

وَقُلْ رَبِّ زِدْنِي عِلْمًا



RESPIRATORY SYSTEM

HAYAT BATCH

SUBJECT : _____

LEC NO. : Lecture 14

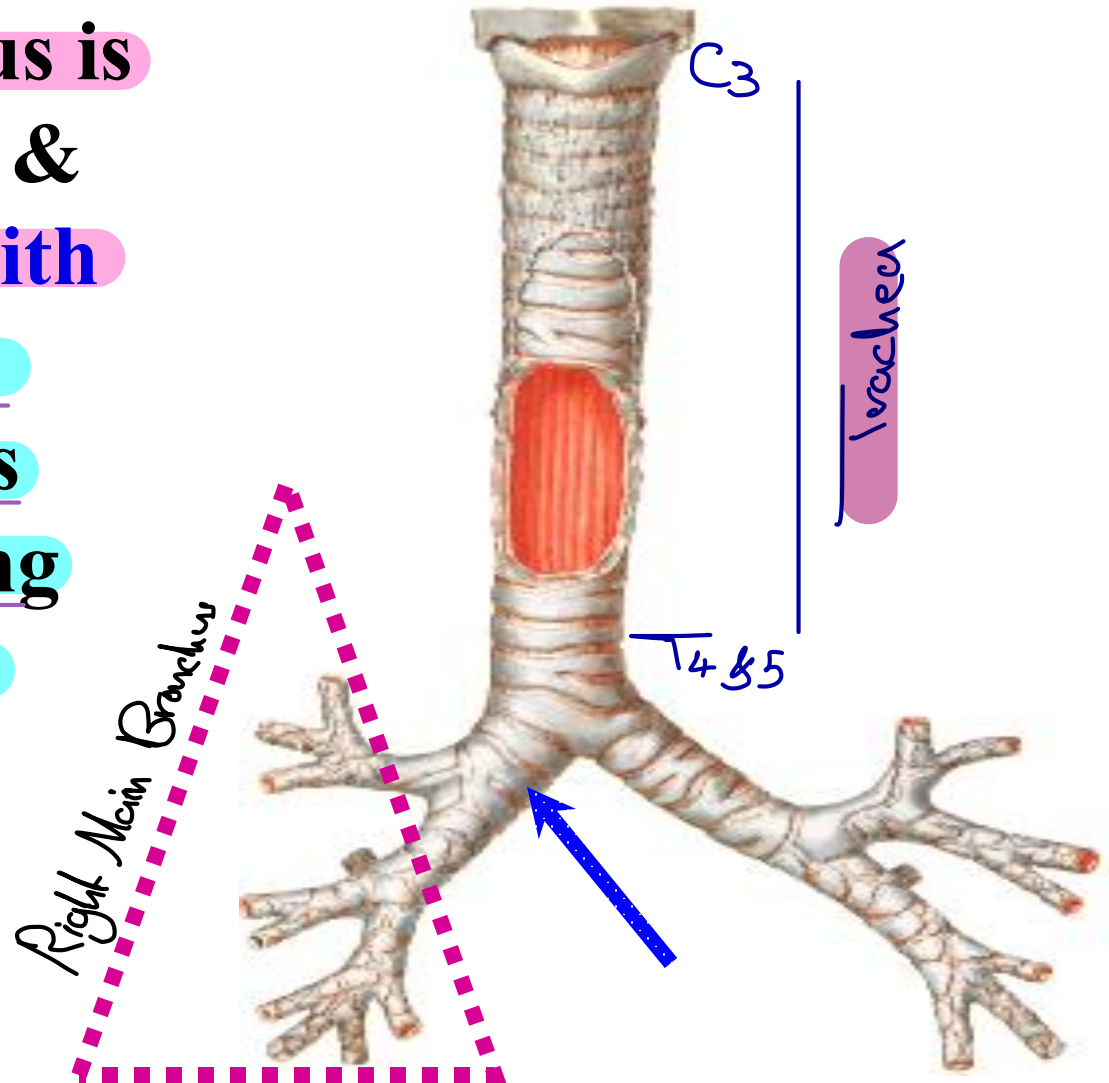
DONE BY : Hedaya Mohammad

The main bronchi

Two main Bronchi -
Right & left.

@Right bronchus is shorter, wider & more in line with the trachea. It usually divides before entering the right lung.

Extra pulmonary division



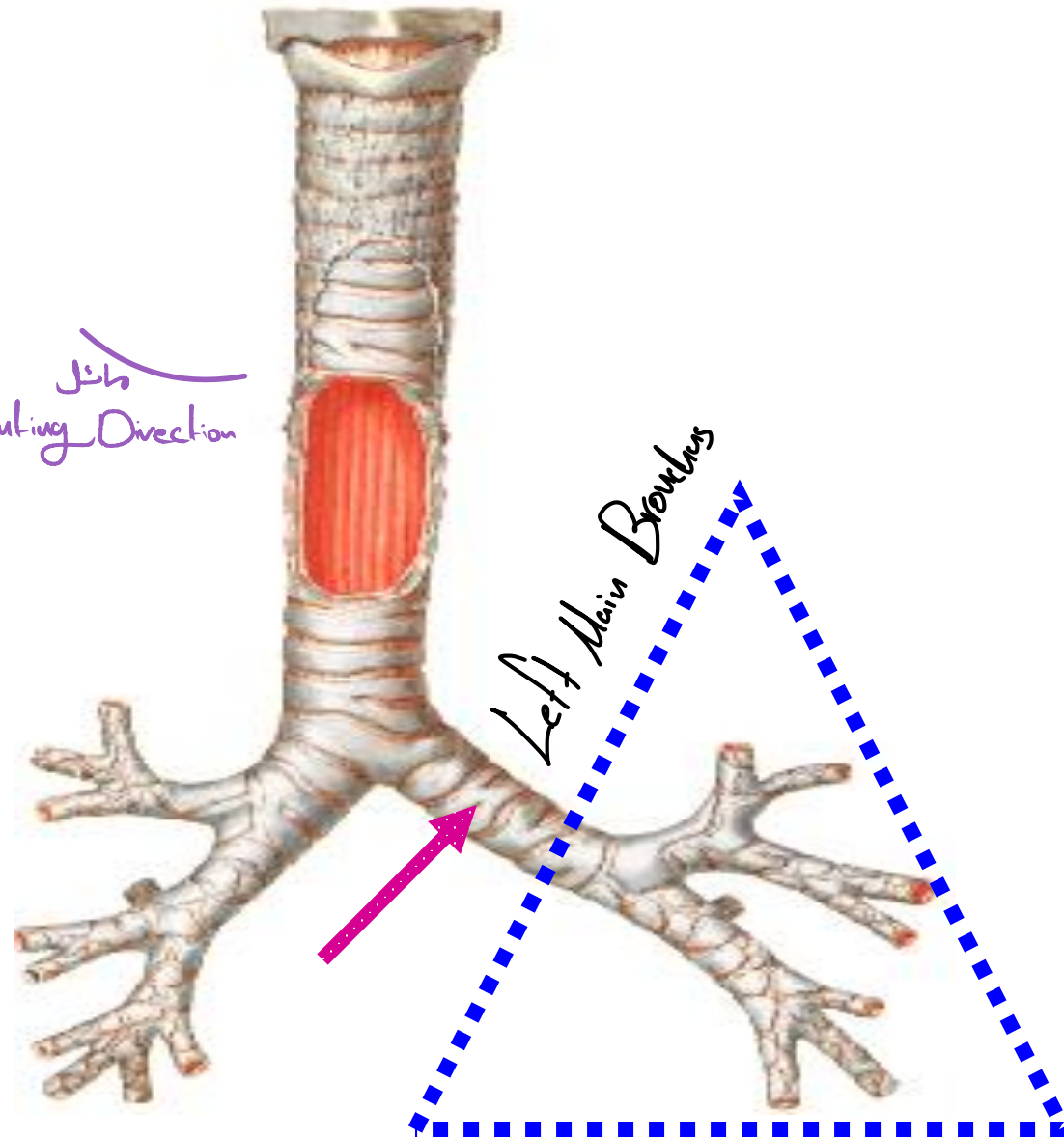
Left bronchus

@ Longer,
narrower &
more oblique.

Slanting Direction

@ Divides after
entering into
the hilum of left
lung.

Intra pulmonary division



Applied Anatomy

- Why do foreign bodies entering into the trachea reach the right bronchus rather than the left bronchus?

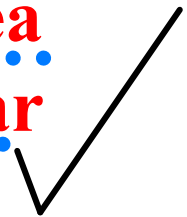
↳ This is Because the Right Bronchus is shorter in Length, wider, More in Line with Trachea than Left Bronchus.



Differences between right and left bronchi

	Right bronchus	Left bronchus
Length	Short (2.5 cm)	Long (5 cm)
Diameter	Wide	Narrow
Course	Vertical, in line with trachea	Oblique or horizontal
Division into lobar bronchi	Extrapulmonary	Intrapulmonary

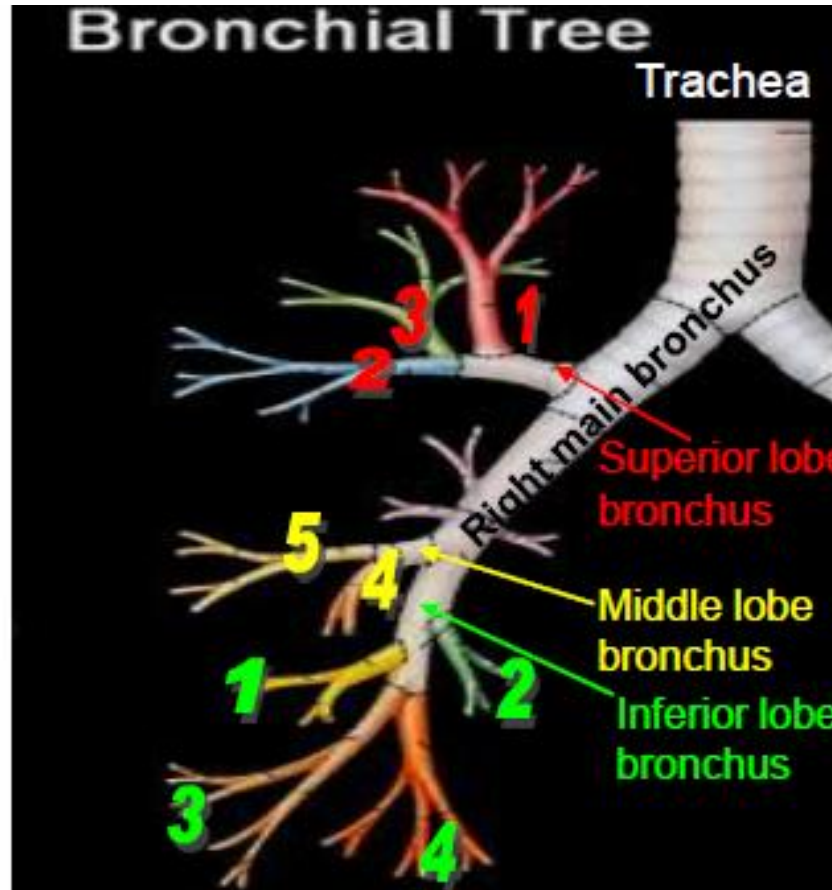
So, any Foreign body entering the trachea will lodged into the right **lower** lobar bronchus.



Segmental branches of right bronchus

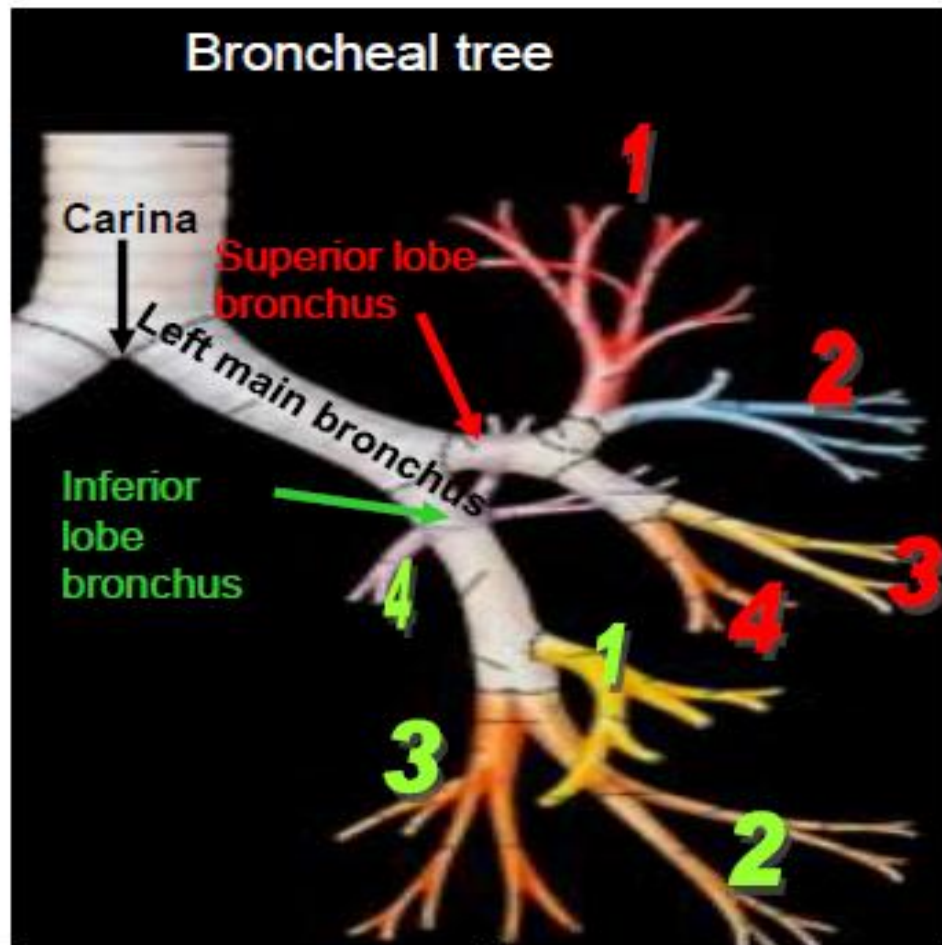
The right lung has 3 lobes
divided into 9 segments

بلا منو فضولنا ومن وين
اجت هاي المسميات تمام؟
علينا نحفظ وبس 🙌👩🏻👨🏻



1- Apical	1	Superior lobe	1- Superior	3	Inferior lobe
2- Anterior	2		2- Medial basal		
3- Posterior			3- Lateral basal		
4- Medial	2	Middle lobe	4- Posterior basal		
5- Lateral					

Segmental branches of left bronchus



1- Apicoposterior	1 Superior lobe	1- Superior	2 Inferior lobe
2- Anterior		2- Anteromedial basal	
3- Superior lingular		3- Lateral basal	
4- Inferior lingular		4- Posterior basal	

Bronchial Tree

Bronchi

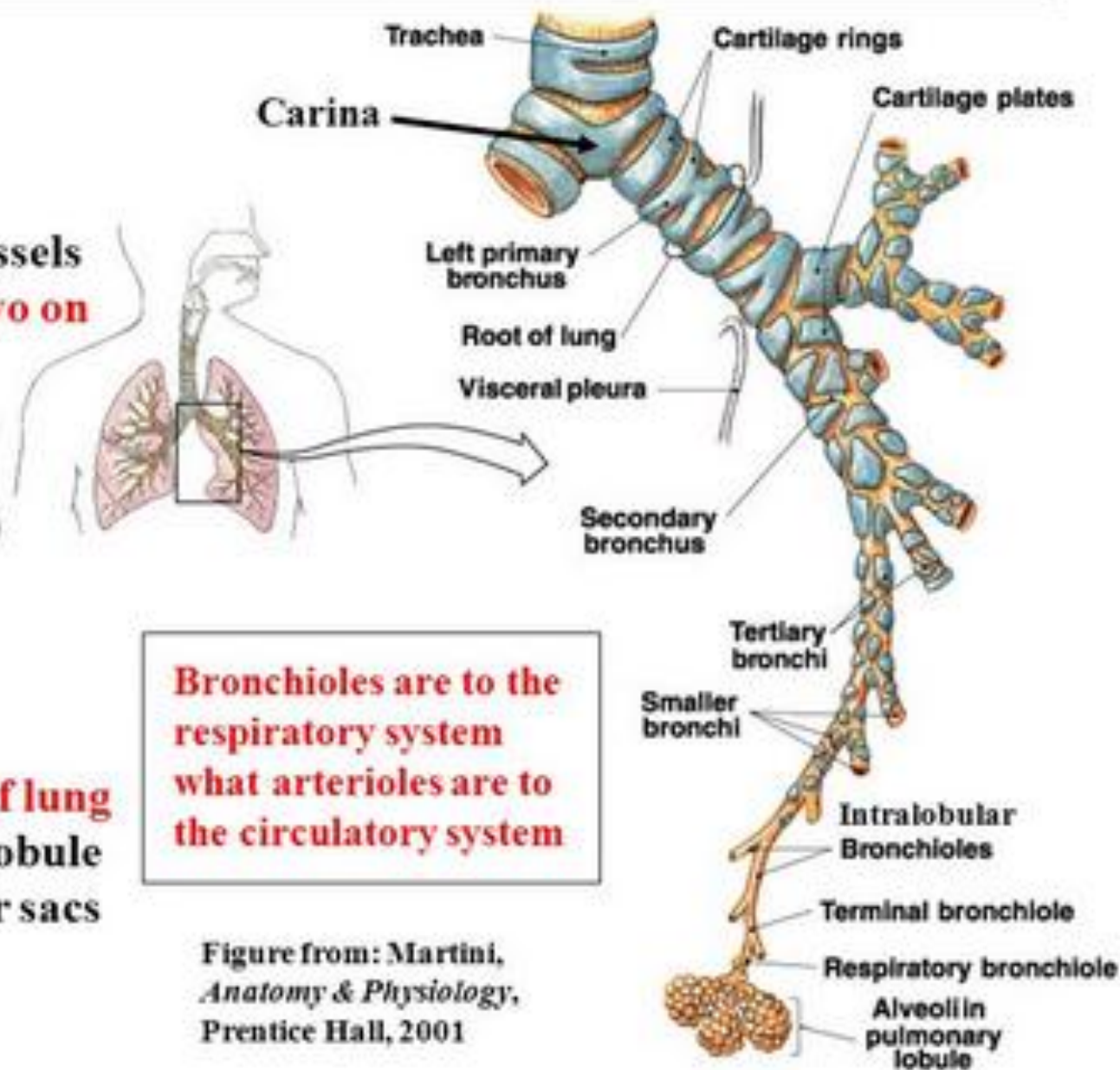
- **Primary**; w/ blood vessels
- **Secondary (lobar)**; two on left, three on right
- **Tertiary (segmental)**; supplies a broncho-pulmonary segment; 10 on right, 8 on left

Bronchioles

- **Intralobular**; supply lobules, the basic unit of lung
- **Terminal**; 50-80 per lobule
- **Respiratory**; a few air sacs budding from these

Bronchioles are to the respiratory system what arterioles are to the circulatory system

Figure from: Martini, *Anatomy & Physiology*, Prentice Hall, 2001

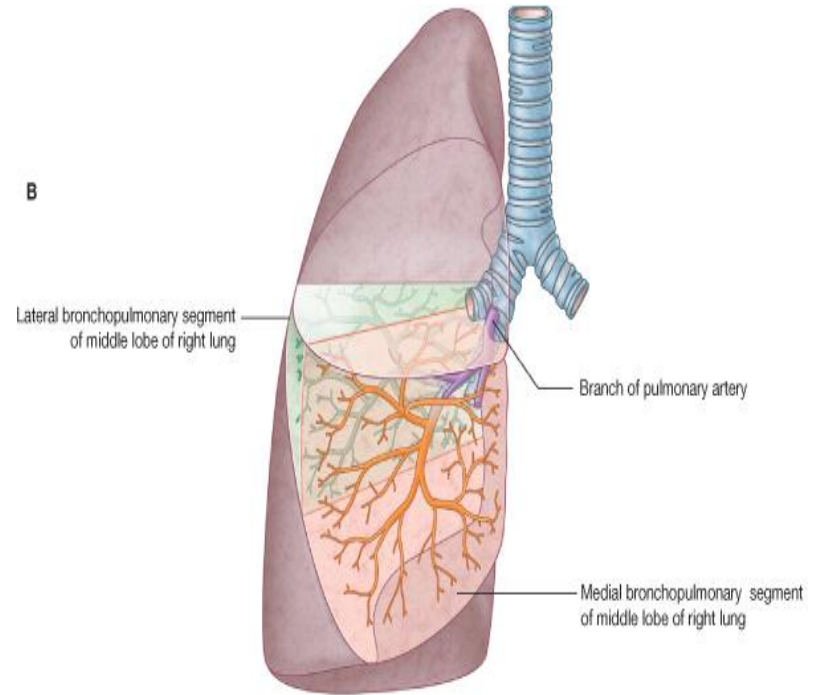


→ Segment + Pulmonary artery + Pulmonary vein

Bronchopulmonary Segments of Lungs

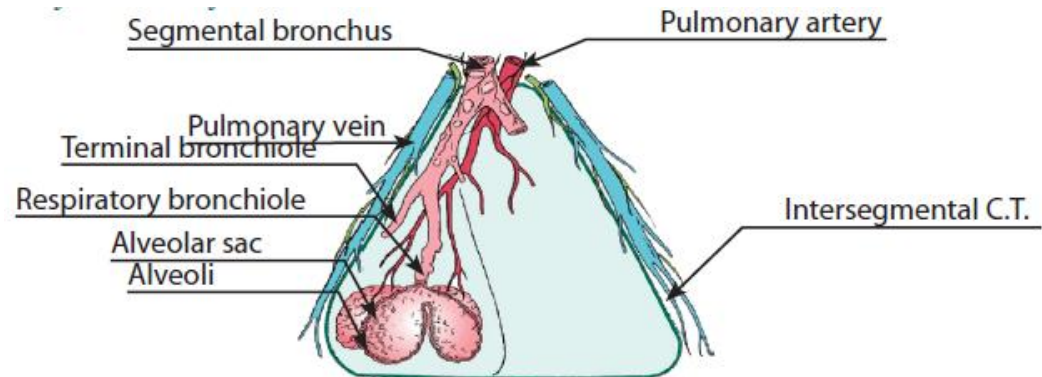
@ Each lung is subdivided into functional (for exchange of gases) segments; each of which receives its own branch from bronchus, pulmonary artery & pulmonary vein.

→ Functional Blood Supply.



@ Segments are separated from each other by fibrous septa.

@Note: Because it is a structural unit, a diseased segment can be removed surgically. *in cancer*

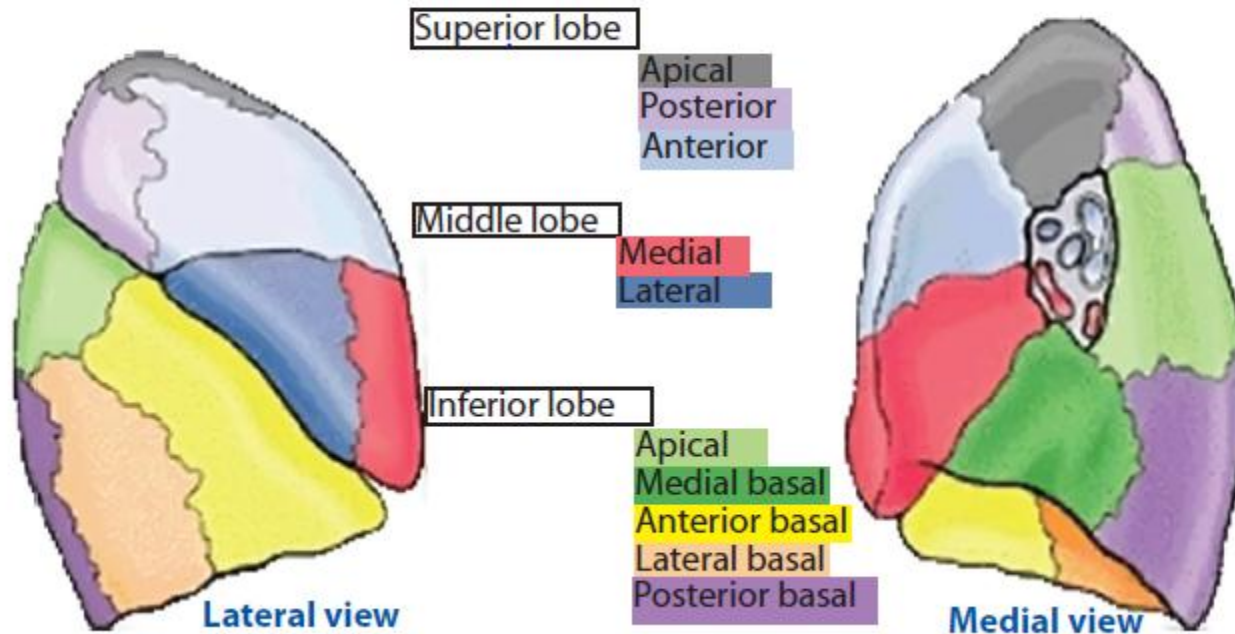


Can be Removed Surgically → Bronchopulmonary segment

Bronchopulmonary segments of right lung

■ Right lung

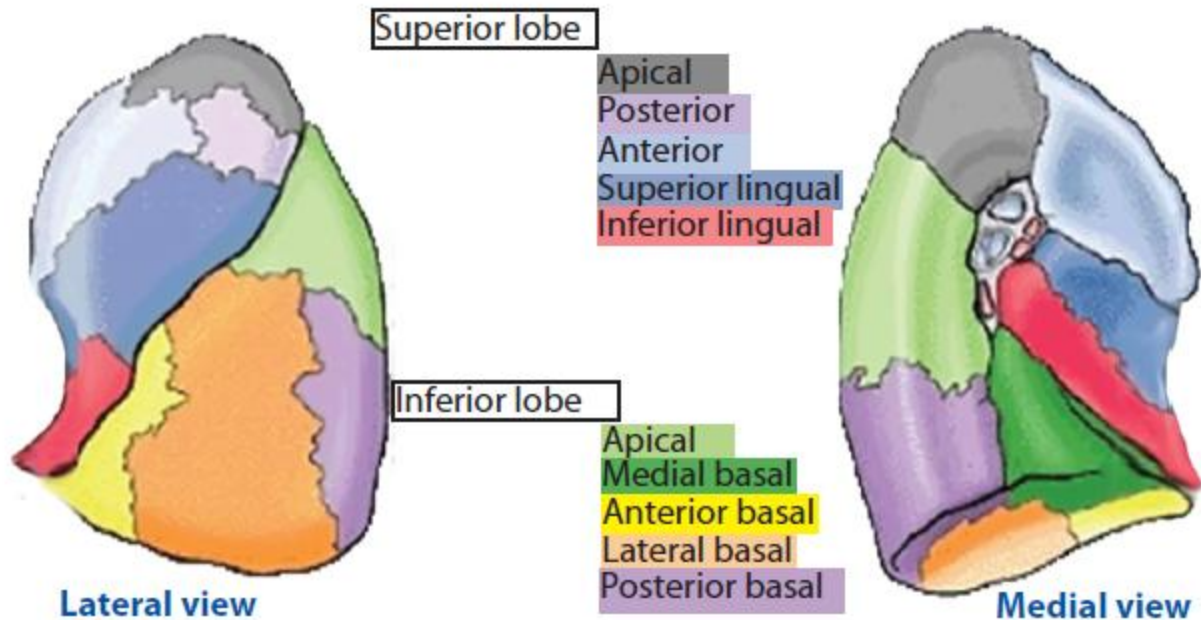
- Superior lobe: Apical, posterior, anterior
- Middle lobe: Lateral, medial
- Inferior lobe: Superior (apical), medial basal, anterior basal, lateral basal, posterior basal



Bronchopulmonary segments of of left lung

■ Left lung

- Superior lobe: Apical, posterior, anterior, superior lingual, inferior lingual
- Inferior lobe: Superior (apical), medial basal, anterior basal, lateral basal, posterior basal

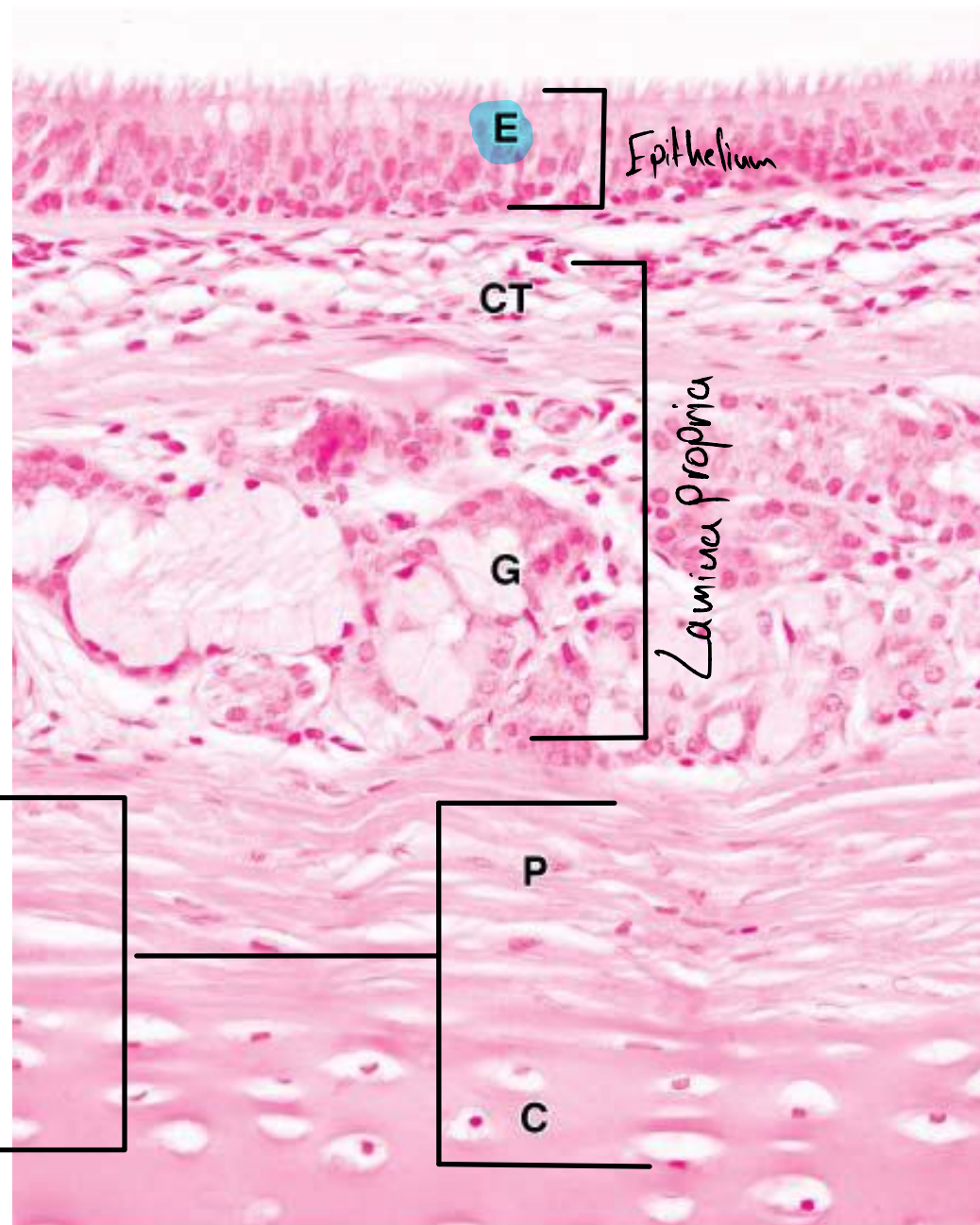


يا جماعة بالنسبة لل **divisions of bronchopulmonary segment** يلي بأخر
سلايدين ما تغلبو حالكم فيهم لانهم متل ال **segmental branches** تمام؟ ♥ (يلي
بيدرسو بس من تفريغ افتح الريكورد هون لتفهم اكثر)
و أهم شي تقدر تميز بيناتهم من ناحية الفروقات بالستركشر

Histology of trachea

The epithelium of trachea: pseudo stratified columnar ciliated epithelium with goblet cell

The wall of the trachea is lined by typical respiratory epithelium (E) underlying connective tissue (CT) and seromucous glands (G) in the lamina propria. The submucosa contains C-shaped rings of hyaline cartilage (C) covered by perichondrium (P).



Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas, 12th Edition*: <http://www.accessmedicine.com>

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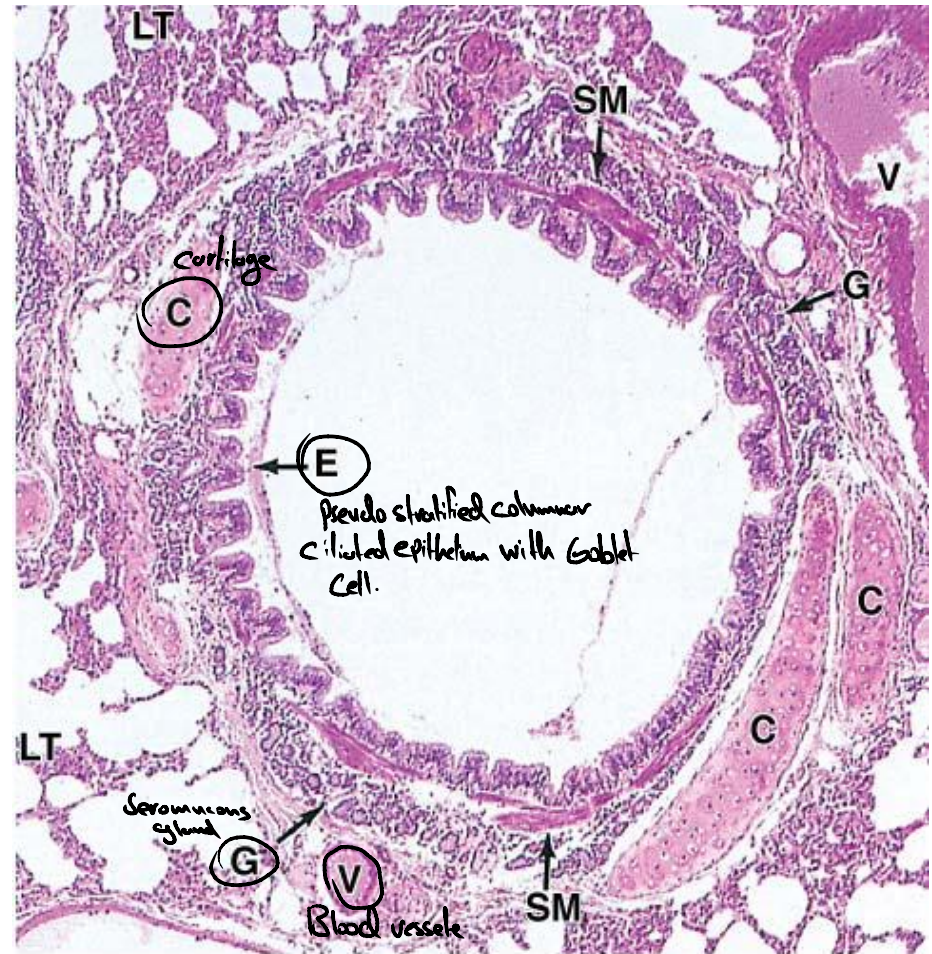
Histology of bronchial tree

مثل ال trachea بس المقطع عرضي

Bronchi (primary, secondary, tertiary)

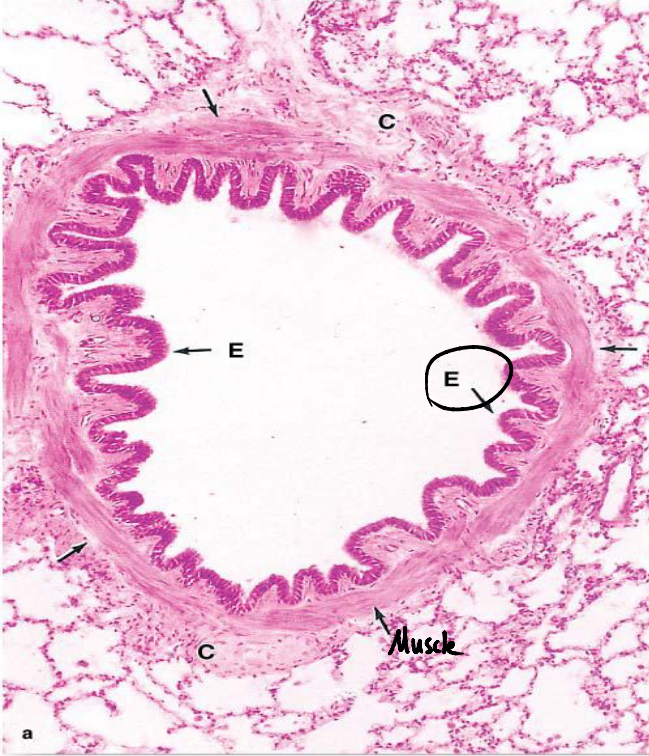
- Each primary bronchus branches repeatedly, with each branch becoming progressively smaller until it reaches a diameter of about 5 mm. The mucosa of the larger bronchi is structurally similar to the tracheal mucosa except for the organization of cartilage and smooth muscle.

In the primary bronchi most cartilage rings completely encircle the lumen, but as the bronchial diameter decreases, cartilage rings are gradually replaced with isolated plates of hyaline cartilage. Abundant mucous and serous glands are also present, with ducts opening into the bronchial lumen. In the bronchial lamina propria is a layer of crisscrossing bundles of spirally arranged smooth muscle which become more prominent in the smaller bronchial branches.



Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas, 12th Edition*: <http://www.accessmedicine.com>

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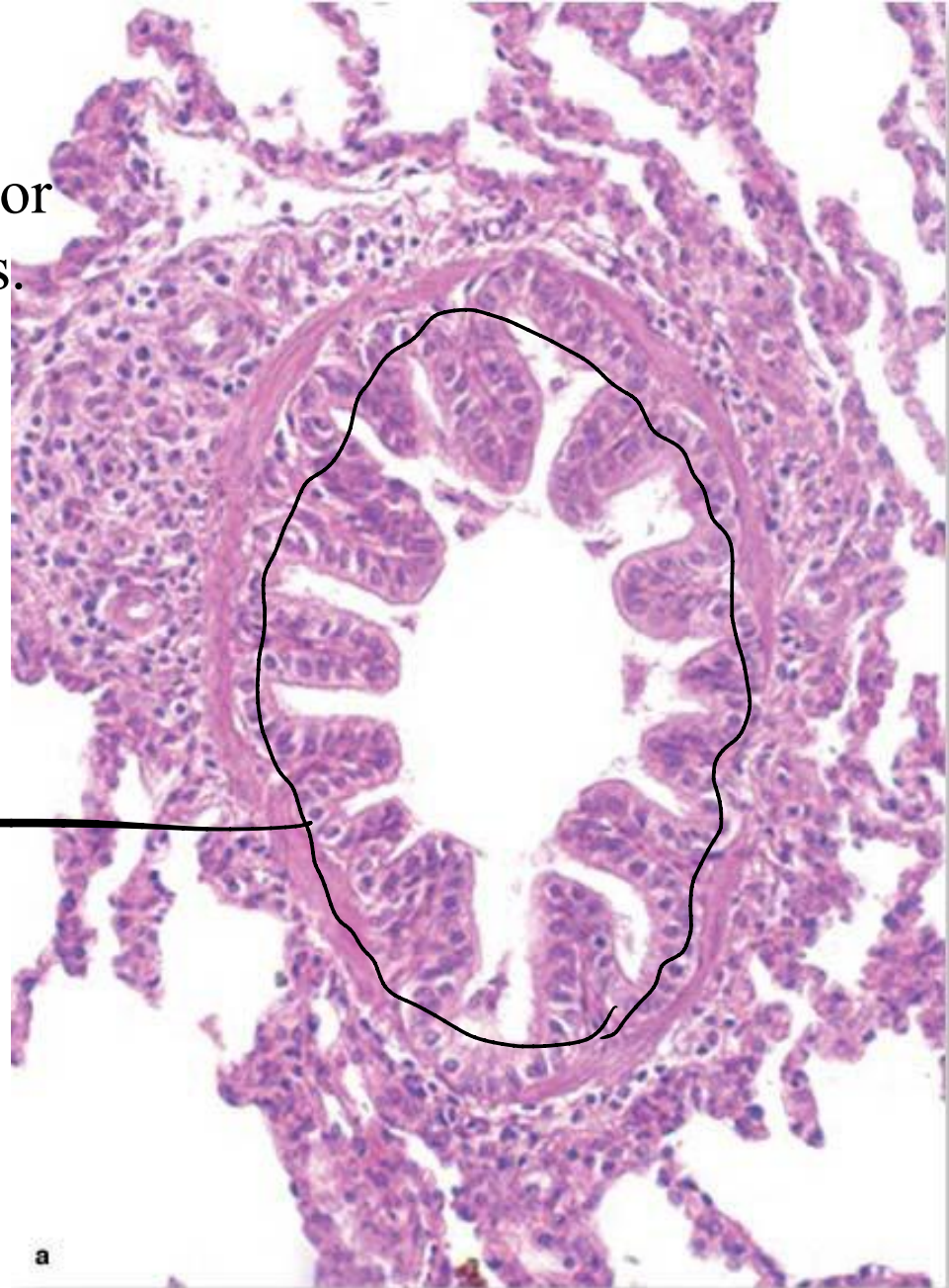
(a): A large bronchiole has the characteristically folded respiratory epithelium (E) and prominent smooth muscle (arrows), but is supported only by fibrous connective tissue (C) with no glands. **(c):** In very small bronchioles the epithelium (E) is reduced to simple low columnar and the several layers of smooth muscle cells (arrows) comprise a high proportion of the wall.

→ Respiratory Conductive
مکان انتقال من

terminal bronchiole has only one or two layers of smooth muscle cells.

The epithelium contains **ciliated cuboidal cells** and many **low columnar nonciliated cells (clara cells)**.

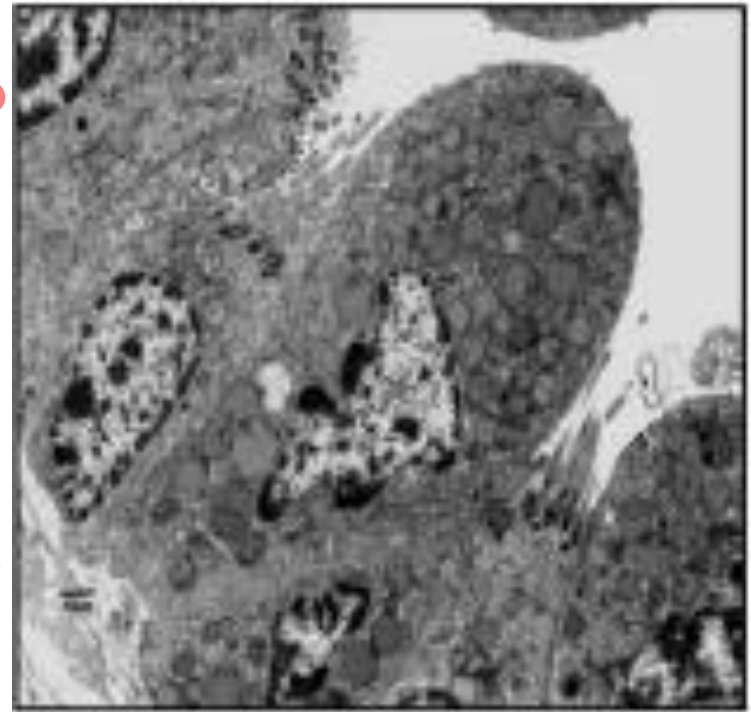
Clara cells ←
cuboidal + Non ciliated



- **Clara cell Site:** Present in terminal bronchioles. It is scattered between ciliated cells. - L/M: it is a tall, non ciliated dome-shaped cell. - E/M: numerous mitochondria, rER, well developed Golgi and apical electron dense secretory granules. It shows short blunt microvilli

- **Function:** Secrete serous secretion rich in protein which has anti-inflammatory function.

Active Cells
 { immune system cells }

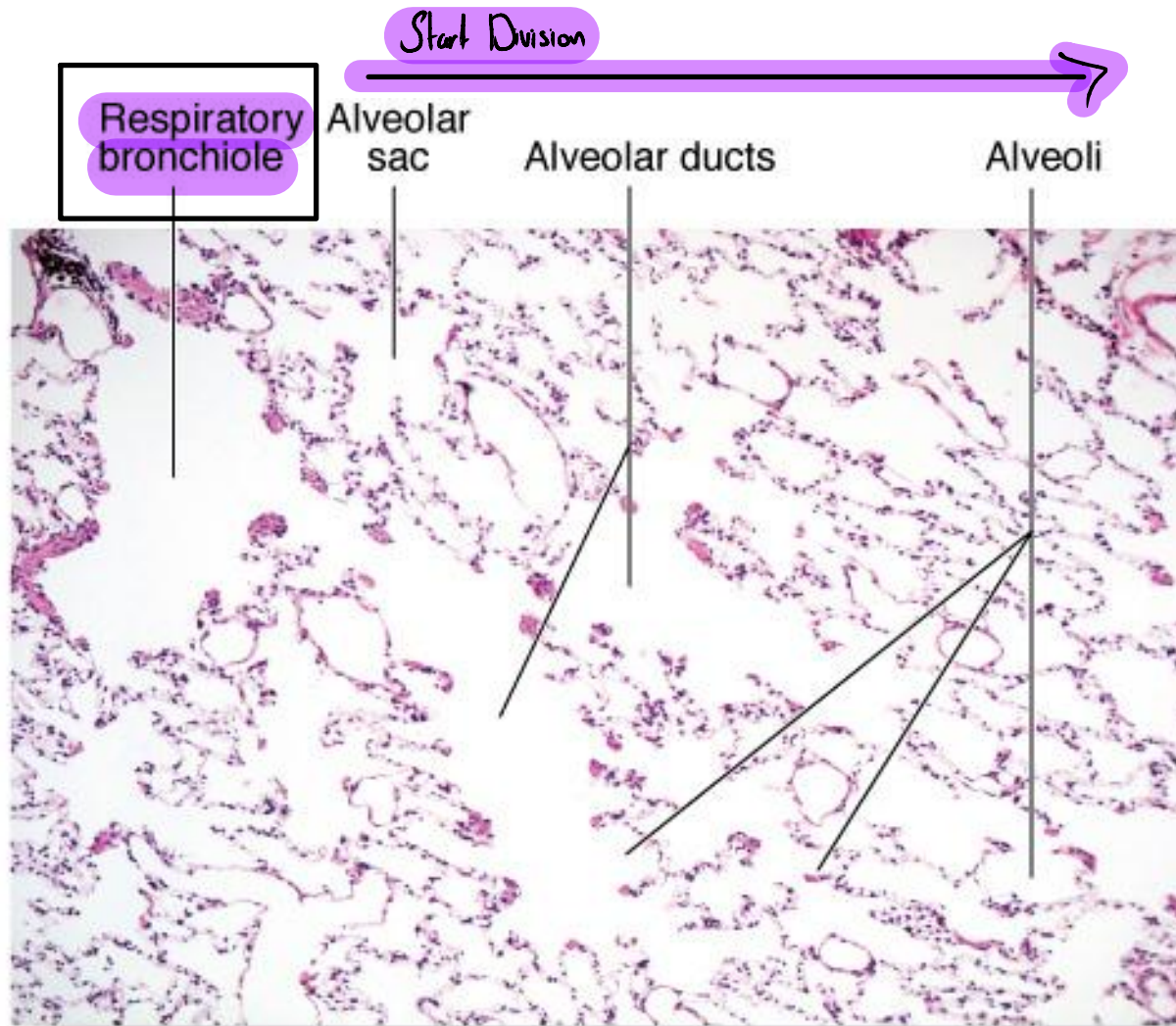


← على مدار وقت تقريبا
 immune cells

Respiratory Bronchioles

Like terminal bronchiole

- Each terminal bronchiole subdivides into two or more respiratory bronchioles that serve as regions of transition between the conducting and respiratory portions of the respiratory system.
- The respiratory bronchiolar mucosa is structurally identical to that of the terminal bronchioles, except that their walls are interrupted by the openings to sac like alveoli where gas exchange occurs. Portions of the respiratory bronchioles are lined with ciliated cuboidal epithelial cells and Clara cells, but at the rim of the alveolar openings the bronchiolar epithelium becomes continuous with the squamous alveolar lining cells (type I alveolar cells; see below). Proceeding distally along these bronchioles, the alveoli increase in number, and the distance between them is reduced. Between alveoli the bronchiolar epithelium consists of ciliated cuboidal epithelium, although cilia may be absent in more distal portions. Smooth muscle and elastic connective tissue lie beneath the epithelium of respiratory bronchioles.



b

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Respiratory system

Lung & Pleura

By

Dr. Mohamed Fathi

Ass. Prof. of Anatomy

By the end of this lecture you must know:

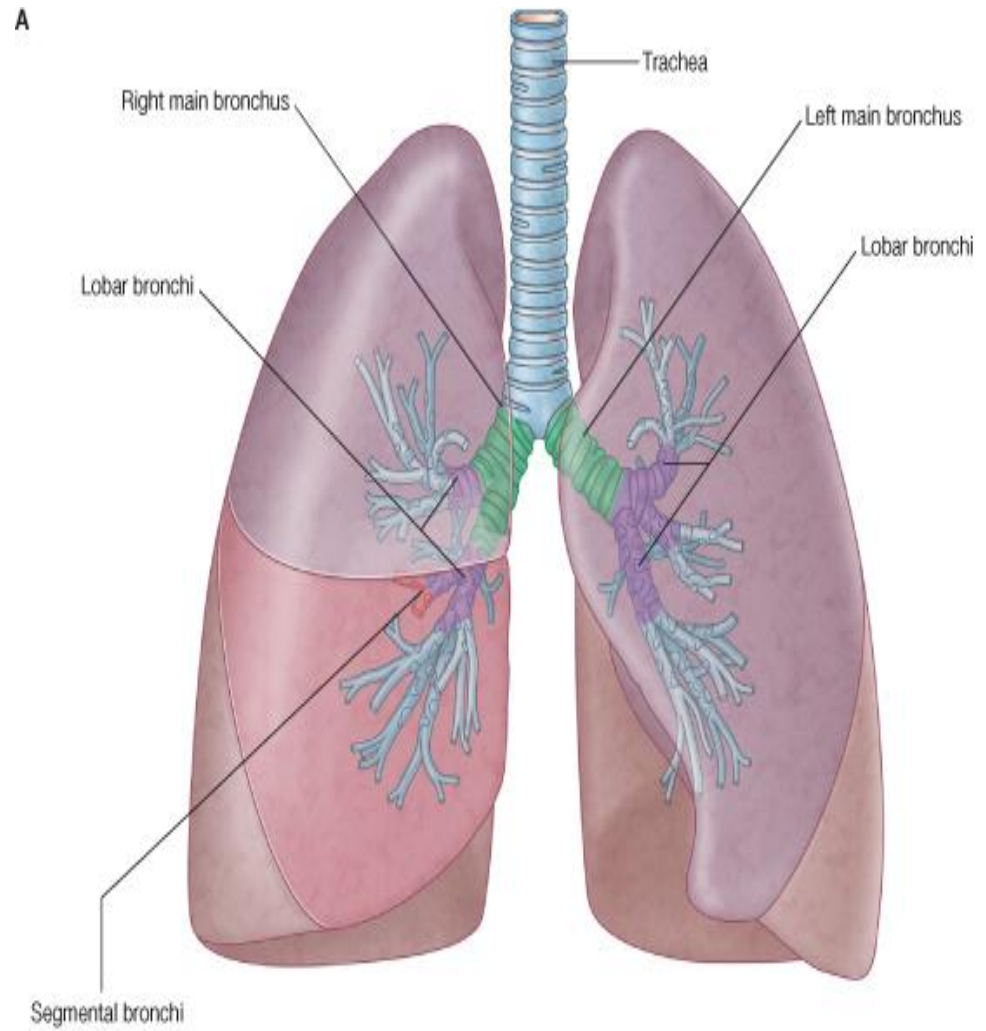
- **Lung (shape, surfaces and borders).**
- **Contents of the root of the lung.**
- **Relations of mediastinal surface of the lung.**
- **Blood supply and nerve supply of the lung.**
- **Comparison between right and left lung.**
- **Parts of the pleura, blood supply and nerve supply of pleura.**
- **Surface anatomy of the lung and pleura.**

THE LUNGS

- ① **Lungs are the chief respiratory organs.**
- ① **Lungs are pink at birth but become dark grey in adults due to deposition of inhaled carbon particles.**
- ① **Normal adult lung is spongy & can float if placed in water**
- ① **In fetuses , lung is hard & sinks if placed in water**

WHY?

بعدو ما دخل عليها هوا لهيك بتكون hard, و بمجرد ما الطفل ينولد ويتنفس ويدخل هوا على الرئة بصيرلها floating



Shape, Surfaces & Borders of lungs

@ Shape → like half a cone.

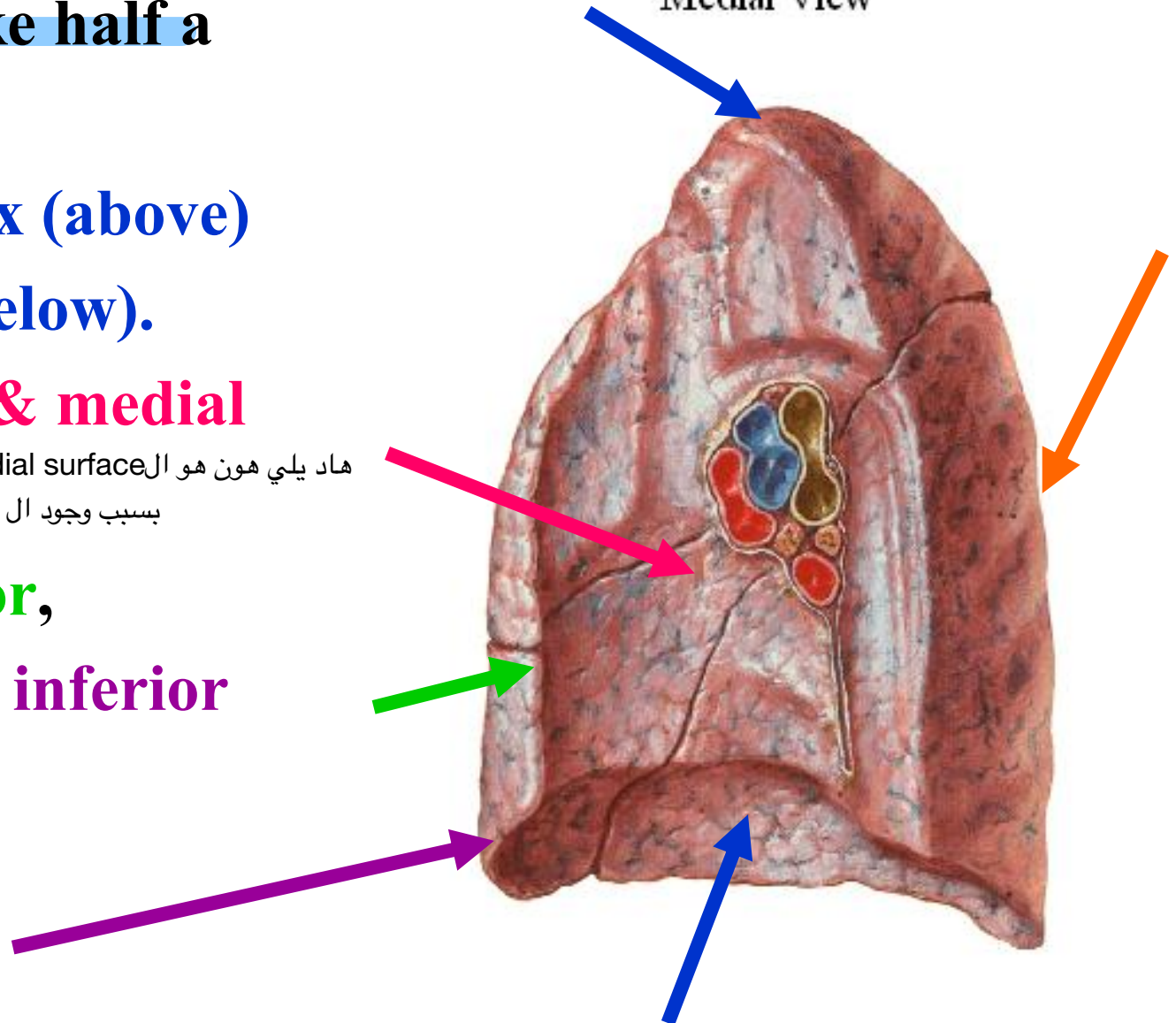
@ Has an apex (above) & a base (below).

@ Has costal & medial surfaces.

هاد يلي هون هو ال medial surface
بسبب وجود ال root

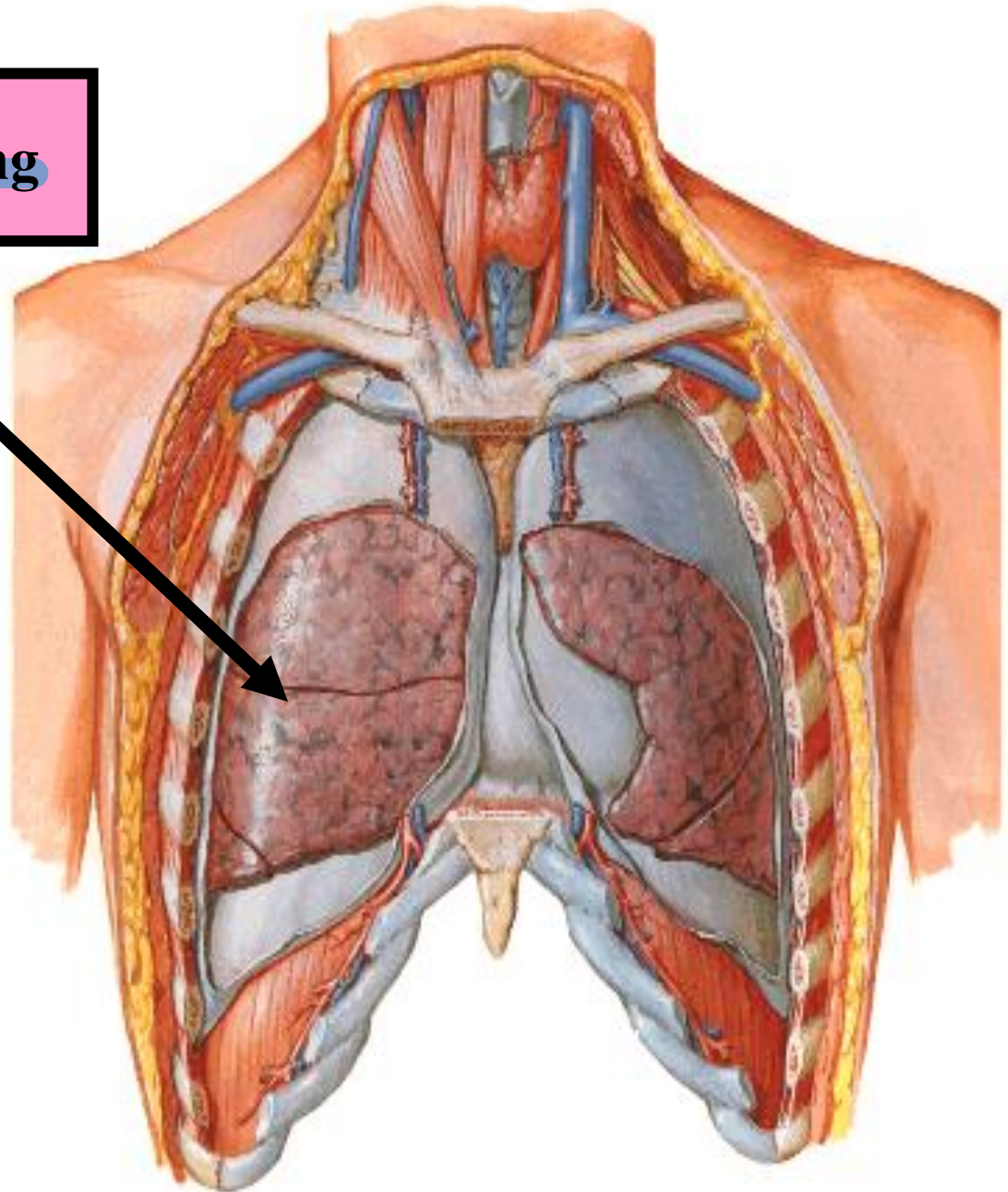
@ Has anterior, posterior & inferior borders.

Right Lung
Medial View



Costal surface of lung

↳ Related to
Ribs.



- **More concave** on right lung which lies over right 1/2 of **diaphragm** that **separates right lung from right lobe of liver.**

Base of right lung

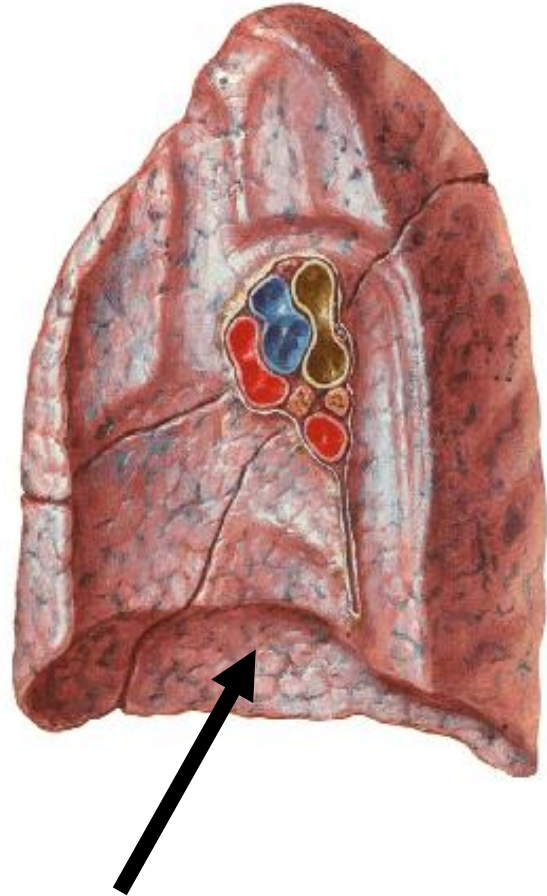
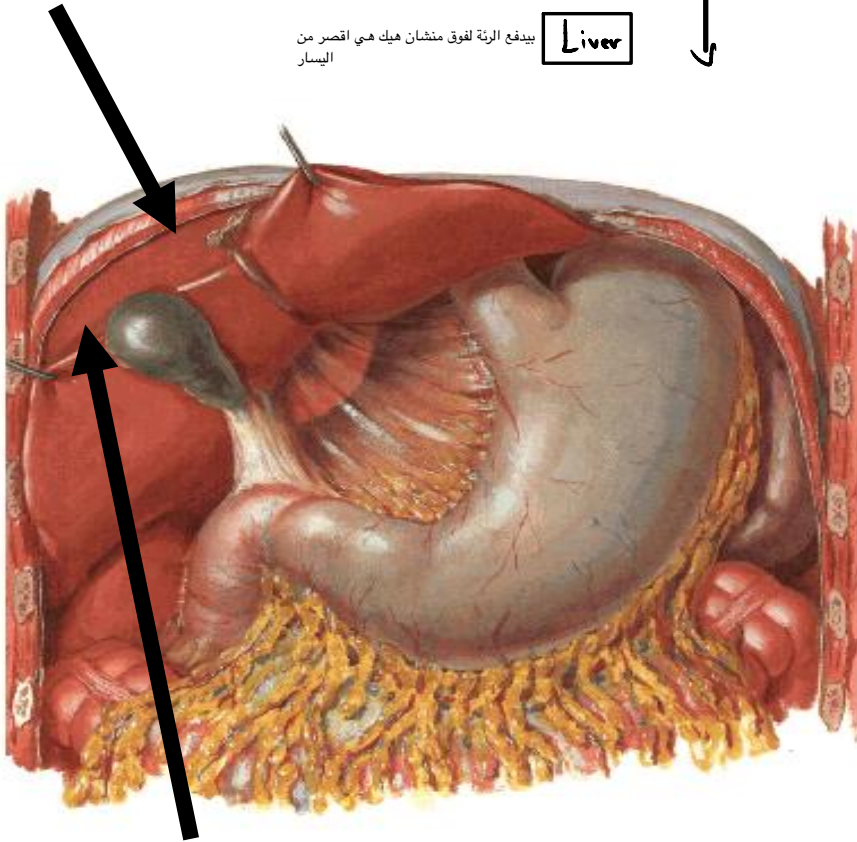
↳ Diaphragmatic surface of the right lung

Related to diaphragm ←

Right Lung
Medial View

Right Lung
Diaphragm
Liver

بيدفع الرئة لقوق منشان هيك هي اقصر من اليسار

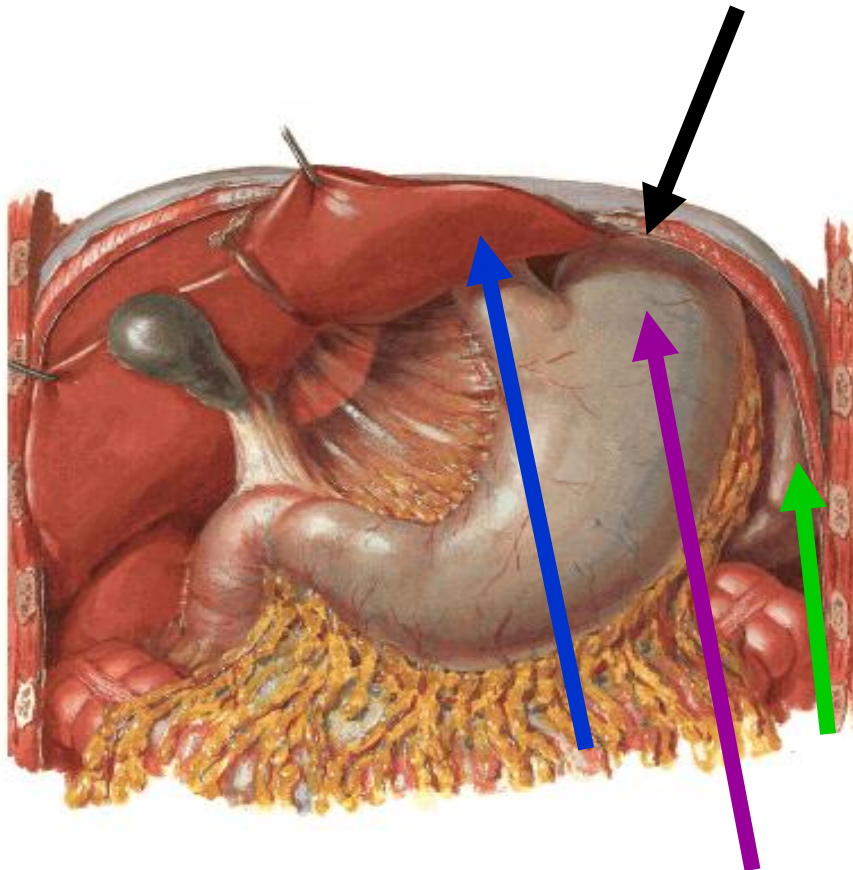


Base of left lung

- **Less concave** on left lung which lies over left $\frac{1}{2}$ of diaphragm that separates left lung from **left lobe of liver, stomach & spleen.**



Left Lung
Medial View

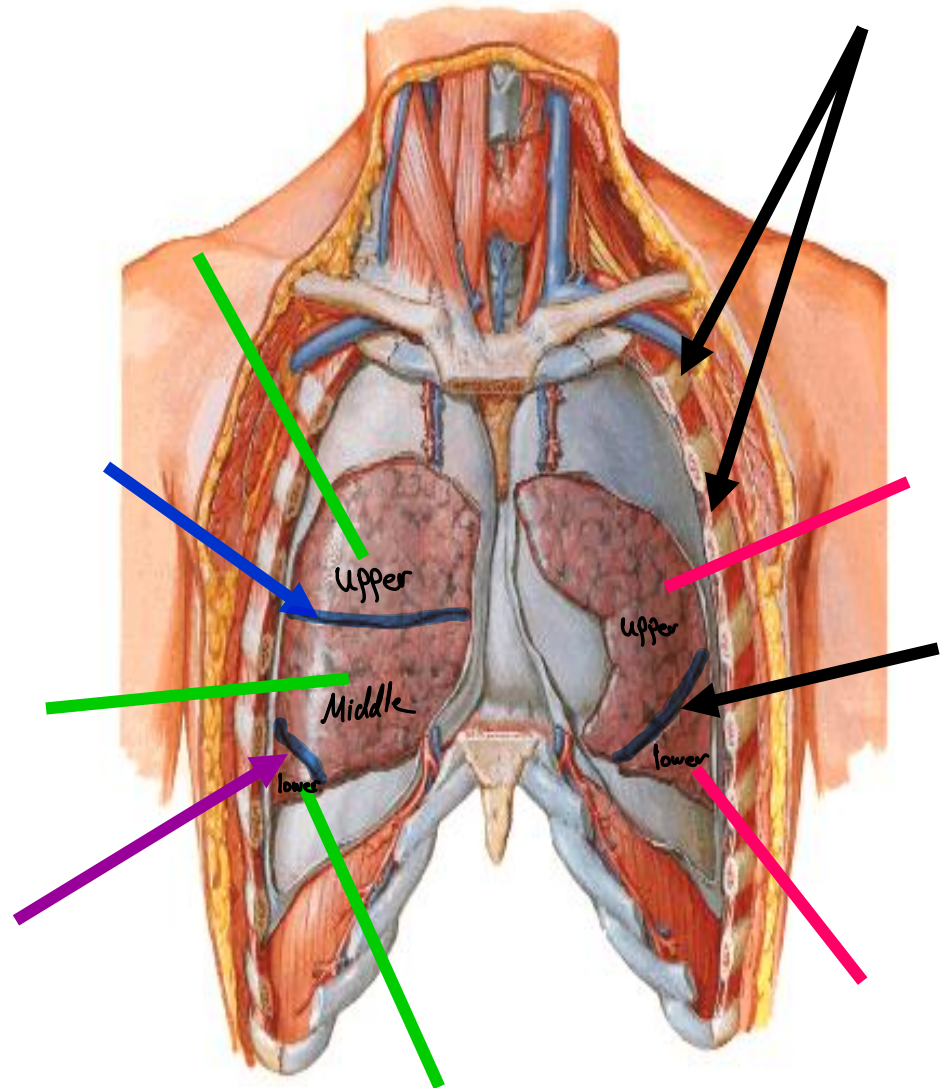


Costal surface of lung

@ Convex & related to ribs & intercostal spaces.

@ Right lung has 2 fissures → horizontal & oblique dividing lung into 3 lobes : upper, lower & middle lobes.

• Left lung has one oblique fissure dividing lung into upper & lower lobes.



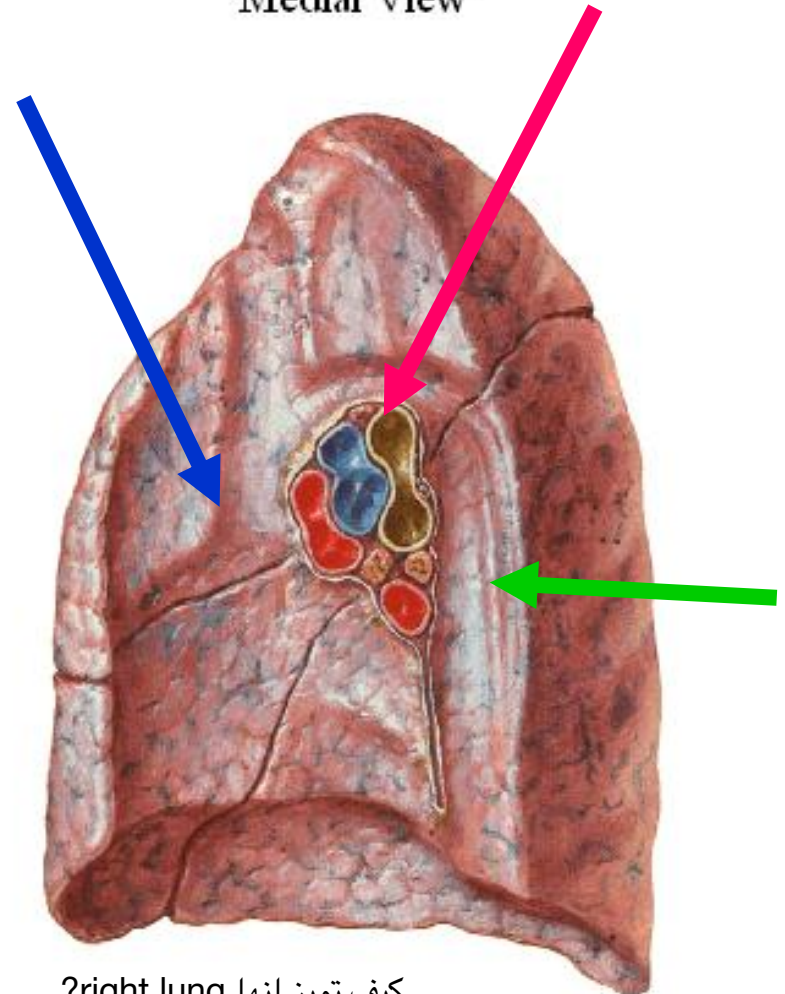
Root يلي يركب فيه ← Medial surface of lung

@Contains **hilum of lung**
(area which gives
passage to structures
forming root of lung).

@Area in front of
hilum → is **anterior or
mediastinal part.**

@Area behind hilum →
is **posterior or
vertebral part.**

Right Lung
Medial View



كيف تميز انها right lung
2 fissure, sharp anterior border

Root of right lung

@Contains 3 major

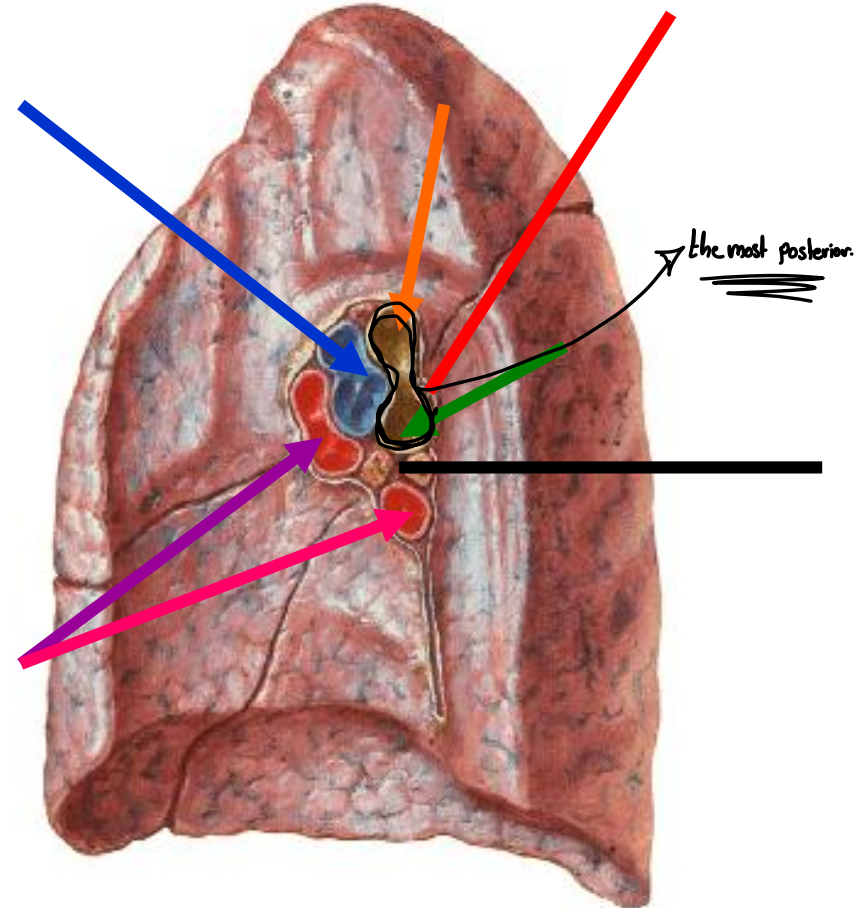
structures → two <sup>⊗ The most posterior Structure
↳ Bronchus.</sup> bronchi (eparterial & hyparterial), one pulmonary artery & 2 pulmonary veins (upper & lower).

between the 2
Bronchi.

@Contains 3 minor

structures → bronchial vessels, pulmonary plexuses & bronchopulmonary LNs. } قسامة

Right Lung
Medial View



Root of left lung

أهم الفروقات بين الـ right root & left root

The bronchus

The site of pulmonary artery

Left Lung

Medial View

@Contains 3 major

structures → one

من مقصودة main bronchus, one

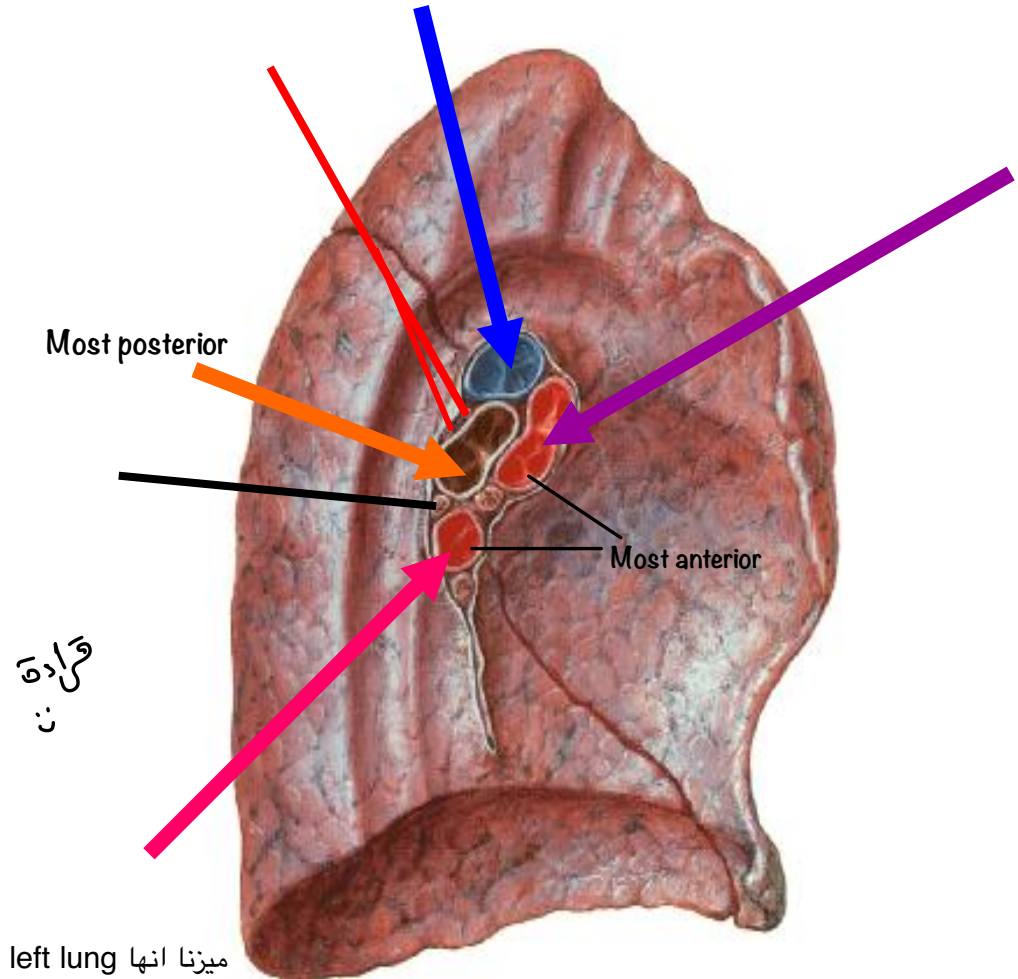
in Apex of the root pulmonary artery & 2

pulmonary veins
(upper & lower).

@Contains 3 minor

structures →

bronchial vessels,
pulmonary plexuses &
bronchopulmonary
LN's.



ميزنا انها left lung لانه عندي one fissure

One bronchus.

وكمان الـ anterior border فياتو مثل انحناء لجوا وهاد يكون مكان

الـ cardiac notch

اعظمكم اعانتة ♡ احفظوا كويين

THANK YOU

