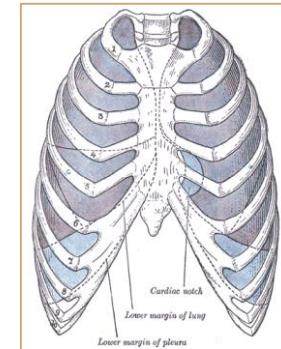
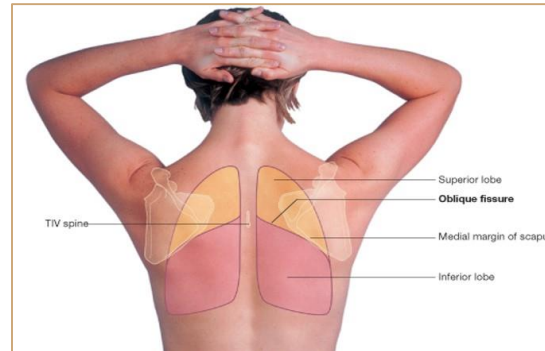
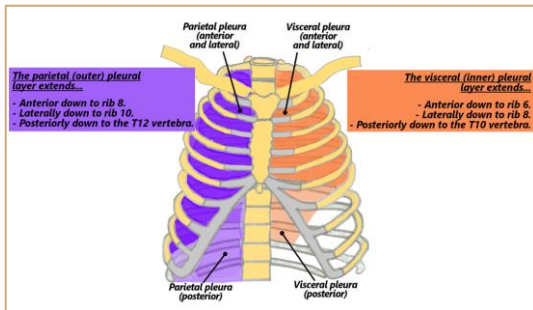
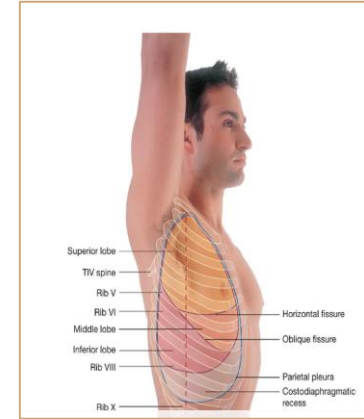
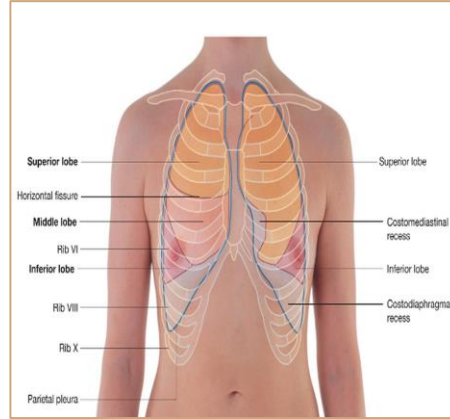
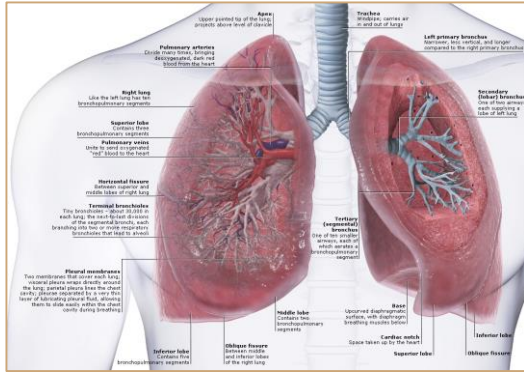
- **Apex:**
 - Lies one inch above the medial 1/3 of the **Clavicle**.
- **Right pleura:**
 - The anterior margin extends vertically from Sternoclavicular joint to 1th costal cartilage.
- **Left pleura:**
 - The anterior margin extends from Sternoclavicular joint to the 4th costal cartilage, then deviates for about 1 inch to left at 1th Costal cartilage to form the **Cardiac notch**.
- **Inferior margin:**
 - Passes around the chest wall, on the 4th rib in midclavicular line, 1st rib in mid-axillary line and finally reaching to the last Thoracic spine (T12 spine).
- **Posterior margin :**
 - Along the vertebral column from the apex to the inferior margin (T12 spine).



Surface Anatomy of the Lung

- **Apex, anterior border and posterior border:**
 - Correspond nearly to the lines of Pleura but are slightly away from the median plane.
- **Inferior margin:**
 - As the pleura but more horizontally and finally reaching to the 1st thoracic spine.
- **Oblique fissure:**
 - Represented by a line extending from 3rd thoracic spine, obliquely ending at 1th costal cartilage.
- **Transverse fissure: Only in the right lung:**
 - Represented by a line extending from 4th right costal cartilage to meet the oblique fissure.

Surface Anatomy of the Lungs & Pleura Cont.



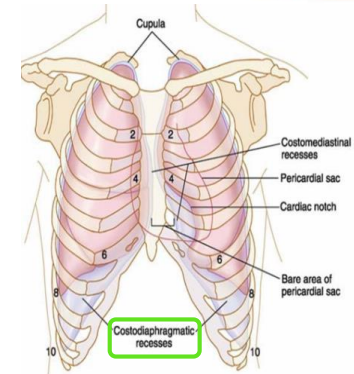
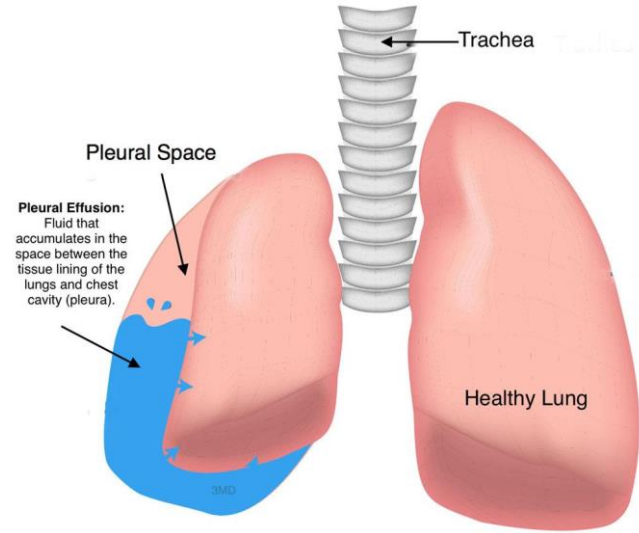
Pleural effusion

- It is an **abnormal accumulation** of fluid in the pleural space.
- In the **Costodiaphragmatic pleural recess**, normally 10-20ml fluid.
 - Causes:
 - **inflammation.**
 - **TB.**
 - **Congestive heart disease.**
 - **Malignancy, (Mesothelioma of the pleural sac).**
- The **lung is compressed** and **bronchi are narrowed**.
 - **Auscultation** would reveal only faint & decreased breathing sounds over compressed or collapsed lung lobe.
 - **Dullness** on percussion over the effusion.*

***Percussion** of the chest over the effusion will produce a dull sound. This is because the fluid in the pleural space is denser than the air in the lung, and the sound waves are reflected back to the chest wall.



Pleural Effusion

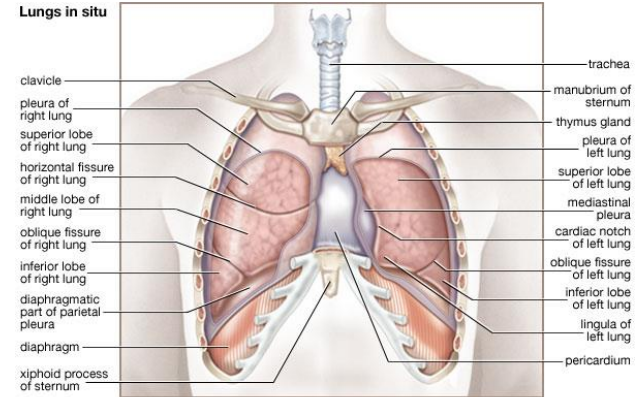


Lungs

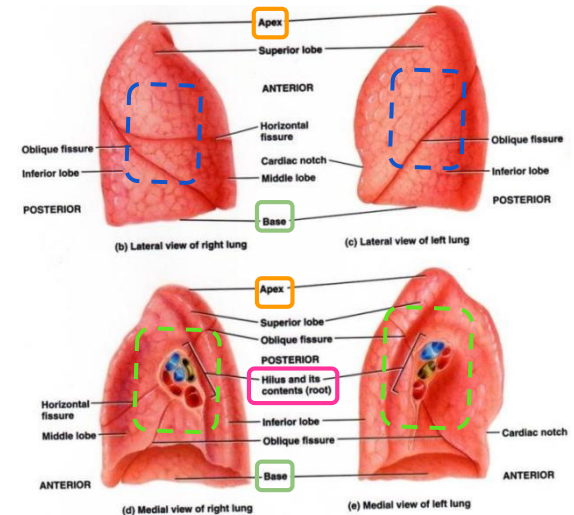


- Located in the **Thoracic cavity**. *munitsaideM* eht fo edis hcae no eno ,
- Each lung is:
 - Conical in shape *شكل مخروطي**.
 - Covered by the visceral pleura.
 - Suspended free in its own pleural cavity.
 - Attached to the mediastinum only by its root.
- Each lung has:
 - **Apex and Base:**
 - Identify the **top and bottom of the lung**, respectively.
 - **Costal surface:**
 - Surrounded by the **ribs and intercostal spaces** from front, side & back.
 - **Medial 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 in situ



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Lungs

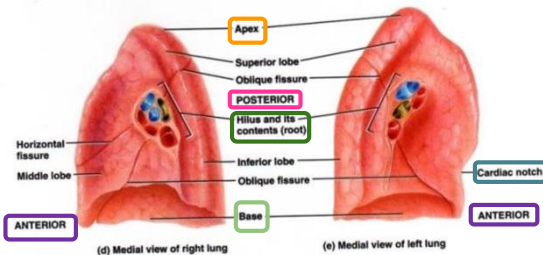
Right lung has 3 lobes; Left has 2 Lobes (alugniL dna 3)

- **Apex:**

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

- **Base:**

- Inferior, (diaphragmatic surface) is concave and rests on the diaphragm.



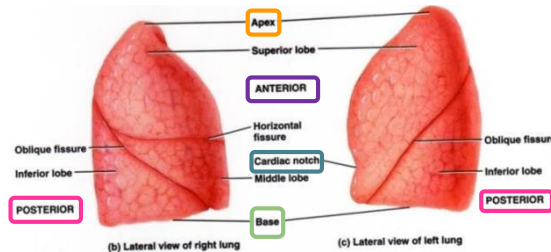
Borders: Anterior & Posterior

- **Anterior border:**

- It is **sharp, thin** and **overlaps the heart**.
- Anterior border of left lung presents a Cardiac Notch at its lower end.
- It has a thin projection called the **Lingula**.

- **Posterior border:**

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



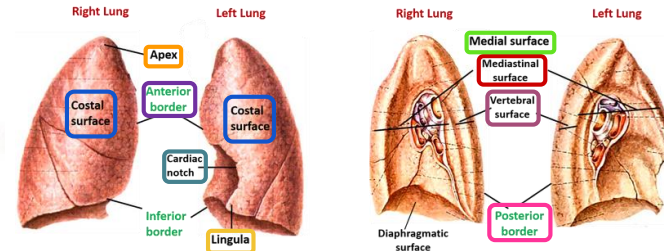
Surfaces: Costal & Mediastinal

- **Costal surface:**

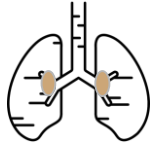
- Convex.
- Covered by Costal pleura which separates the lung from:
 - Ribs, costal cartilages & intercostal muscles.

- **Medial surface:**

- It is divided into 2 parts:
 - **Anterior (Mediastinal) part:**
 - Contains a **Hilum** in the middle (it is a depression in which **bronchi, vessels, & nerves forming the root of lung**).
 - **Posterior (Vertebral) part:**
 - It is related to:
 - Bodies of **thoracic vertebrae**, **Intervertebral discs**, **Posterior intercostal vessels**, **Sympathetic trunk**.



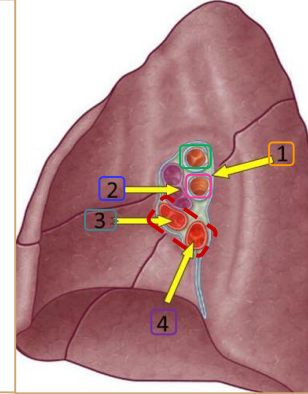
Lung Roots



Arteries are vessels which take blood from the heart no matter it was **Oxygenated** or **Deoxygenated**. Here it's shown **Blue** so it's **Deoxygenated**. For that you mustn't confuse such thing^_^ .

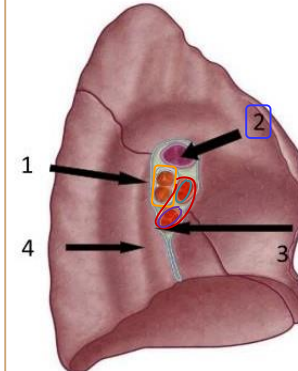
Right Lung Root

- **† bronchi:**
 - **Middle & Inferior** lobar bronchi.
 - Lies **Most** posterior.
- **Pulmonary artery:**
 - Is **Most** superior.
- **Pulmonary veins:**
 - Are **Most Anterior** and **Most Inferior**.



Left Lung Root

- **One Bronchus:**
 - Lies **Most** posterior.
- **Pulmonary artery:**
 - Is **Most** superior.
- **Pulmonary veins:**
 - Are **Most Anterior** and **Most Inferior**.



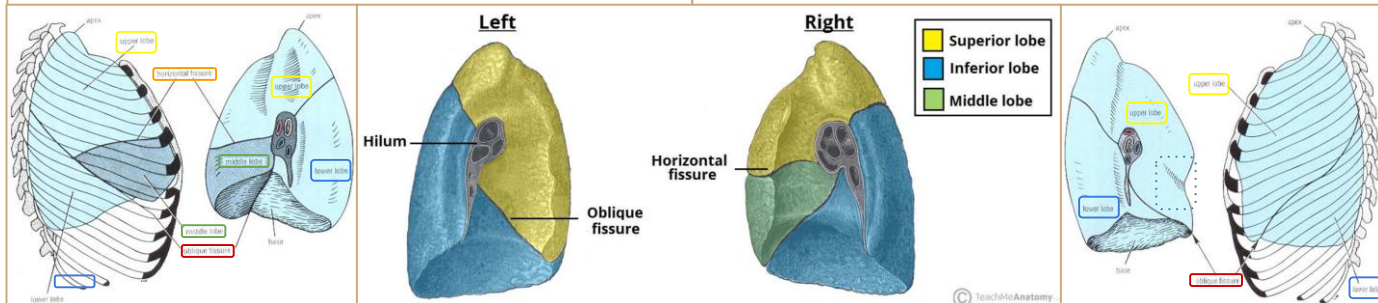
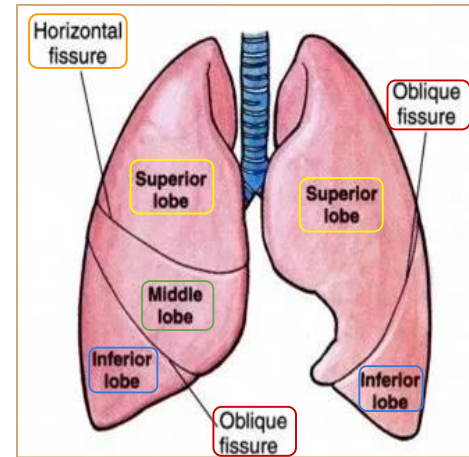
Lungs

Right Lung

- Larger & shorter than left lung.
- Divided by:
 - 3 fissures:
 - Oblique fissure.
 - Horizontal fissure.
 - Into 3 lobes:
 - Upper lobe.
 - Middle lobe.
 - Lower lobe.

Left Lung

- Divided by:
 - 1 fissure:
 - Oblique fissure.
 - Into 2 lobes:
 - Upper lobe.
 - Lower lobe.
- It has **NO** erussfi latnoziroH
- It has a Cardiac Notch of its anterior border.

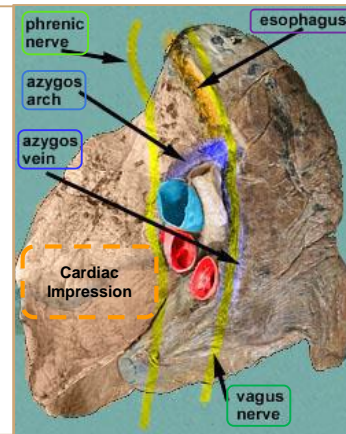


Mediastinal Surfaces

Mediastinal Surface of Right Lung

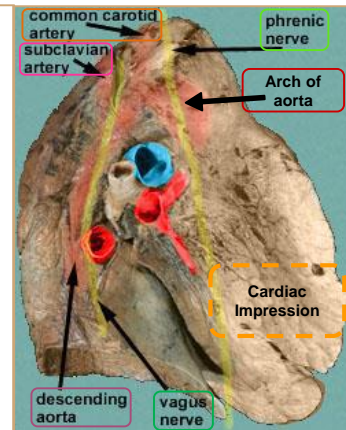
- On the **Mediastinal surface of the right lung**:
 - Azygos vein** and its.
 - Vagus nerve**.
 - Esophagus** posterior to the root.
 - Phrenic nerve**.
 - Cardiac impression**:
 - Related to **right atrium**.
 - Below **Hilum**
 - groove for I.V.C***.

*I.V.C: Inferior Vena Cava.

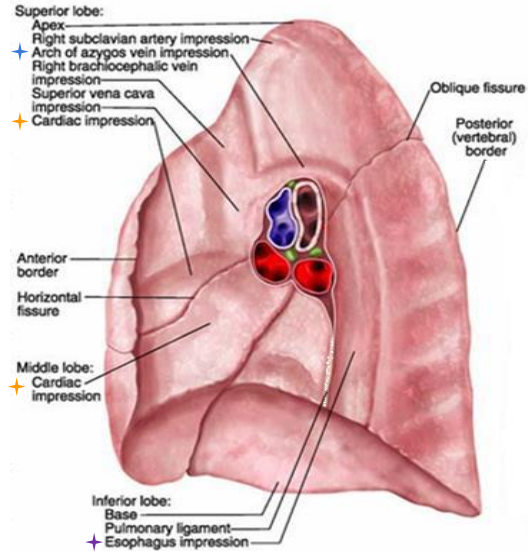


Mediastinal Surface of Left Lung

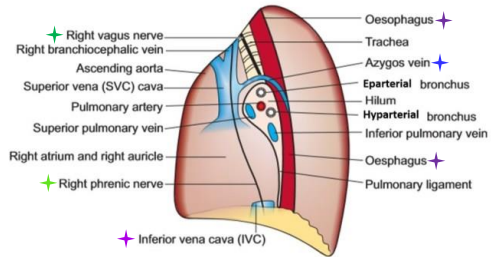
- On the **Mediastinal surface of the right lung**:
 - Descending Aorta**.
 - Vagus nerve**.
 - Arch of the aorta**.
 - Groove for:
 - Left common carotid artery**.
 - Left subclavian artery**.
 - Phrenic nerve**.
 - Cardiac impression**:
 - Related to **left ventricle**.



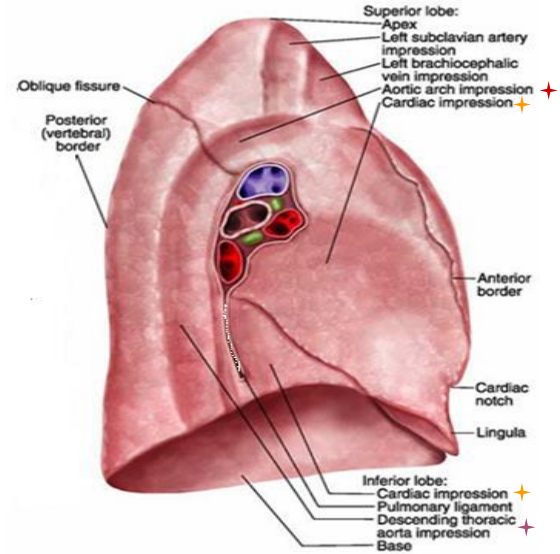
Mediastinal surface of the right lung



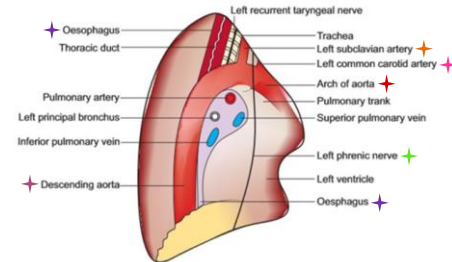
Right Lung





Mediastinal surface of the left lung



LEFT LUNG



Blood Supply of the Lung

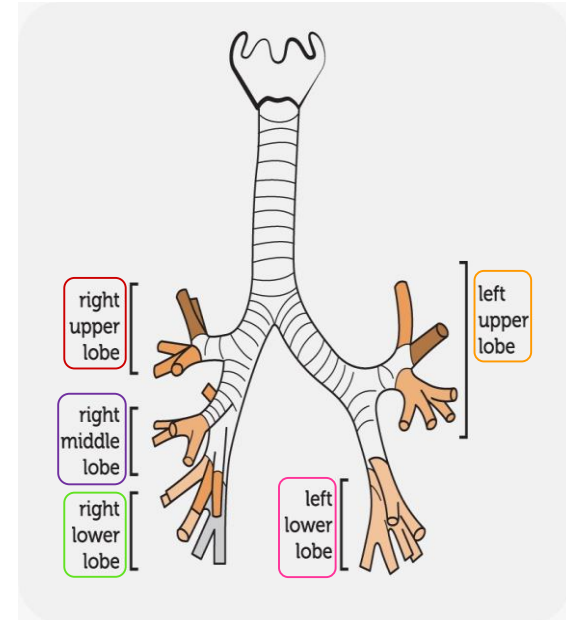
- **Bronchial arteries:** (atropa gnidnesced morF)
 - It supply **oxygenated blood** to:
 - **Bronchi.**
 - **Lung tissue.**
 - **Visceral pleura.**
- **Bronchial veins:**
 - Drain into:
 - **Azygos Vein.**
 - **Hemiazygos Vein.**
- **Pulmonary artery:**
 - Carries **Non-oxygenated blood** from right ventricle to the lung alveoli. 
- **↑ Pulmonary veins:**
 - Carry **oxygenated blood** from lung alveoli to the left atrium of the heart. 

Nerve Supply of the Lung

- **Pulmonary plexus:** gnul fo toor eht ta
 - Is formed of Autonomic Nervous System:
 - **Sympathetic fibers.**
 - **Parasympathetic fibers.**
- **Sympathetic Fibers:**
 - From:
 - **Sympathetic trunk.**
 - Action:
 - **broncho-dilatation.**
 - **vasoconstriction.**
- **Parasympathetic Fibers:**
 - From:
 - **Vagus nerve.**
 - Action:
 - **Broncho-constriction.**
 - **Secretomotor** to **bronchial glands.**
 - **Vasodilatation.**

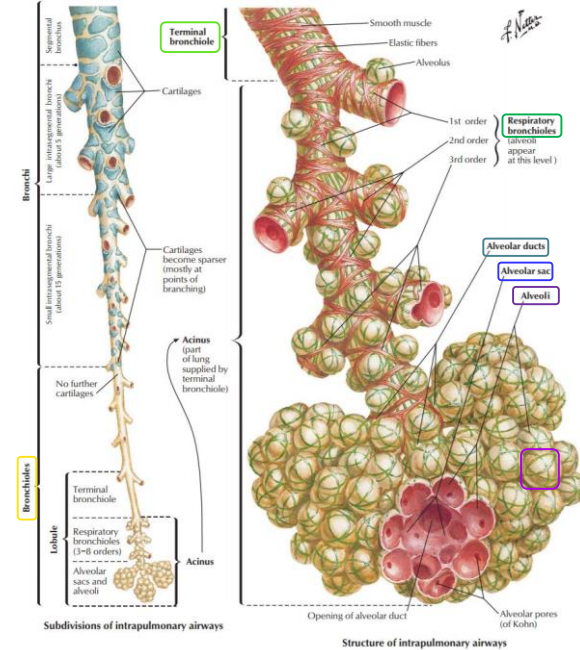
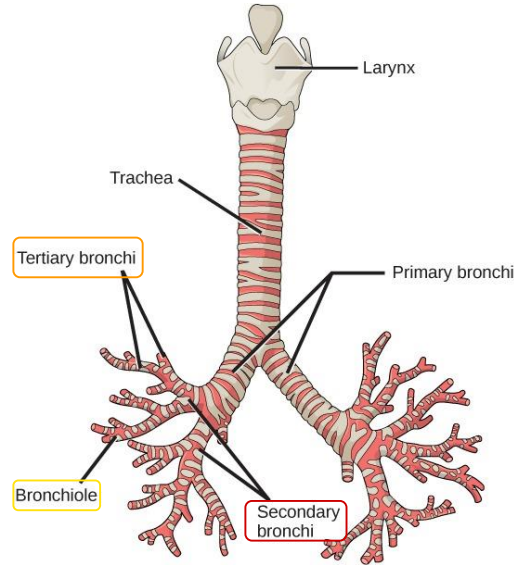
Bronchi

- The **Trachea** divides into 2 **Main Bronchi**:
 - **Right main bronchus**: se divid hcihw ,
 - Before entering the Hilum, it gives:
 - **Superior lobar (secondary) bronchus.**
 - On entering hilum, it divides into:
 - **Middle lobar bronchus.**
 - **Inferior lobar bronchus.**
 - **Left main bronchus**:
 - On entering hilum, it divides into:
 - **Superior lobar bronchus.**
 - **Inferior lobar bronchus.**



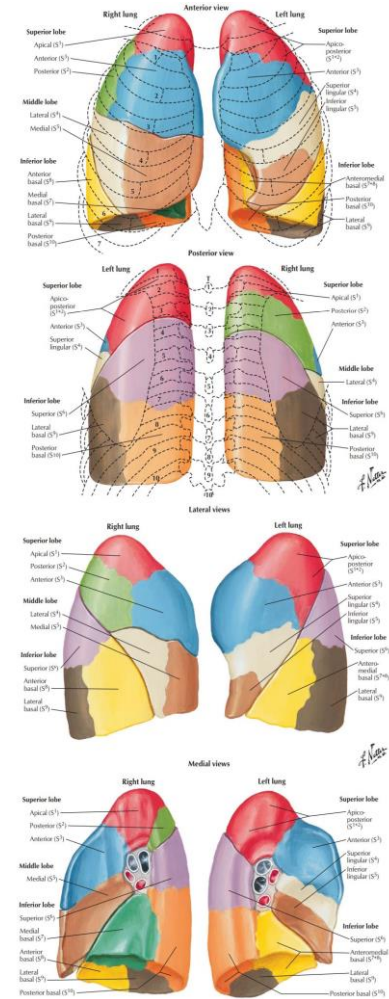
Bronchopulmonary Segments

- These are the **Anatomical, Functional, and Surgical** segments of the bronchopulmonary tree.
- Each **lobar (secondary) bronchus** gives rise to **segmental (tertiary) bronchi**.
- Each **segmental bronchus** divides into **subsegmental bronchioles**.
- **Bronchioles** divide into **terminal bronchioles** which are the **respiratory bronchioles**.
- The **respiratory bronchioles** give rise to **alveolar ducts** and **alveolar sacs**.
- The **alveolar sacs**:
 - Consist of several **alveoli**.
 - Each **alveolus** contains a **capillary bed** for **gas exchange**.



*تجيب خارجي: Outpouchings

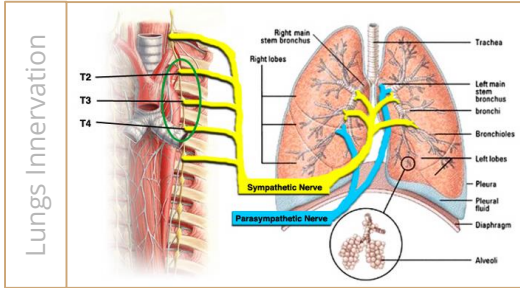
Bronchopulmonary Segments



- 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.**
 - **Segmental artery.**
 - **Lymph vessels.**
 - **Autonomic nerves.**
 - The **segmental vein** neewteb atpes eussit evitcennoc latnemges -retni eht ni seil .stnemges eht
 - A diseased segment can be removed surgically, because it is a structural unit.

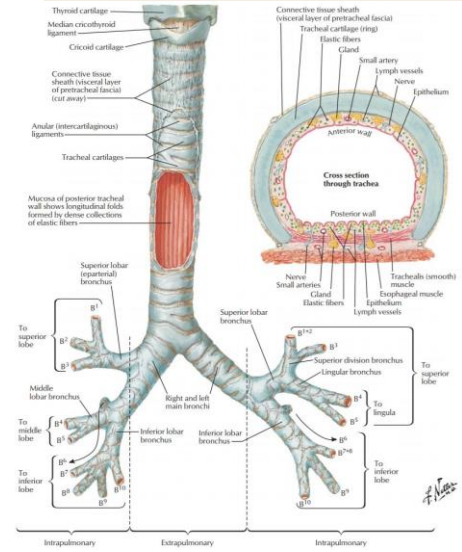
ملاحظة: لسنا مُطالبون بحفظ الأسماء،
المطلوب منا معرفة تواجد هذه الأجزاء. ^

Extra Visuals May Help You Understand More About Lung Structures

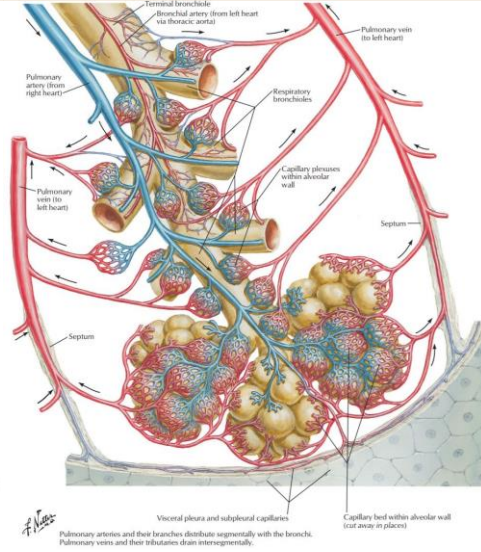


From Atlas

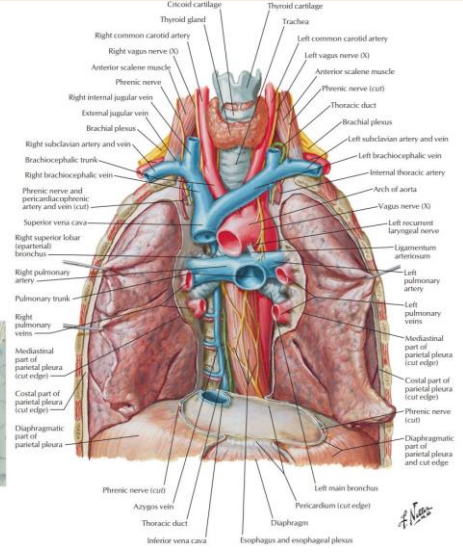
Trachea & Bronchi



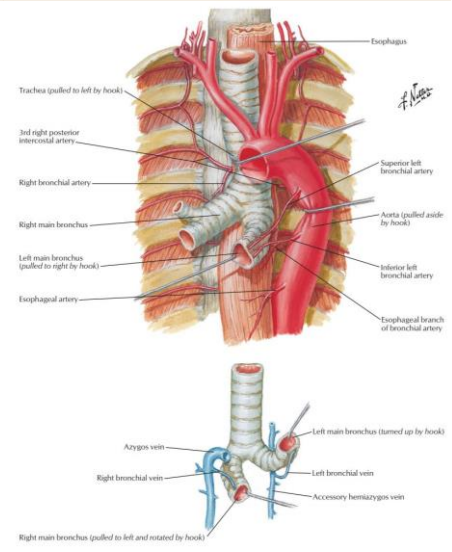
Intrapulmonary Blood Circulation



Thorax Blood Supply



Vessels that Supply Bronchi



MCQs:

-\ The volume in the pleural cavity is:

- A- 300ml
- B- 100ml
- C- 1000ml
- D- 1200ml

-\ How many regions are in the parietal pleura?

- A- 7
- B- 8
- C- 9
- D- 10

-\ Costal pleura covers:

- A- The back of the sternum.
- B- The front of the ribs.
- C- The front of the costal cartilages.
- D- The front of the intercostal spaces.

-\ Diaphragmatic pleura covers:

- A- The mediastinum.
- B- The upper surface of the diaphragm.
- C- The back of the sternum.
- D- The sides of the vertebral bodies.

-\ C

-\ B

-\ A

-\ B

->What is the normal volume of fluid in pleura?

A- 300 ml.

B- 100 ml.

C- 10-20ml.

D- 70 -100ml.

->Pleura is a serous membranous sac enclosing the lung.

A- Single-layered.

B- Double-layered.

C- Triple-layered.

D- Quadruple-layered.

->Layer lines between the thoracic walls.

A- Parietal layer.

B- Visceral layer.

C- Oblique fissure.

D- Horizontal fissure.

->Which part of parietal pleura lines under surface of the Suprapleural membrane?

A- Costal.

B- Mediastinal.

C- Cervical.

D- Diaphragmatic.

->C

->B

->A

->C

-9 Which part of parietal pleura is supplied only by phrenic nerves?

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

-10 Visceral pleura is supplied by:

- A- Autonomic fibers.
- B- Phrenic nerves.
- C- intercostal nerves.
- D- thoracic nerve.

-11 The Cardiac notch in the left pleura is formed at:

- A- 4th costal cartilage.
- B- 6th costal cartilage.
- C- 8th costal cartilage.
- D- 9th costal cartilage.

-12 Which of the following is not a cause of pleural effusion?

- A- Inflammation.
- B- TB.
- C- Myopathy.
- D- Heart disease.
- E- Tumors.

-9B

-10A

-11C

-12C

Which of the following is **NOT** a characteristic of the right lung?

- A- It has a horizontal fissure.
- B- It has a cardiac notch.
- C- It has an oblique fissure.
- D- It is divided into 2 lobes.

The cardiac impression in the mediastinal surface of the right lung is related to:

- A- Left atrium.
- B- Right atrium.
- C- Left Ventricle.
- D- Right ventricle.

Which of the following you can find only on the mediastinal surface of the right lung?

- A- Vagus nerve.
- B- Phrenic nerve.
- C- Descending aorta.
- D- Azygos vein.

The main bronchus is the:

- A- Right bronchus.
- B- Left bronchus.

What is the action of sympathetic fibers?

- A- Broncho-dilatation
- B- Broncho-constriction
- C- Secretomotor to bronchial glands

A-1

B-1

D-1

B-1

A-1

Team Members

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