

## Respiratory System

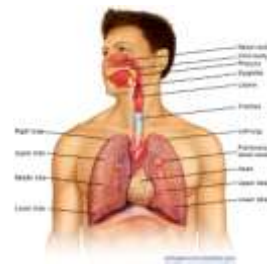
### Primary Function

- Obtain O<sub>2</sub>, remove CO<sub>2</sub>
- Respiration: entire process of gas exchange
  1. Ventilation
    - Movement of air into/out of lungs
  2. External respiration
    - Gas exchange between blood & air
  3. Transport of gases within the blood
  4. Internal respiration
    - Gas exchange between blood & cells

### Secondary Functions

- Regulation of blood pH
  - Controlling the CO<sub>2</sub> within the blood
- Voice production
- Olfaction = Smell
- Protection
  - 1st line of defense against microorganism.

### Organs of the Respiratory System



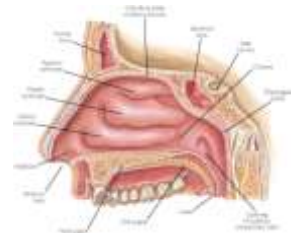
### Nose

- Entry way to respiratory system
- Bone (bridge) and cartilage
- 2 external nares (nostrils)
- Internal hairs
  - Prevent entry of large particles



### Nasal Cavity

- Hollow space behind nose
- Nasal septum
  - Divides cavity
- Nasal conchae
  - Divides into passageways
  - Supports mucous membrane



## Mucous membrane

- Pseudostratified ciliated epithelium
  - Creates mucus
- Traps dust
- Cilia move to throat → swallowed
- Extensive blood supply
- Warms and hydrates air

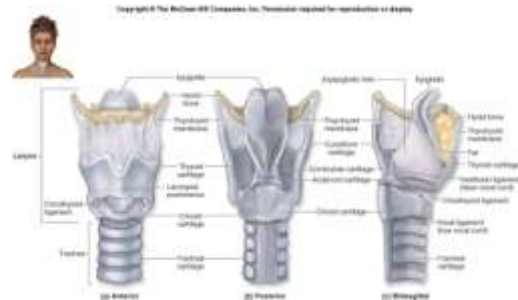
## Pharynx

- Throat
- Behind oral cavity
- Passageway for air and food



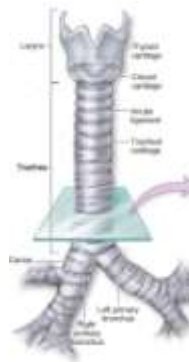
## Larynx

- Enlargement of airway
- Inferior to pharynx, superior to trachea
- Prevents foreign objects from entering trachea
  - Epiglottis covers trachea when swallowing
- Houses vocal cords
- Protected by
  - Hyoid bone
  - Thyroid cartilage
  - Cricoid cartilage



## Trachea

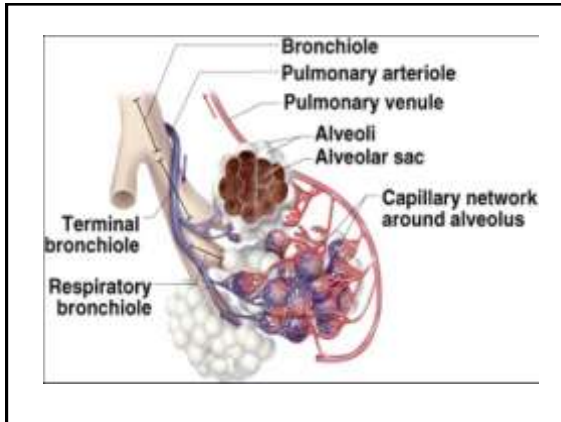
- Windpipe
- Flexible, cylindrical tube
  - Anterior to esophagus
- Lined with ciliated mucous membrane
  - Trapped particles swept up to pharynx
- Protected by C-shaped hyaline cartilage rings



## Bronchial Tree

- Branched airways
- Bronchus → bronchioles → alveolar ducts → alveoli





## Alveoli

- Microscopic air sac
- Simple squamous epithelium
- External respiration
  - Large surface area for exchange



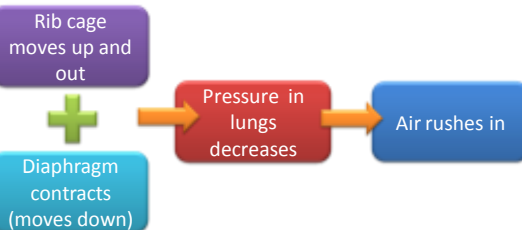
## Lungs

- Soft, spongy organs
- Fill thoracic cavity
- Contain air passages, blood vessels, etc.
- Covered by visceral and parietal pleura
  - Serous membranes



## Breathing Mechanism

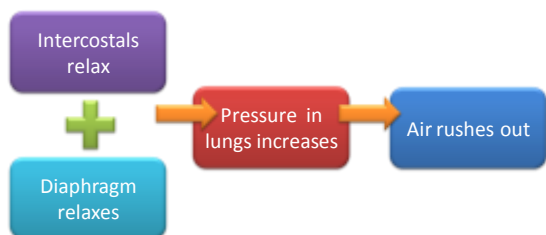
## Inspiration



## Expansion of Lungs

- Pleural membranes help
  - “Stick” together
  - Thoracic wall moves → parietal pleura moves → Visceral pleura moves → Lung expands
- Alveoli impede
  - Surface tension prevents alveoli from expanding
  - Surfactants: lipid-protein mix reduces surface tension

## Expiration



## Respiratory Air Volumes and Capacities

1. Tidal volume
2. Inspiratory reserve volume
3. Expiratory reserve volume
4. Residual volume



## Respiratory Air Volumes and Capacities

