



Respiratory System



Respiratory system is divided into two parts:

A- Conducting portion consists

- 1- Nasal cavity
- 2- pharynx
- 3- Larynx
- 4- Trachea
- 5- Bronchi
- 6- Terminal bronchioles

functions : two

- 1- provide a passage through which air moves to and from alveoli.
- 2- cleans and humidifies inspired air



B- Respiratory portion consists:

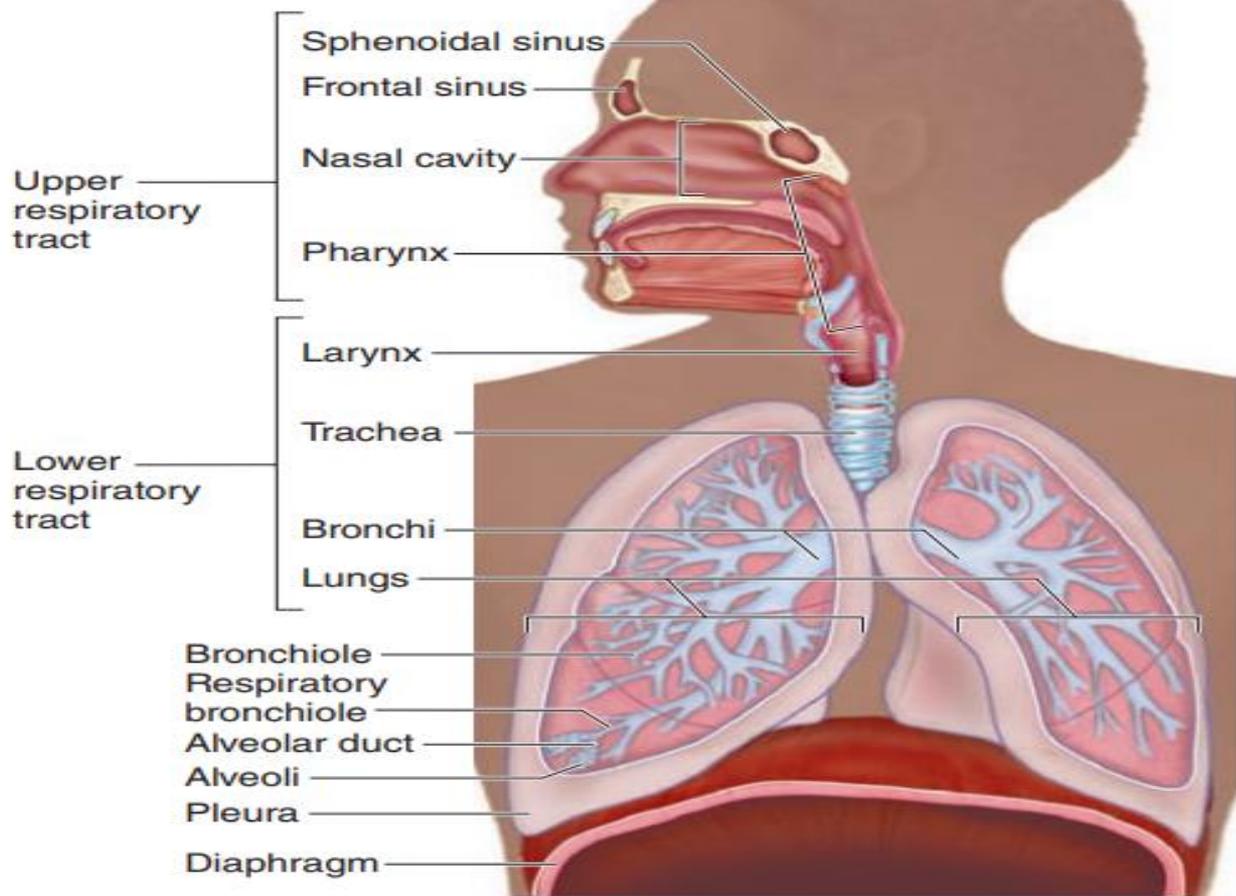
1- Respiratory bronchioles

2- Alveolar ducts

3- Alveoli

-**Function** is the exchange of O₂ and CO₂ between inspired air and blood.

Q/ Where is the gases exchange occur ? In which organ?



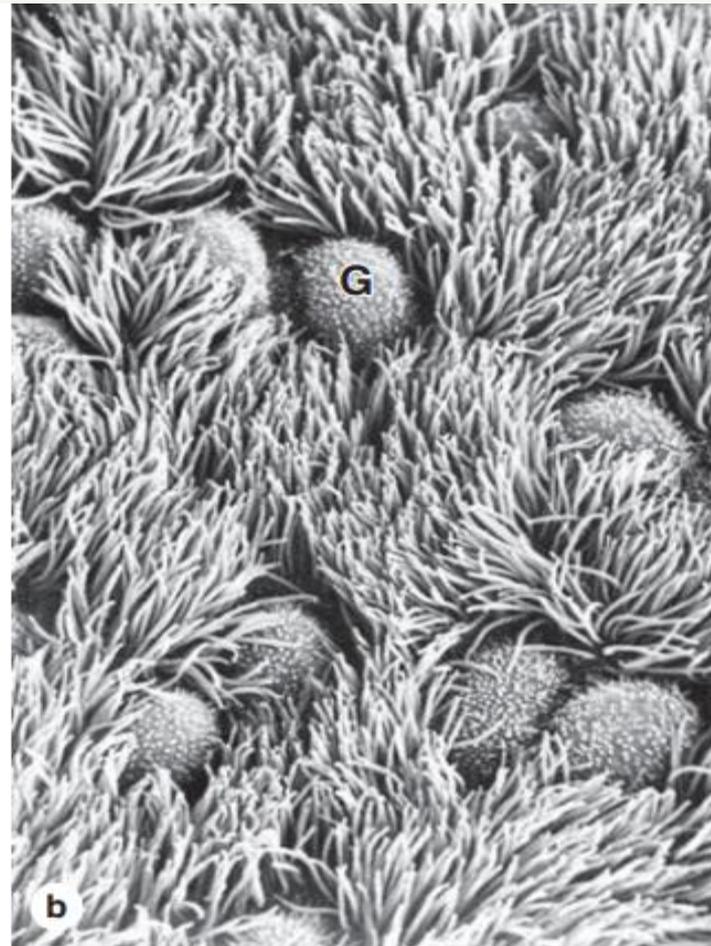
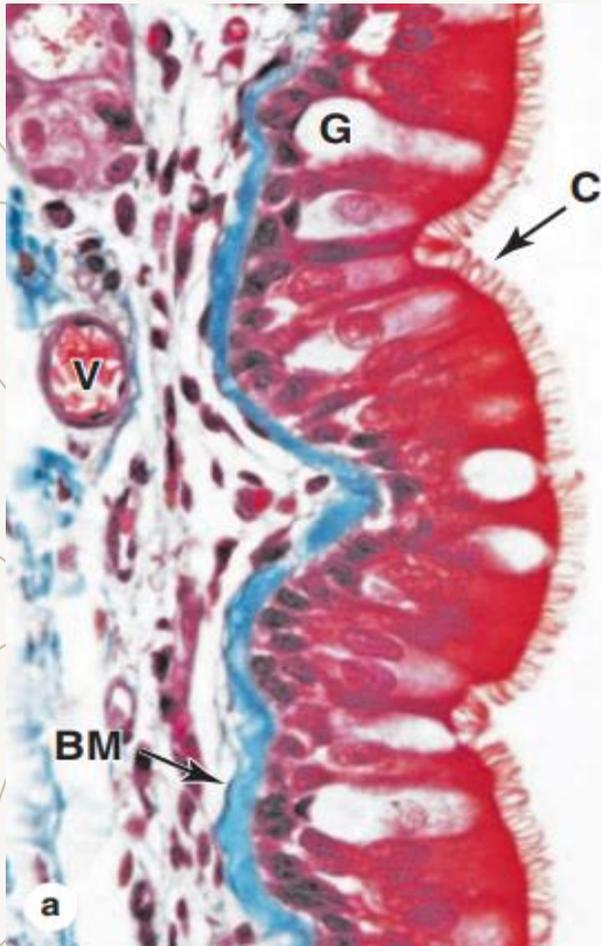
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Note: to ensure an uninterrupted supply of air ,

A combination of cartilage , elastic and ,collagen fibers and smooth muscle to provide the conducting portion with rigidity and flexibility.

Respiratory Epithelium ,What is it?

- The mucosa lining most regions of the nasal cavities and conducting portion of the respiratory system bears ciliated pseudostratified columnar epithelium, .
- The tissue has at least **five** cell types on it basement membrane which are :
 - 1- **Ciliated columnar cells**: most abundant .
 - 2- **Goblet cells** : with mucin glycoproteins –numerous.
 - 3- **Brush cells** : are few, they have microvilli on free surface and secrete serous fluid
 - 4- **Small granule cells**: lie in basal layer and contain secretory granules.
 - 5- **Basal cells** : stem cells ,that give rise to other cell types



Respiratory Epithelium

Nasal Cavity (N.C.)

(1) Anterior portion of N.C. :

Vestibule: is lined with thin skin (keratinized stratified squamous epithelium) with sweat glands, sebaceous glands, and coarse, moist vibrissae (hairs).

(1) Posterior portion of N.C. :

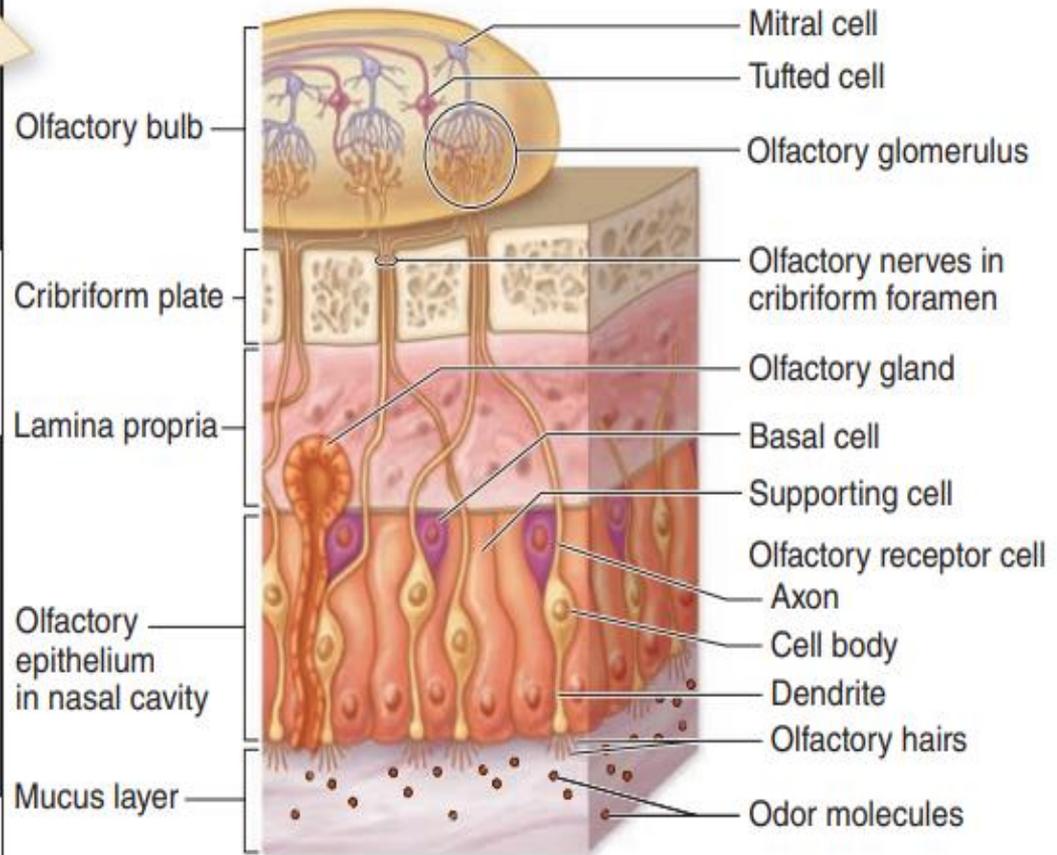
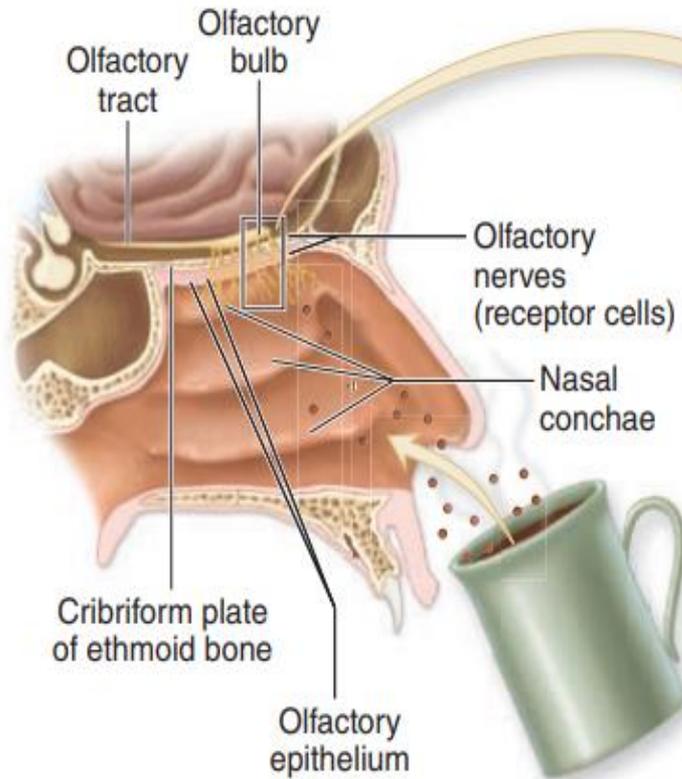
a- **Olfactory region.**

b- **Respiratory region**

Olfactory region of nasal cavity

- Superior regions of nasal cavities.
- Smell (olfaction)
 - smelling receptors are located in the epithelium (area:10 cm²)
 - It is a pseudostratified epithelium, three types of cells
 - 1- basal cells = stem cells
 - 2- columnar supporting cells
 - 3- olfactory neurons

The lamina propria of the olfactory epithelium possesses, the olfactory glands secreting into the surface mucus a watery fluid containing lysozyme and other innate immune factors, IgA.





Respiratory region of nasal cavity

MUCOSA (Mucous Membrane):

(A) Epithelium:

Pseudo-stratified ciliated columnar epithelium with goblet cells (respiratory epithelium).

(B) Lamina propria :connective tissue contains:

- 1- Loops of capillaries (highly vascularized)
- 2- Many seromucous glands.
- 3- Abundant lymphoid elements: including occasional lymphoid nodules, plasma cells & mast cells

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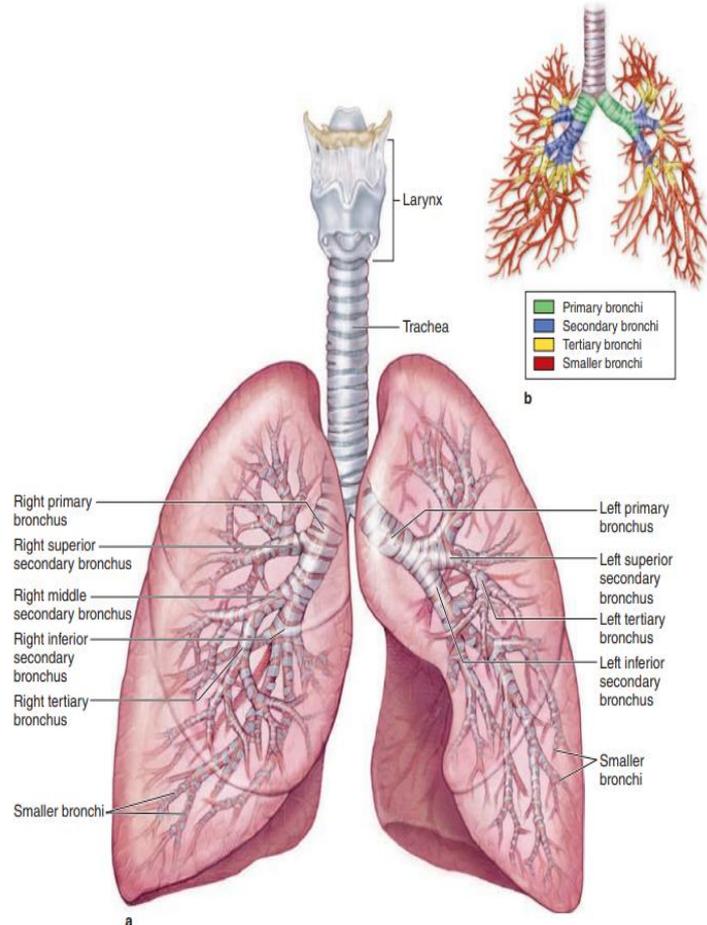
Pharynx

The first part of the pharynx , nasopharynx is lined by respiratory mucosa and continuous caudally with the posterior part of the oral cavity, the oropharynx (throat), the mucosa of which has non-keratinized stratified squamous epithelium.

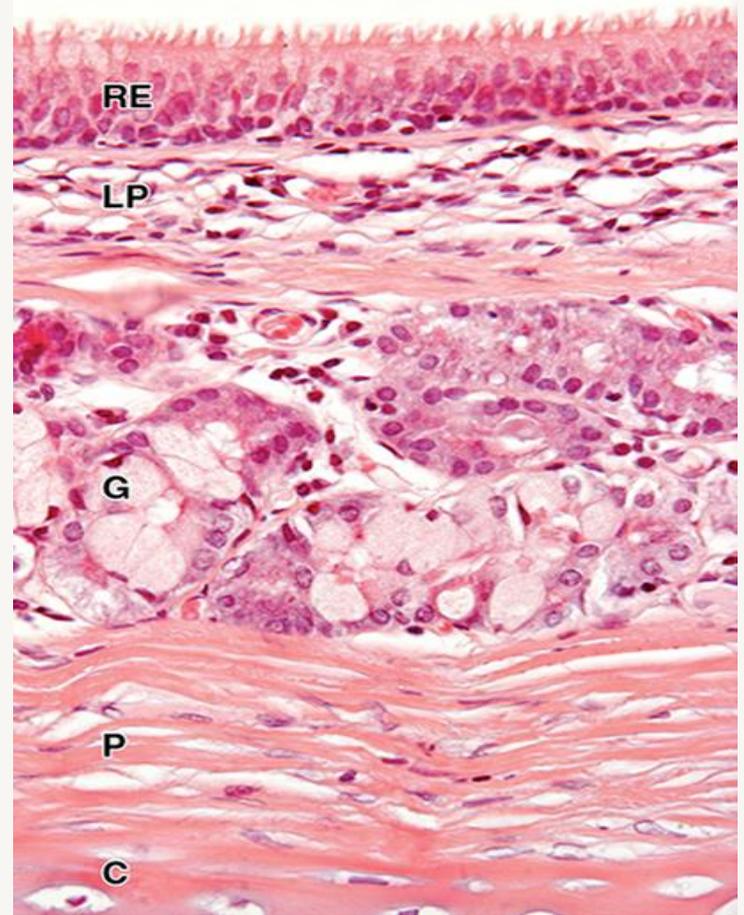
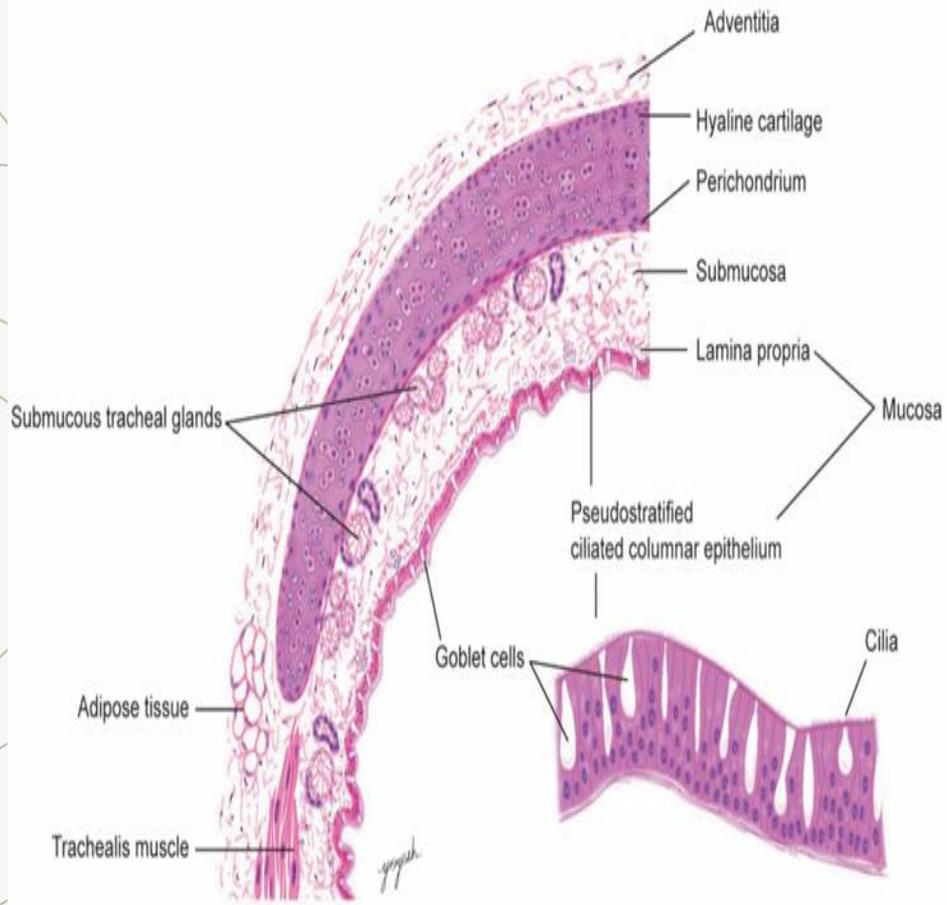
Larynx

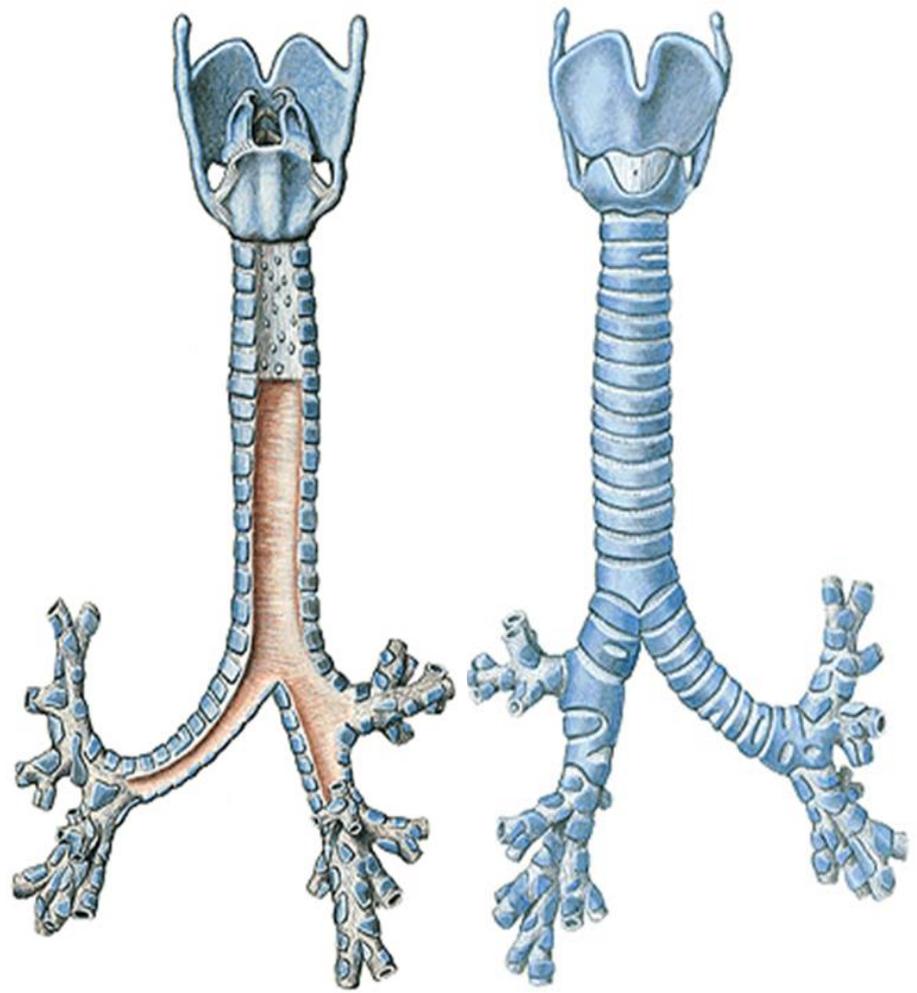
The larynx is a short passage for air between the pharynx and the trachea. Its rigid wall is reinforced by hyaline cartilage and elastic cartilage
Larynx also serves as an organ of phonation (speech)

TRACHEA



- The trachea (12-14) long
- lined with respiratory epithelium mucosa
- the lamina propria with seromucous gland
- Between the submucosa and adventitia, C-shaped rings of hyaline cartilage (function to keep the trachea open)
- The open ends of the cartilage rings are on the posterior surface, against the esophagus, bridged by smooth muscle .
- the entire trachea is surrounded by adventitia





Post.

Ant.

Notes

Trachea relaxes during swallowing to facilitate the passage of food in esophagus .

In the cough reflex the muscle contract to narrow the trachea lumen and provide for increased velocity of the expelled air and material.

Intrapulmonary airway: (airways within the lungs)

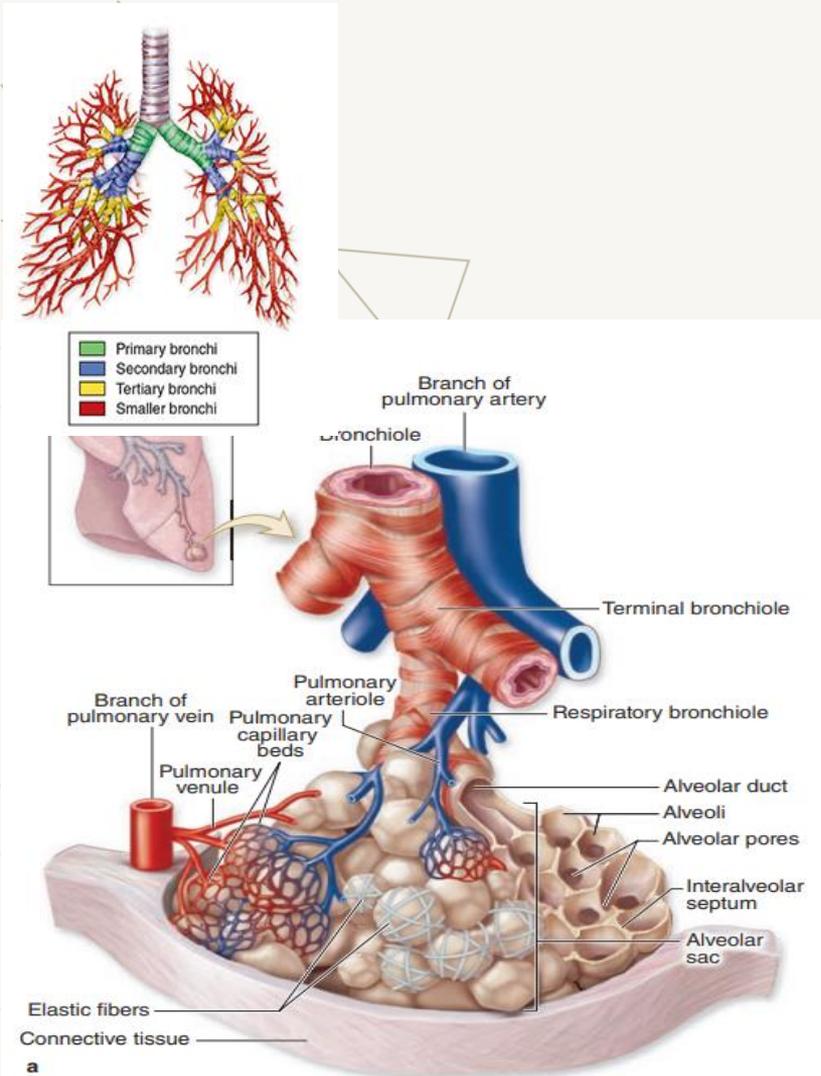
1- Bronchi (respiratory epithelium):

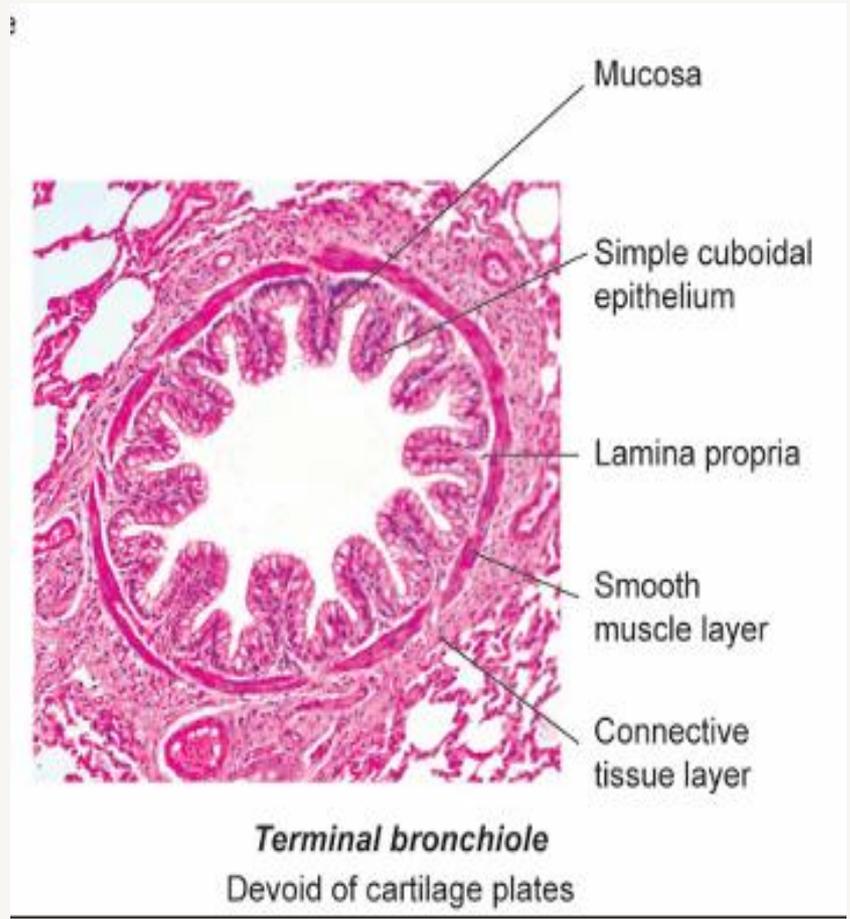
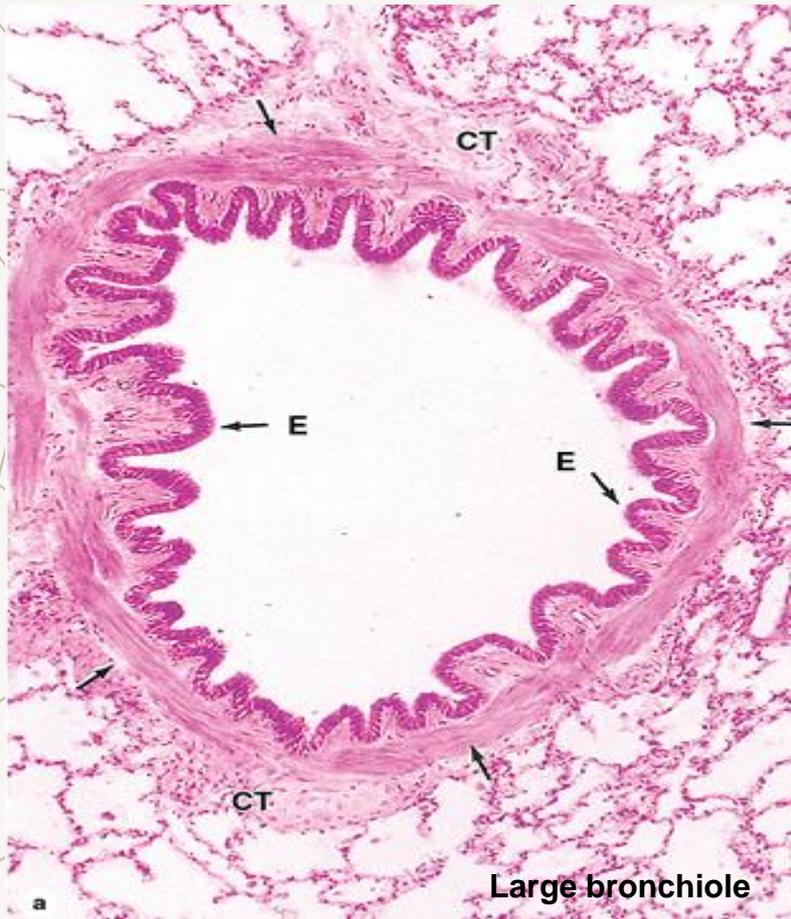
- primary
- lobar
- segmental

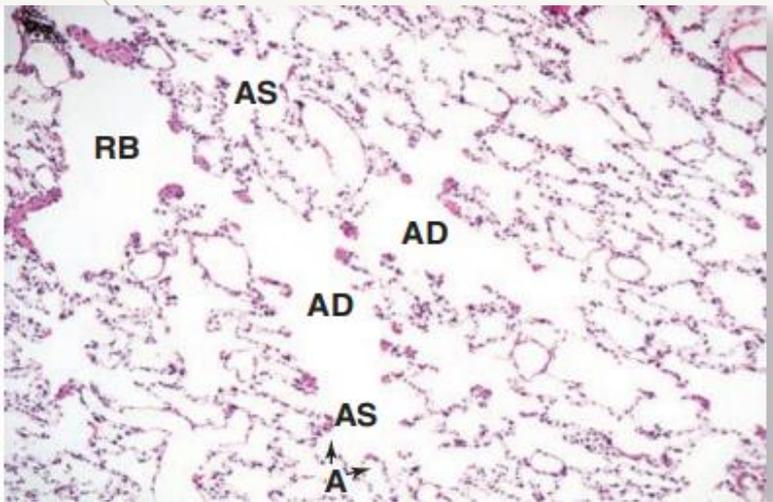
2- Bronchioles:, lack supporting cartilage and glands

- Larger bronchioles (ciliated pseudostratified columnar)
- Terminal (simple ciliated cuboidal to columnar)
- respiratory bronchioles, openings to alveoli

3- Alveolar ducts and sacs (lined with squamous cells.

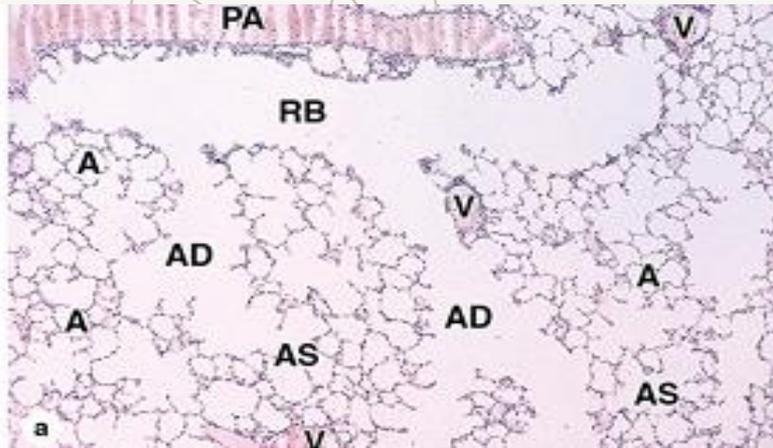






4- Alveoli

- Lined by extremely attenuated squamous cells.
- Air in these structures exchanges O₂ and CO₂ with the blood in surrounding capillaries.
- Type I alveolar cells (or type I pneumocytes) 95% of the alveolar lining
- Type II alveolar cells (type II pneumocytes) are cuboidal cells ,secrete components of **surfactant** which reduces surface tension and. helps prevent alveolar collapse at exhalation and allows alveoli to be inflated with less inspiratory force.





Thank you