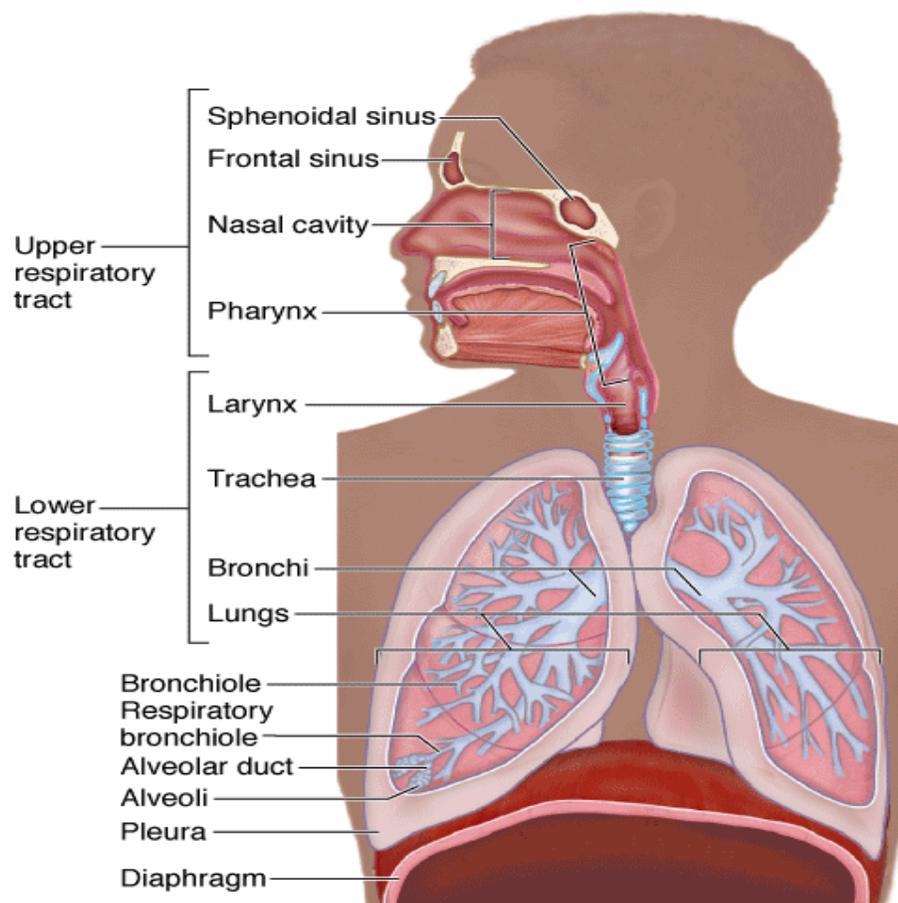


The respiratory system

The respiratory system provides for exchange of O_2 the CO_2 to and from the blood. Respiratory organs include lungs and a branching system of bronchial tubes that link the sites of gas exchange with the external environment.



Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas, 12th Edition*: <http://www.accessmedicine.com>
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The system can be divided anatomically into:

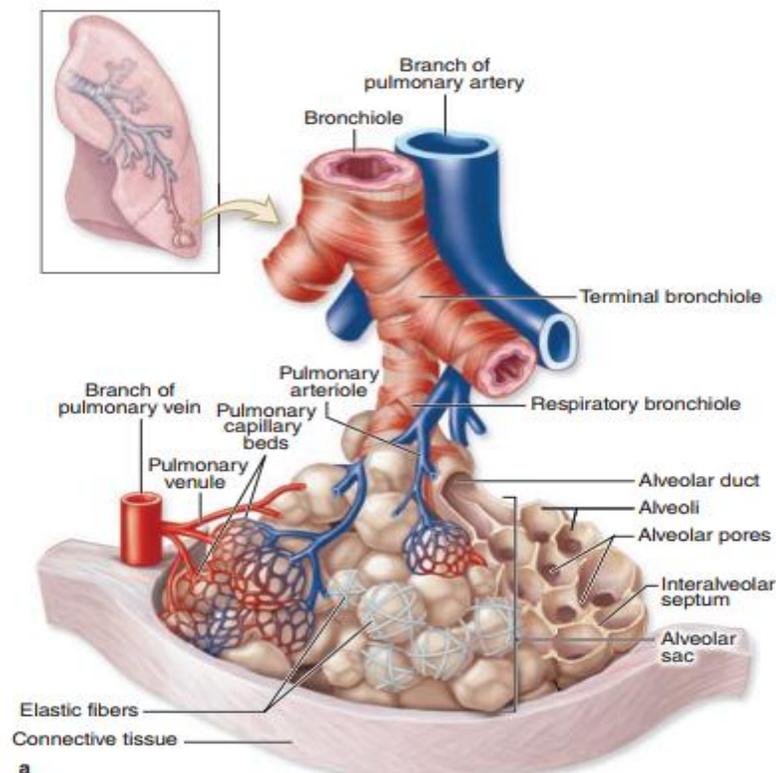
- The upper respiratory tracts and
- Lower respiratory tracts.

Functionally the system has two components:

- The **conducting portion**, which consists of the nasal cavities, pharynx, larynx, trachea, bronchi, bronchioles, and terminal bronchioles. The conducting portion cleans and humidifies inspired air and provides conduits for air movement to and from alveoli.
- The **respiratory portion**, where the system's main function of gas exchange occurs, consisting of respiratory bronchioles, alveolar ducts, and alveoli.

Alveoli, the cellular sites of the exchange of O₂ and CO₂ between inspired air and blood, are small, air-filled, saclike structures, which make up most of the lung structure.

FIG 17-11 Pulmonary circulation, terminal and respiratory bronchioles, and alveoli.





Respiratory Epithelium:

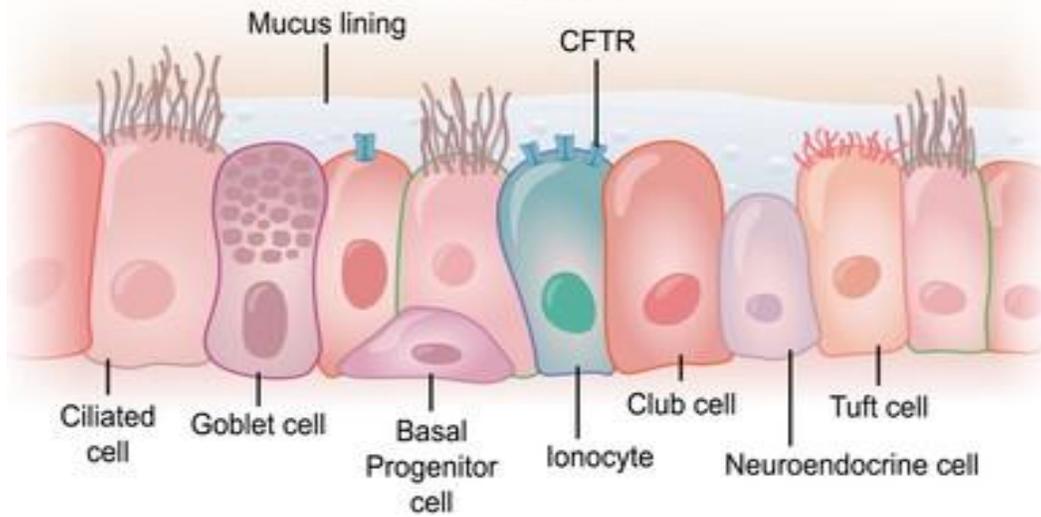
Most of the conducting portion is lined with ciliated pseudo-stratified columnar epithelium known as **respiratory epithelium** .

This epithelium has at least five cell types, all of which touch the thick basement membrane:

- 1- **Ciliated columnar cells:** are the most abundant, each with about 300 cilia on its apical surface.
- 2- **Goblet cells** are also abundant in some areas of the respiratory epithelium filled in their apical portions with granules of mucin glycoproteins.
- 3- **Cells:** are a much more sparsely scattered and less easily found, columnar cell type, which has a small apical surface bearing a tuft of many short, blunt microvilli.
- 4- **Small granule cells:** are also difficult to distinguish in routine preparations, but possess numerous dense core granules 100–300 nm in diameter. Like brush cells, they represent about 3% of the total cells and are part of the diffuse neuroendocrine system .
- 5- **Basal cells:** small rounded cells on the basement membrane and not extending to the luminal surface, are stem cells that give rise to the other cell types.



Respiratory epithelium



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