

A microscopic image of lung tissue, showing a network of pink-stained alveolar walls and purple-stained nuclei. The background is a light pinkish-yellow color.

In the Name of GOD

Respiratory System

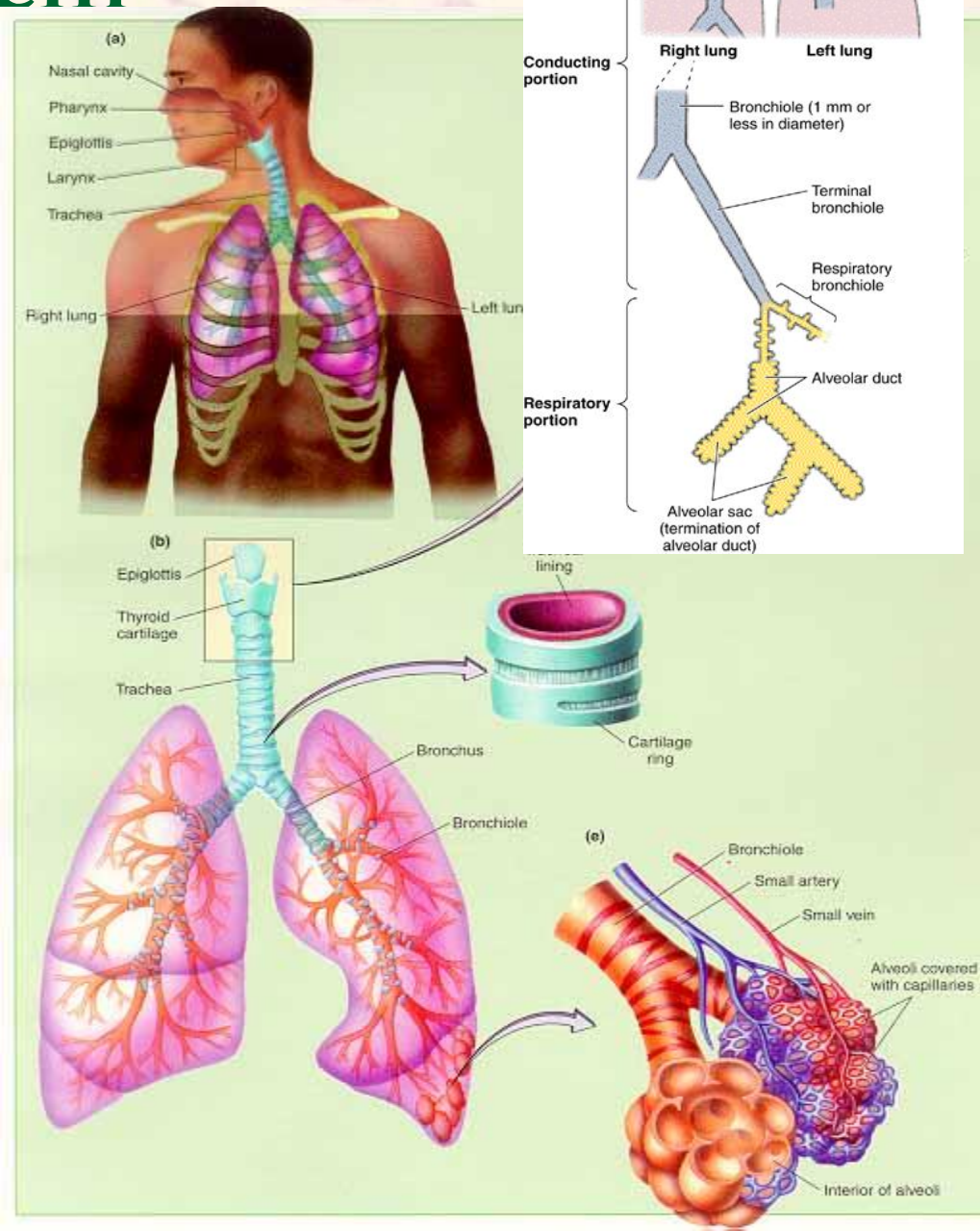
Respiratory System

■ Conducting Portion

- ❑ Nasal Cavity
- ❑ Nasopharynx
- ❑ Larynx
- ❑ Trachea
- ❑ Bronchus
- ❑ Bronchioles
- ❑ Terminal Bronchioles

■ Respiratory Portion

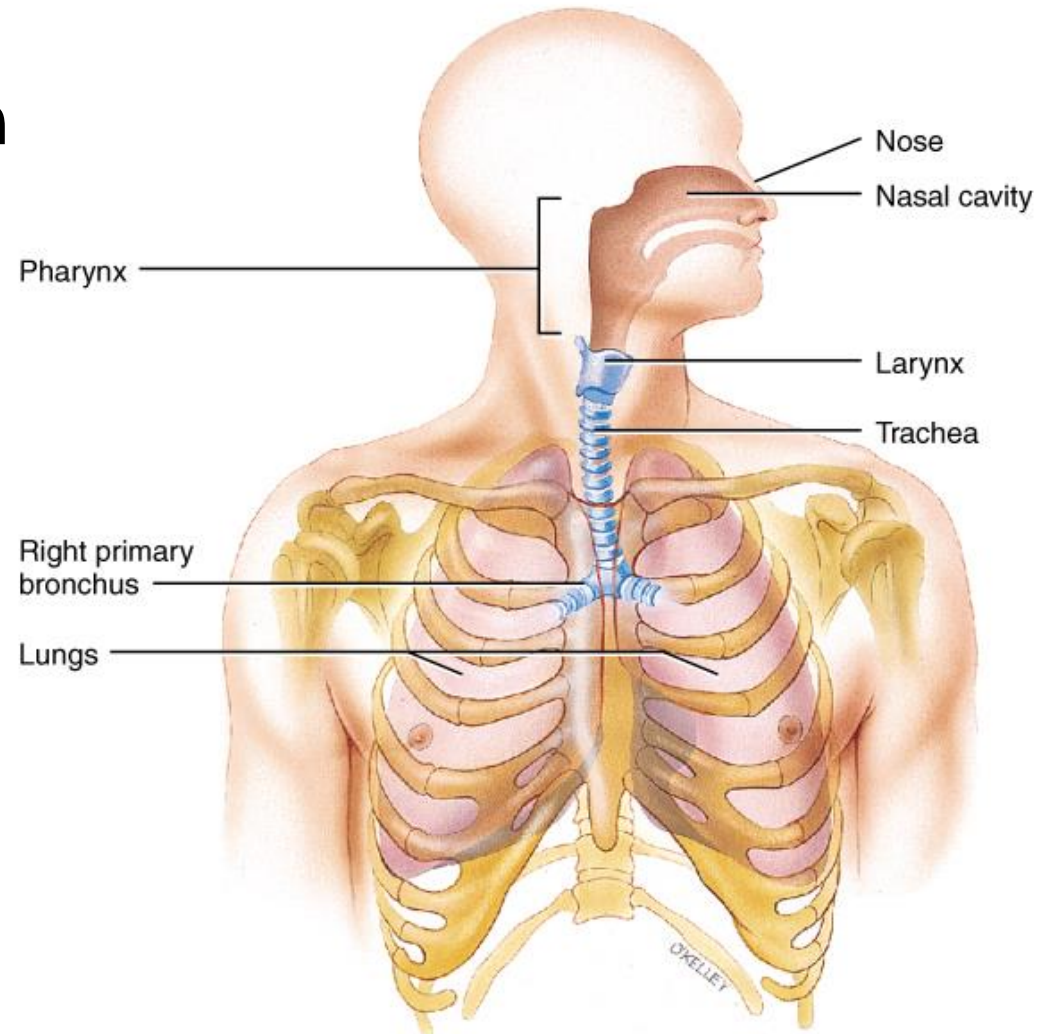
- ❑ Respiratory Bronchioles
- ❑ Alveolar Duct
- ❑ Atrium
- ❑ Alveolar Sac
- ❑ Alveoli



Respiratory System

■ Conducting Portion

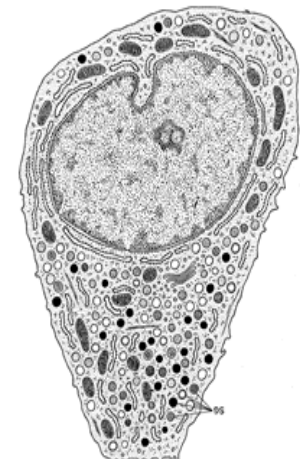
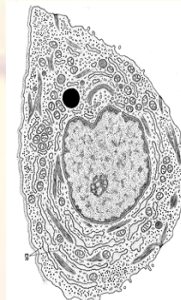
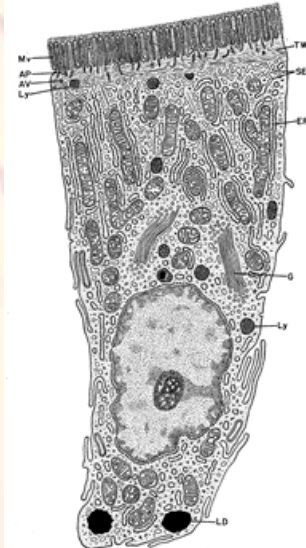
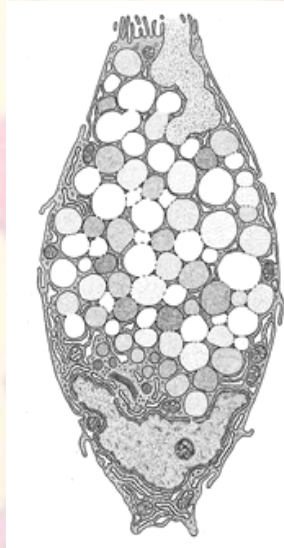
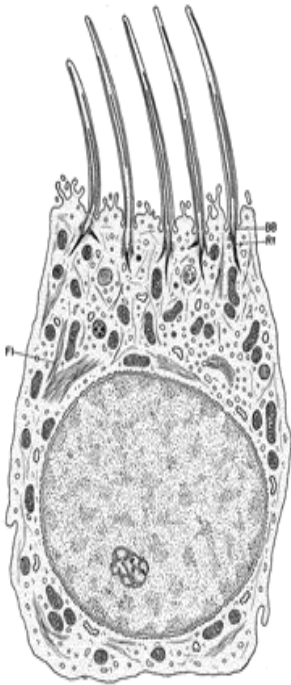
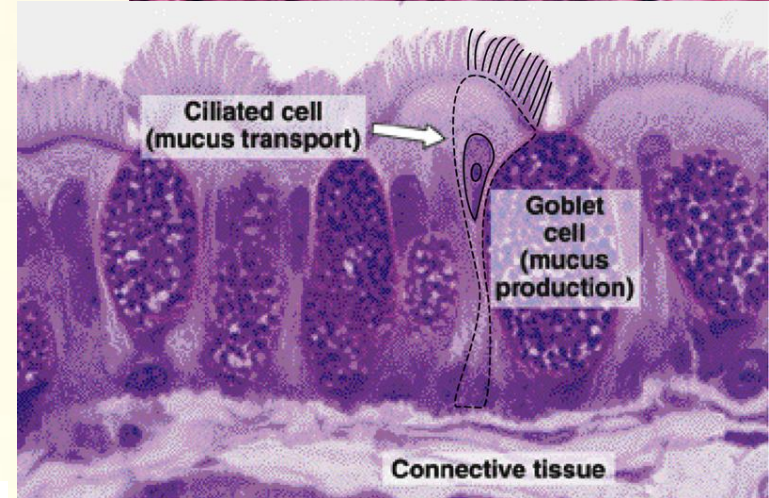
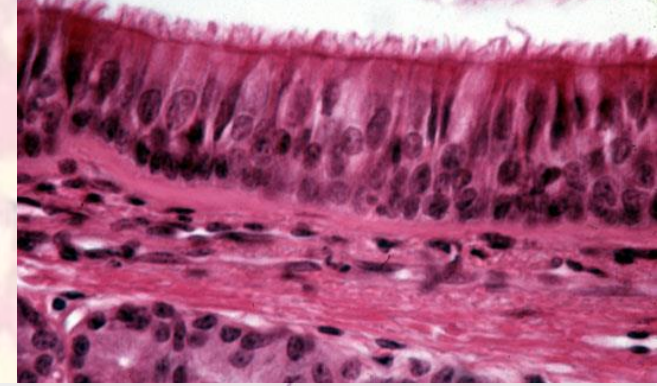
- Airway Formation
- Air Conditioning



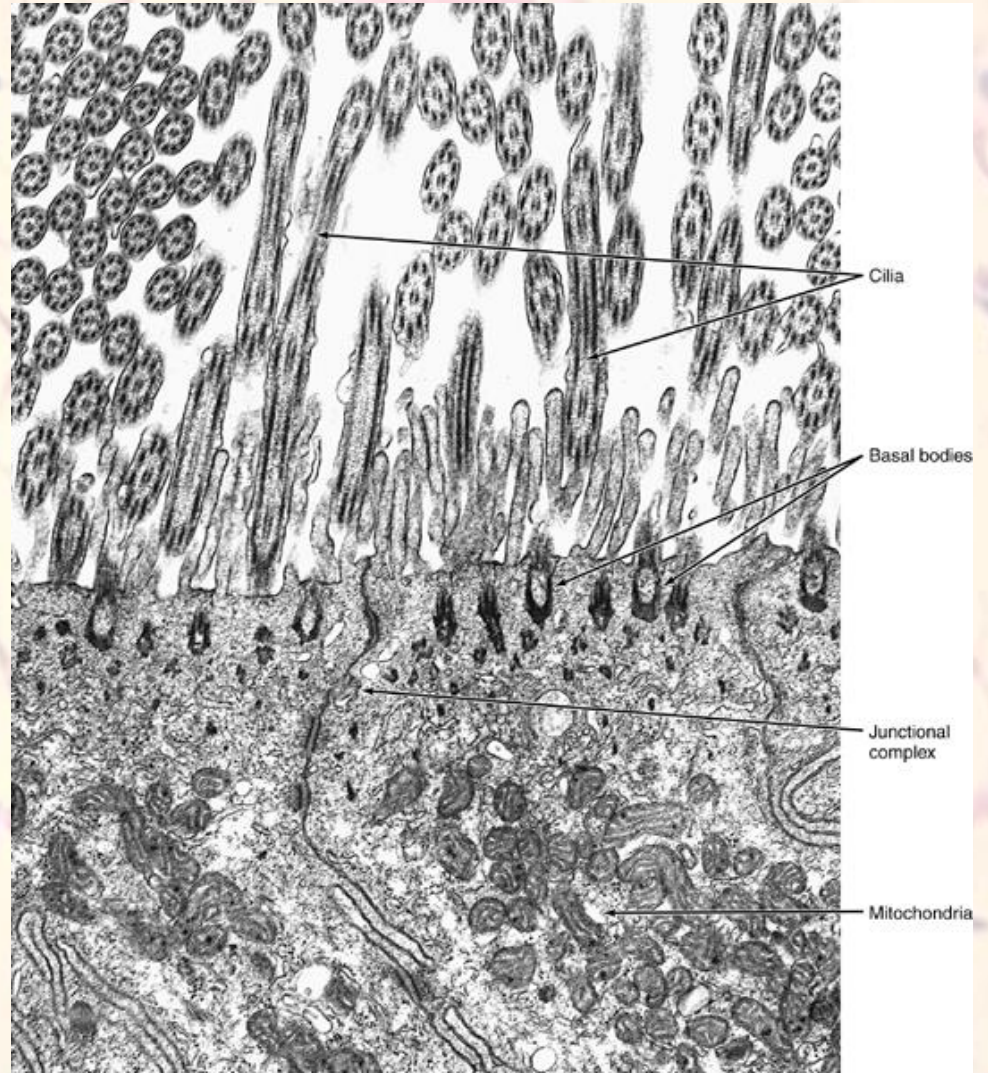
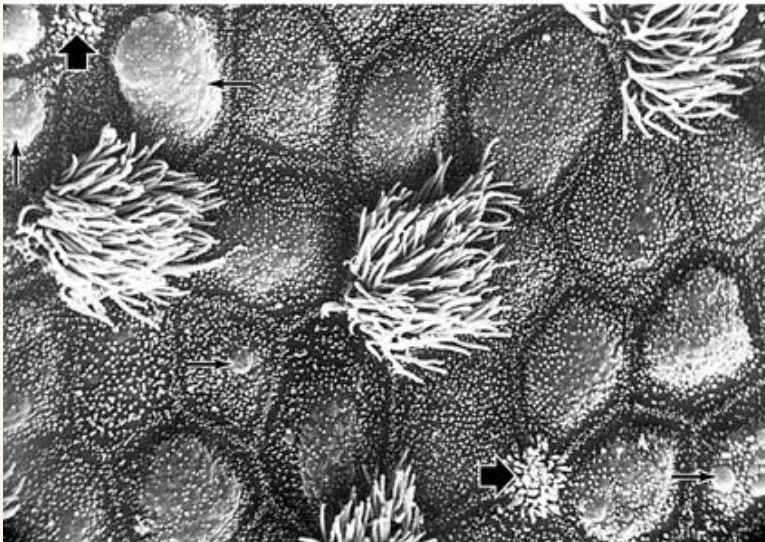
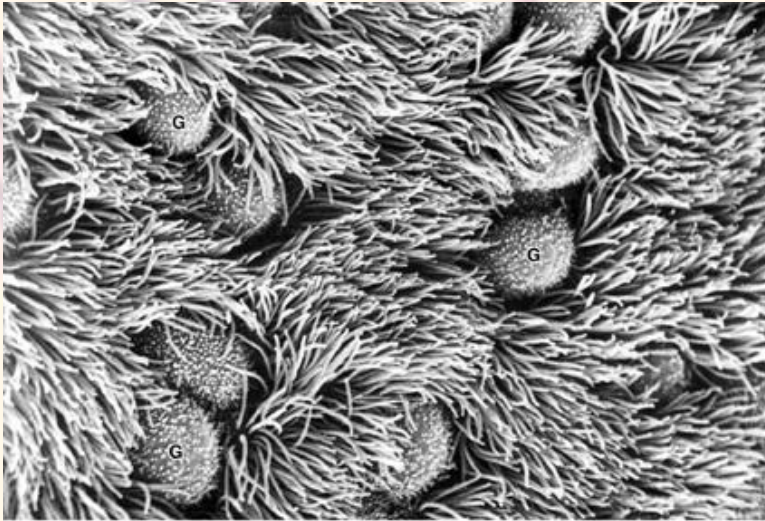
Respiratory Epithelium

■ Pseudo-Stratified Ciliated Columnar

- ❑ Ciliated Columnar Cells
- ❑ Mucous Goblet Cells
- ❑ Brush Cells (Sensory receptor)
- ❑ Basal cells
- ❑ Small Granule Cells (DNES)

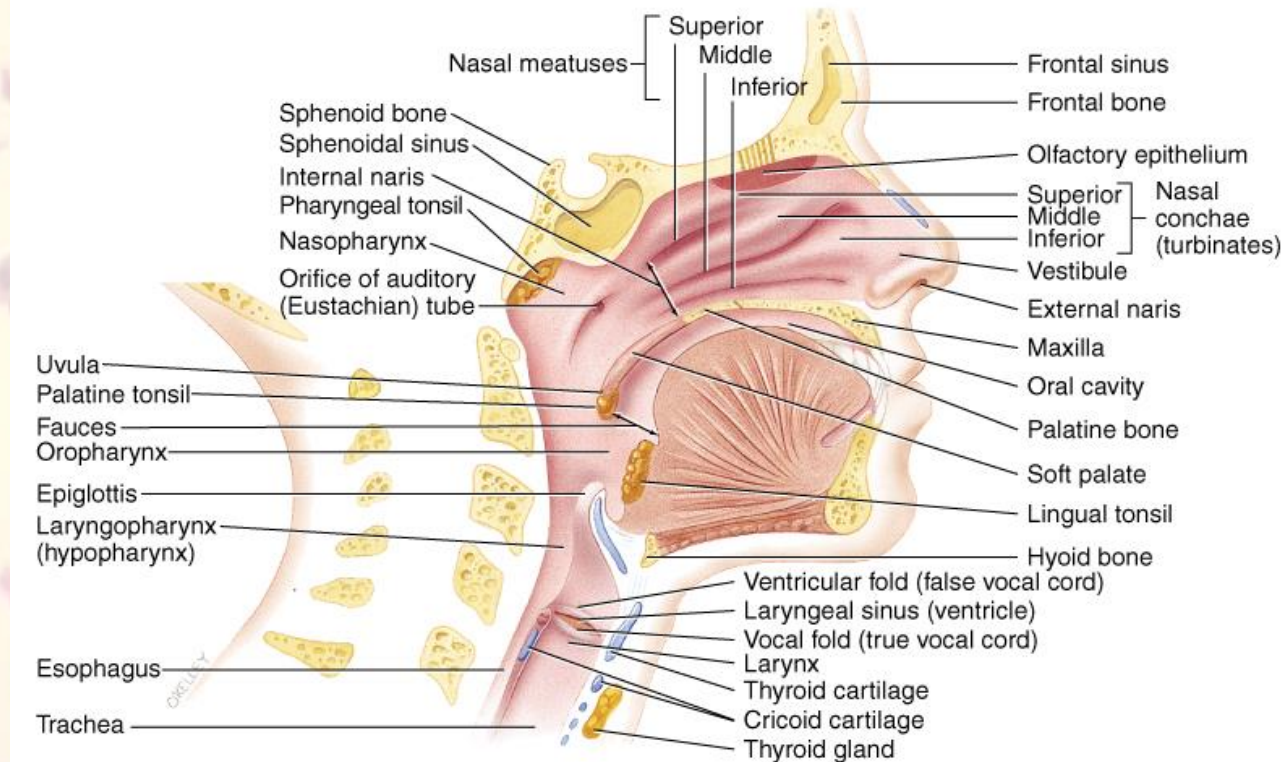


Respiratory Epithelium

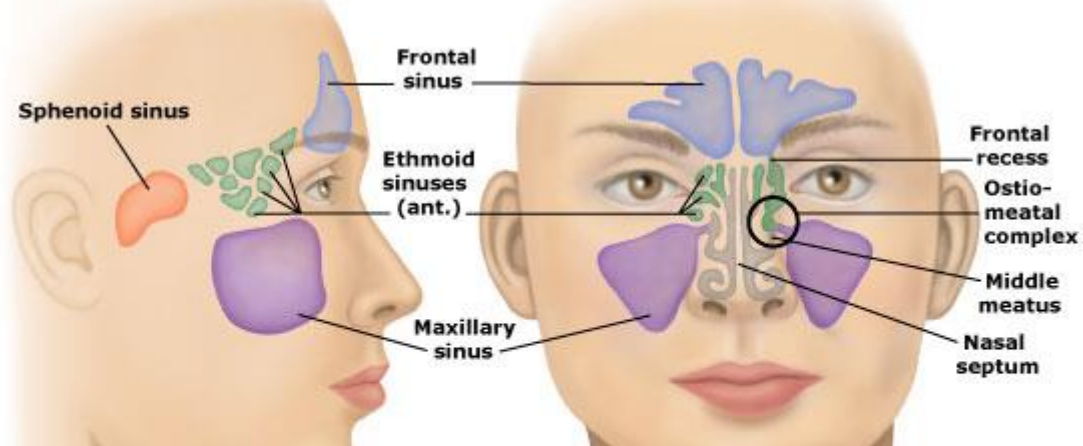


Stratified Squamous Epithelium

- Nasal Vestibule
- Oropharynx
- Lingual Surface of Epiglottis
- Vocal Fold
- Metaplasia



Nasal Cavity

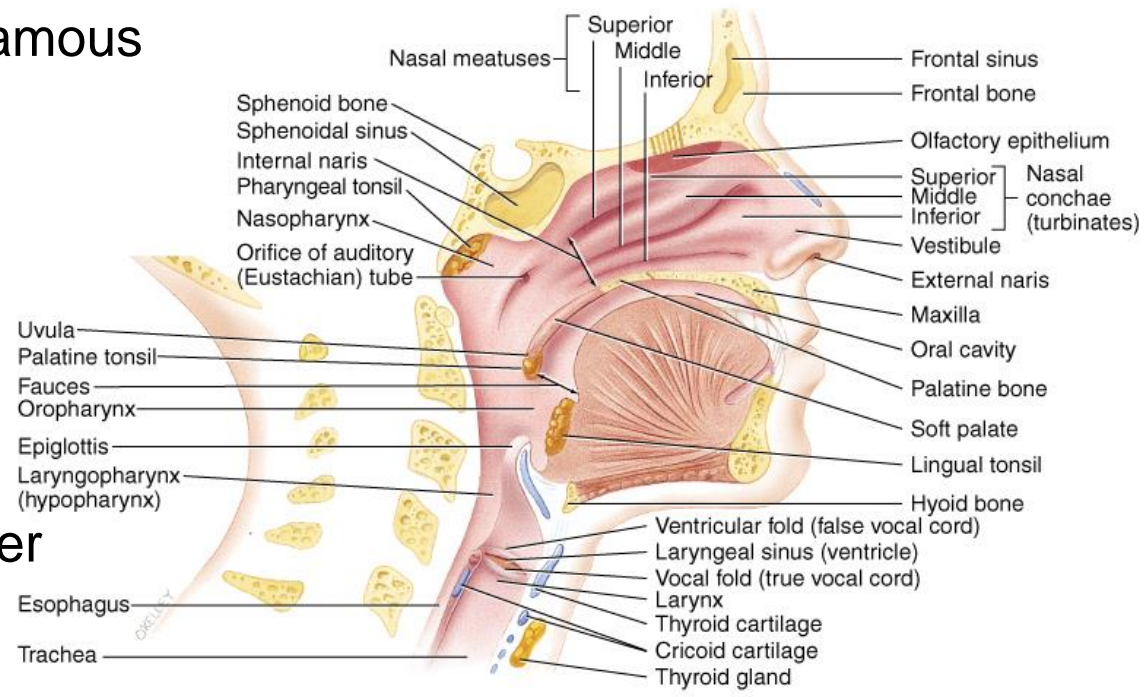


■ Vestibule

- Cornified Stratified Squamous
 - Sebaceous Gland
 - Vibrissae
- Non-Cornified SS
- Respiratory Epithelium

■ Nasal Fossa

- Two Cavernous Chamber
- Nasal Septum
- Conchae
 - Sup. C: Olfactory Epithelium
 - Mid. & Inf. C: Respiratory Epithelium



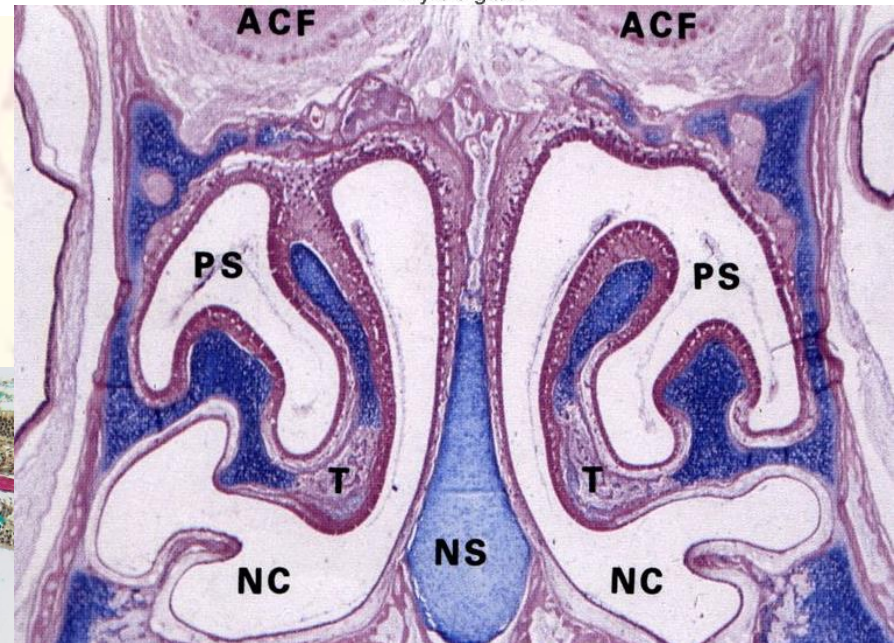
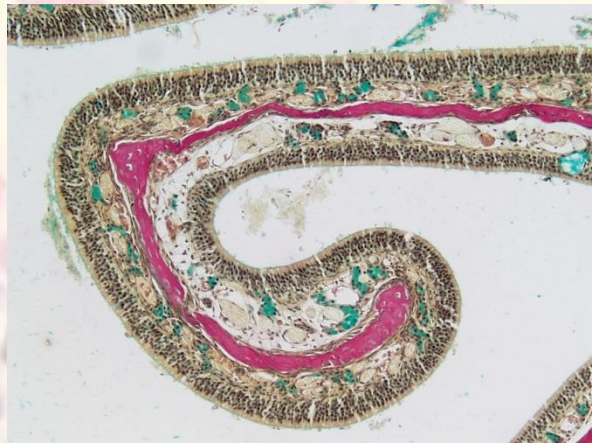
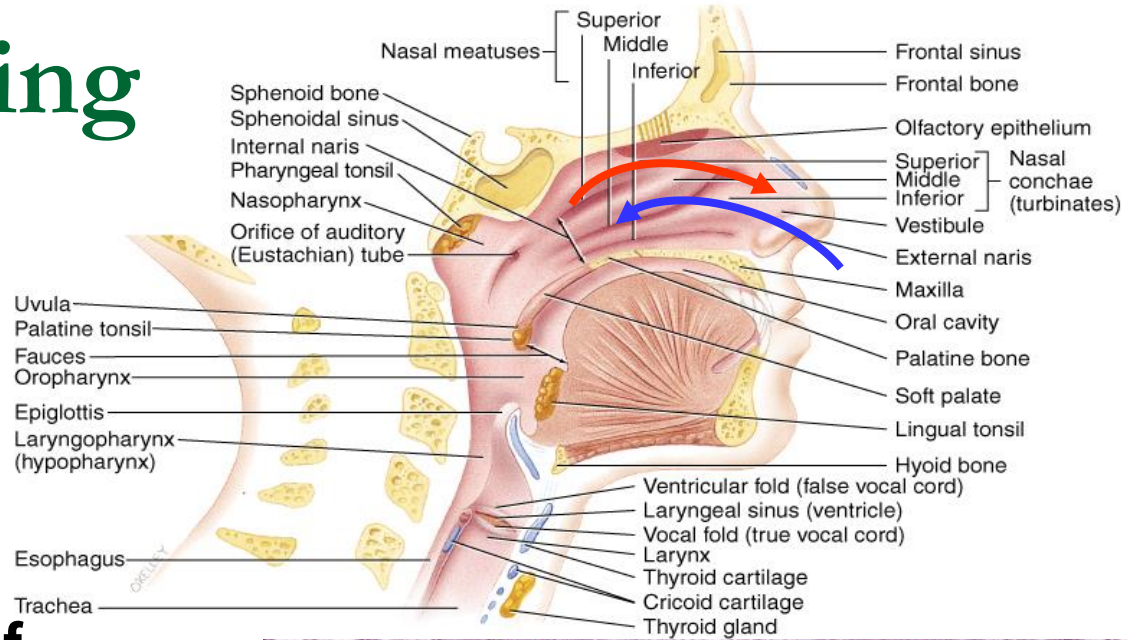
Air Conditioning

Conchae

- ❑ Surface Increasing
- ❑ Turbulence Air Flow
- ❑ Swelling Bodies (Lamina Propria)

Special Organization of Blood Vessels

- ❑ Periosteal Large Vessels
- ❑ Arcadian Branches
- ❑ Countercurrent Flow



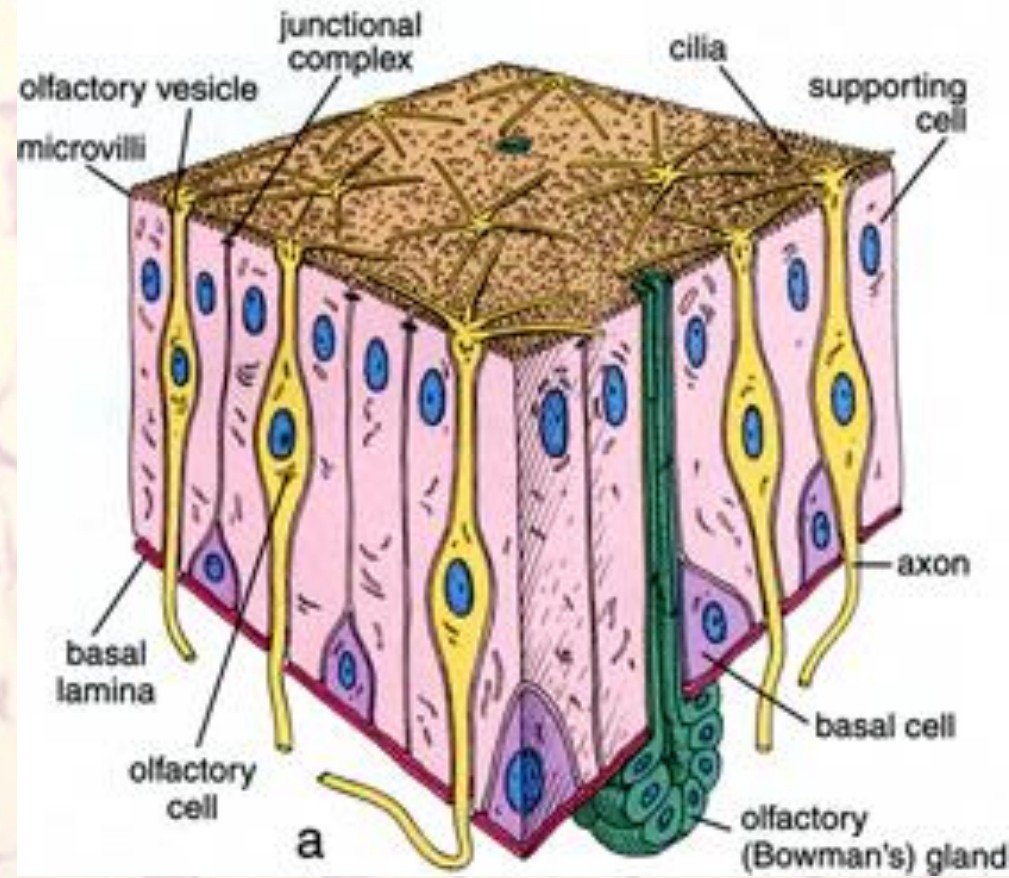
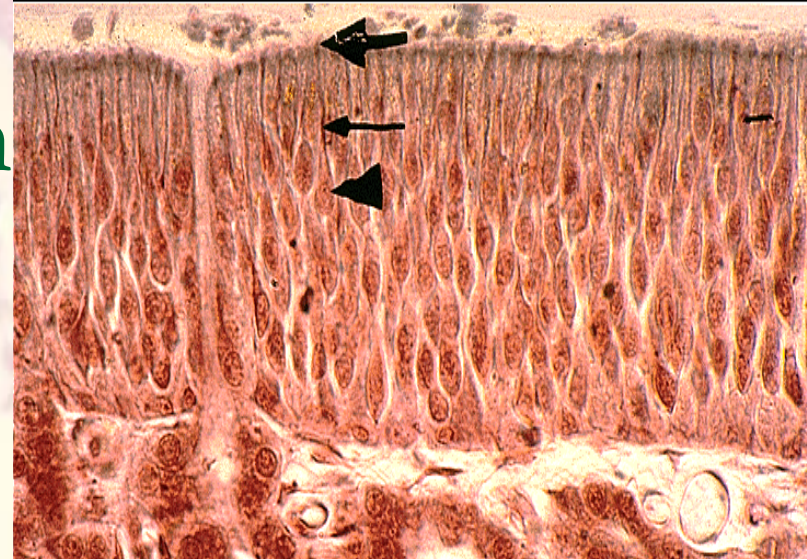
Olfactory Epithelium

■ Pseudostratified Columnar

- Supporting Cells
 - Pale Yellow Pigment & Microvilli
- Basal Cells
- Olfactory Cells (Bipolar Neurons)
 - Long Immotile Cilia

■ Lamina Propria

- Bowman's Glands



Larynx

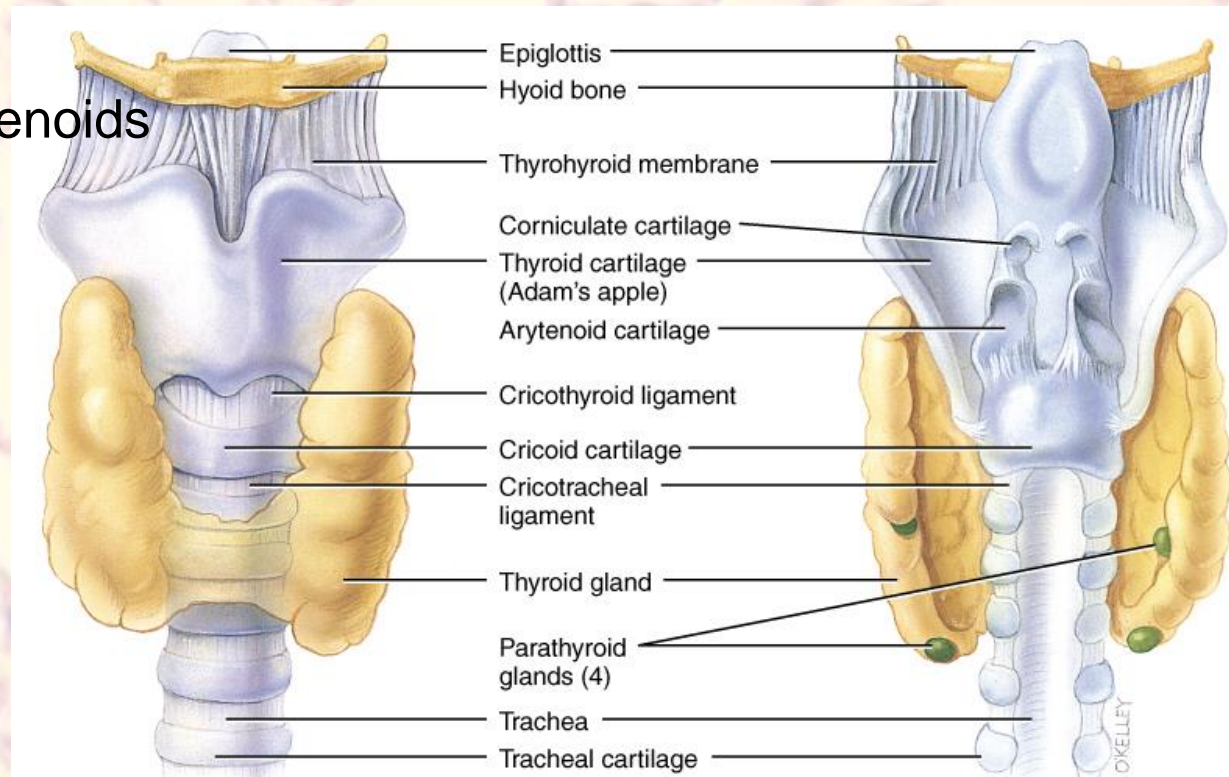
A Tube Between pharynx& trachea

■ Hyaline Cartilage

- ❑ Thyroid
- ❑ Cricoid
- ❑ Major Part of Arytenoids

■ Elastic Cartilage

- ❑ Epiglottis
- ❑ Cuneiform
- ❑ Corniculate
- ❑ Tip of Arytenoids



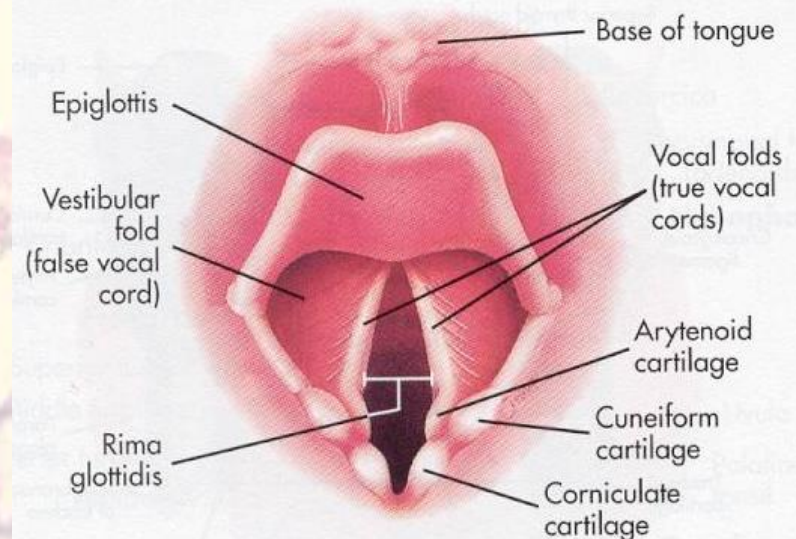
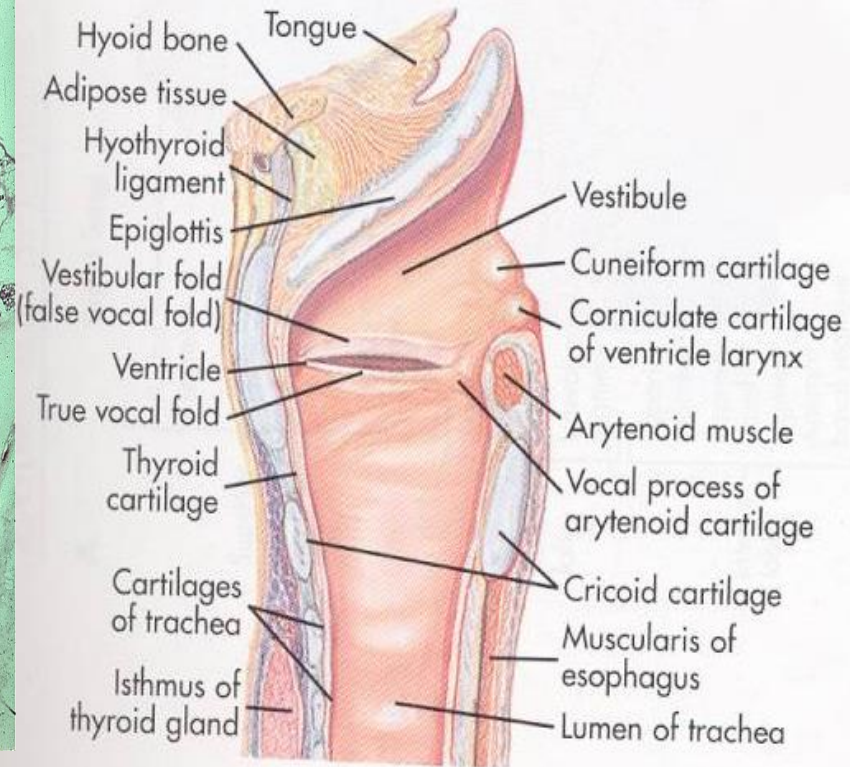
Larynx

■ Epiglottis

- Lingual Surface
 - Stratified Squamous
- Laryngeal Surface
 - Respiratory
- Seromucous Glands

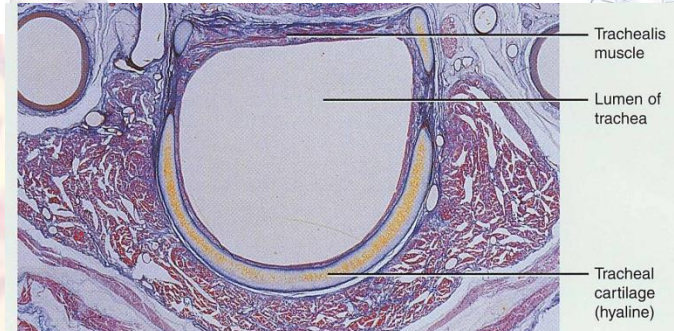
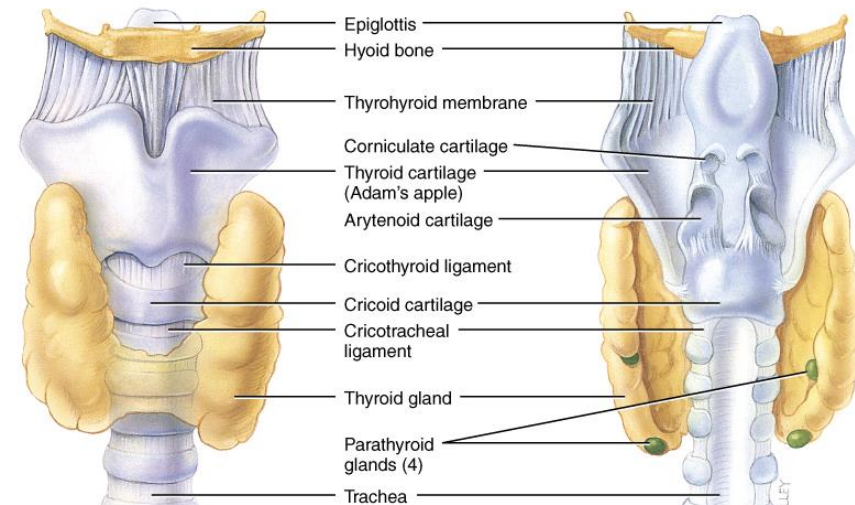
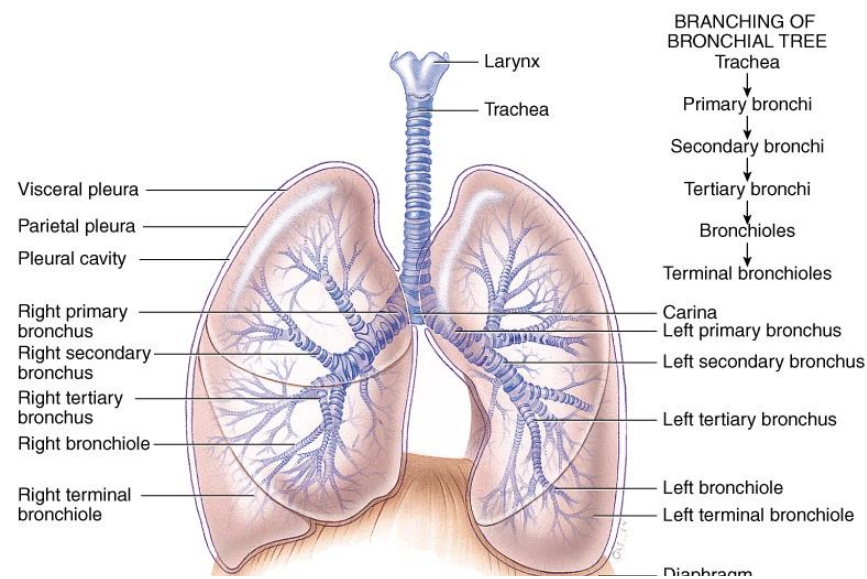
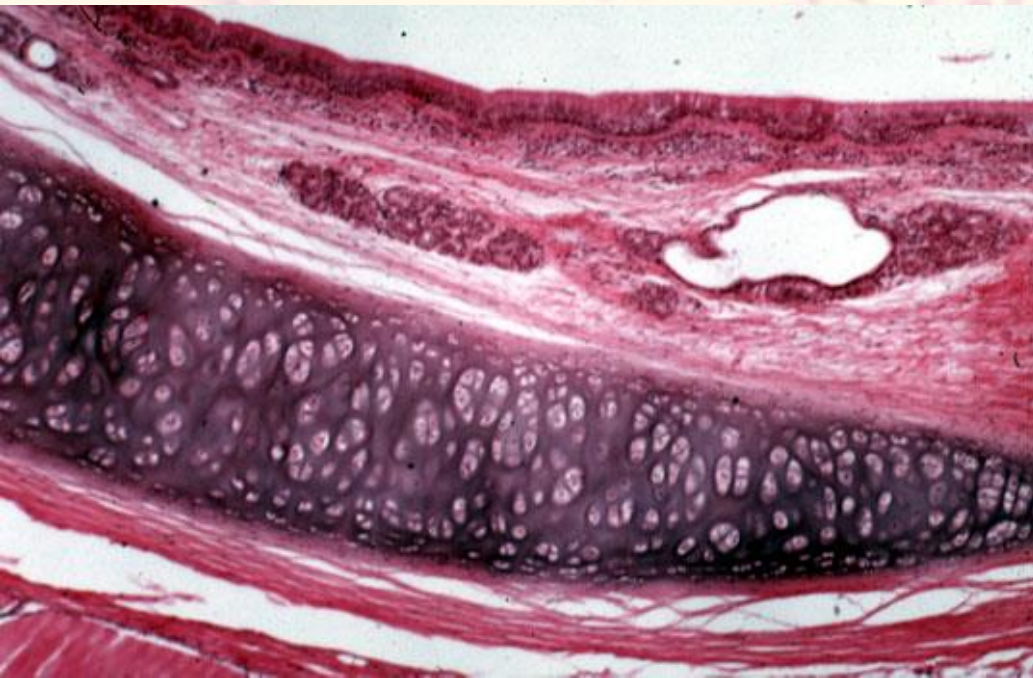
■ Vestibular Folds

- False Vocal Cords
 - Respiratory Epithelium
- True Vocal Cords
 - Stratified Squamous
- Vocal Ligaments
- Vocalis Muscles



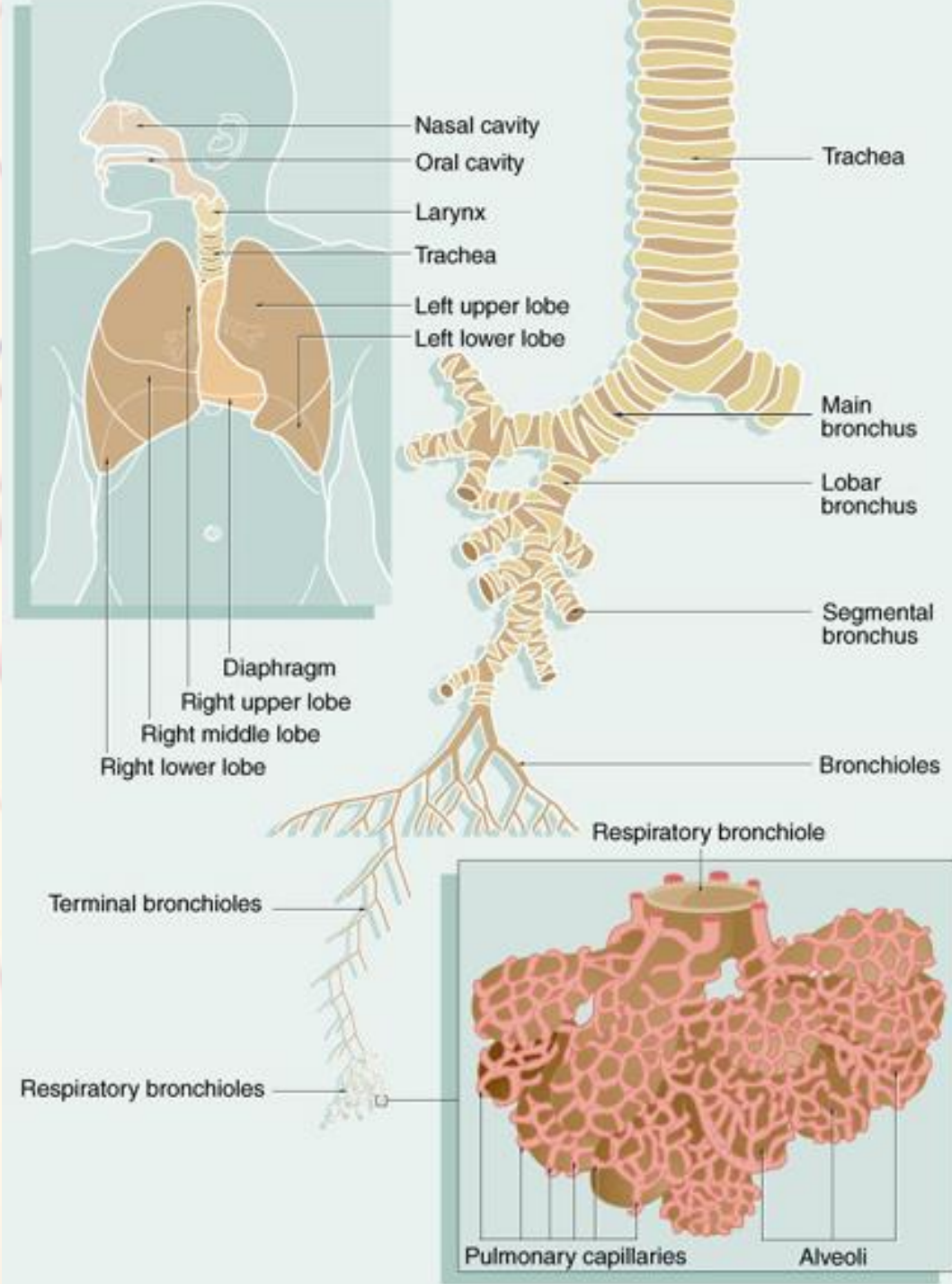
Trachea

- C-Shape Hyaline Cartilages (16-25)
- Fibroelastic Lig. & Smooth Muscle
- Respiratory Epithelium
- Lamina Propria
 - Seromucous Glands



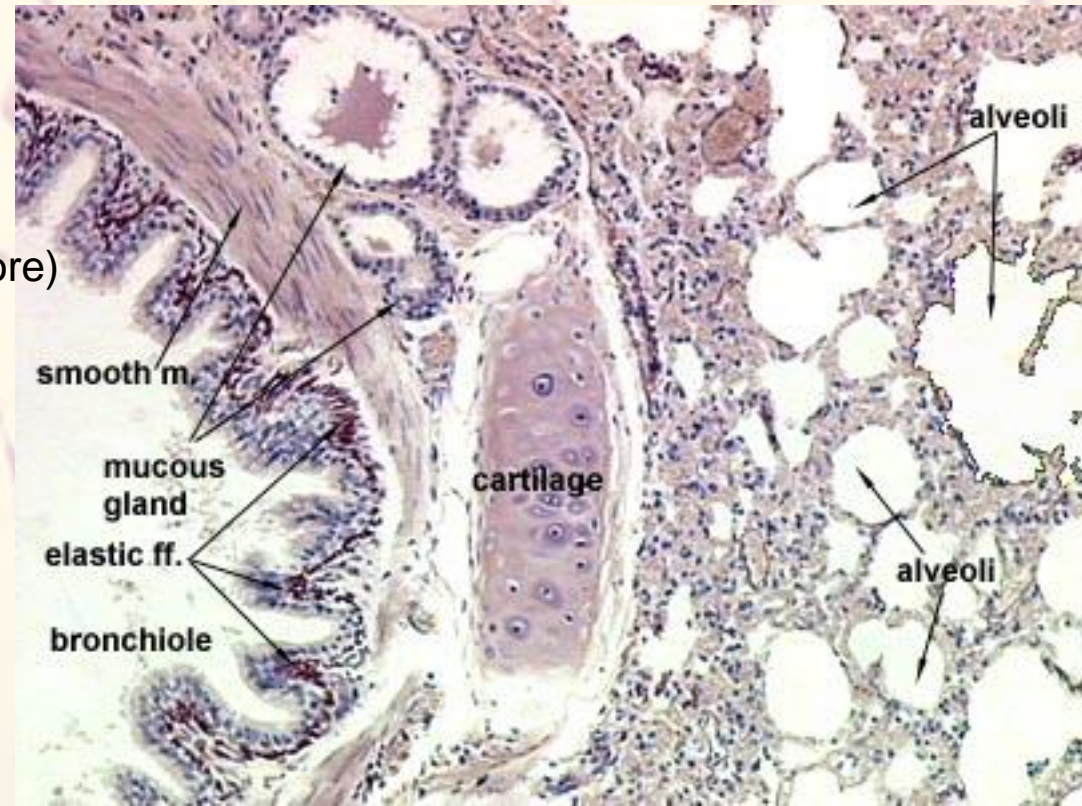
Bronchial Tree

- Trachea
- Primary (Right & Left) Bronchi
- Secondary (Lobar) Bronchi
- Tertiary (Segmental) Bronchi
- . . .
- Terminal Bronchioles
- Pulmonary Lobules



Bronchi Structure

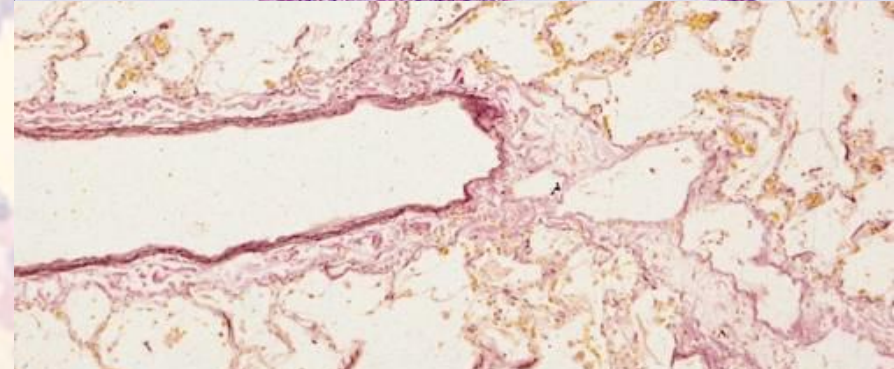
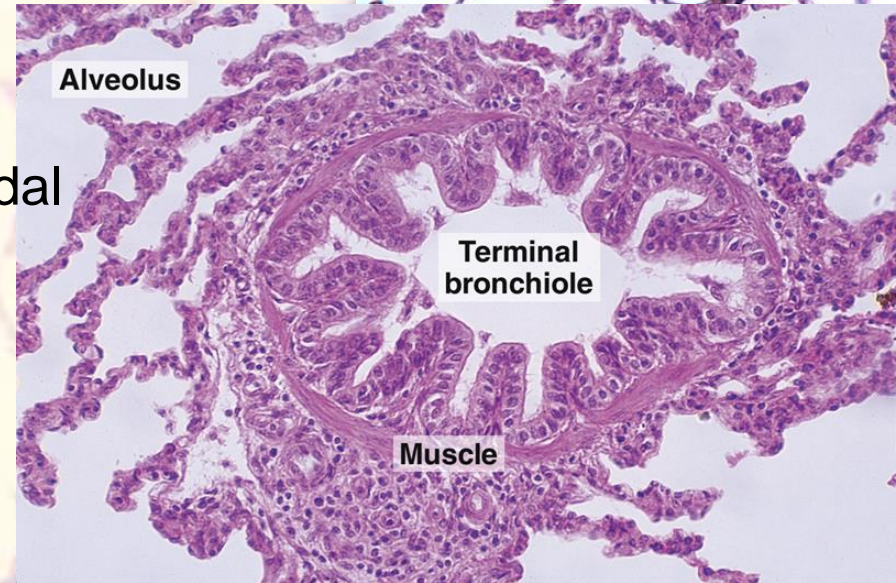
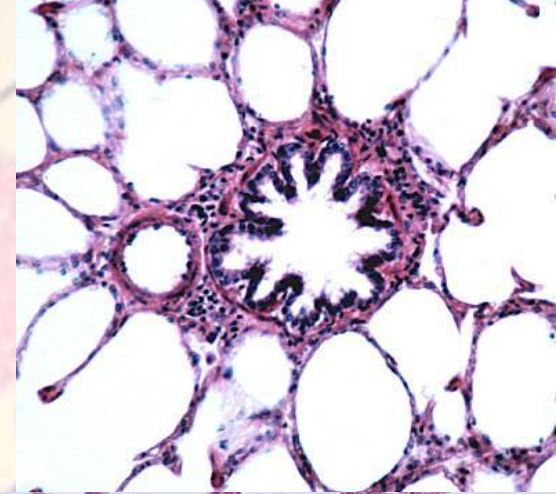
- **Primary Bronchi**
 - Similar to Trachea
- **Other Smaller Bronchi**
 - More than 5mm Diameter
 - Epithelium
 - Respiratory
 - Lamina Propria
 - Cartilage (Circular to Islets)
 - Smooth Muscle (Less to More)
 - Elastic Fibers
 - Seromucous Glands
 - Lymphatic Nodules (BALT)



Bronchioles Structure

Less than 5mm Diameter

- **No Cartilage & Mucosal Glands**
- **Epithelium**
 - Respiratory
 - Ciliated Simple Columnar & Cuboidal
 - Goblet to Clara Cells
 - Neuroepithelial Area (80-100 Cells Cholinergic Innervated)
 - Chemoreceptor ?!
- **Lamina Propria**
 - Smooth Muscle
 - Elastic Fibers



Respiratory Bronchioles

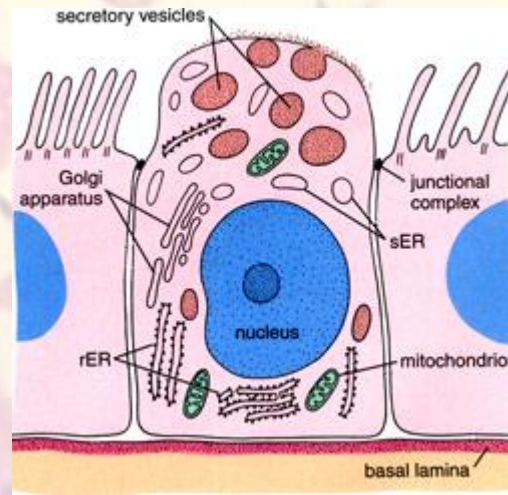
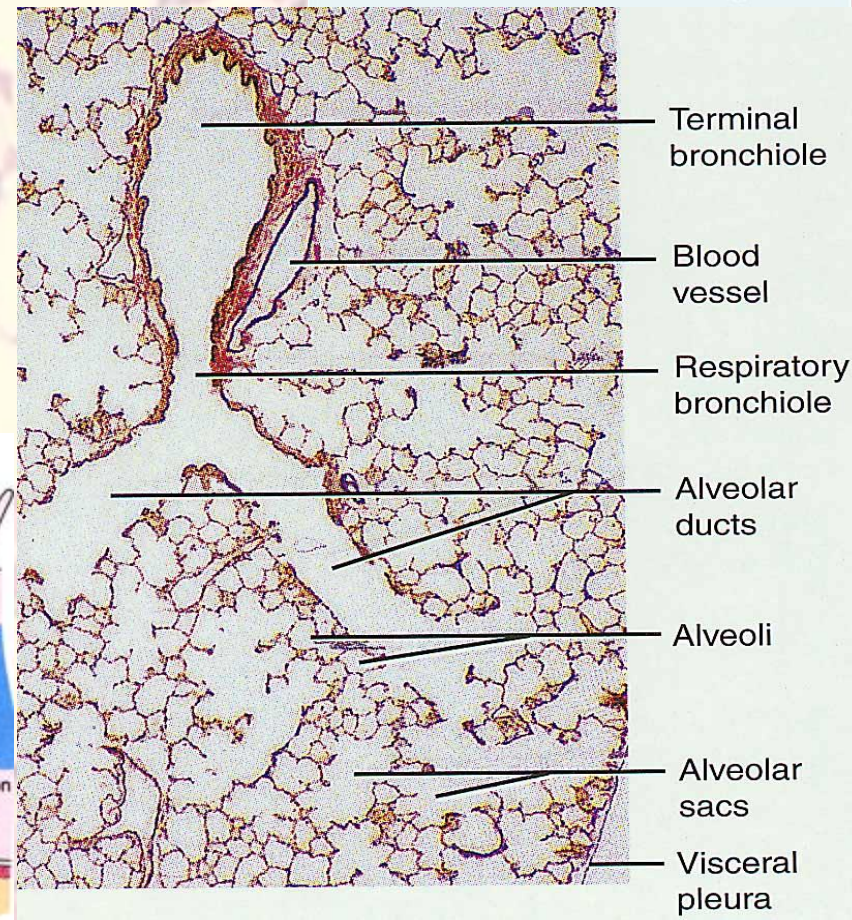
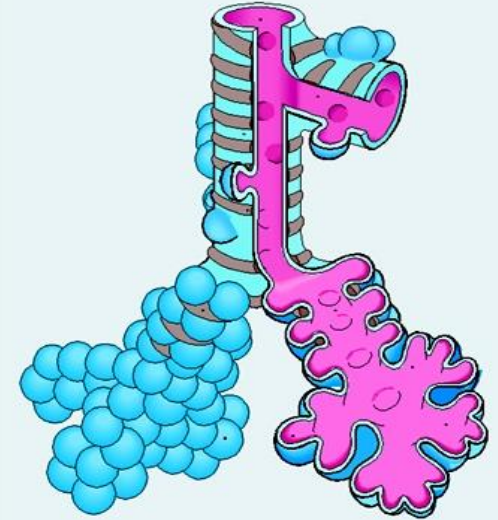
Conducting to Respiratory Passages

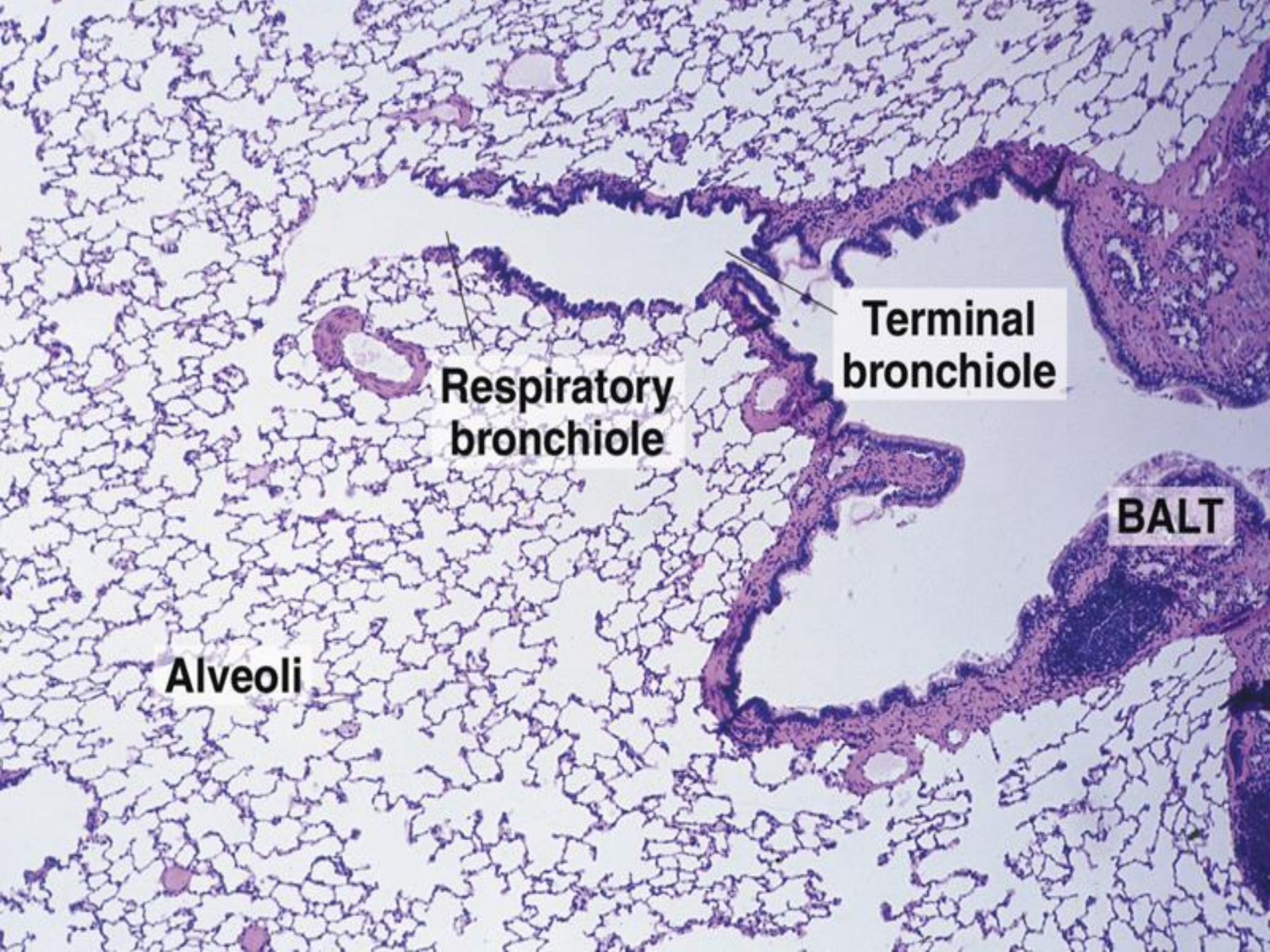
■ Epithelium

- Ciliated Simple Cuboidal
- Clara Cells
- Opening to Alveolus

■ Lamina Propria

- Smooth Muscle
- Elastic Fibers





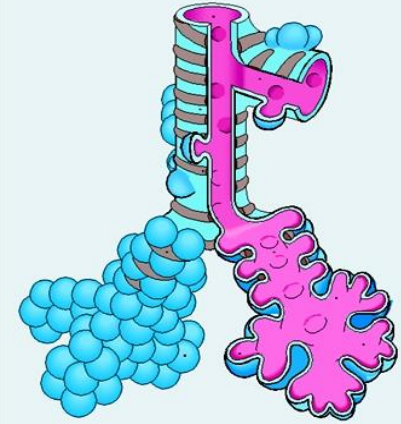
Alveoli

**Respiratory
bronchiole**

**Terminal
bronchiole**

BALT

Alveolar Duct, Atrium & Alveolar Sac



Epithelium

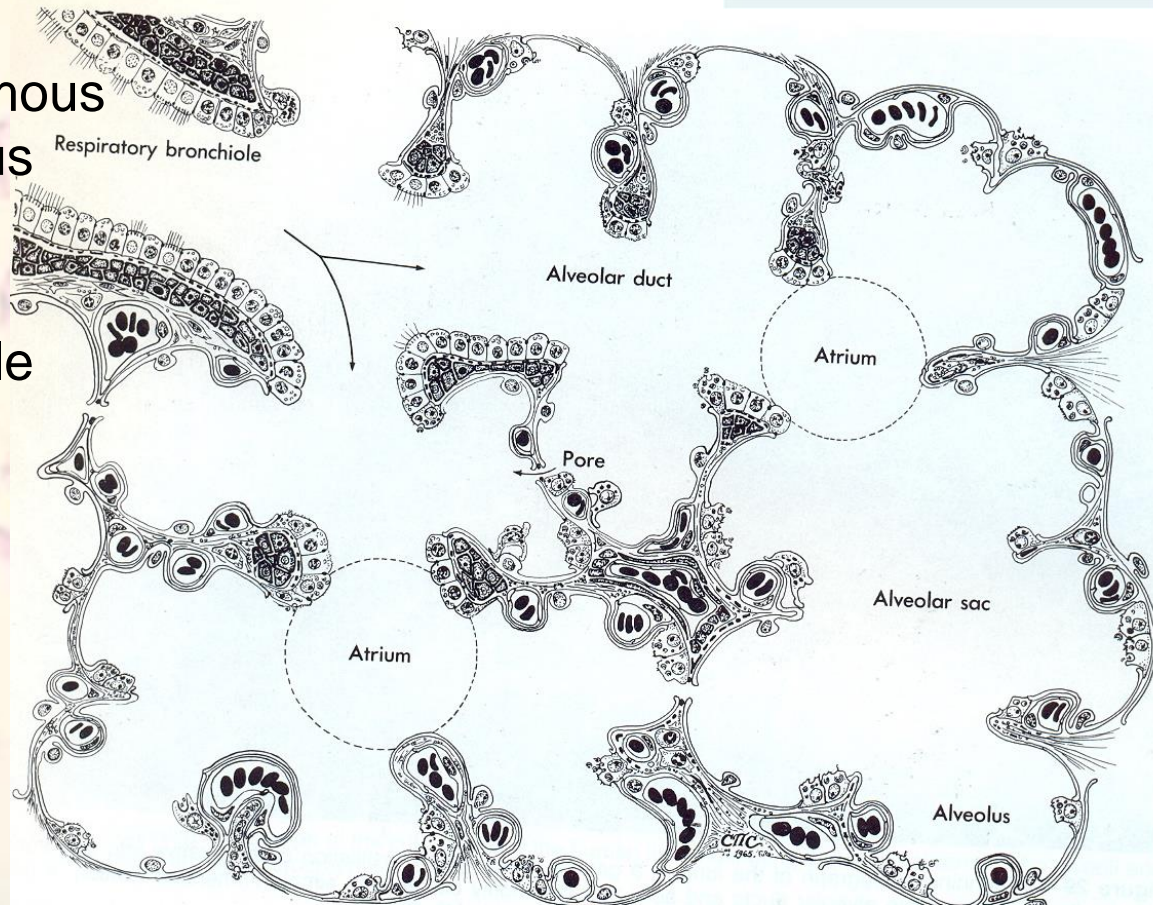
- Simple Cuboidal to Squamous
- Mainly Opening to Alveolus

Lamina Propria

- Sphincteric Smooth Muscle
- Elastic & Collagen Fibers

Atrium

- 2 or More Alveolar Sac



V

V

RB

A

V

AD

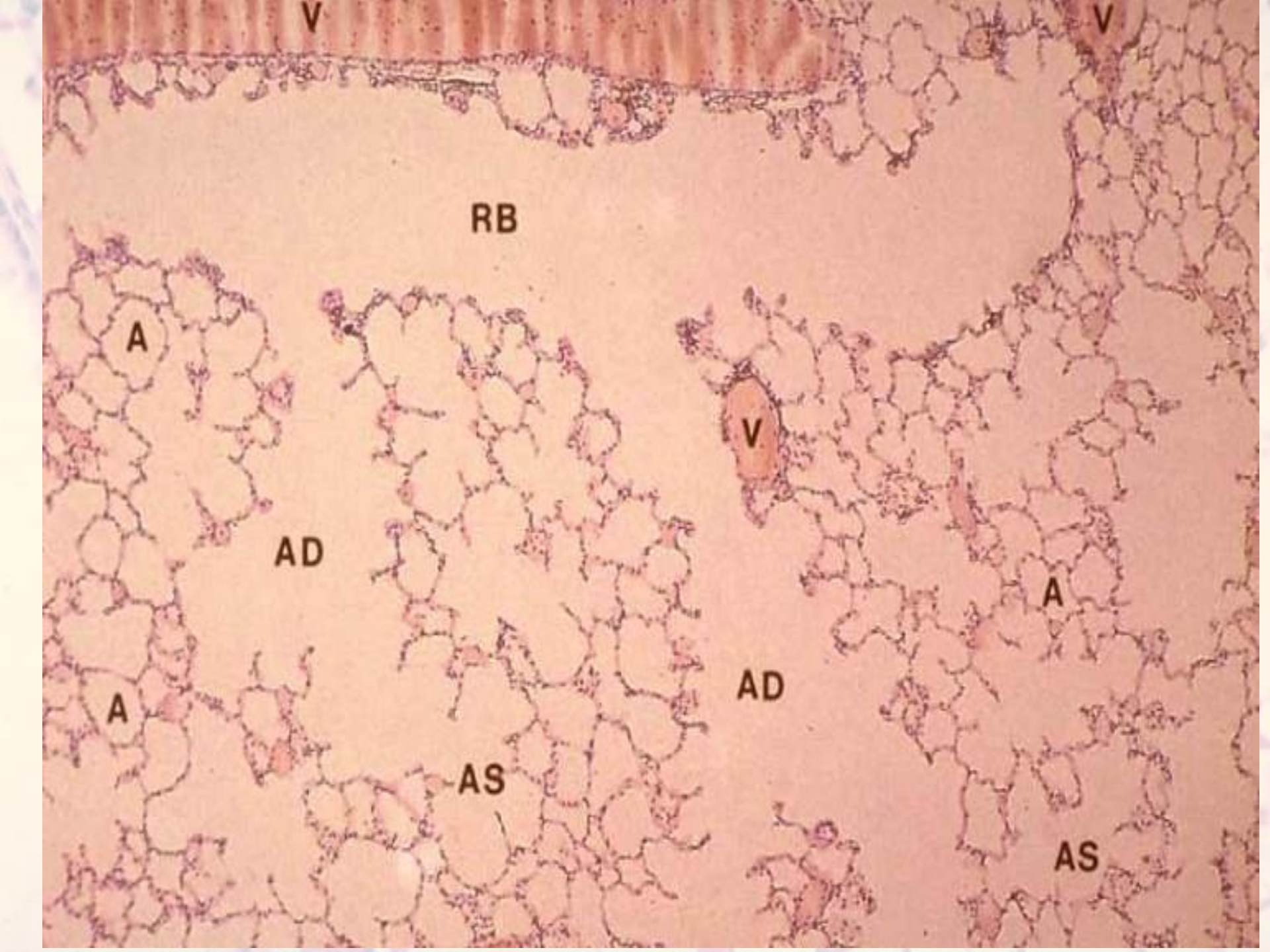
A

A

AD

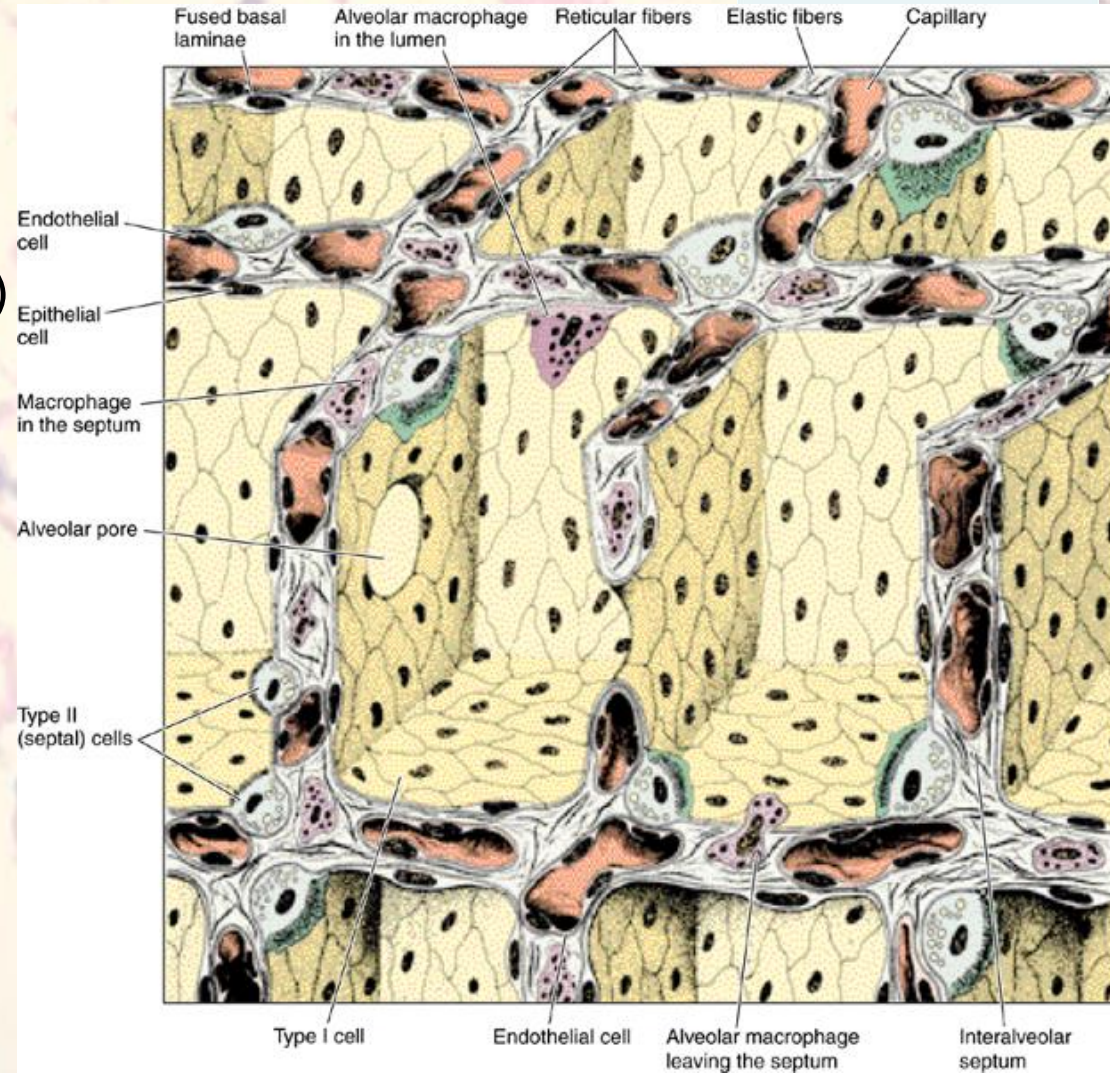
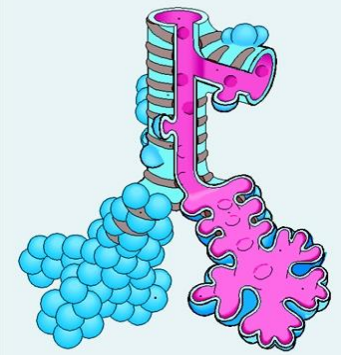
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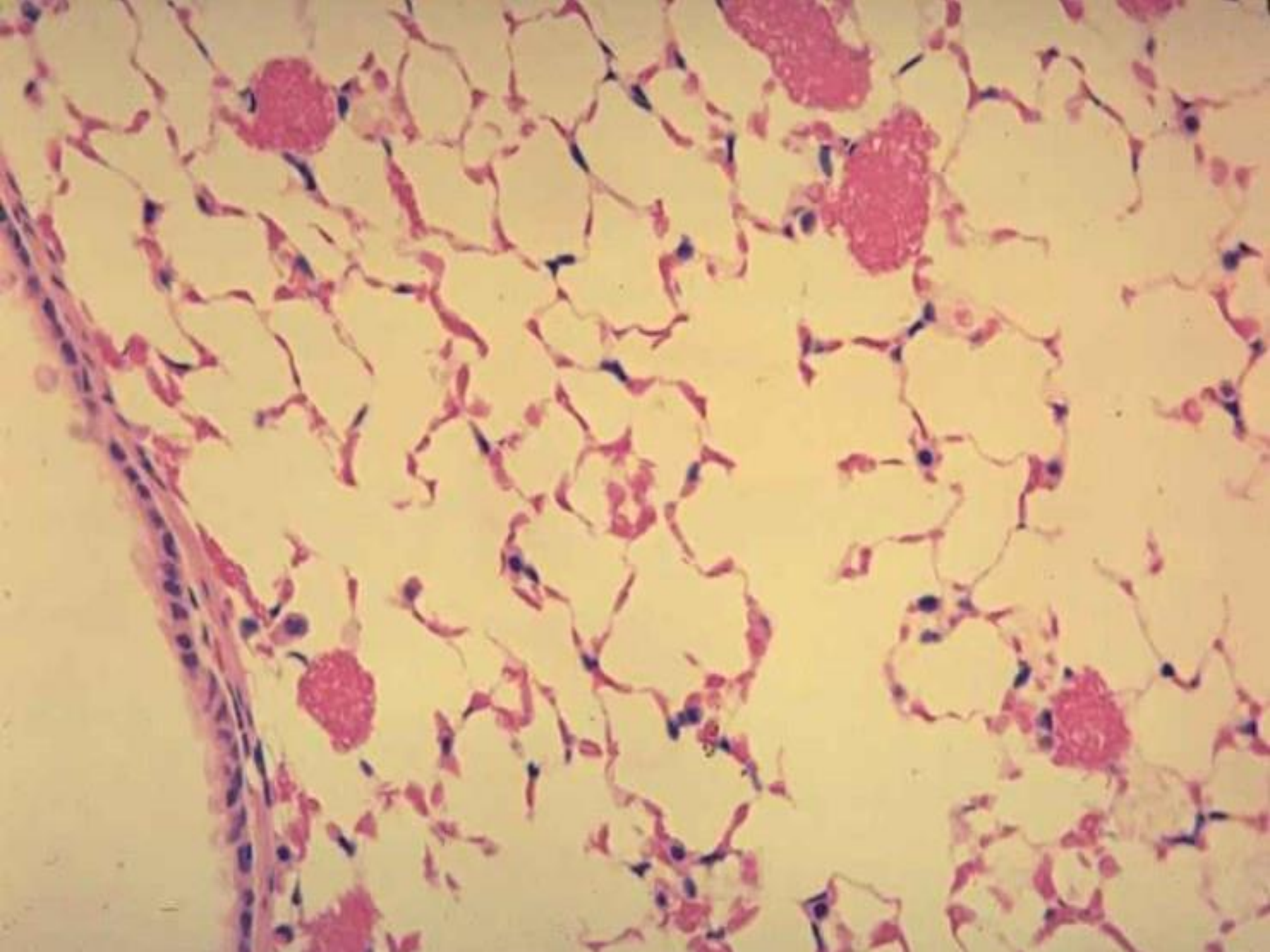
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Alveoli

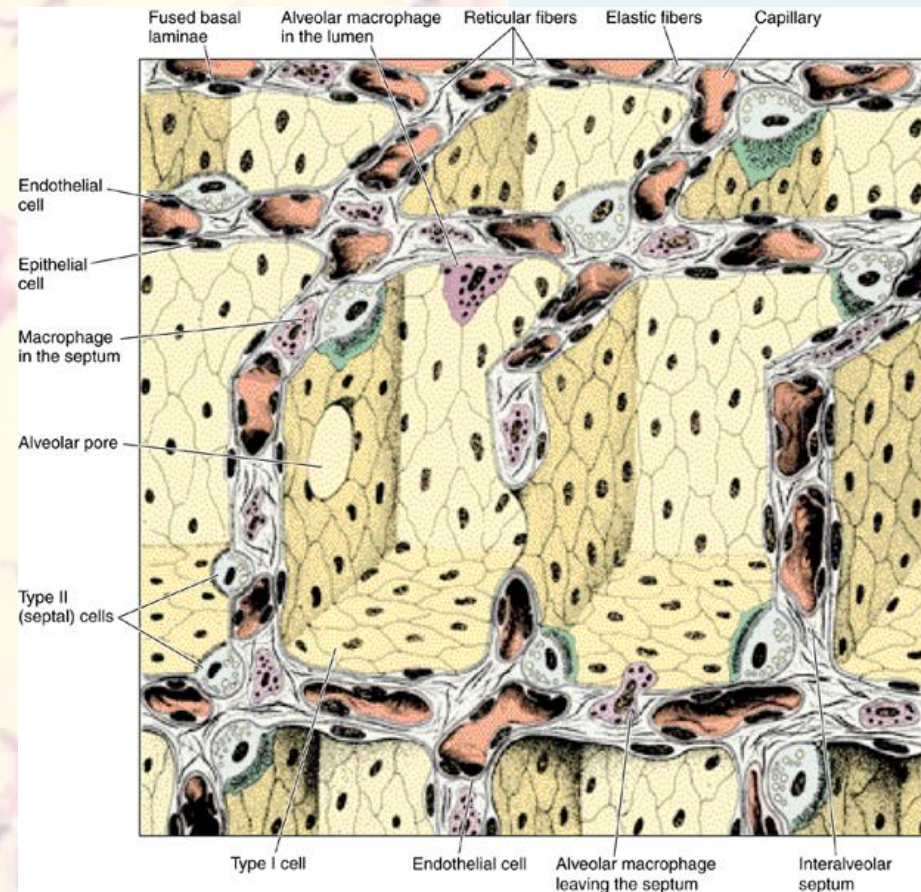
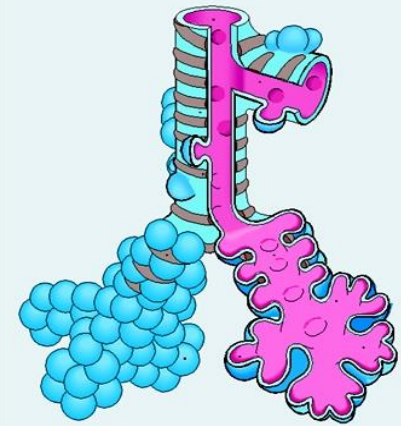
- 200µm Out pocketing from:
 - Respiratory Bronchioles
 - Alveolar Duct
 - Alveolar Sac
- **Epithelium**
 - Pneumocyte Type I (97%)
 - Pneumocyte Type II (3%)
- **Interalveolar Septum**
 - Simple Squamous (Pneumocyte I)
 - Loose CT
 - Fibroblast
 - Macrophage (Dust Cells)
 - Capillary
 - Simple Squamous (Pneumocyte I)



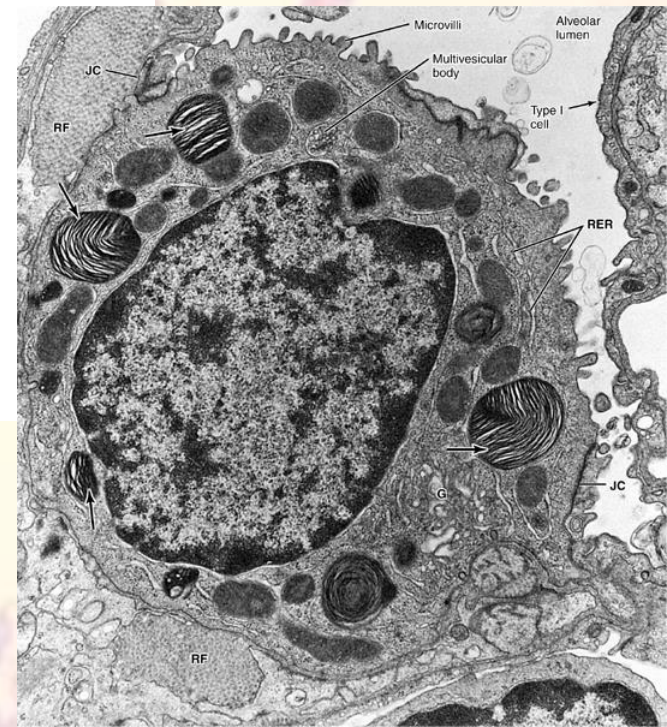
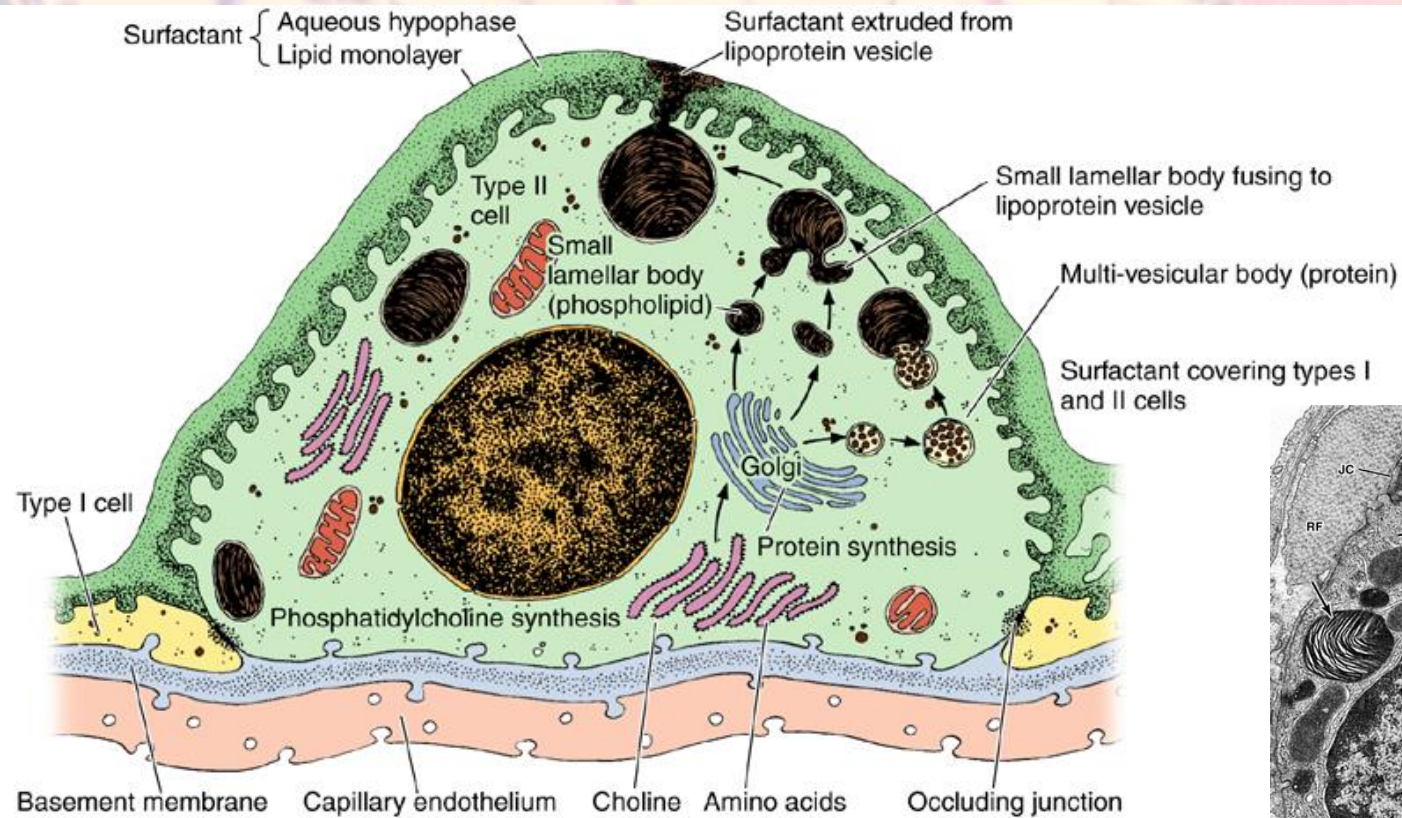


Alveoli Epithelium

- **Pneumocyte Type I**
 - Thin Cytoplasm (Up to 25nm Thickness)
 - Perinuclear Organelles
 - Pinocytotic Vesicles
 - Tight & Desmosome Junctions
- **Pneumocyte Type II**
 - Spheroid Cells
 - Lamellar Body
 - Surfactant



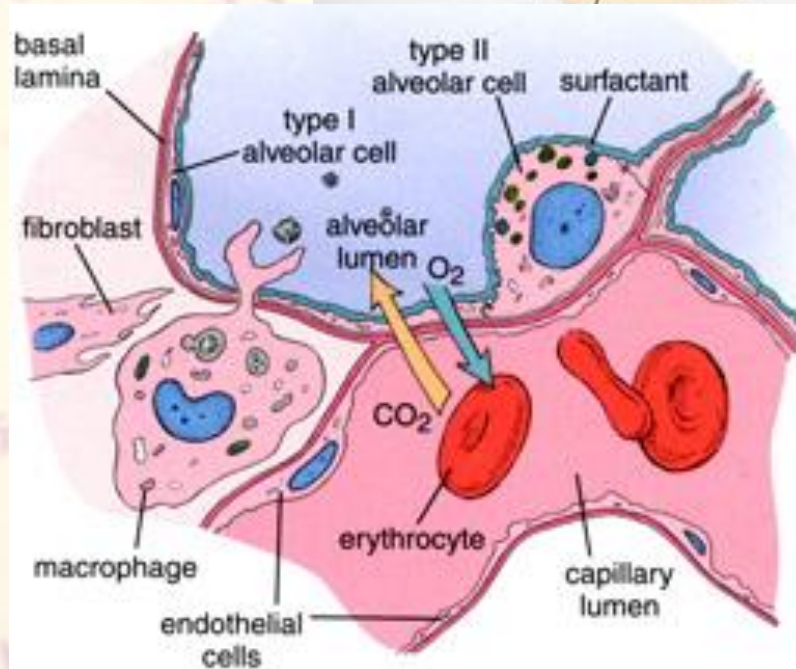
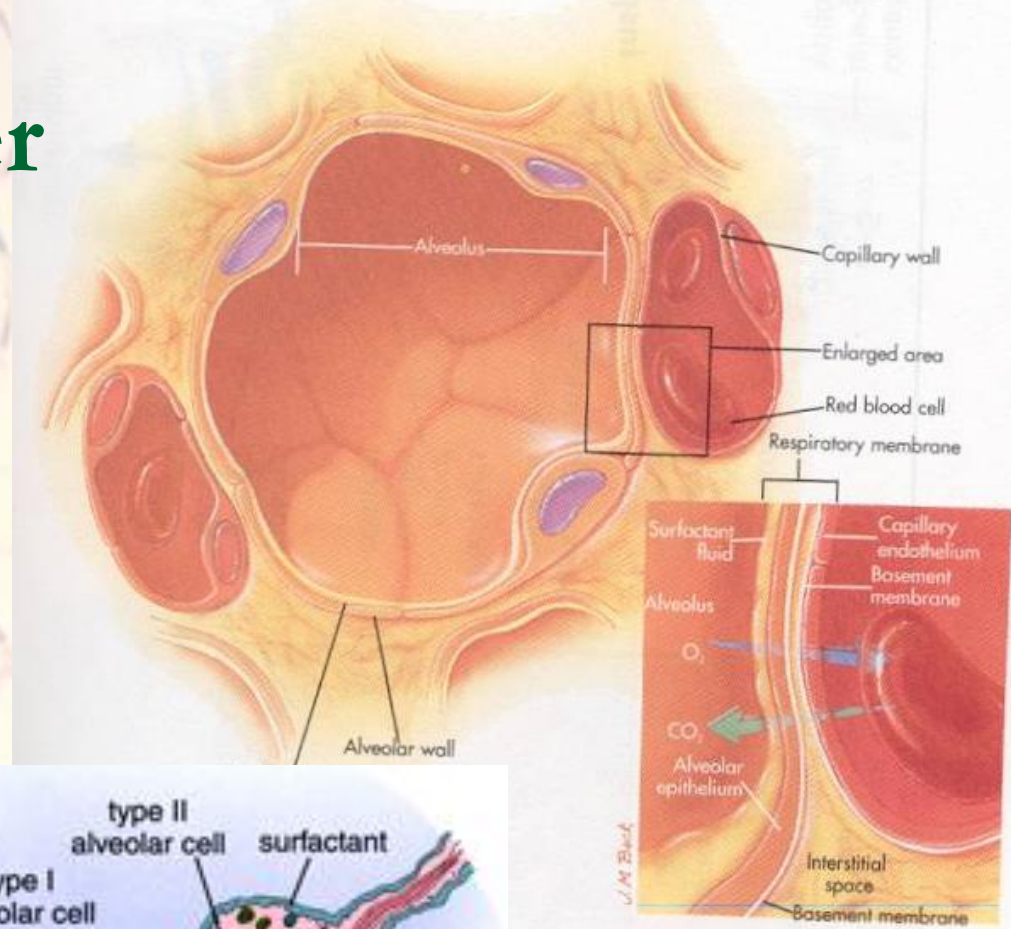
Pneumocyte Type II



Blood Air Barrier

- **Pneumocyte Type I**
- **Common Basal Lamina**
 - BL of Pneumocyte
 - BL of Capillary Endothelium
- **Capillary Endothelium**

- **BAB Thickness**
 - 0.5-1.5 μm



Blood Supply

Pulmonary Circulation

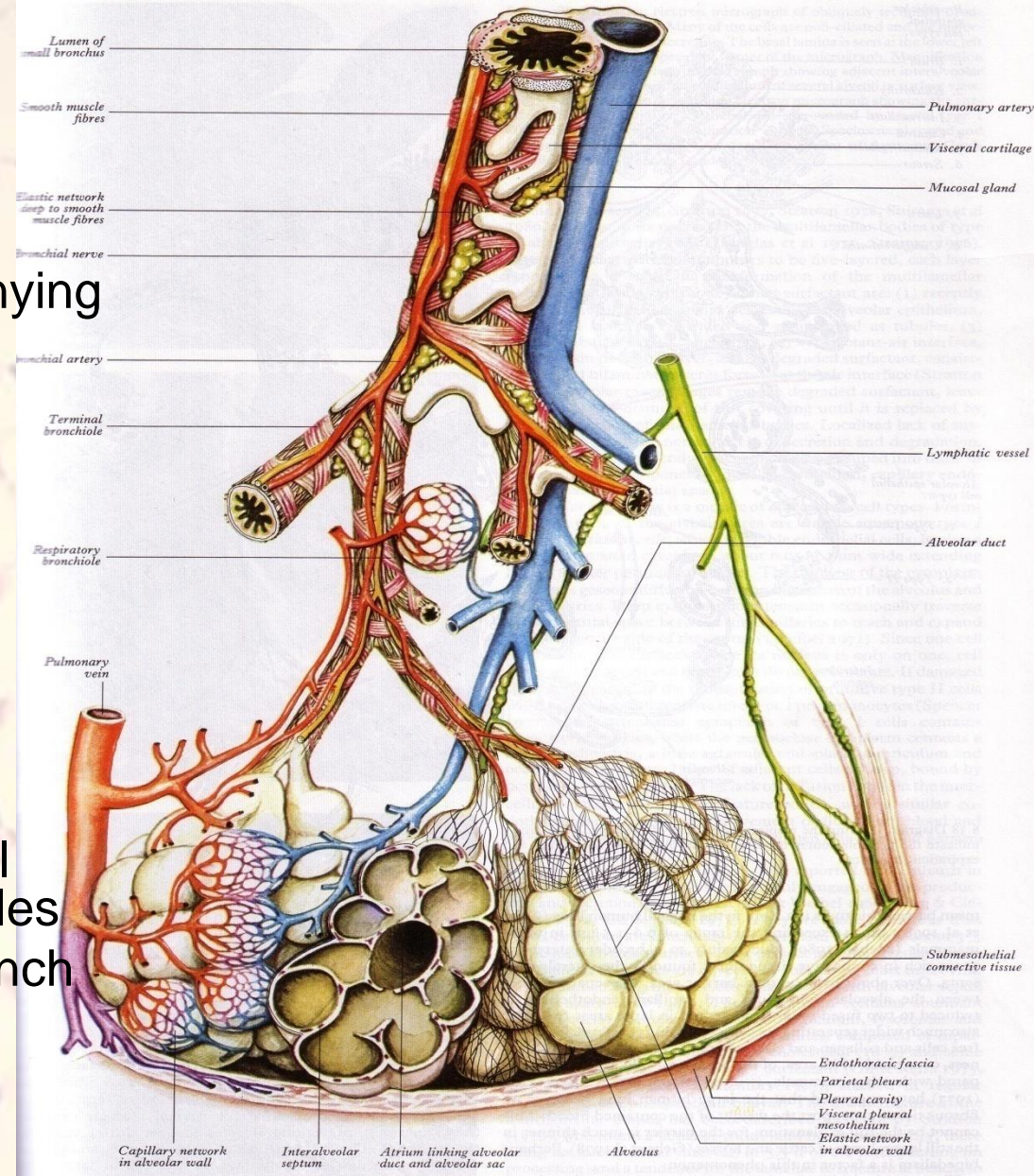
- Pulmonary Artery (Accompanying with Bronchial Tree)
 - Pressure: 25mm Hg
 - Thin Wall
- Capillary Network
 - Interalveolar Septum
- Venule
 - In Parenchyme
 - Interlobular Septum

Systemic Circulation

- Accompanying with Bronchial Tree to Respiratory Bronchioles
- Anastomoses with Small Branch of pulmonary A.

Lymphatics

- Deep
 - From Interlobular Septum
- Superficial
 - Visceral Pleura



Pleura

- Serous Membrane
 - Mesothelium
 - Loose CT
 - Elastic & Collagen Fibers
- Visceral Pleura
- Lateral Pleura

