

Respiratory System

Descriptive Histology 272

17 Nov 2019



Respiratory System

The respiratory tract has 2 parts

1. **Conducting portion,**

Nasal cavities,

Nasopharynx,

Larynx,

Trachea,

Bronchi

Bronchioles, and

terminal Bronchioles

2. **Respiratory portion**

1. Small terminal Bronchioles and Alveoli



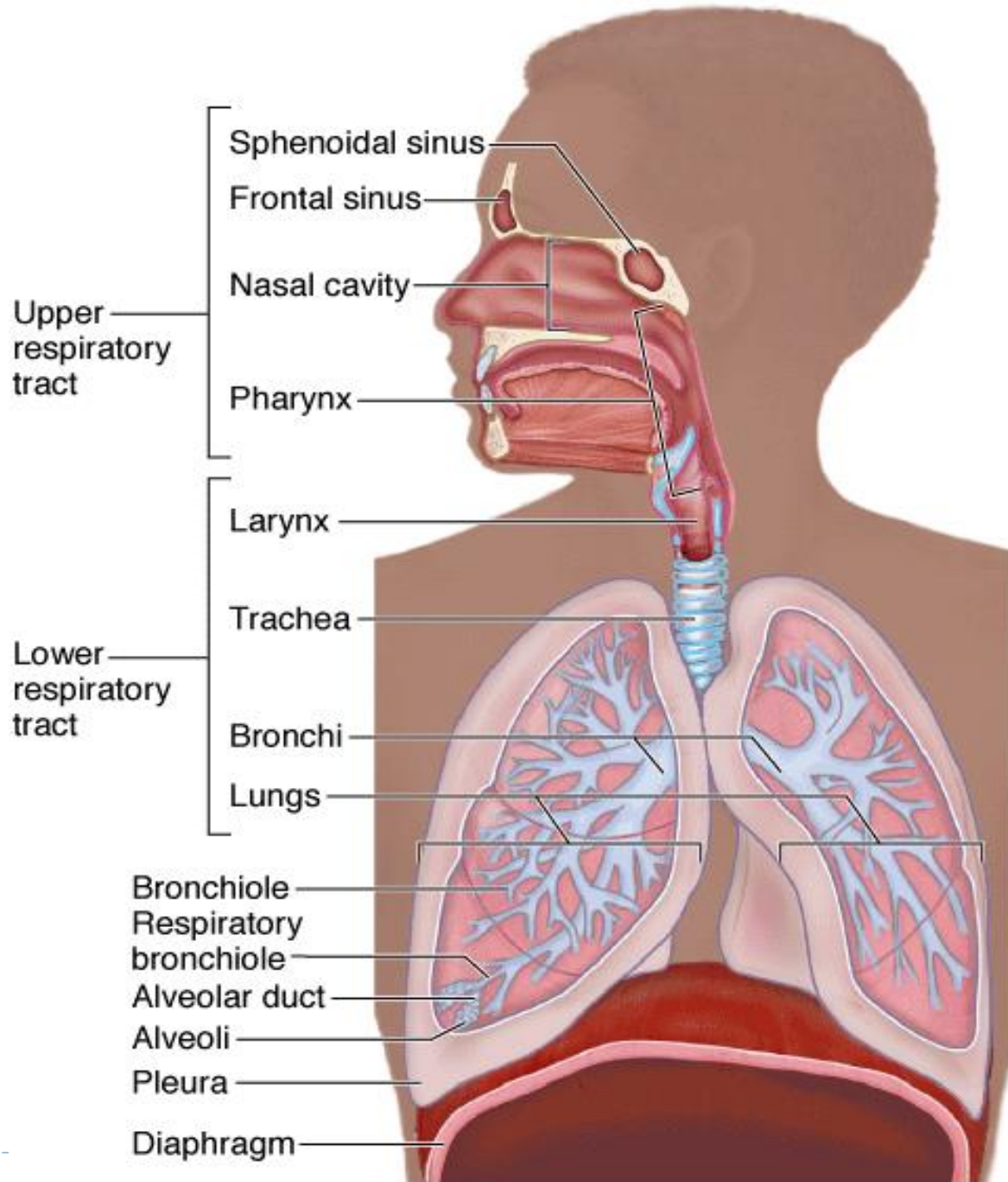
<http://www.youtube.com/watch?v=OIU7Mdx4DTg>

<https://www.youtube.com/watch?v=x5xI9lwPnbo>

<https://www.youtube.com/watch?v=KqZcIJqArco>

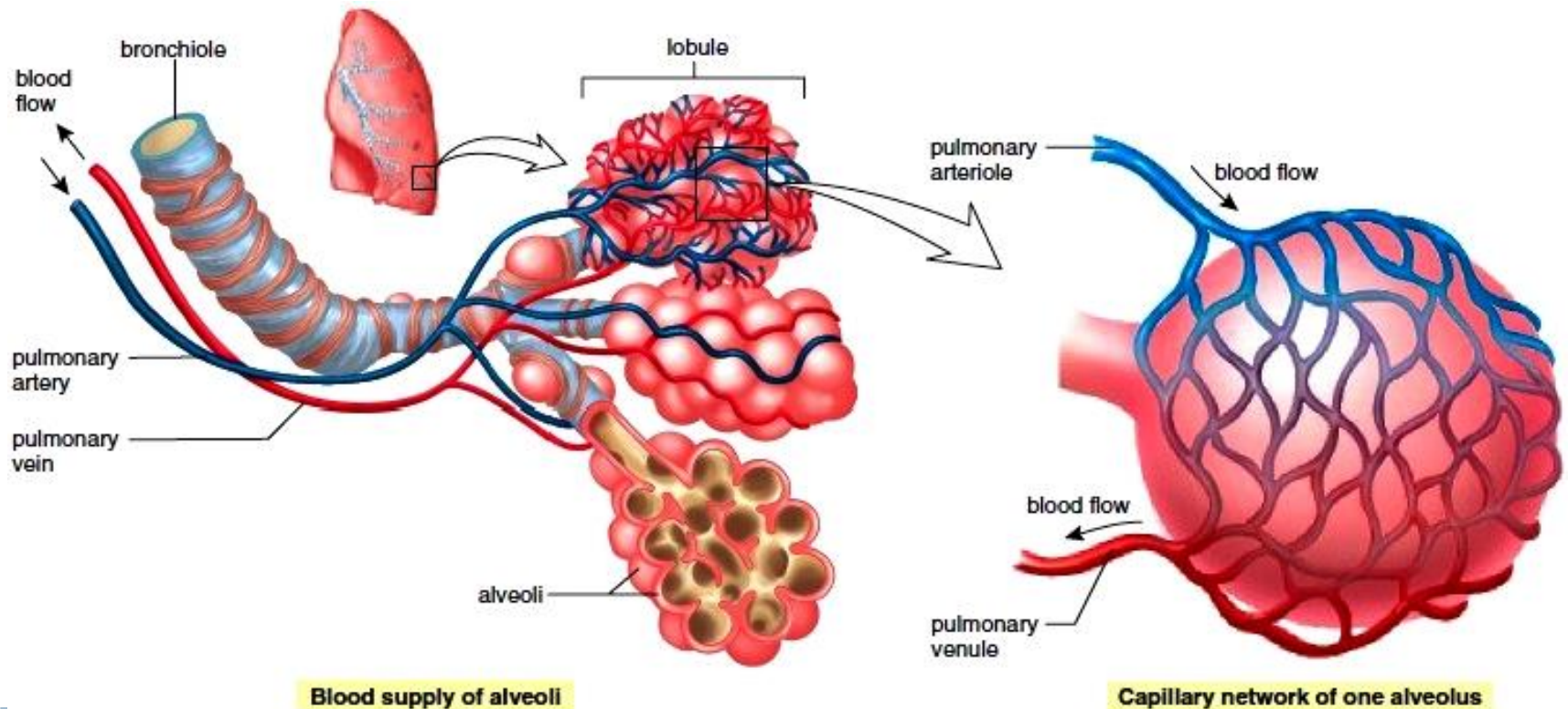
<https://www.youtube.com/watch?v=noDxydboLrA>





Introduction

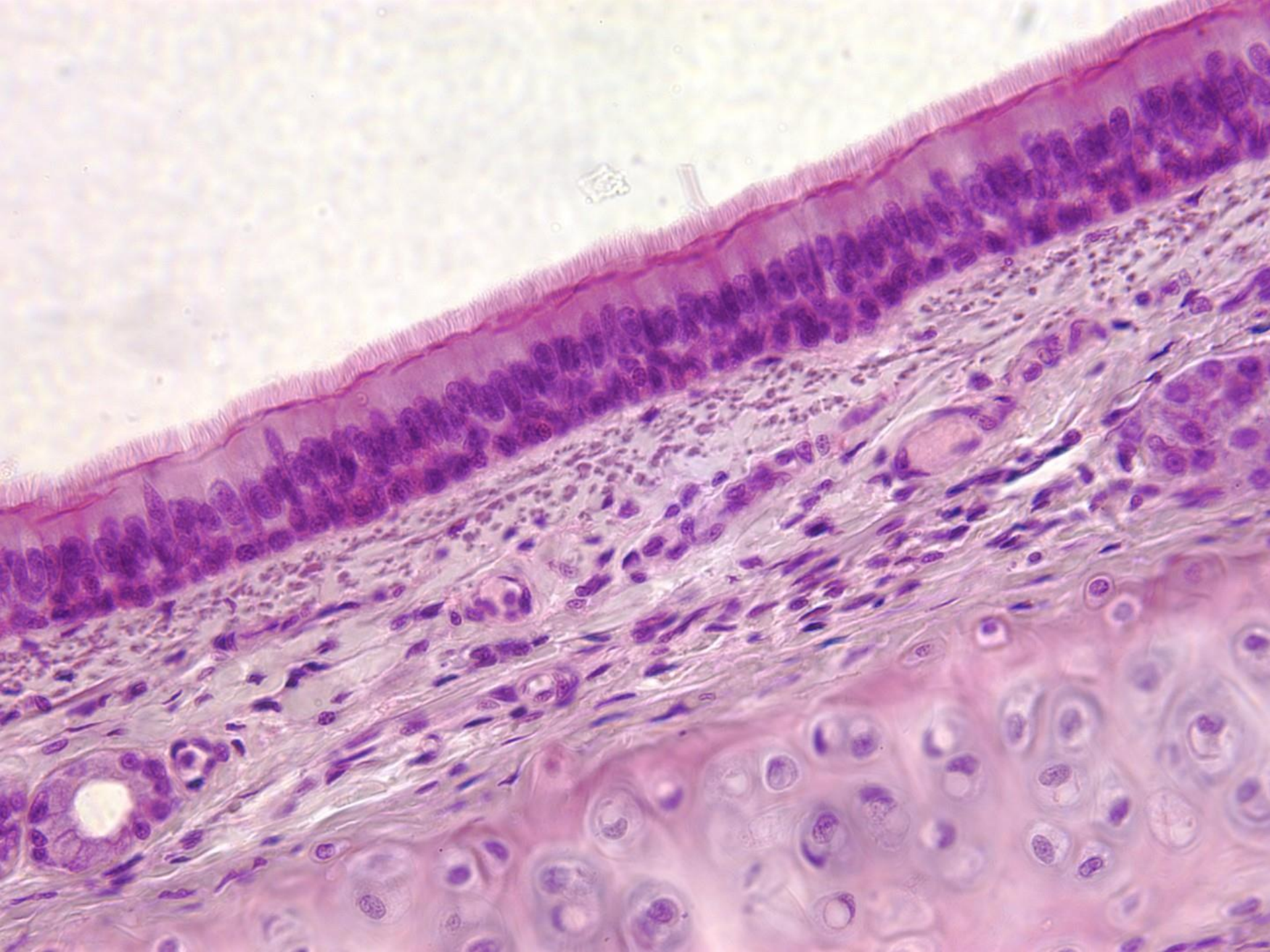
- ▶ The primary function of the respiratory system is to **provide oxygen** to, and **remove carbon dioxide** from, the **circulating blood**.

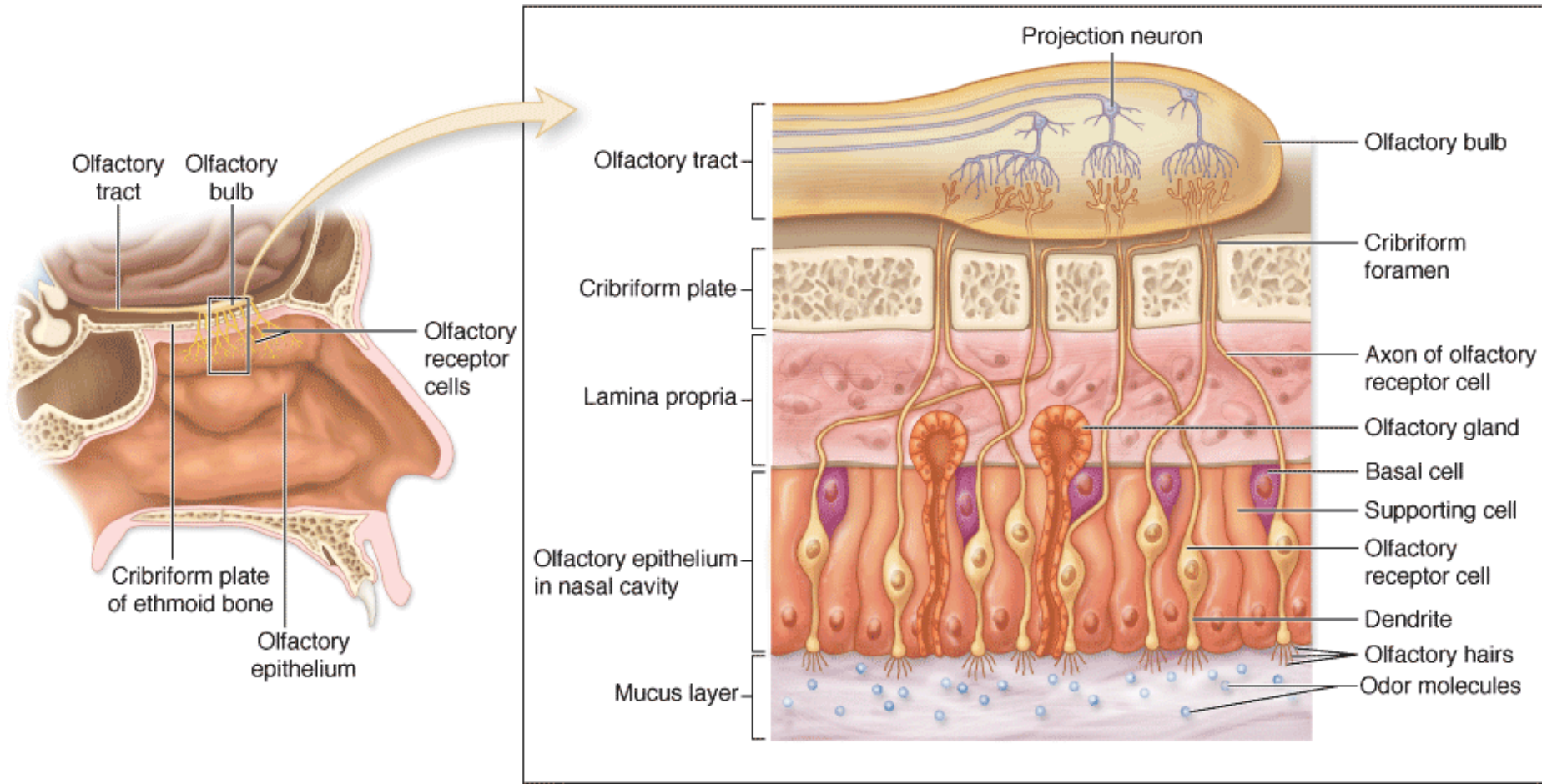


Respiratory Epithelium tissue

- ▶ Lined with ciliated pseudostratified columnar epithelium known as **respiratory epithelium**
 - ▶ **Ciliated columnar cells** : each with about 300 cilia on its apical surface
 - ▶ **Goblet cells** : filled with granules of mucin glycoproteins
 - ▶ **Brush cells** : (Microvilli) chemosensory receptors
 - ▶ **Basal cells** : stem cells that give rise to the other cell types
 - ▶ **Small granule cells** : diffuse neuroendocrine system and represent only about 3% of the cells in respiratory epithelium.



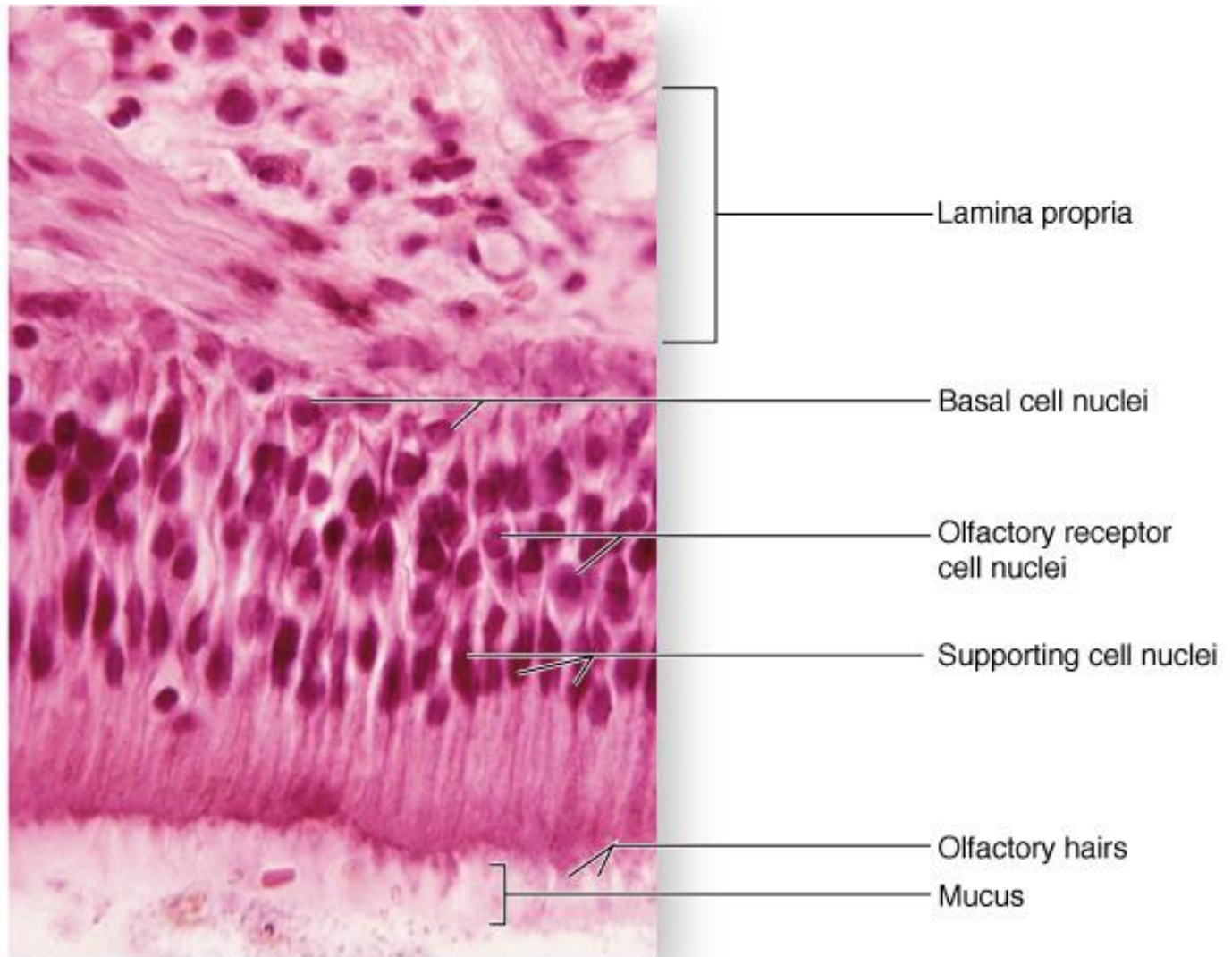




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Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas, 12th Edition*: <http://www.accessmedicine.com>

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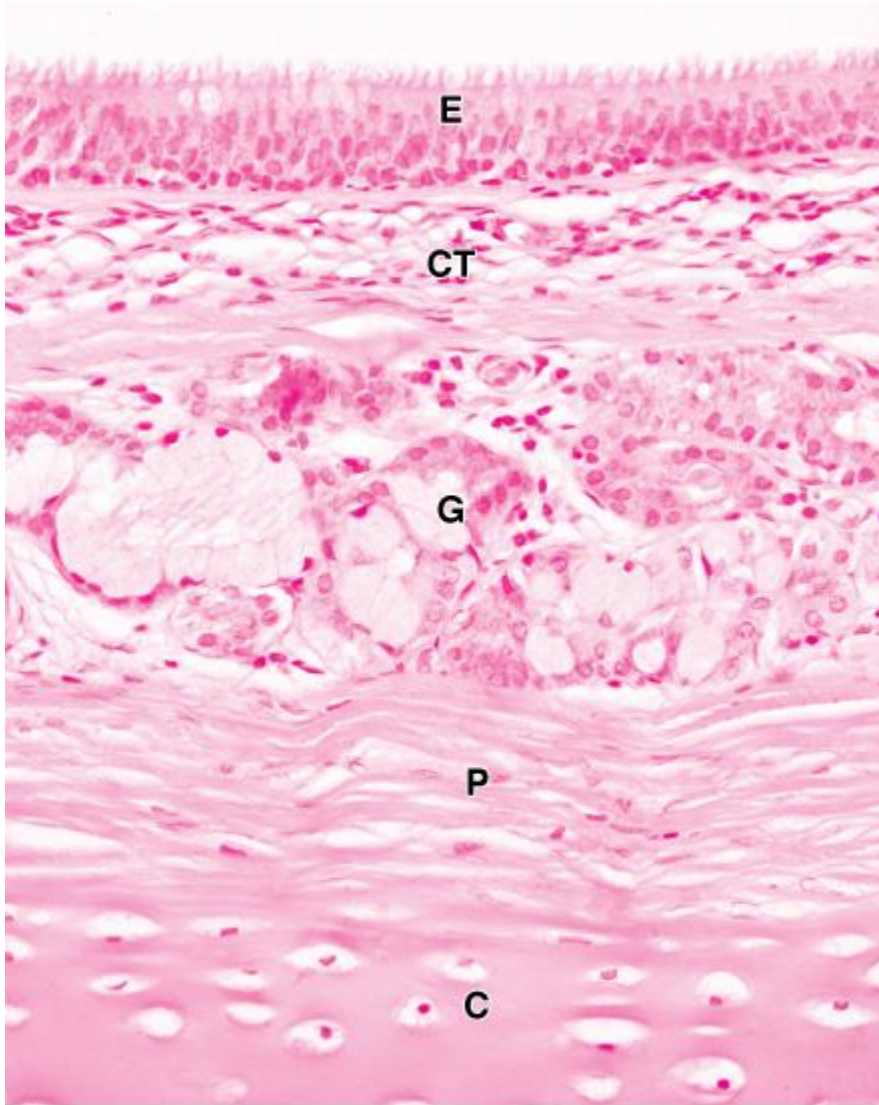


b

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

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Trachea

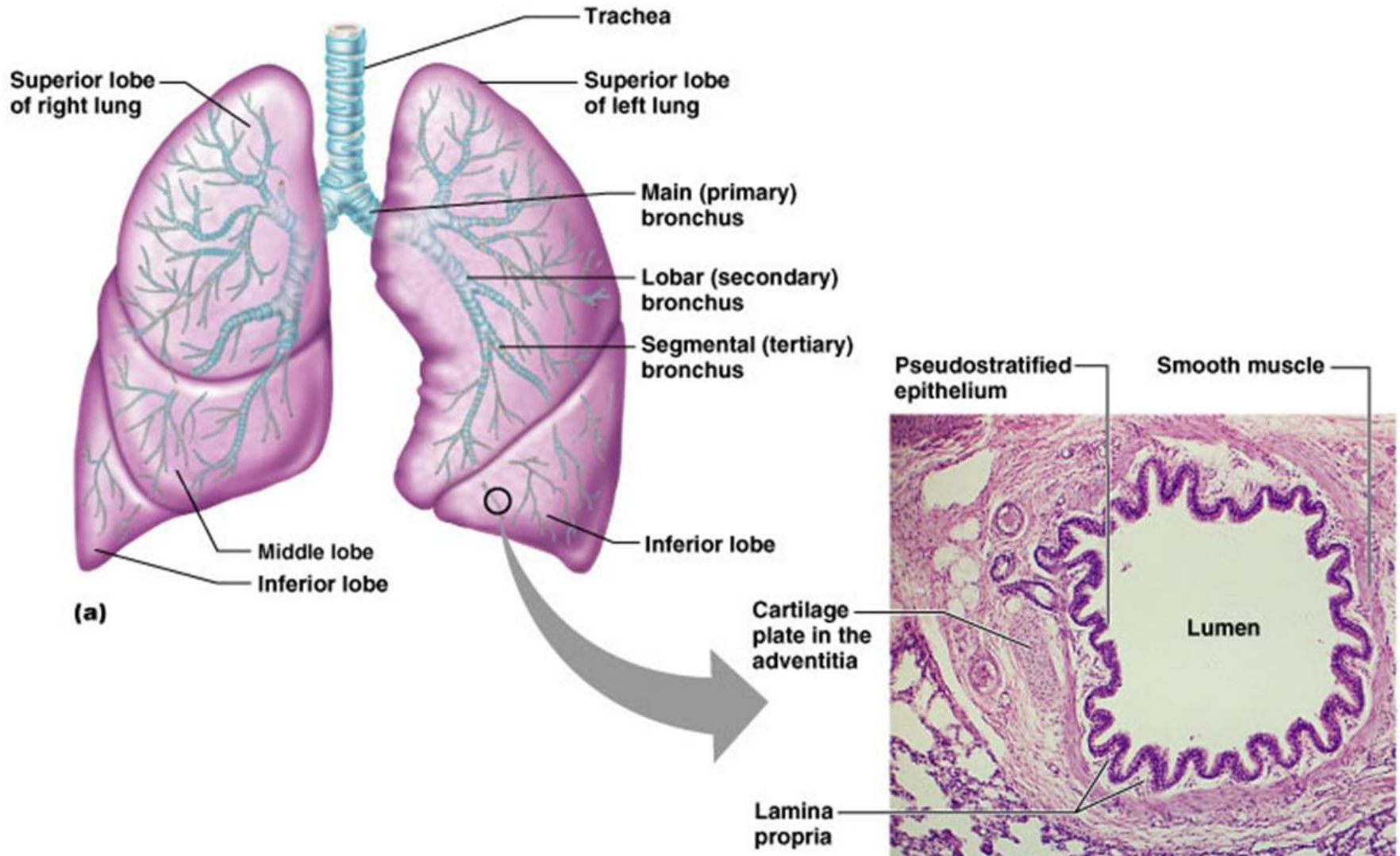


respiratory epithelium (E)
underlain by connective
tissue (CT) and seromucous
glands (G) in the lamina
propria. The submucosa
contains C-shaped rings of
hyaline cartilage (C) covered
by perichondrium (P).

[http://www.youtube.com/watch?v=TQ24-
WCsYN4](http://www.youtube.com/watch?v=TQ24-WCsYN4)

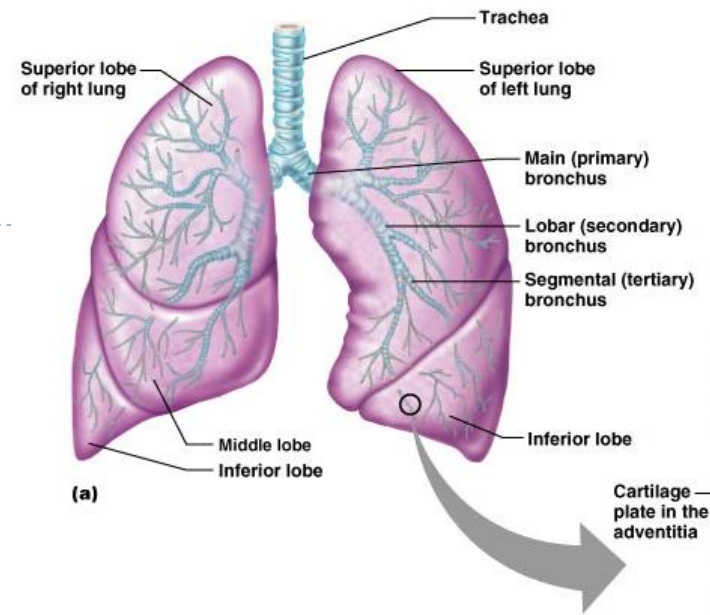


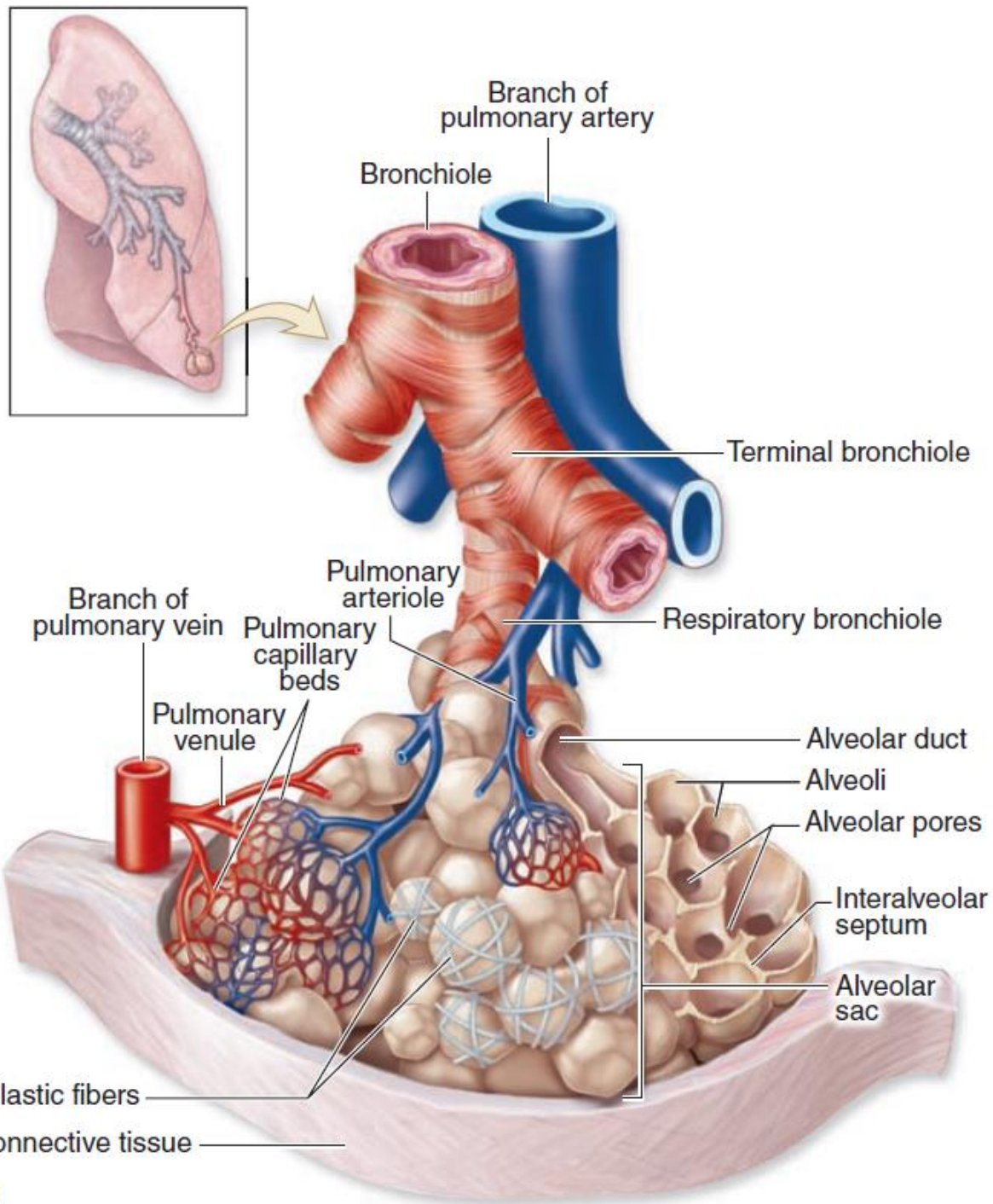
Bronchial tree



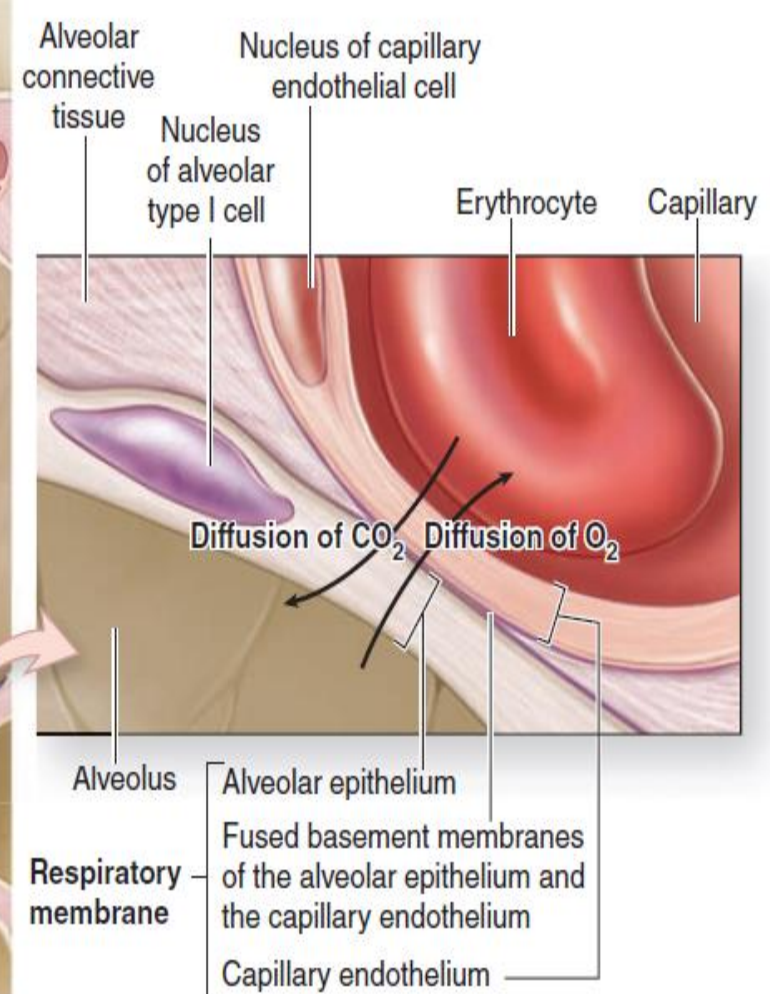
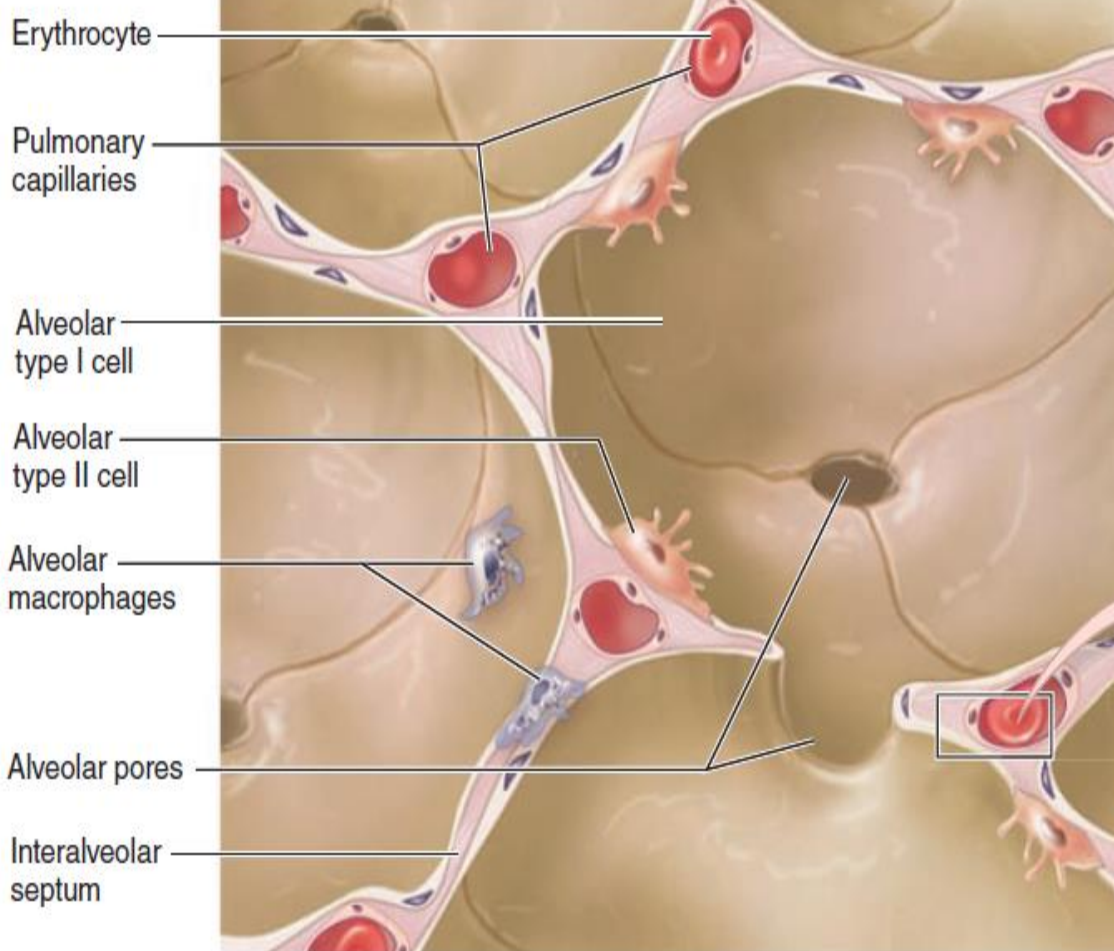
3 Lobe on the right 2 on the left

- ▶ Lobar bronchi branch into tertiary = segmental bronchi
- ▶ Continues dividing: about 23 times
- ▶ Tubes smaller than 1mm called bronchioles
- ▶ Smallest, terminal bronchioles, are less than 0.5 mm diameter
- ▶ Tissue changes as becomes smaller
 - ▶ Cartilage plates, no rings, then disappears
 - ▶ Pseudostratified columnar to simple columnar to simple cuboidal without mucus or cilia
 - ▶ Smooth muscle important: sympathetic relaxation (“bronchodilation”), parasympathetic constriction (“bronchoconstriction”)





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Gas Exchange

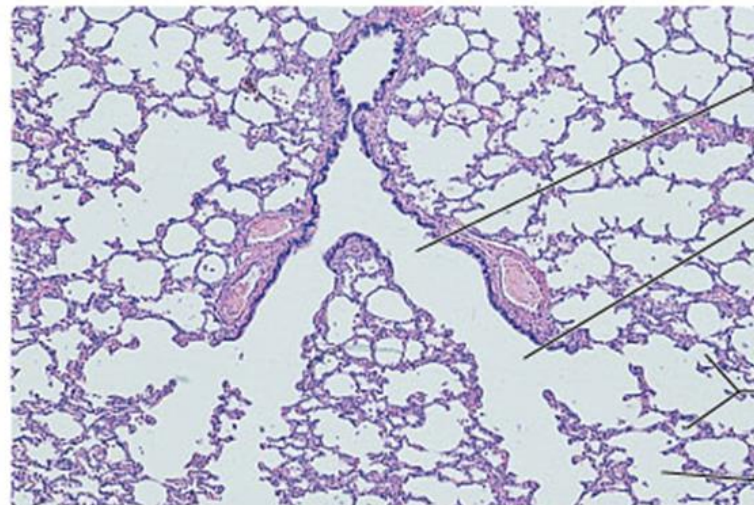
- ▶ Air filled alveoli account for most of the lung volume
- ▶ Very great area for gas exchange (1500 sq ft)
- ▶ **Alveolar wall**
 - ▶ Single layer of squamous epithelial cells (type I cells) make up to 95% of the alveolar surfaces surrounded by basal lamina
 - ▶ 0.5 μm (15 X thinner than tissue paper)
 - ▶ External wall covered by cobweb of capillaries
- ▶ **Respiratory membrane**: fusion of the basal laminas of
 - ▶ Alveolar wall
 - ▶ Capillary wall



Microscopic detail of alveoli

- ▶ Alveoli surrounded by fine elastic fibers
- ▶ Alveoli interconnect via alveolar pores
- ▶ Alveolar macrophages – free floating “dust cells”
- ▶ Type I and type II cells and joint membrane

(air on one side; blood on the other)



Respiratory bronchiole

Alveolar duct

Alveoli

Alveolar sac



What type of cartilage is found in the trachea?

The wall of the trachea consists of four definable layers:

1. Mucosa: composed of a ciliated, pseudostratified epithelium and an elastic fiber-rich lamina propria.
2. Submucosa: composed of a slightly denser connective tissue than the lamina propria.
3. Cartilaginous layer, composed of C-shaped hyaline cartilages.
4. Adventitia , which bind the trachea to adjacent structures .



What is the conducting portion of the respiratory system?

The conducting zone of the respiratory system is made up of the nose, pharynx, larynx, trachea, bronchi, bronchioles, and terminal bronchioles; their function is to filter, warm, and moisten air and conduct it into the lungs.



Do terminal bronchioles have cartilage?

Bronchioles do not have hyaline cartilage to maintain their patency. Instead, they rely on elastic fibers attached to the surrounding lung tissue for support. The inner lining (lamina propria) of these bronchioles is thin with no glands present, and is surrounded by a layer of smooth muscle.



Extra Material

<http://www.youtube.com/watch?v=TQ24-WCsYN4>

http://www.youtube.com/watch?v=Y_S5W4iXigl

http://www.youtube.com/watch?v=SPGRkexl_cs

