

وَقُلْ رَبِّ زِدْنِي عِلْمًا



RESPIRATORY SYSTEM

HAYAT BATCH



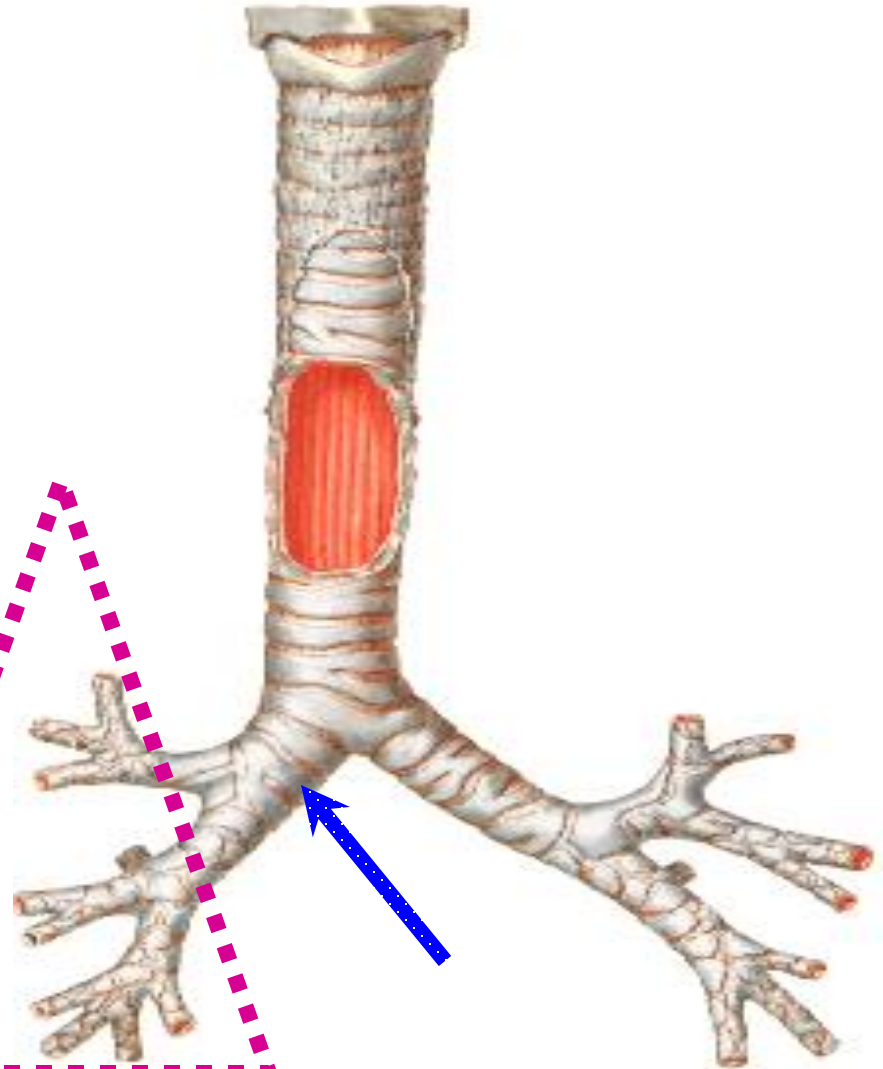
SUBJECT : Anatomy

LEC NO. : Part 2 lec 3 + Part 1 lec 4

DONE BY : Shahed Tanineh ♡

The main bronchi

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



Right main bronchi ← لا نبي على ال

Right Lung سيكون هيكل منظرها وليس داخلية على ال

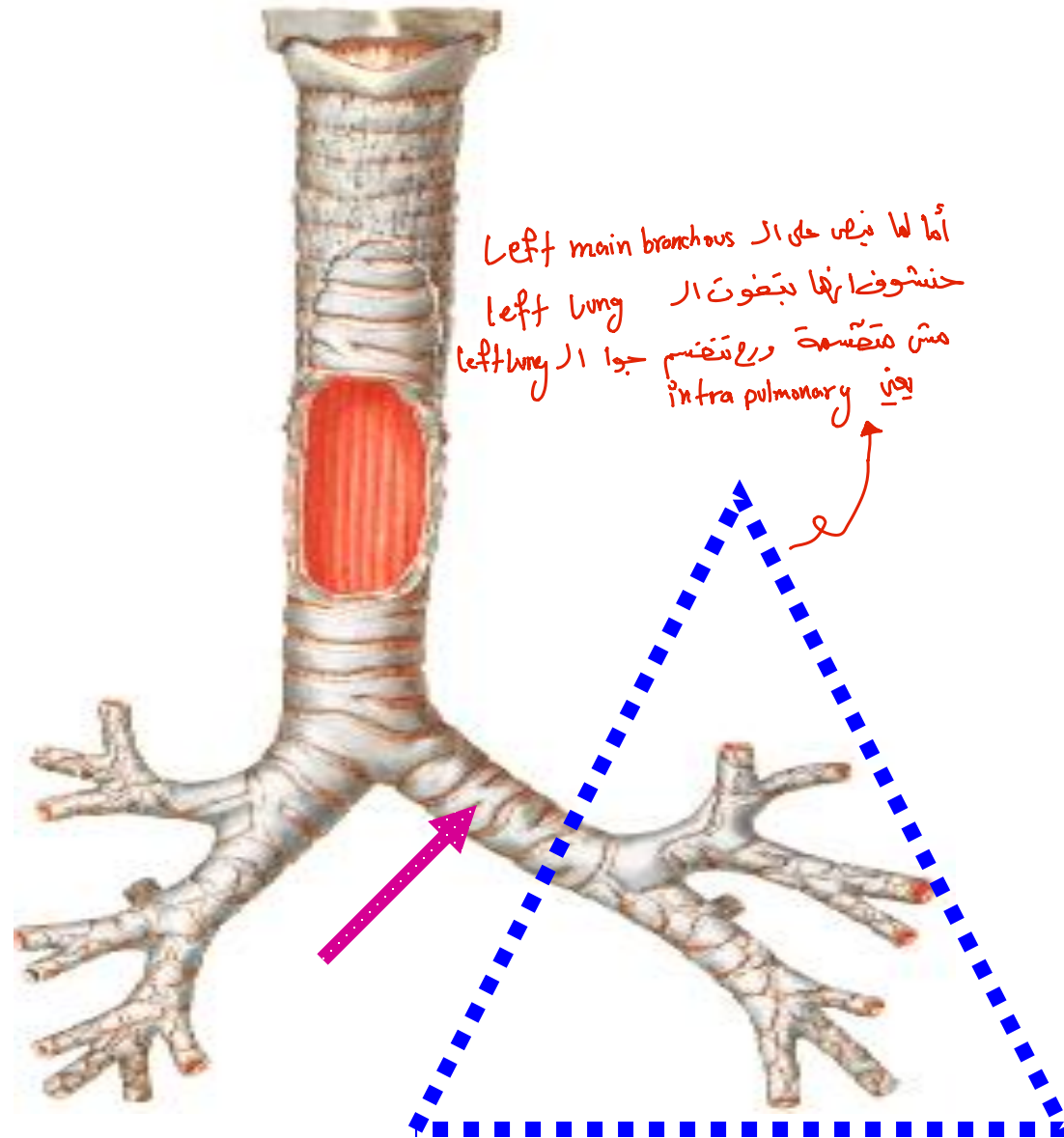
Right Lung لاحظوا انها تتقسم قبل ما تدخل ال

extra pulmonary Right bronchous مفس ذلك انه ال

Left bronchus

**@Longer,
narrower &
more oblique.**

**@Divides after
entering into
the hilum of left
lung.**



Applied Anatomy

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

الاجابة هي الجدول جالالايد
القادم



Because right bronchus are wider & vertical in line with trachea.

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.

Line with trachea

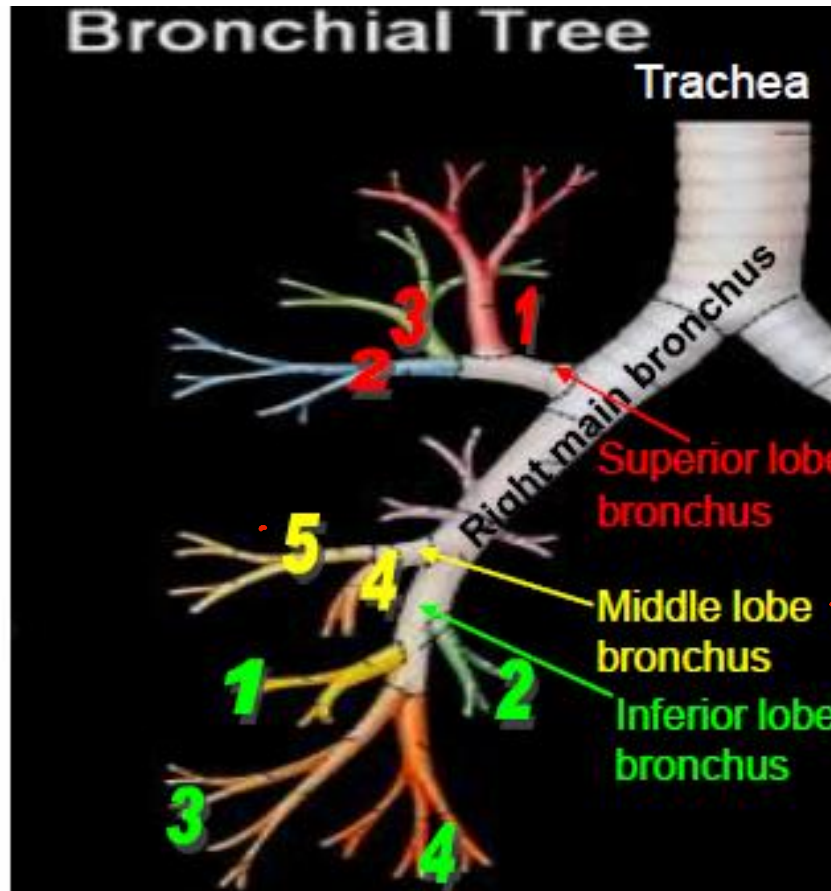
VI

Segmental branches of right bronchus

يعني ايه التفرعة

تباعده ال Bronchi جوا ال Lungs

تفرع



ال right lung عبارة عن three lobes :

1. superior lobe
2. Middle lobe
3. inferior lobe

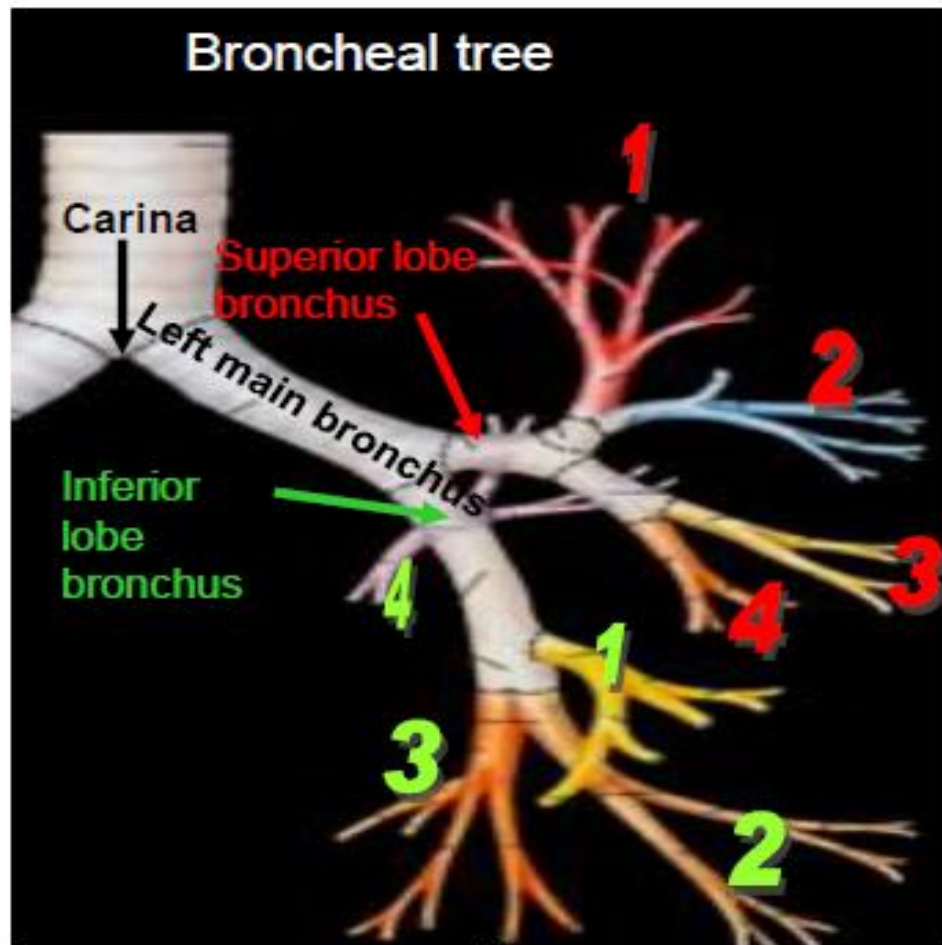
بالتفصيل ال right bronchus ال upper lobe (superior lobe) بتفرع بال 1 2 3

- middle lobe < 4 5

- inferior lobe < 1 2 3 4

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

Segmental branches of left bronchus



* نفس فكرة السلايد السابق
 ولكن هون عن ال left lung
 اي ما فيها الا two lobes

مخطط

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

Bronchial Tree

Skip

Bronchi

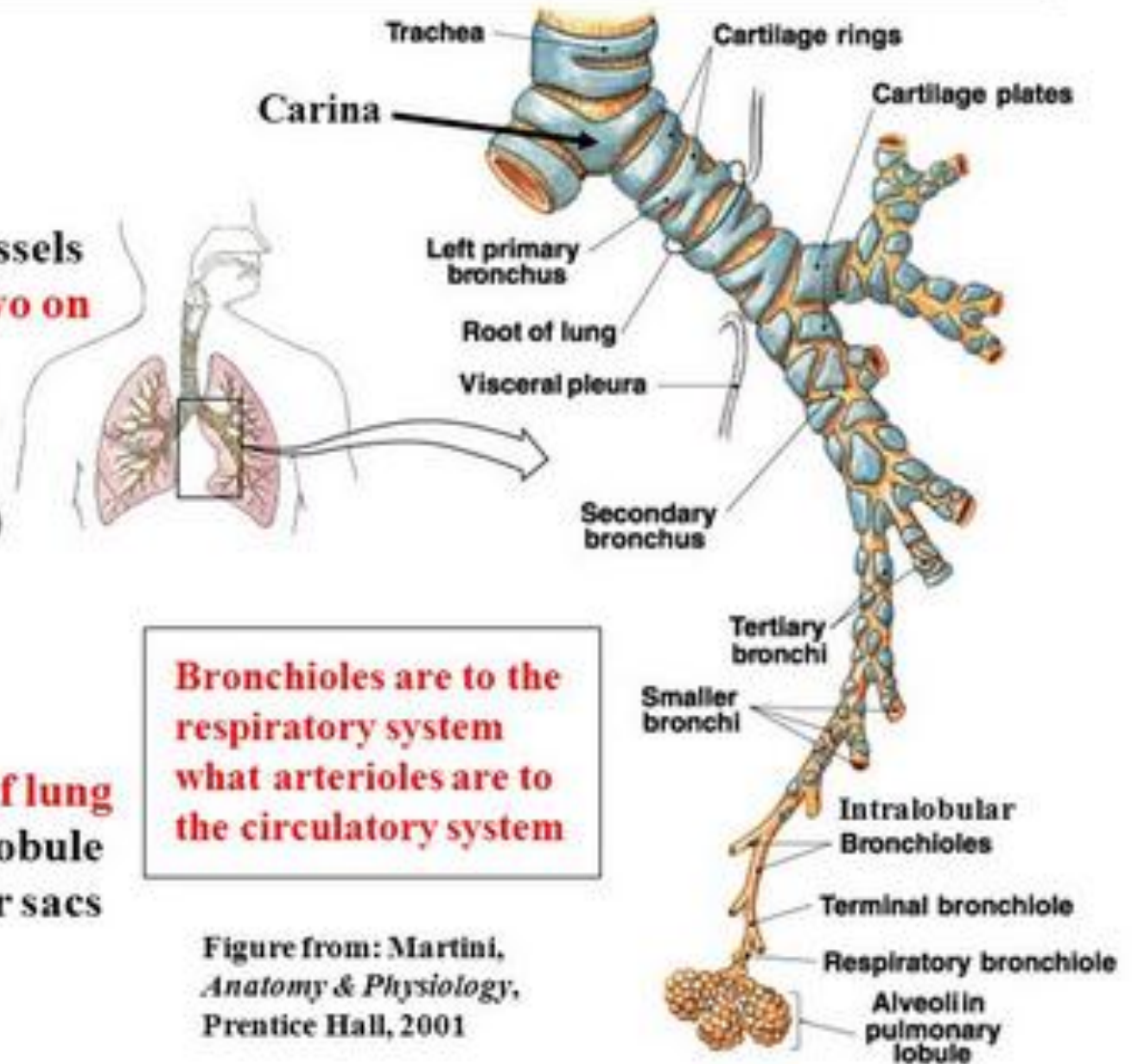
- **Primary**; w/ blood vessels
- **Secondary (lobar)**; two on left, three on right
- **Tertiary (segmental)**; supplies a broncho-pulmonary segment; 10 on right, 8 on left

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



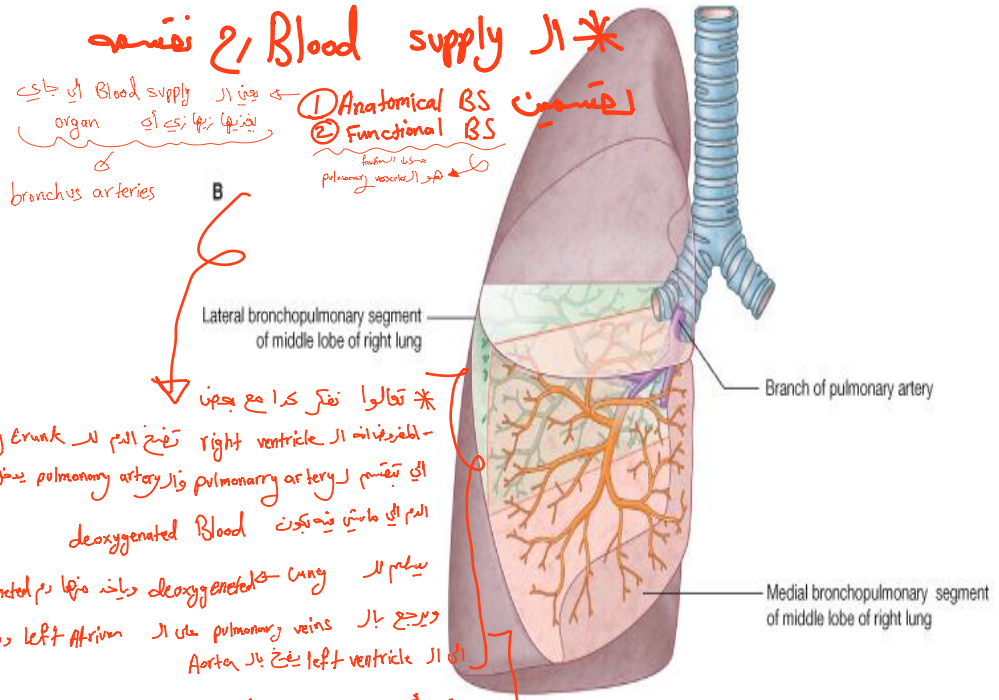
Bronchopulmonary Segments of Lungs

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

احنا اتفقنا مع بعض انه قسمنا ال bronchus لما دخلت ال lung ال segmental bronchi طيب جوا ال lung كل segmental
 bronchus وهي رايحة تعمل ال supply ال area معينة في ال lung حيجيلها branch من ال pulmonary artery
 و branch من ال pulmonary vein وهو ده الي اسمه Bronchopulmonary Segments
 بيبنى في فرق بال terminology ما بين ال segmental division of bronch وما بين ال bronchopulmonary segments of lungs

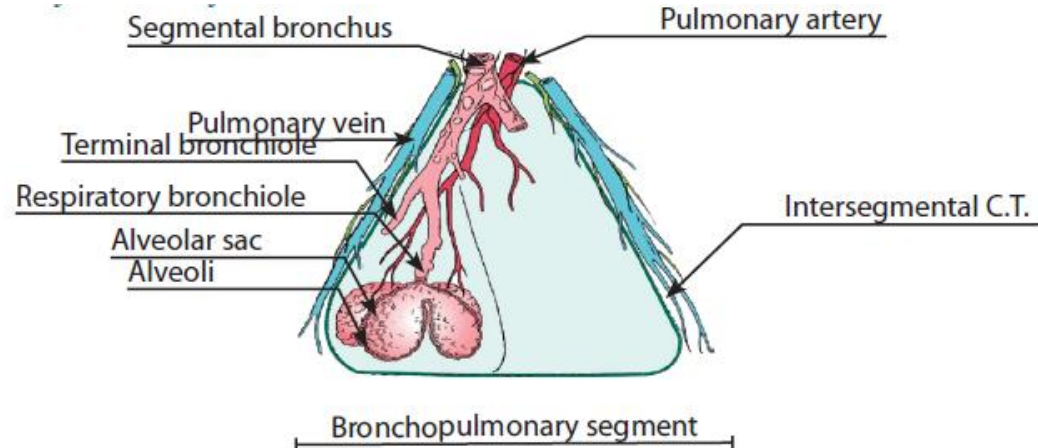
@ Segments are separated from each other by fibrous septa.

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



* اتالوا نفر كرا مع بعضنا
 - المفروض ان ال right ventricle تفتح الدم لل pulmonary trunk
 الي بتقسم ال pulmonary artery وال pulmonary artery يدخل ال lung
 الدم الي ماتس فيه يكون deoxygenated blood
 يسلم ال lung ال deoxygenated وياخد منها دم oxygenated
 ويرجع ال pulmonary veins ال left atrium ويزود ال left atrium
 ال ال left ventricle بفتح بال Aorta

بيبنى انا استخدمت ال pulmonary vessels ك Functional BS وليس Anatomical



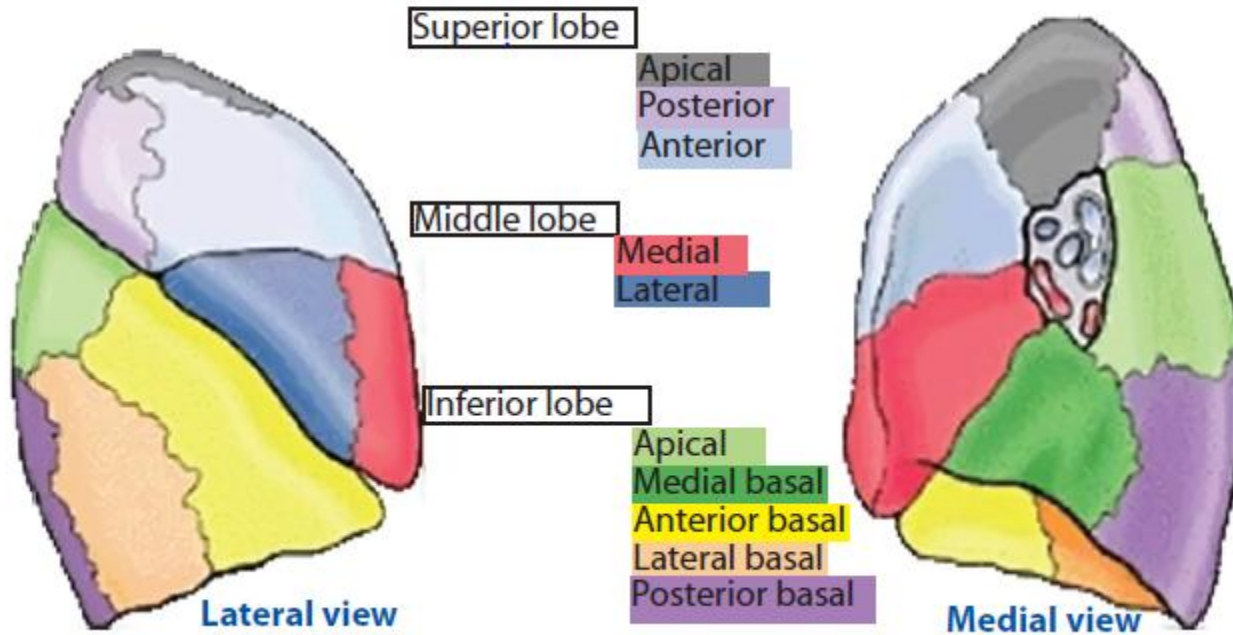
- الفأدة انه ممكن جالان ال lung cancer ال segment وابعدها واطاها
 ال Affection بتاع ال segment وابعدها واطاها
 surgical excision

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

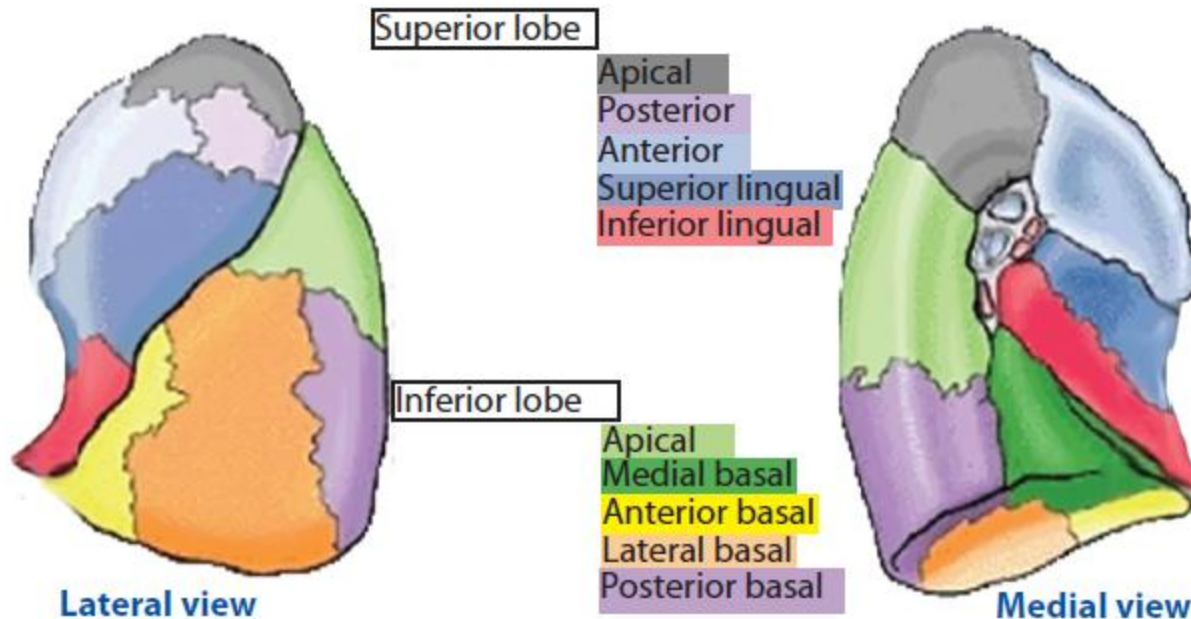
الوجودية بال Segmental division بتوابع الـ لungs
Bronchopulmonary Segments نفس الـ الـ



Bronchopulmonary segments of of left lung

■ Left lung

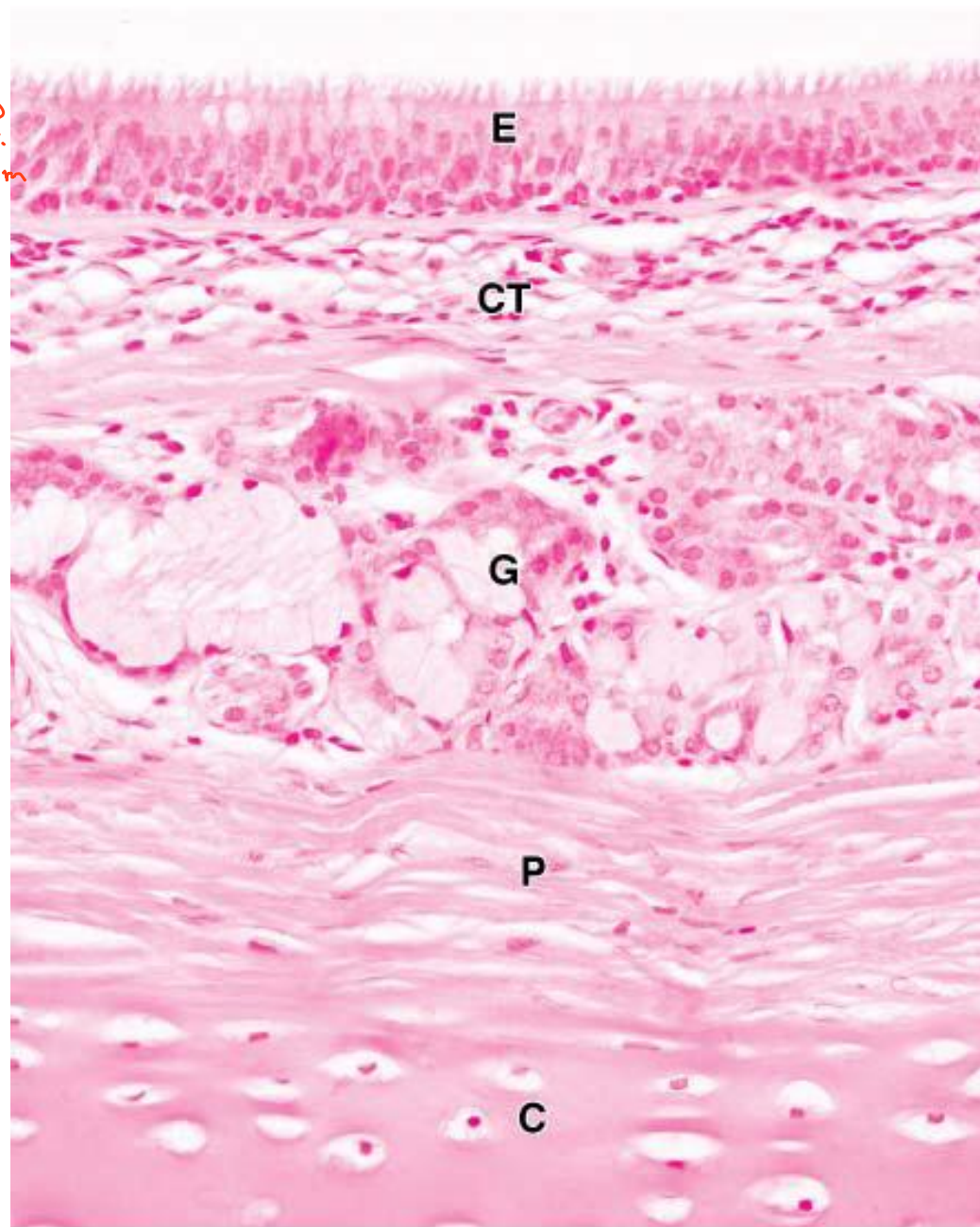
- **Superior lobe:** Apical, posterior, anterior, superior lingular, inferior lingular
- **Inferior lobe:** Superior (apical), medial basal, anterior basal, lateral basal, posterior basal



Histology of trachea

*What is the epithelium of the trachea?
→ pseudostratified columnal ciliated epithelium with goblet cells.

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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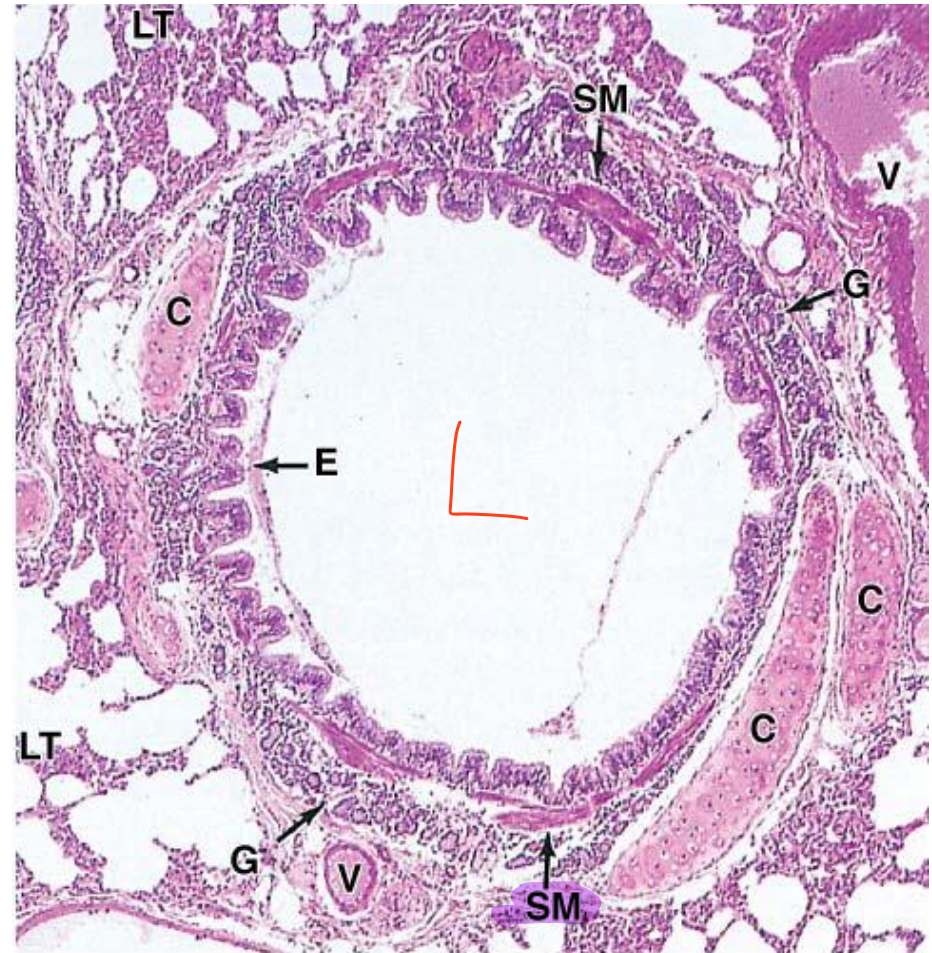
Histology of bronchial tree

نبرها زيء ال
-اعها عرضي
trachea ولكن المقطع

Bronchi (primary, secondary, tertiary)

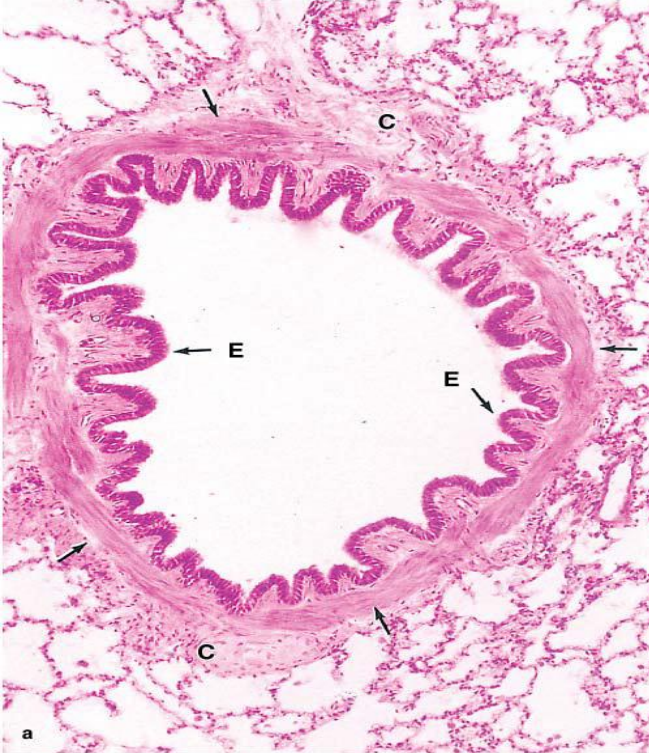
- Each primary bronchus branches repeatedly, with each branch becoming progressively smaller until it reaches a diameter of about 5 mm. The mucosa of the larger bronchi is structurally similar to the tracheal mucosa except for the organization of cartilage and smooth muscle.

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.

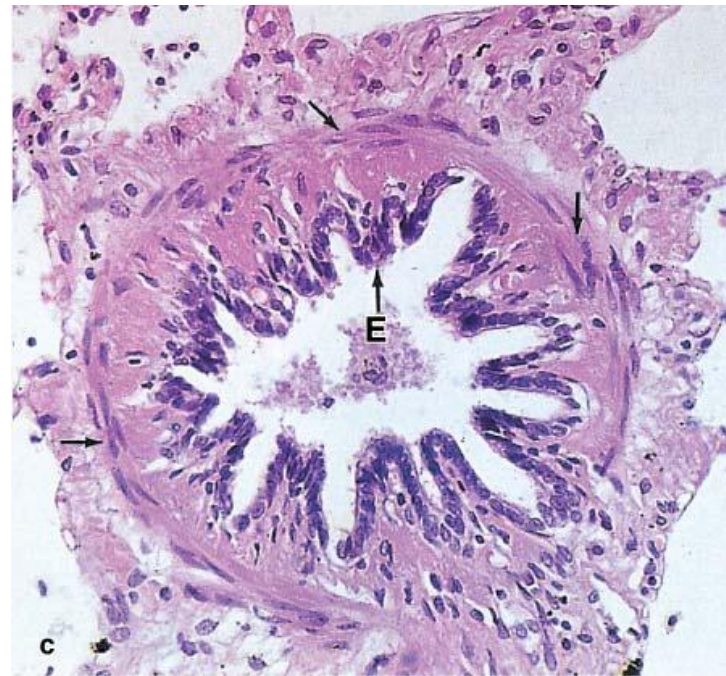


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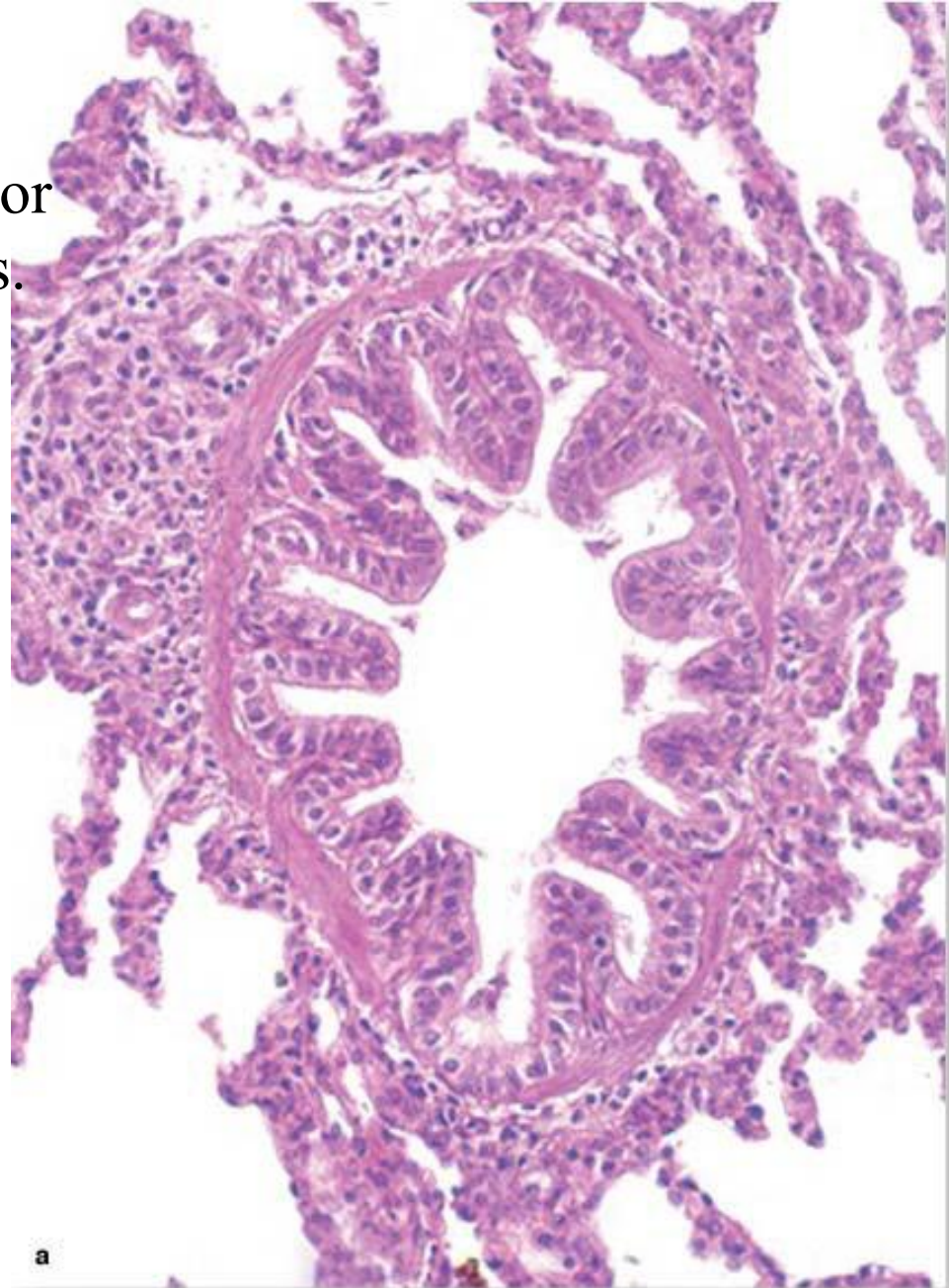


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(a): A large bronchiole has the characteristically folded respiratory epithelium (E) and prominent smooth muscle (arrows), but is supported only by fibrous connective tissue (C) with no glands. **(c):** In very small bronchioles the epithelium (E)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

الفرق هو ان

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).



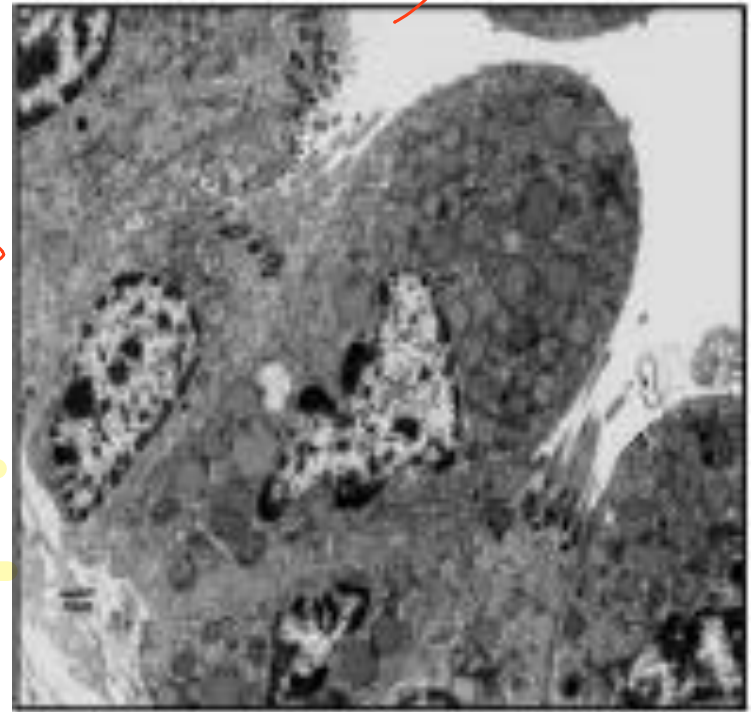
* لا تنس انه ال terminal Bronchiole
هي الحد الفاصل ما بين ال conductive system
ما قبلها وما بعدها حكون ال exchange system

- **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.

- very active
 - From Immunity system
 Active cells
 123

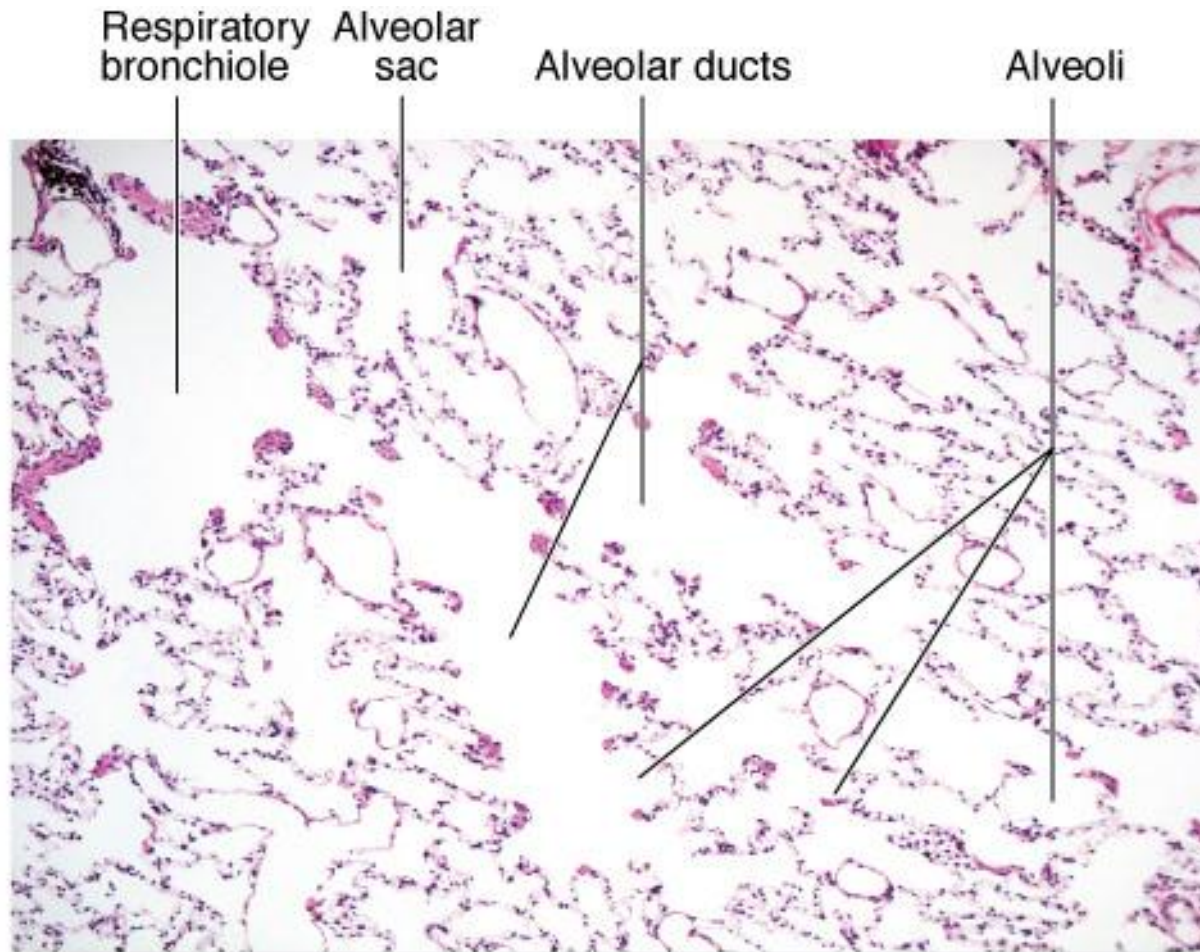
دفرها باال - immunity system



Respiratory Bronchioles

- الحويصلات الهوائية الطرفية terminal bronchioles
وتتفرعها إلى أجزاء أصغر Alveolar segments

- 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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THANK YOU





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

@ Lungs are the chief respiratory organs.

هنا المسؤولة عن
exchange of gases

@ Lungs are pink at birth but become dark grey in adults due to deposition of inhaled carbon particles.

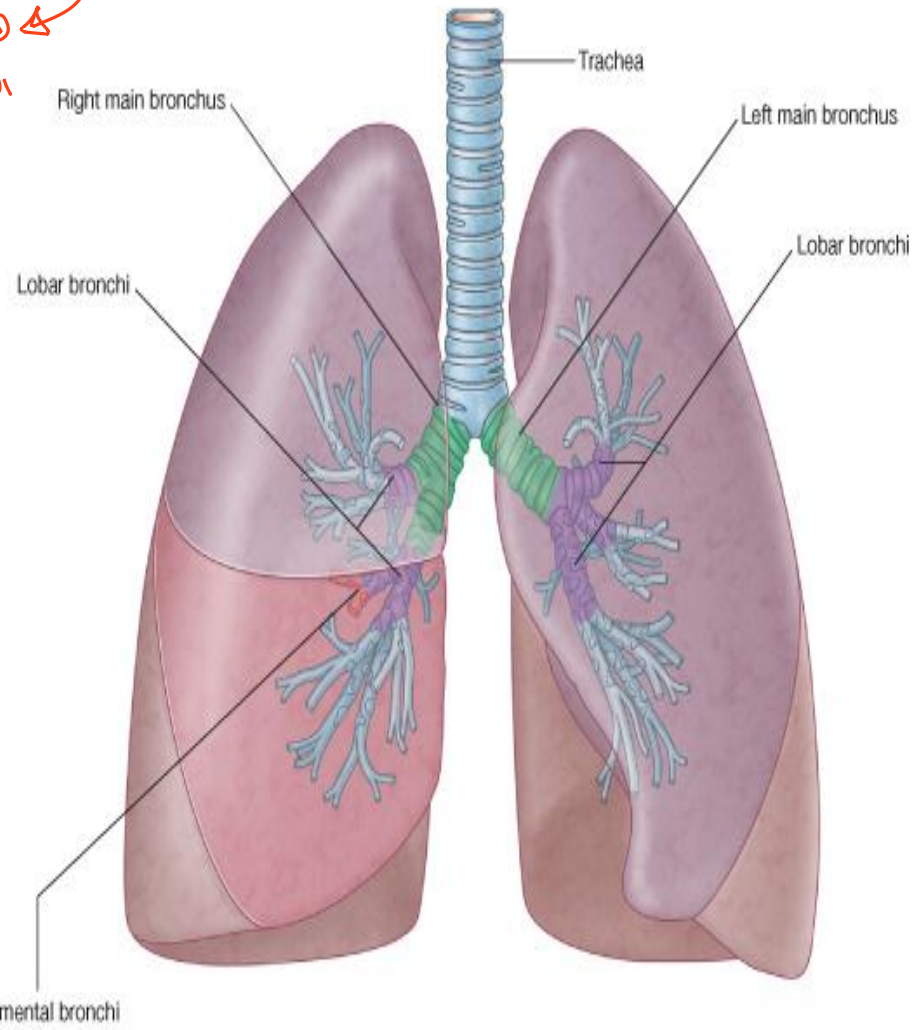
@ Normal adult lung is spongy & can float if placed in water

@ In fetuses , lung is hard & sinks if placed in water

WHY?

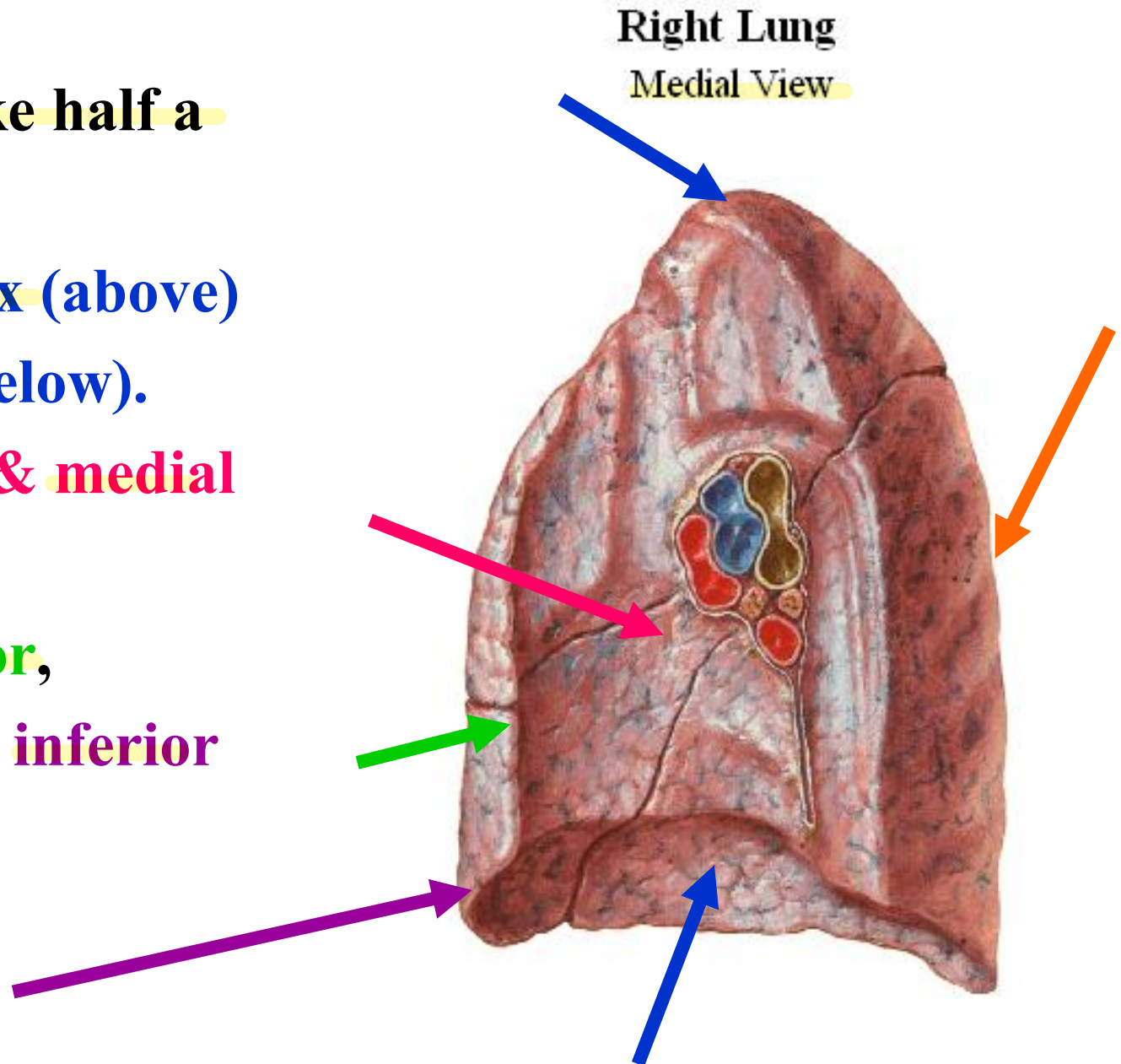
لأن الرئتين حكي قسوة ملحظها انه يقدر
أعزى الطفل مات قبل الولادة ولا يجدها
عن طريق افني احطال دوس (lung) نامة بهاء
← اذا حارها sinking معناها الطفل انوله ميت

← اذا حارها floating ← يعني الطفل انولا عايش بعد كذا ما



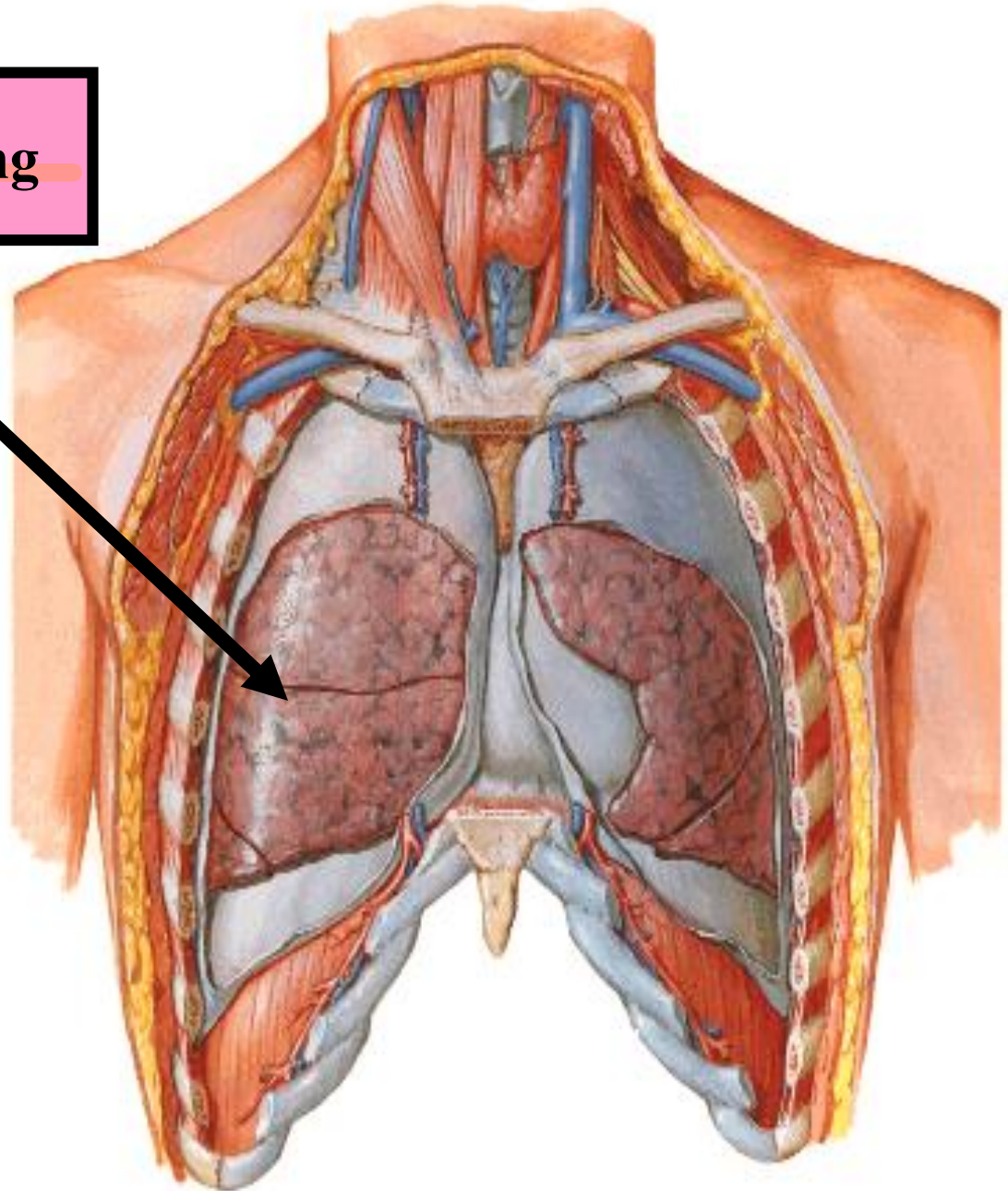
Shape, Surfaces & Borders of lungs

- @ Shape → like half a cone.
- @ Has an apex (above) & a base (below).
- @ Has costal & medial surfaces.
- @ Has anterior, posterior & inferior borders.



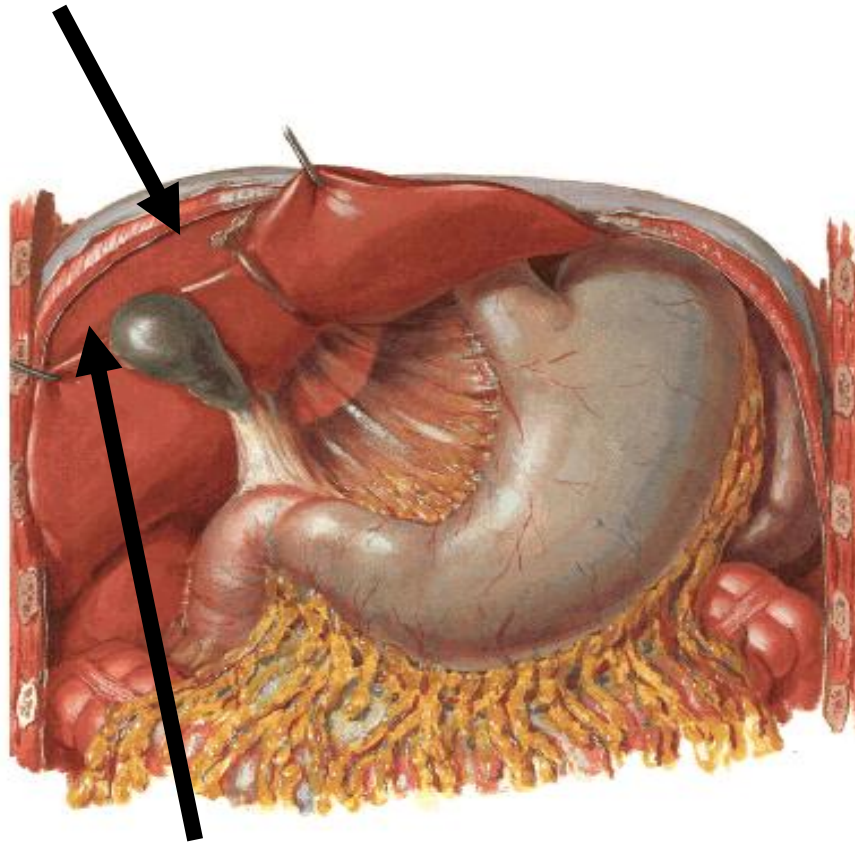
Costal surface of lung

*related to
ribs & costal
cartilage*

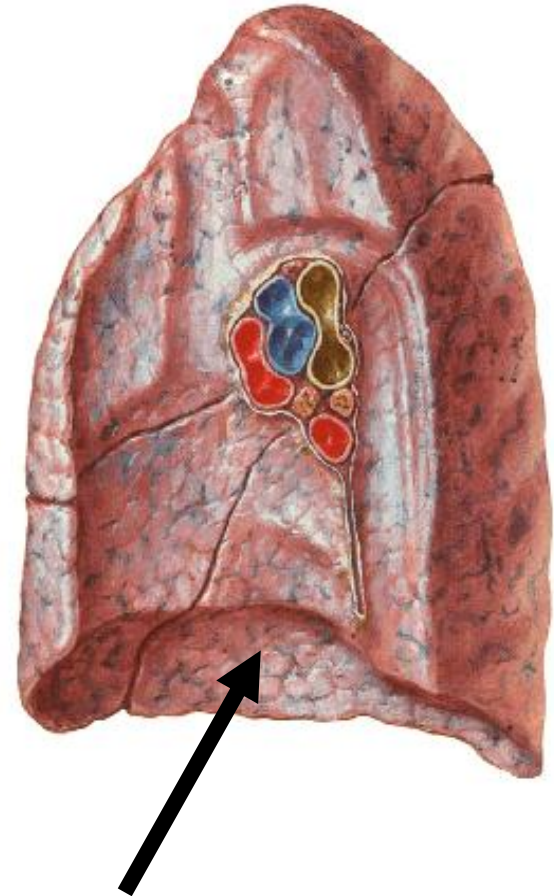


- More concave on right lung which lies over right $\frac{1}{2}$ of diaphragm that separates right lung from right lobe of liver.

Base of right lung



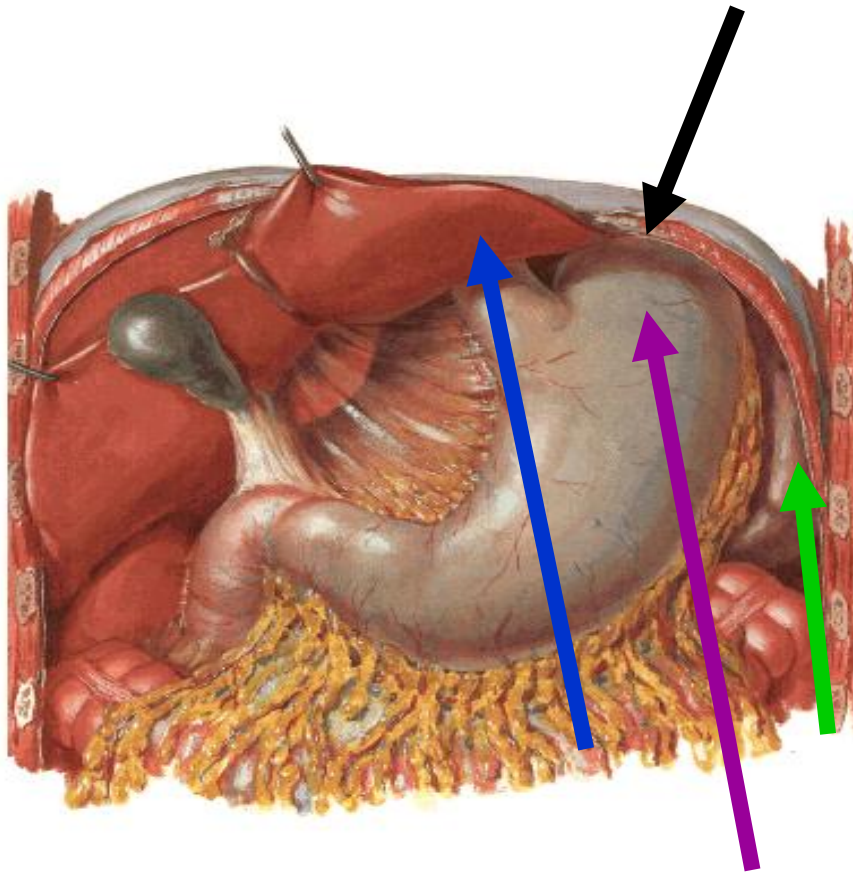
Right Lung
Medial View



Base of left lung

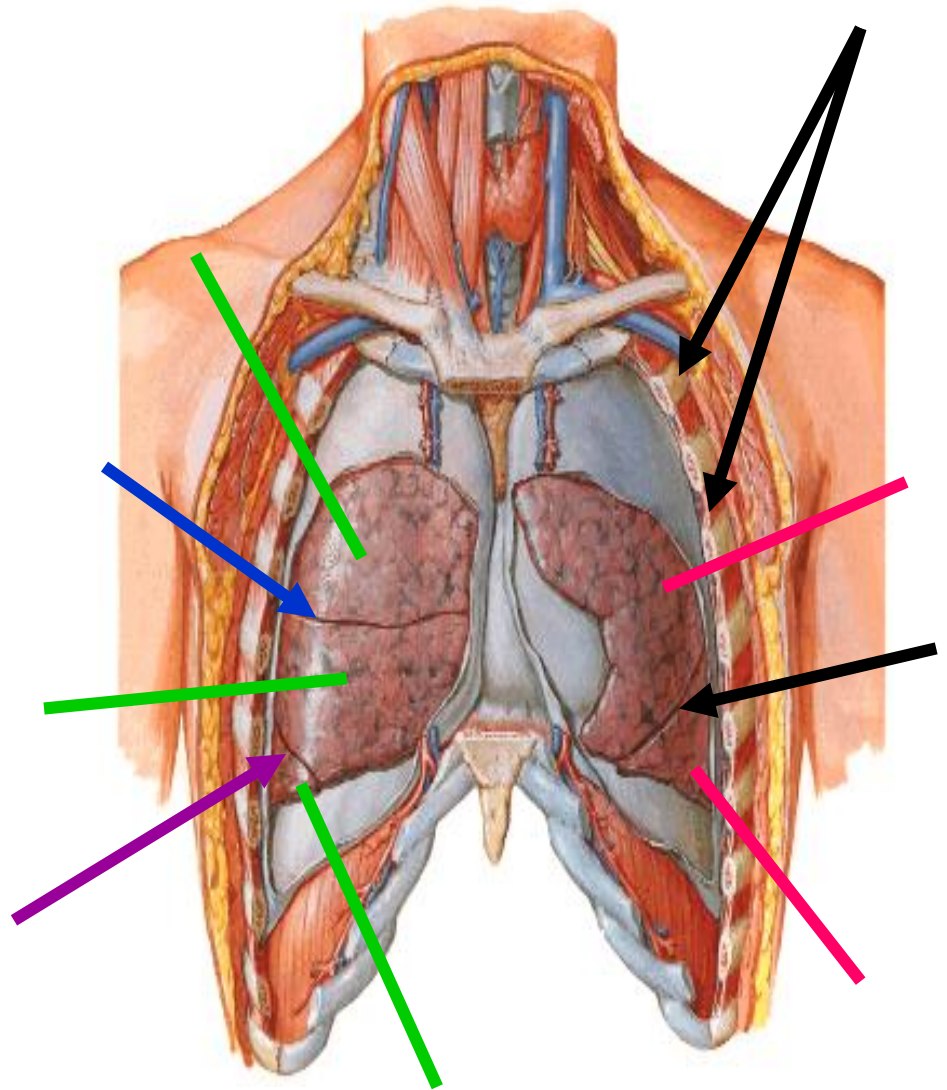
- Less concave on left lung which lies over left $\frac{1}{2}$ of diaphragm that separates left lung from left lobe of liver, stomach & spleen.

Left Lung
Medial View



Costal surface of lung

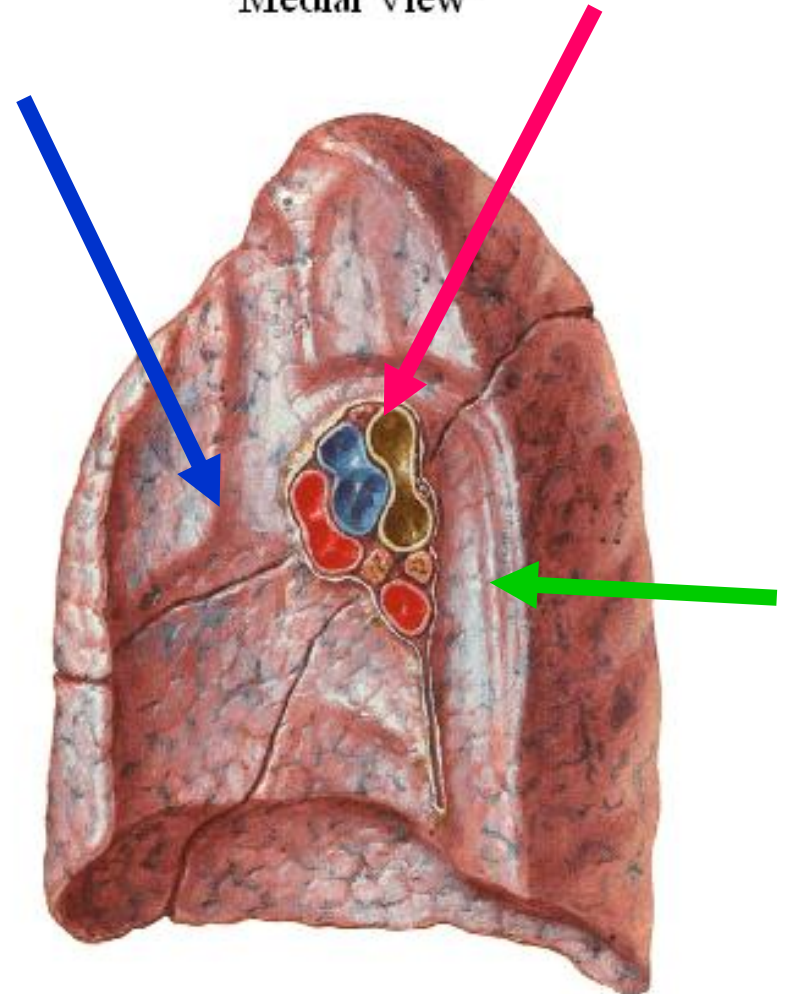
- @ Convex & related to ribs & intercostal spaces.
- @ Right lung has 2 fissures → horizontal & oblique dividing lung into 3 lobes : upper, lower & middle lobes.
- Left lung has one oblique fissure dividing lung into upper & lower lobes.



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



Root of right lung

@Contains 3 major structures → two bronchi (**eparterial** & **hyparterial**), one pulmonary artery & 2 pulmonary veins (**upper** & **lower**).

most posterior

eparterial

two bronchi

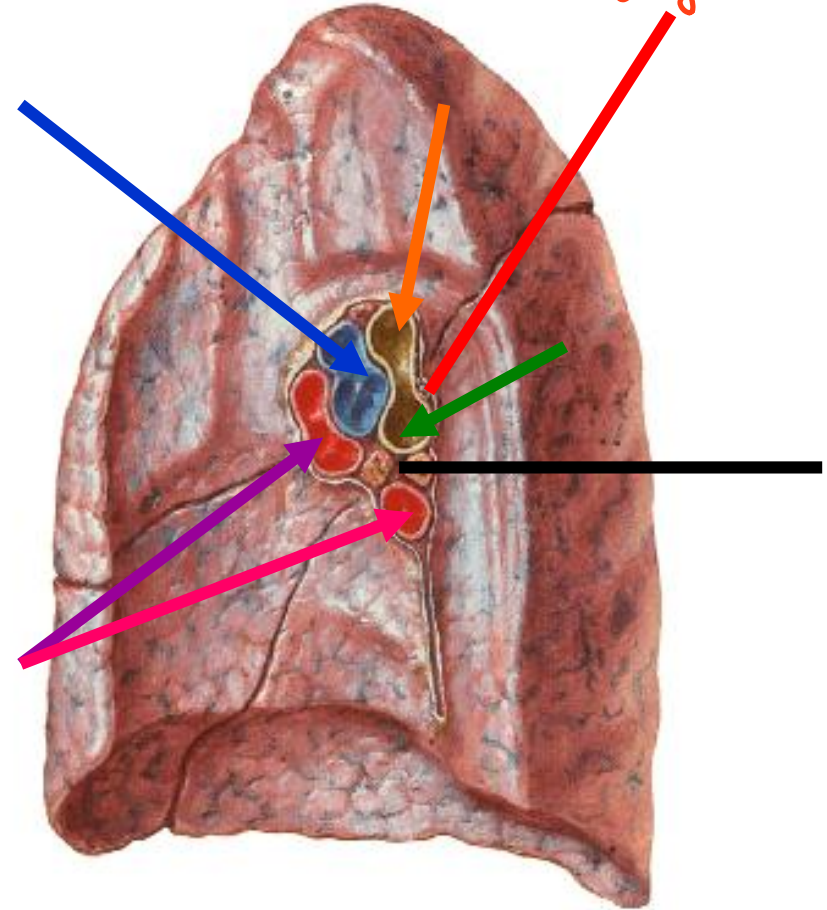
@Contains 3 minor structures → **bronchial vessels**, pulmonary plexuses & bronchopulmonary LNs.

قسطا

- Three lobes

Right Lung
Medial View

Because we can see Root of the Lung.



انتبهوا للفريق
ما بين ال Right & left.

Root of left lung

Left Lung
Medial View

- two lobes
- one main bronchus

@Contains 3 major

structures → one main bronchus, one pulmonary artery & 2 pulmonary veins (upper & lower).

most posterior

in the apex of the Root

@Contains 3 minor

structures → bronchial vessels, pulmonary plexuses & bronchopulmonary LNs.

فراصة

مكان ال heart

