جامـــــعـة المـــــستـقـبـل
AL MUSTAQBAL UNIVERSITY

كلية العلوم
قـســـــــم الانظمة الطبية الذكية

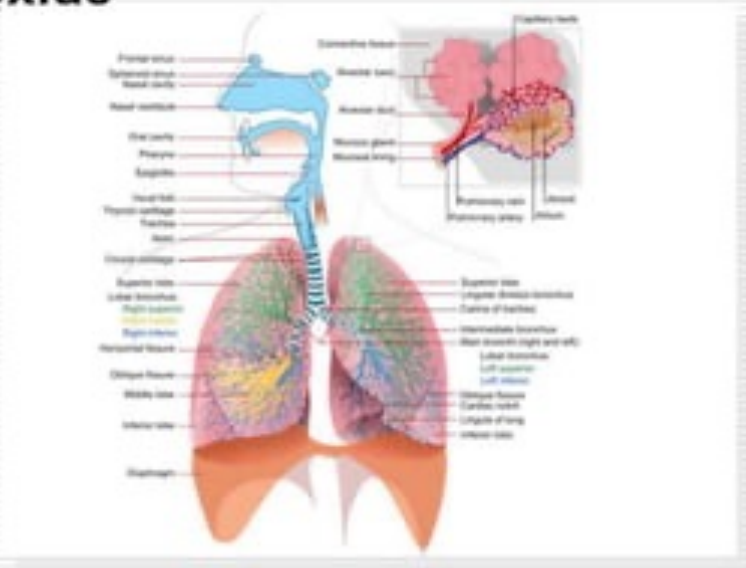
Lecture: (9)

Subject: **The respiratory system**

Level: First
Lecturer: MSc. Mustafa Yousif

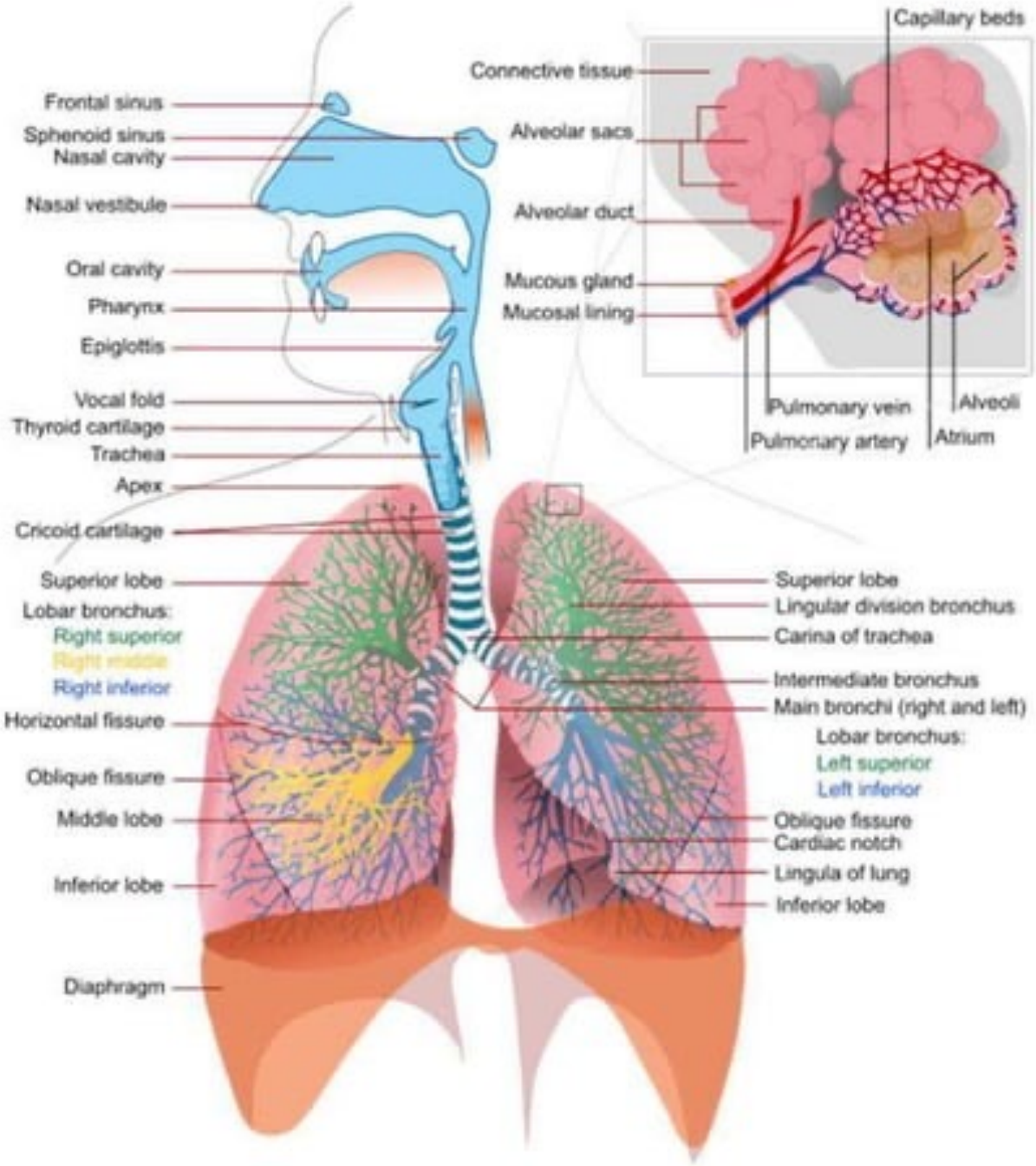
Respiratory System at a Glance

- Functions of the Respiratory System
  - **Inhale fresh air** into lungs
  - Exchange **oxygen for carbon dioxide**
  - **Exhale stale air**



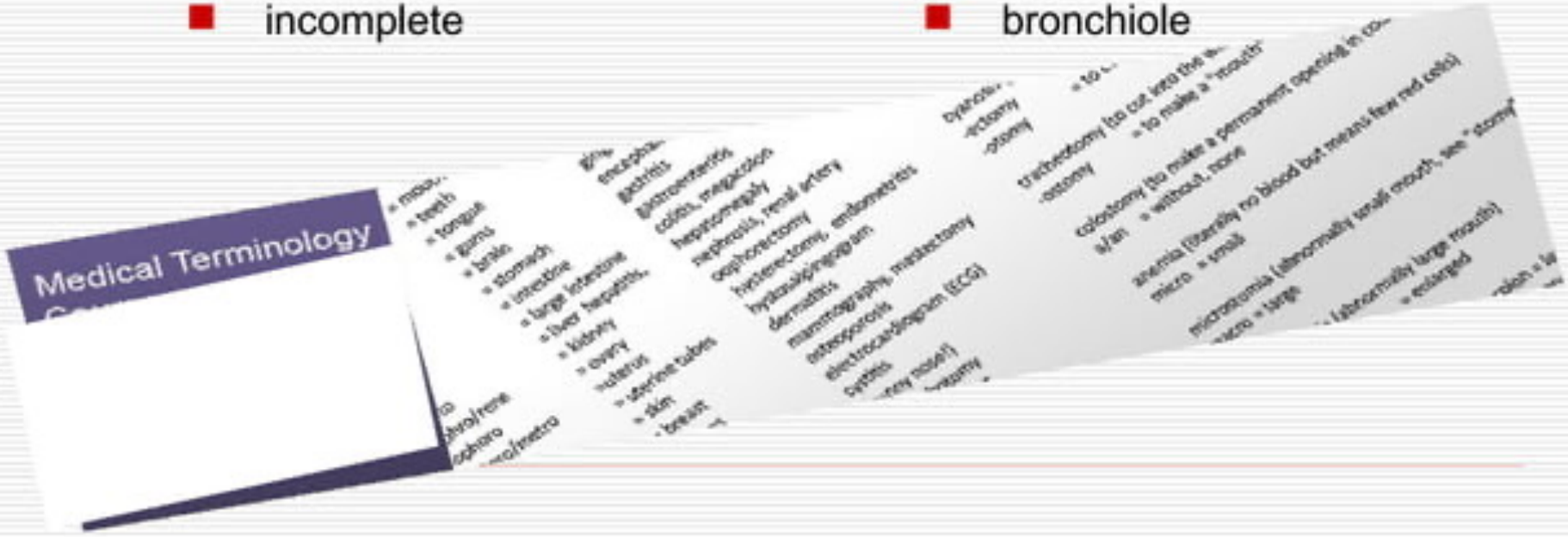
Respiratory System at a Glance

- Organs of the Respiratory System
  - Nasal cavity
  - Pharynx
  - Larynx
  - Trachea
  - Bronchial tubes
  - Lungs


Capillary beds
Connective tissue
Alveolar sacs
Alveolar duct
Mucous gland
Mucosal lining
Pulmonary vein
Alveoli
Pulmonary artery
Atrium
Frontal sinus
Sphenoid sinus
Nasal cavity
Nasal vestibule
Oral cavity
Pharynx
Epiglottis
Vocal fold
Thyroid cartilage
Trachea
Apex
Cricoid cartilage
Superior lobe
Lobar bronchus:
Right superior
Right middle
Right inferior
Horizontal fissure
Oblique fissure
Middle lobe
Inferior lobe
Diaphragm
Superior lobe
Lingular division bronchus
Carina of trachea
Intermediate bronchus
Main bronchi (right and left)
Lobar bronchus:
Left superior
Left inferior
Oblique fissure
Cardiac notch
Lingula of lung
Inferior lobe

Respiratory System Combining Forms

- alveol/o
  - alveolus; air sac
- anthrac/o
  - coal
- atel/o
  - incomplete
- bronch/o
  - bronchus
- bronchi/o
  - bronchus
- bronchiol/o
  - bronchiole

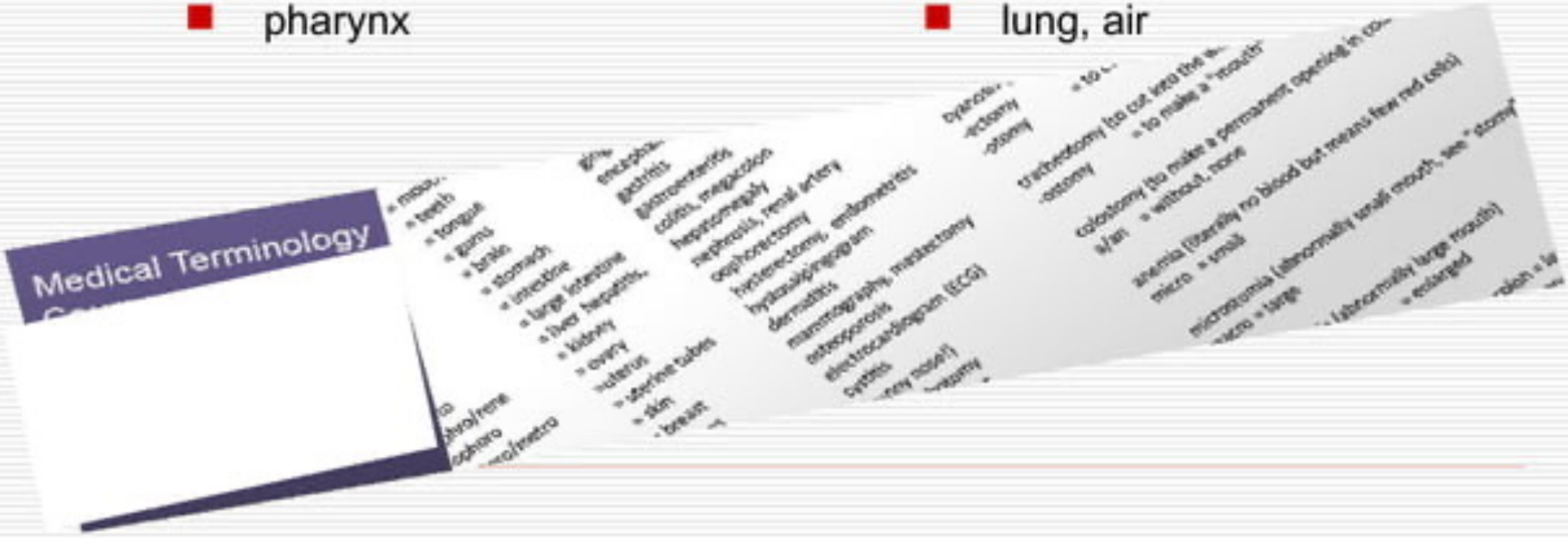


Respiratory System Combining Forms

- coni/o
  - dust
- diaphragmat/o
  - diaphragm
- epiglott/o
  - epiglottis
- laryng/o
  - larynx
- lob/o
  - lobe
- nas/o
  - nose

Respiratory System Combining Forms

- orth/o
  - straight, upright
- ox/o, ox/i
  - oxygen
- pharyng/o
  - pharynx
- pleur/o
  - pleura
- pneum/o
  - lung, air
- pneumon/o
  - lung, air



Respiratory System Combining Forms

- pulmon/o
  - lung
- rhin/o
  - nose
- sinus/o
  - sinus, cavity
- spir/o
  - breathing
- trache/o
  - trachea, windpipe

Respiratory System Suffixes

- –capnia
  - carbon dioxide
- –ectasis
  - dilated, expansion
- –osmia
  - smell
- –phonia
  - voice
- –pnea
  - breathing
- –ptysis
  - spitting
- –thorax
  - chest

Anatomy and Physiology

- Cells of body require constant gas exchange
  - **Delivery** of oxygen
  - **Removal** of carbon dioxide
- Respiratory system works in conjunction with ….

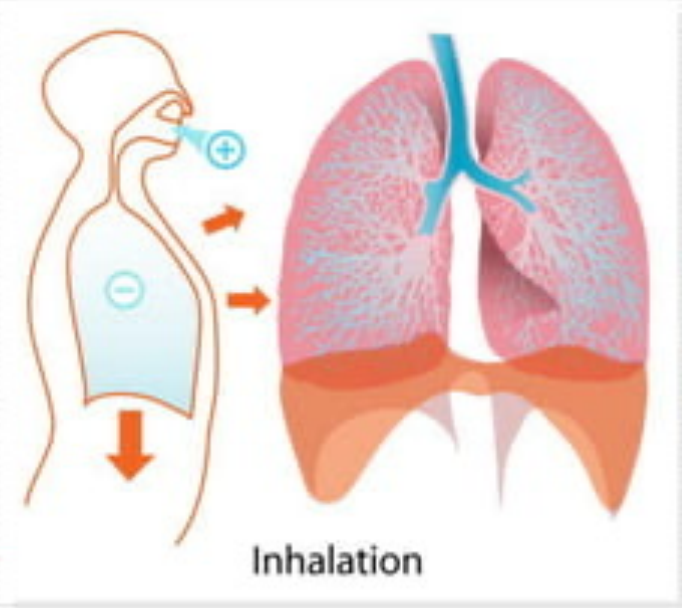
Cardiovascular system to meet this need

Respiration

- Must be continuous to meet cells' needs
- Subdivided into three distinct parts:
  - **Ventilation**
  - **Inhalation**
  - **Exhalation**

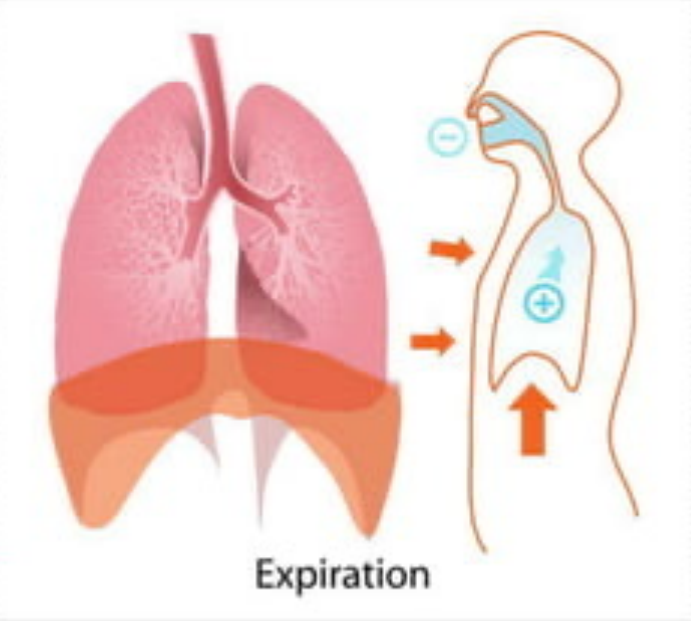
Ventilation

- Flow of air between **outside** environment and **lungs**
- **Inhalation**
  - Flow of air into lungs
  - Brings fresh oxygen into air sacs
- **Exhalation**
  - Flow of air out of lungs
  - Removes carbon dioxide from body



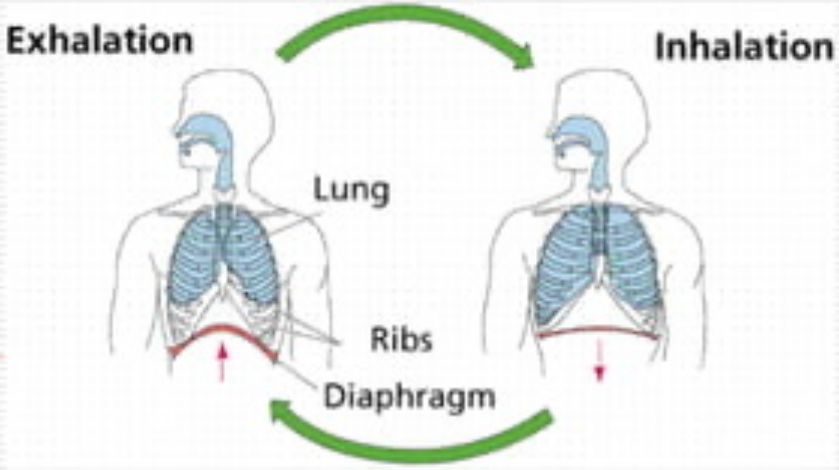
Ventilation

- Flow of air between outside environment and lungs
- **Inhalation**
  - Flow of air into lungs
  - Brings fresh oxygen into air sacs
- **Exhalation or Expiration**
  - Flow of air out of lungs
  - Removes carbon dioxide from body



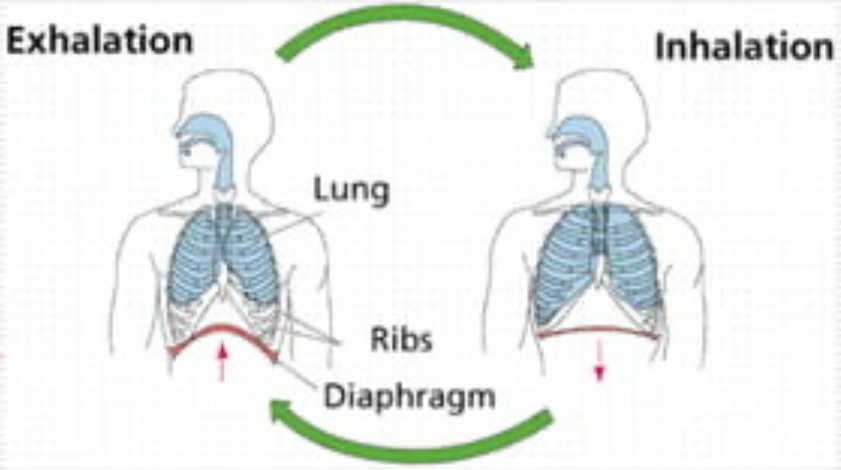
External Respiration

- **Exchange** of *oxygen* and *carbon dioxide* **in lungs**
- Gases diffuse in opposite directions
- Oxygen
  - Leaves air sacs and enters blood stream
- Carbon dioxide
  - Leaves blood stream and enters air sacs



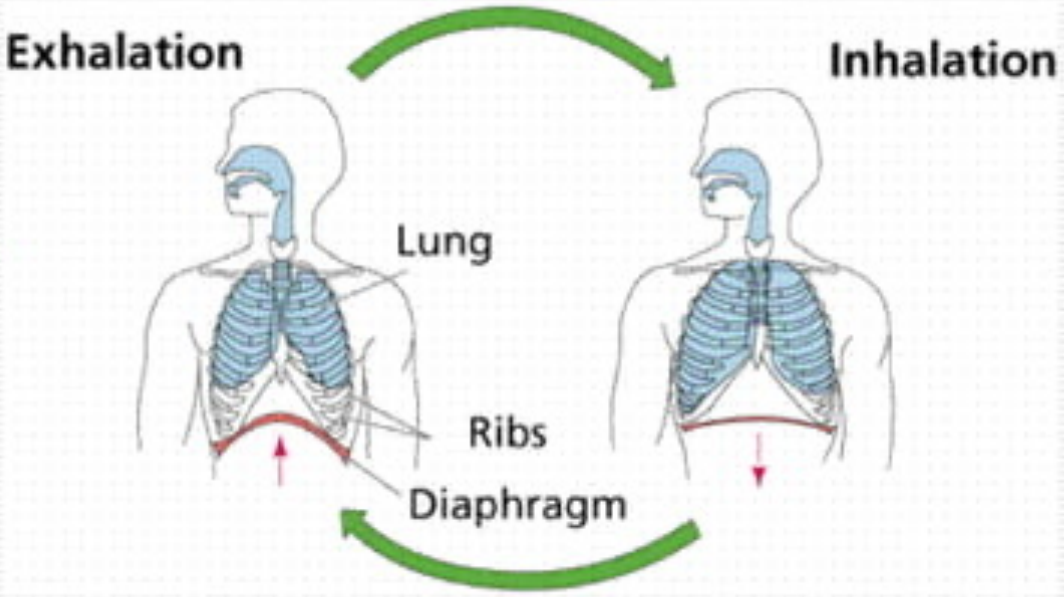
Internal Respiration

- Oxygen and carbon dioxide **exchange** at **cellular level**
- Oxygen
  - Leaves bloodstream and is delivered to tissue
  - Used immediately for metabolism
- Carbon dioxide
  - Waste product of metabolism
  - Leaves tissue and enters bloodstream

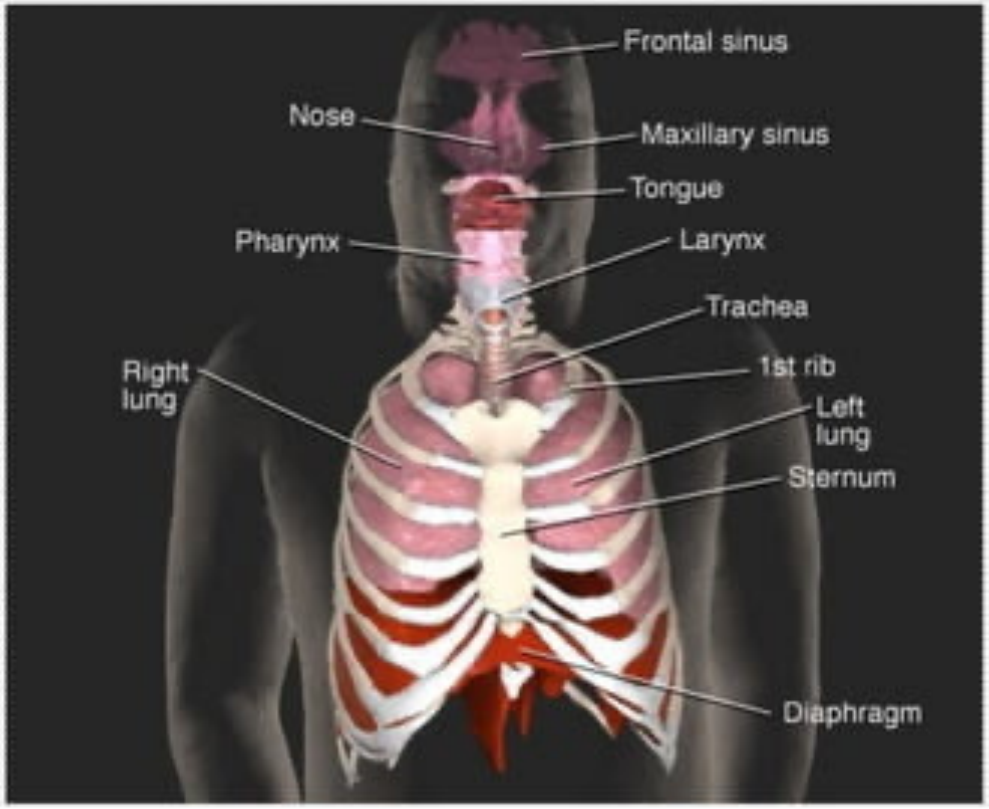


Respiratory System Organs

- Nasal cavity
- Pharynx
- Larynx
- Trachea
- Bronchial tubes
- Lungs



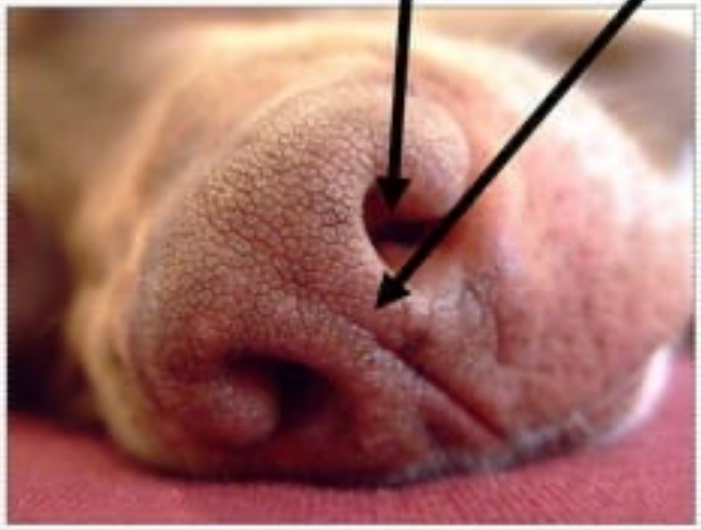
Respiratory System Animation

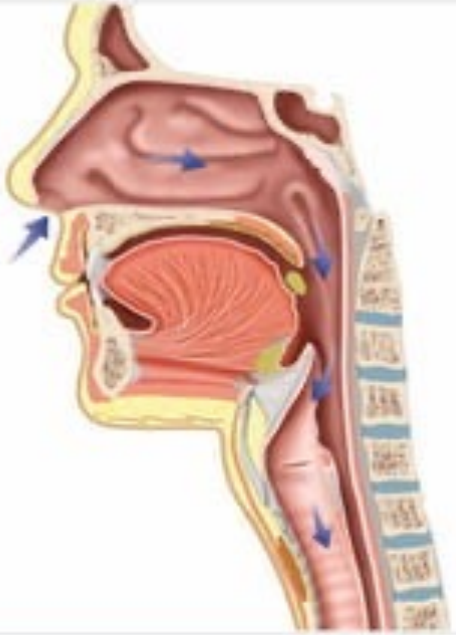


Click here to view an animation of the respiratory system.

Nasal Cavity

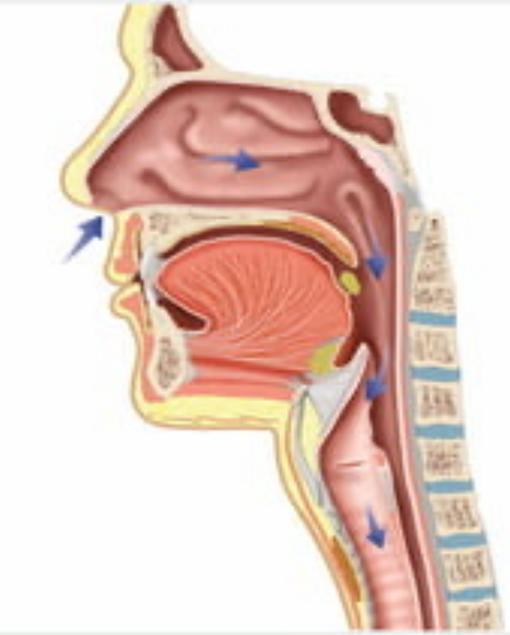
- Air enters through **nares**
- Nasal cavity divided by **nasal septum**
- **Palate** in roof of mouth separates nasal cavity above from mouth below





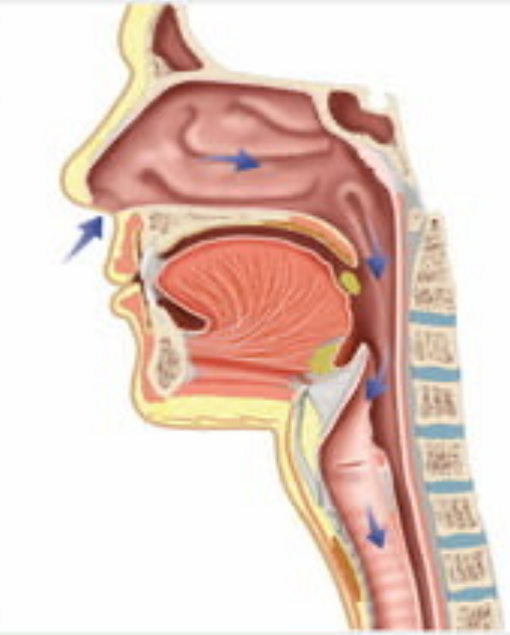
Nasal Cavity

- **Cilia**
  - Small hairs line opening to nasal cavity
  - Filter out large dirt particles before they can enter lungs
- Walls of nasal cavity and nasal septum
  - Made of flexible cartilage
  - Covered with **mucous membrane**



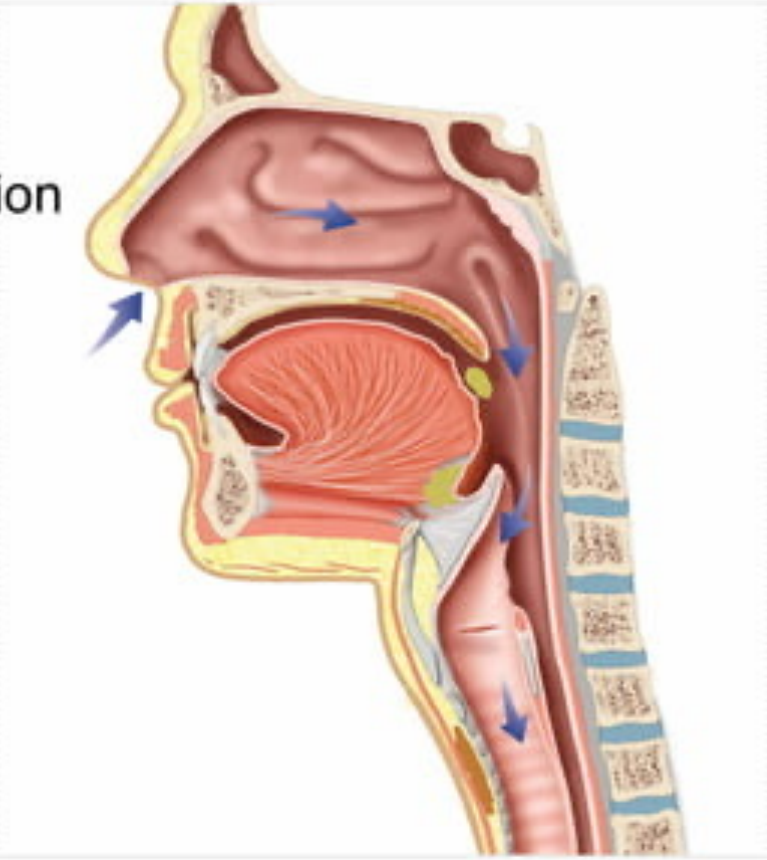
Nasal Cavity

- Much of respiratory tract is coved with mucous membrane
  - **Mucus** is thick and sticky secretion of membrane
  - Cleanses air by trapping dust and bacteria
- Capillaries in mucous membranes
  - Warm air
  - Humidify air



Nasal Cavity

- **Paranasal sinuses**
  - Located within facial bones
  - Echo chamber for sound production
  - Gives resonance to voice



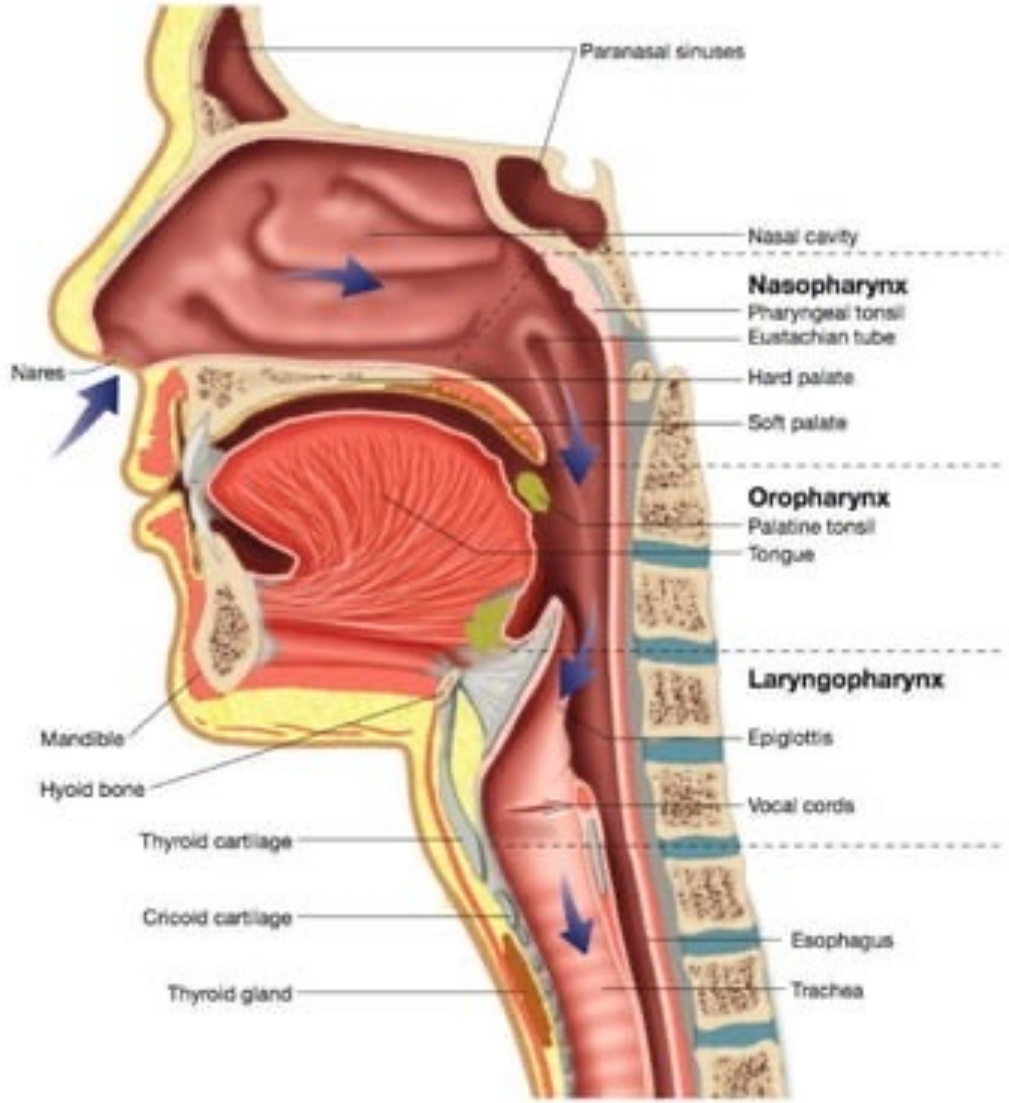
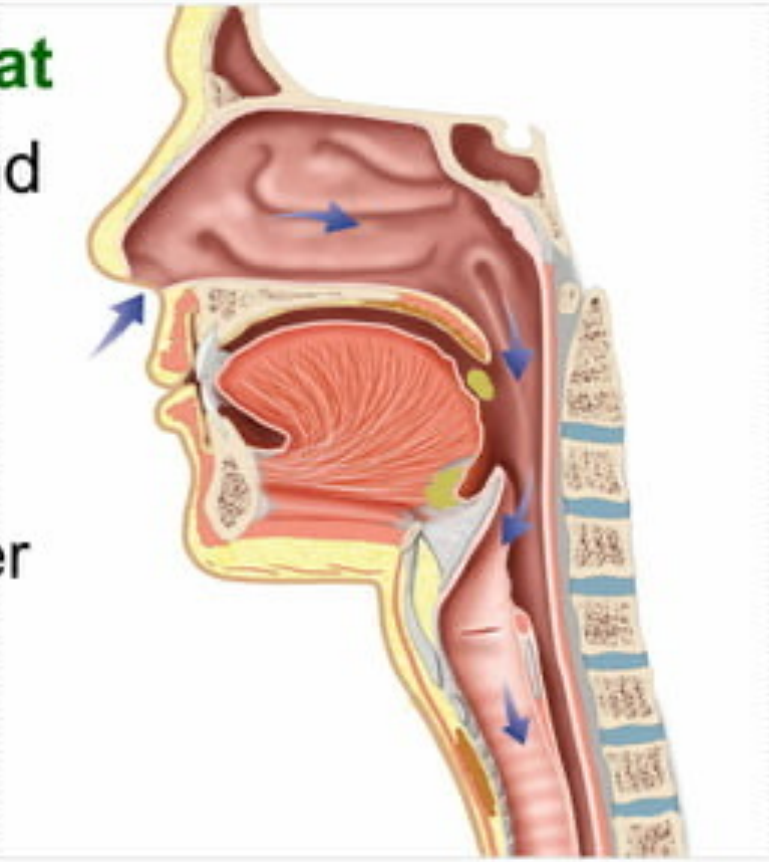


Figure 7.1 – Sagittal section of upper respiratory system illustrating the internal anatomy of the nasal cavity, pharynx, larynx, and trachea.

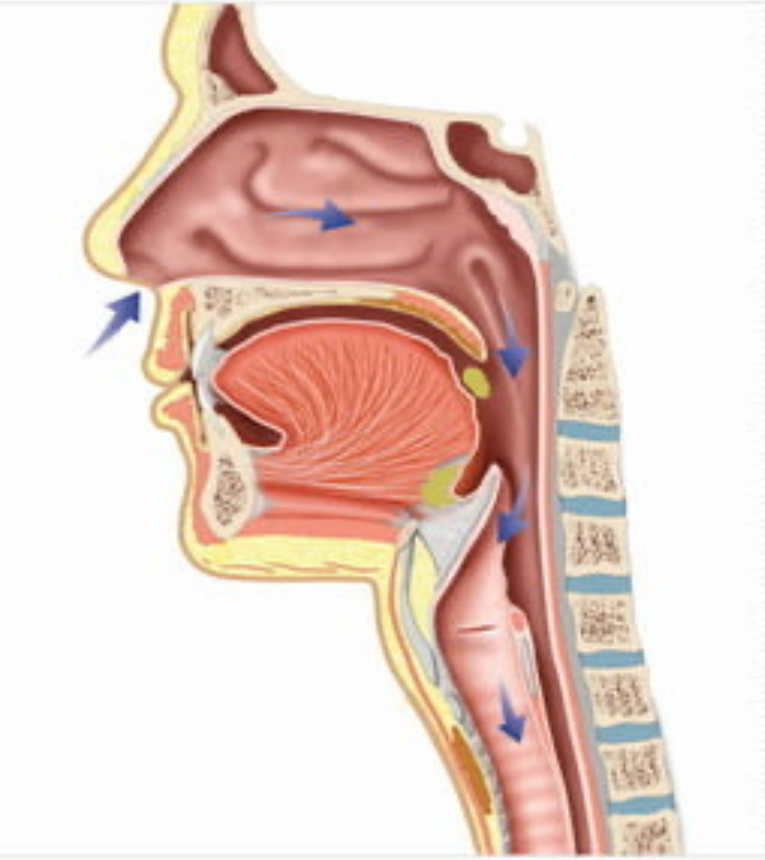
Pharynx

- Commonly called **throat**
- Used by respiratory and digestive systems
- At end of pharynx
  - Air enters trachea
  - Food and liquids enter esophagus



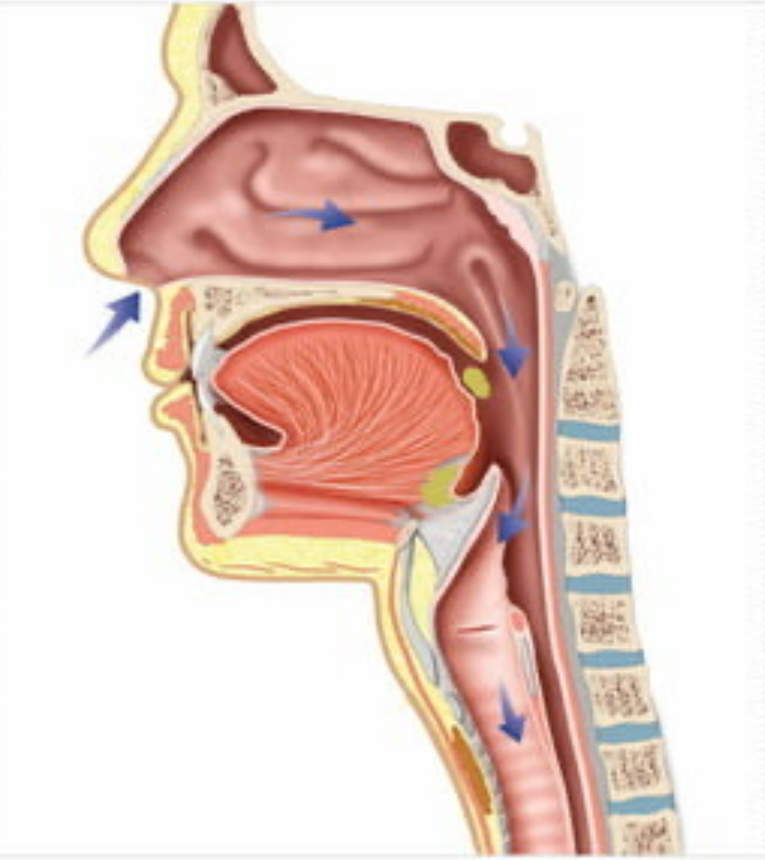
Three Subdivisions of Pharynx

- **Nasopharynx**
  - Upper section by nasal cavity
- **Oropharynx**
  - Middle section by oral cavity
- **Laryngopharynx**
  - Lower section by larynx



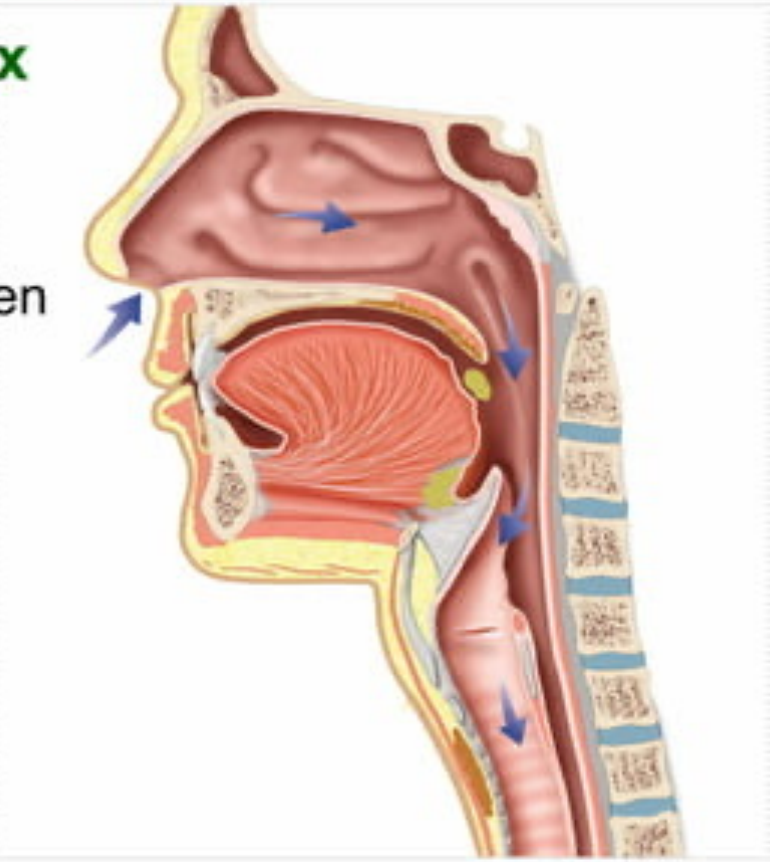
Tonsils

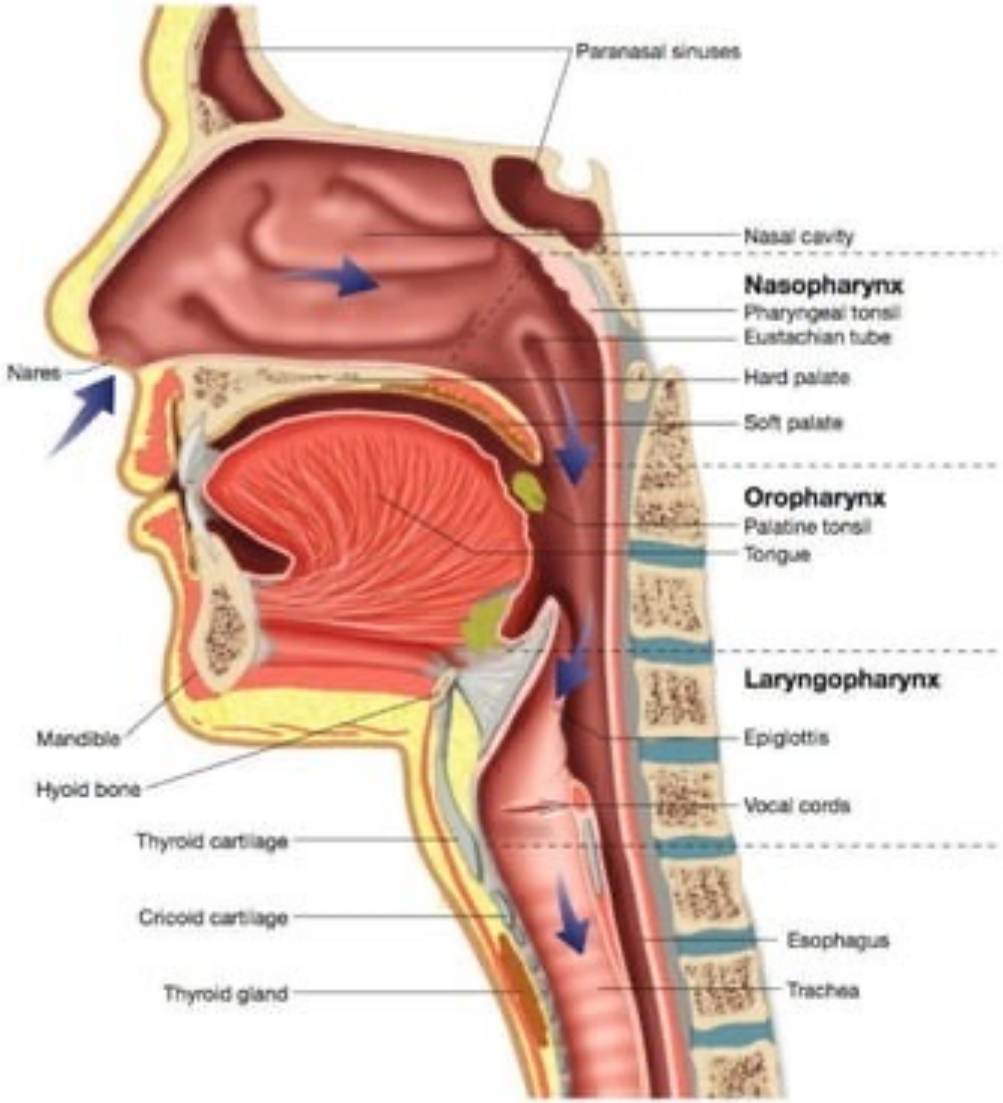
- Lymphatic tissue
  - Removes pathogens in air and food
- Three pairs
  - **Adenoids**
  - **Palatine**
  - **Lingual**



Eustachian or Auditory Tube

- Opening found in **nasopharynx**
- Other end opens into **middle ear**
- Tube opens with each swallow
  - Equalizes air pressure between middle ear and outside atmosphere





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Thank You