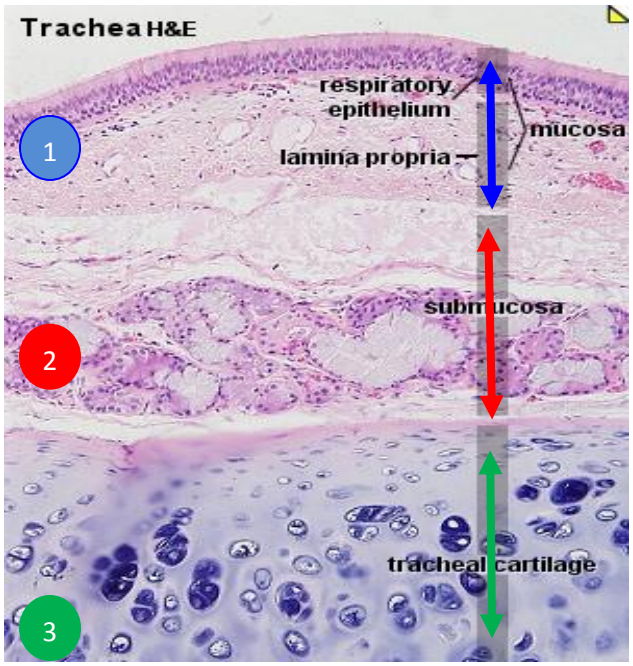
King Saud University
College of Medicine

431 Histology team

1- Trachea + The primary bronchus (Extrapulmonary Bronchus)



1- Mucosa

-Respiratory Epithelium (Pseudo-stratified columnar ciliated epithelium with goblet cells)
-Lamina propria
-Elastic Lamina contains elastic fibers and separates mucosa from submucosa

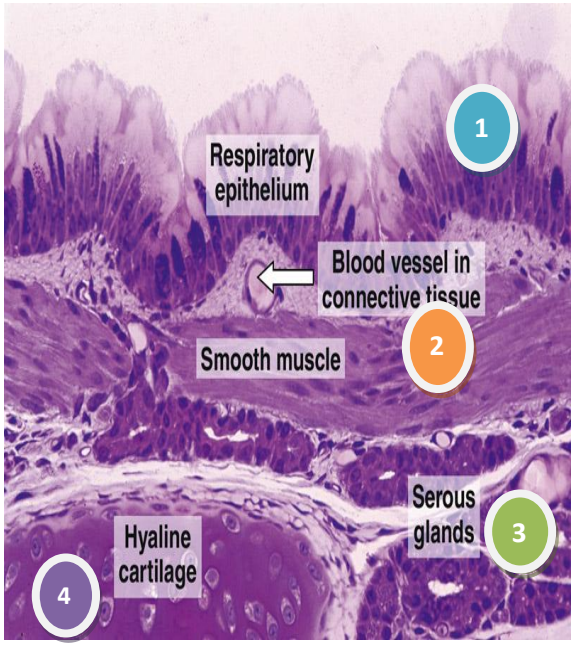
2- Submucosa

-C.T.
-Mucous glands and seromucous glands
-Lymphoid elements

3- Adventitia

-Fibroelastic CT
-12-16 C-shaped hyaline cartilage the two ends are connected by Trachealis Muscle (a smooth muscle)

2- Intrapulmonary Bronchi – 2ry and 3ry



1- Mucosa the same as Trachea except
No elastic Lamina, instead it is replaced by a second layer of muscle coat

2- Muscle coat
- Two spirally arranged layers of smooth muscles

3- Submucosa the same as Trachea
No mucous glands, only seromucous is present.

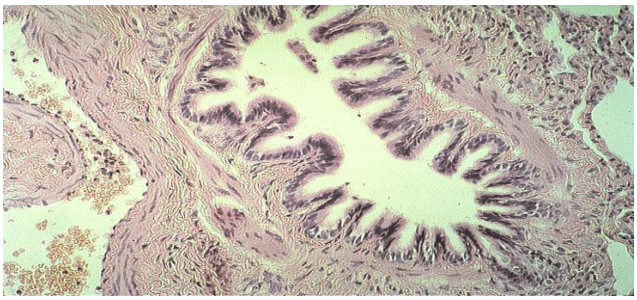
4- Adventitia
-Loose CT
-Complete layer of Irregular plates of Hyaline cartilage
-Lymphoid nodules

	Trachea	Bronchus
Cartillage	C-shaped hyaline cartilage	Complete round plate of irregular hyaline cartilage
	BOTH in the Adventitia (outermost connective tissue covering of any organ)	
Muscle	The trachealis muscle that connects the two ends of the C-shaped hyaline cartilage	Many spirally arranged muscles

3- **Bronchioles**

- **Preterminal Bronchioles (Also called bronchioles)**
- **Terminal Bronchioles**
- **Respiratory Bronchioles**

In them, the mucous is highly folded, the epithelium starts to change, no cartilage.



1- **Mucosa:**

- **Epithelium**
- **Lamina propria**

A-Preterminal Bronchioles: Simple ciliated columnar with occasional goblet cells.

B-Terminal Bronchioles: Simple cuboidal partially ciliated epithelium, the goblet cells terminates and Clara cells appear

C-Respiratory Bronchioles: Similar to terminal (simple cuboidal partially ciliated with Clara cells) but surrounded by alveoli so it appears interrupted by sqamous cells

***Clara cells:**

They are stem columnar non ciliated cell.

- **Produce Surfactant-like substance**
- **Degrade toxins in inhaled air**
- **Divide to regenerate the bronchiolar epith.**

2- **Smooth Muscle**

2 helically arranged.

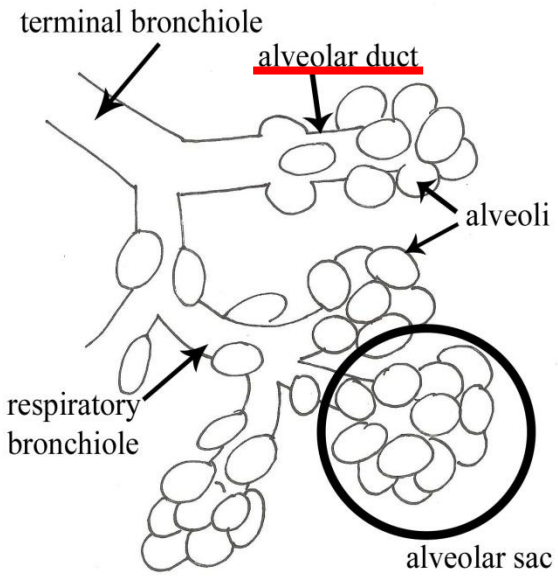
3- **Adventitia**

Only contains C.T. NO CARTILAGE

NOTE: Because there is no submucosa, there are no glands nor lymph nodules.

ALVEOLAR DUCTS:

The wall of the alveolar duct is formed by a series of pulmonary alveoli.



Function:

Alveolar duct → ends by: atrium → communicates with: 2-3 alveolar sacs.

PULMONARY ALVEOLI:

are spherical (outcroppings\out-pouching= تفرع خارجي) of the respiratory bronchioles, alveolar ducts & alveolar sacs.

INTERALVEOLAR SEPTA:

A Partition between adjacent pulmonary alveoli which separate them.

Components: Alveolar Epithelium (on the both side of the septum) & Interstitium

(1)ALVEOLAR EPITHELIUM: **Type I Pneumocytes: simple squamous epithelium, its function is Exchange of gases**

Type II Pneumocytes: simple cuboidal epithelium With Foamy cytoplasm, the cytoplasm contains Lamellar bodies (contain pulmonary surfactant).

Function of pneumocyte II:

1- **Stem cell: can divide to regenerate both type of pneumocytes**
2- **Synthesis & secretion of pulmonary surfactant**

Note: although type II more numerous than type I pneumocytes, type II line 5% of the alveolar surfaces and type I line 95% of the alveolar surface.

(2)Interstitium: **Continuous Pulmonary Capillaries** (continuous means there is no opening through it to prevent the transfer of the pathogen from the lung to the blood)

Interstitial C.T: fibers & cells
elastic fibers & type III collagen (reticular fibers).
Fibroblasts, Macrophages **(dust cells)***, Mast cells &Lymphocytes

Dust cells:
Can also be found in the pulmonary alveoli **Function:** phagocytosis

Pleura: **formed of two layers, Parietal and visceral pleura.**

They formed of simple squamous mesothelium and separated by serous fluid

Blood-gas barrier*:

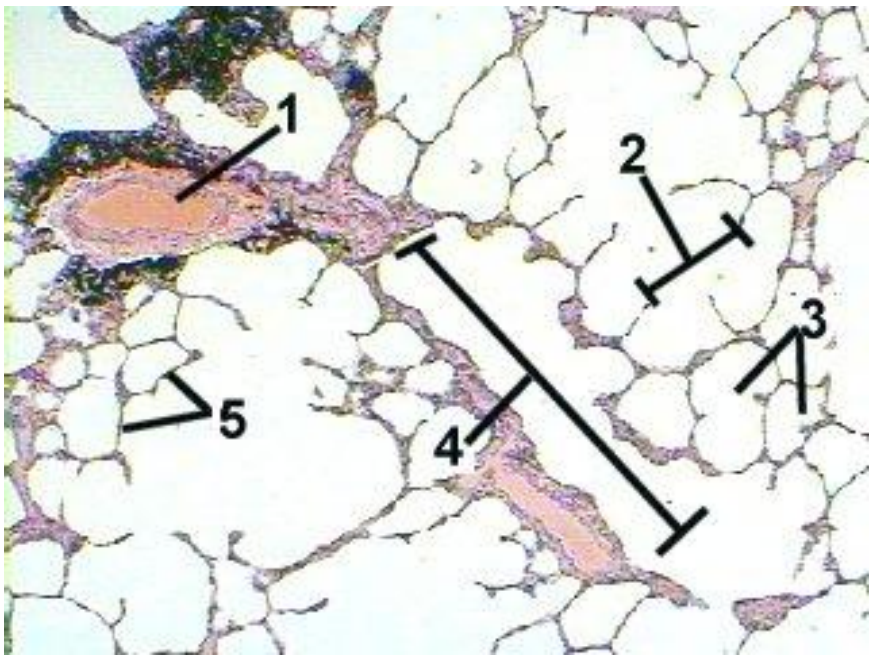
It's the region of the intralveolar septum that is traversed by O2 &CO2

Component: 1- thin layer of surfactant 2- type I pneumocyte 3-fused basal lamina 4- endothelial cells of pulmonary capillary

***(Explanation: the gas can exchange only when there is a pulmonary capillary with no interstitial fibers or cells, so that will enable the gas exchange.)**

Test your self & Take a quiz

Identefy 1,3,4,5



Answers:

1. Blood vessel
3.Pulmonary alveoli
4. Alveolar duct
5. Interalveolar septa