

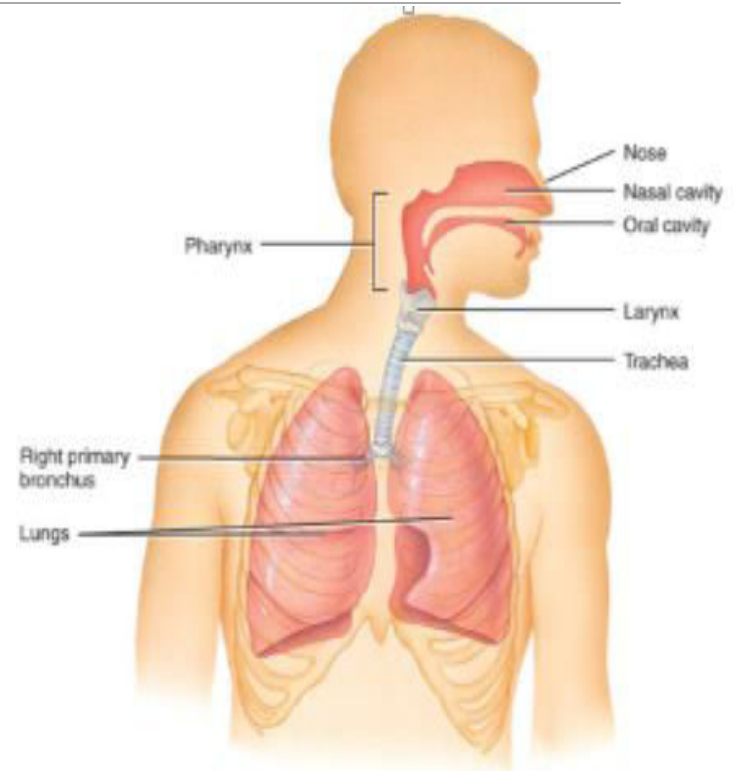
# The Respiratory System

---

DR. WAFAA SHUNNAQ

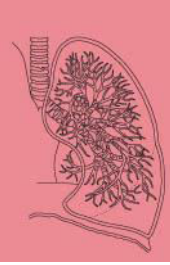
# Respiratory System

- Cells continually use O<sub>2</sub> & release CO<sub>2</sub>
- Respiratory system designed for gas exchange
- Cardiovascular system transports gases in blood
- Failure of either system
  - rapid cell death from O<sub>2</sub> starvation



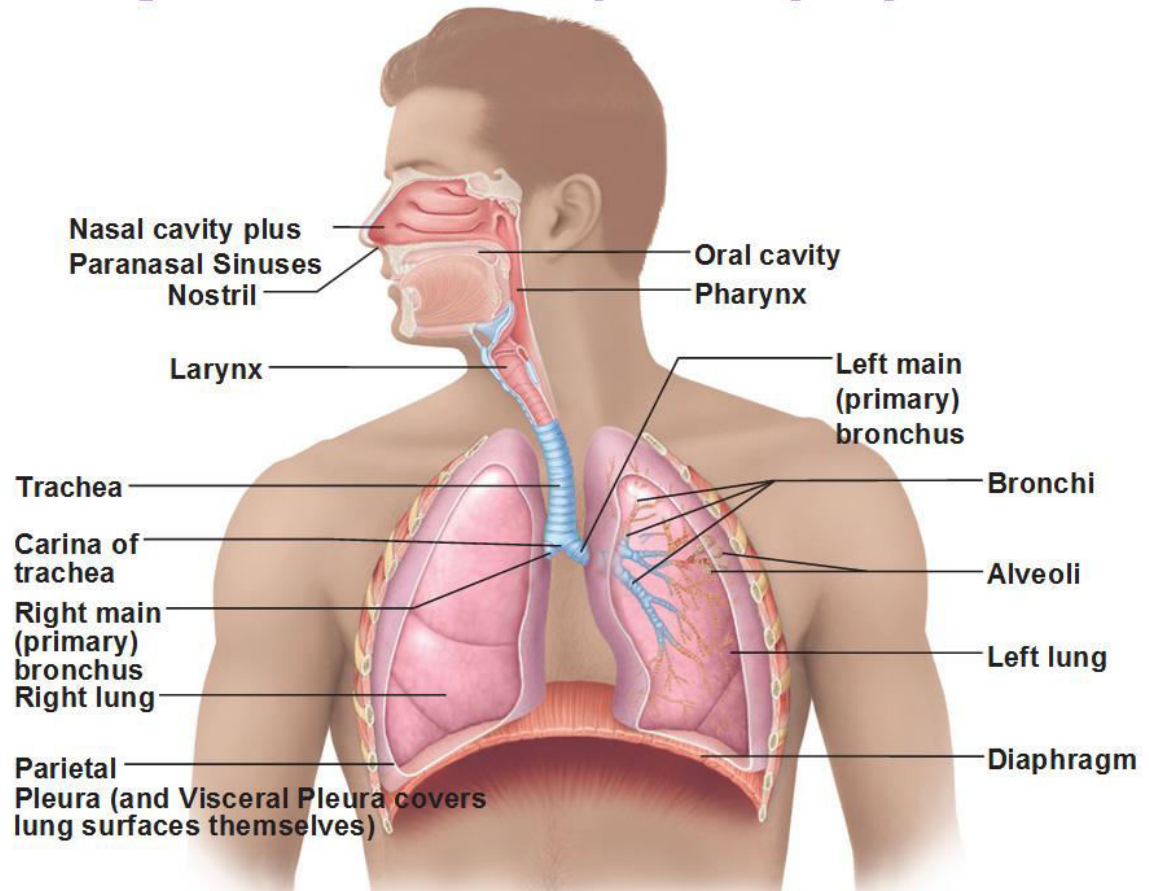
(a) Anterior view showing organs of respiration

# Respiratory System Anatomy

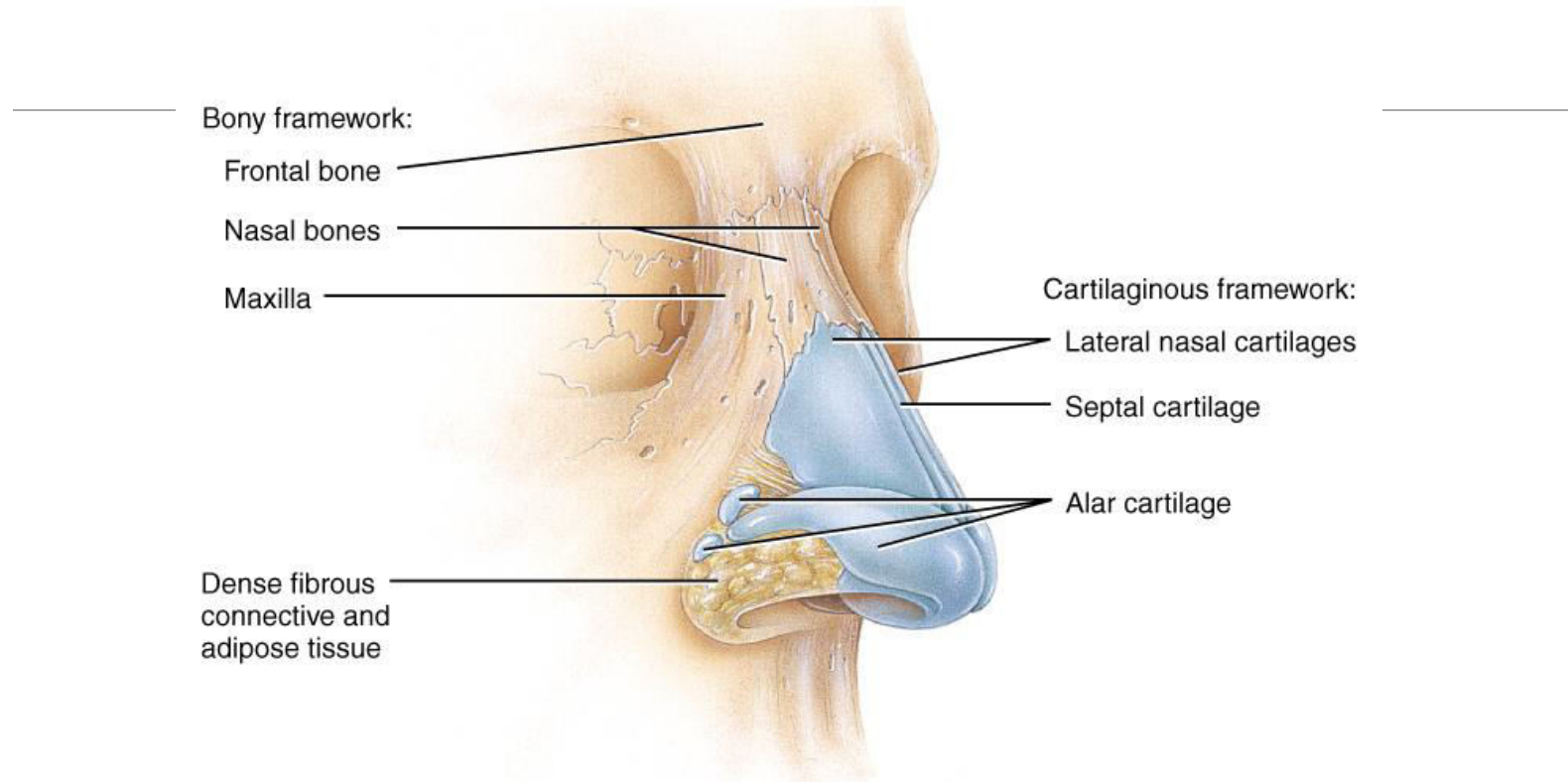


- Nose
- Pharynx = throat
- Larynx = voicebox
- Trachea = windpipe
- Bronchi = airways
- Lungs

## Organs of the Respiratory System



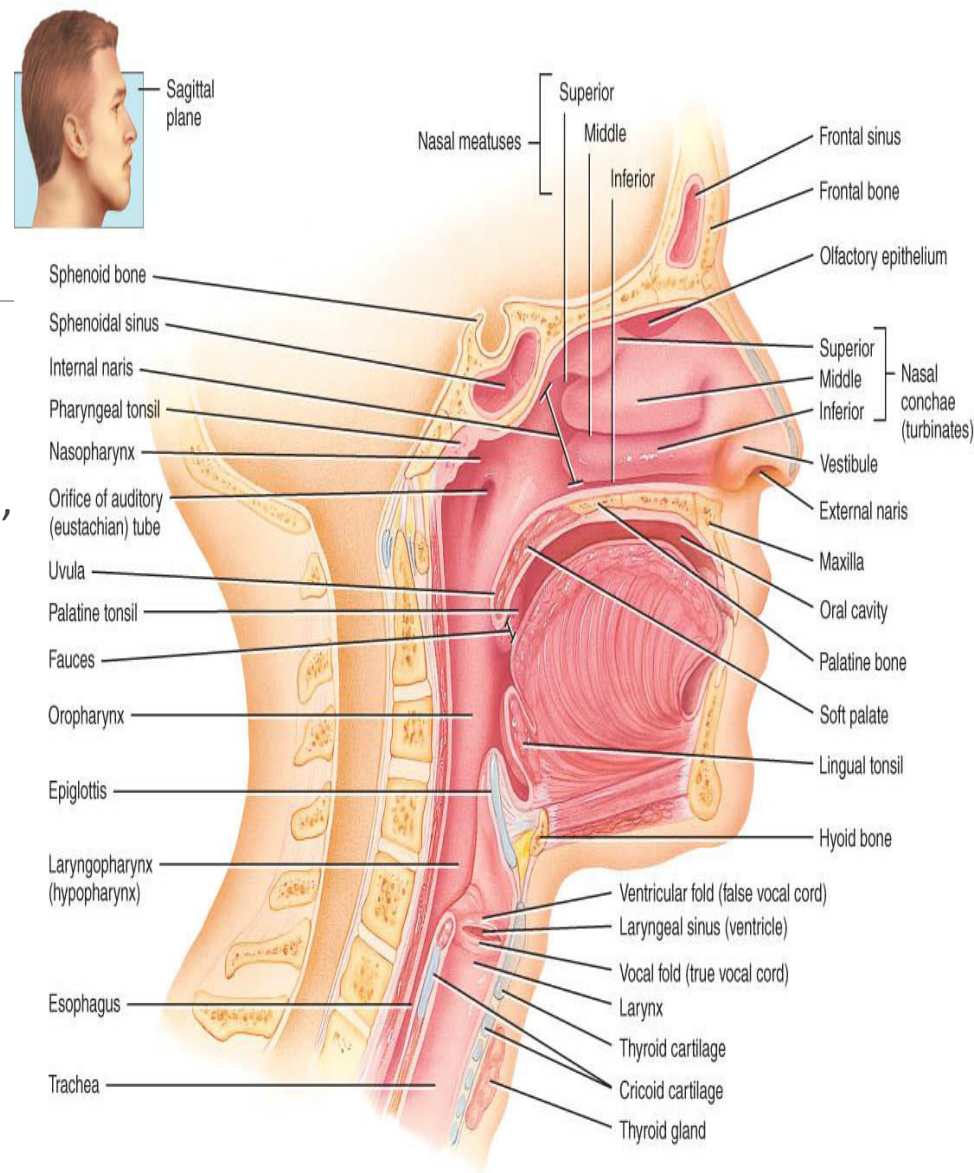
# External Nasal Structures



- The external portion of the nose is made of cartilage and skin and is lined with mucous membrane. Openings to the exterior are the **external nares**.
- The bony framework of the nose is formed by the **frontal bone, nasal bones, and maxillae**

# Nose -- Internal Structures

- Large chamber within the skull
- The interior structures of the nose are specialized for warming, moistening, and filtering incoming air; receiving olfactory stimuli; and serving as large, hollow resonating chambers to modify speech sounds.
- The nasal cavity is divided into right and left sides by the nasal septum.
- The anterior portion of the cavity is called the **vestibule**
- **Roof** is made up of ethmoid and **floor** is hard palate
- **Internal nares (choanae)** are openings to pharynx
- Nasal septum is composed of bone & cartilage
- Bony swelling or **conchae** on lateral walls



(b) Sagittal section of the left side of the head and neck showing the location of respiratory structures

# Functions of the Nasal Structures

---

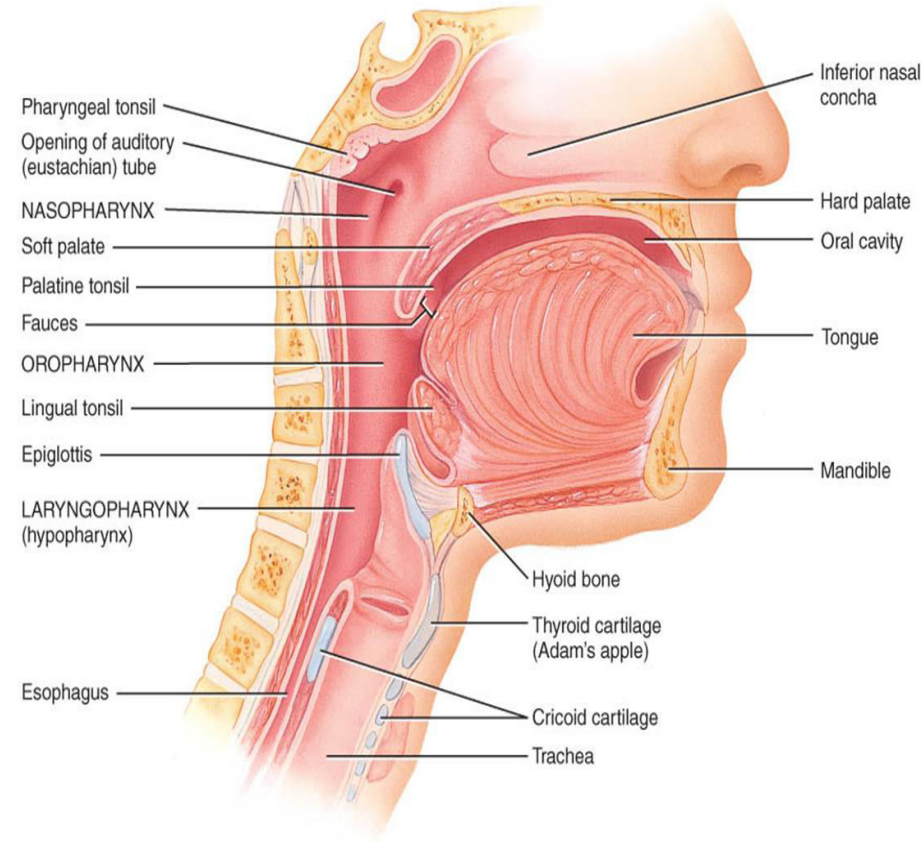
- **Olfactory epithelium for sense of smell**
- **Pseudostratified ciliated columnar with goblet cells lines nasal cavity**
  - warms air due to high vascularity
  - mucous moistens air & traps dust
  - cilia move mucous towards pharynx
- **Paranasal sinuses open into nasal cavity**
  - found in ethmoid, sphenoid, frontal & maxillary
  - lighten skull & resonate voice

# Pharynx - Overview

- The *pharynx (throat)* is a muscular tube lined by a mucous membrane .
- The anatomic regions are the *nasopharynx*, *oropharynx*, and *laryngopharynx*.
- The nasopharynx functions in respiration. Both the oropharynx and laryngopharynx function in digestion and in respiration (serving as a passageway for both air and food).



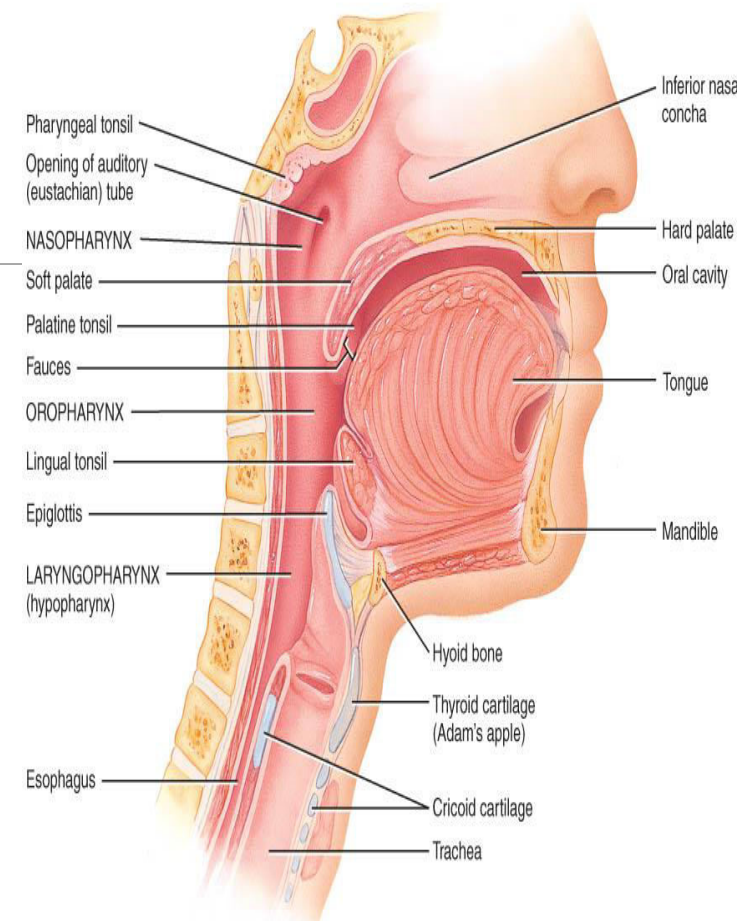
Nasopharynx  
 Oropharynx  
 Laryngopharynx  
 Regions of the pharynx



Sagittal section showing the regions of the pharynx

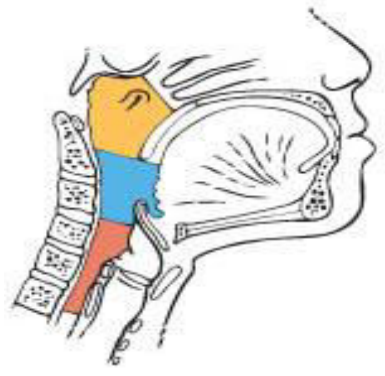
# Pharynx

- Muscular tube (5 inch long).
  - skeletal muscle & mucous membrane
- Extends from internal nares to cricoid cartilage
- Functions
  - passageway for food and air
  - resonating chamber for speech production
  - tonsil (lymphatic tissue) in the walls protects entryway into body
- Distinct regions -- nasopharynx, oropharynx and laryngopharynx

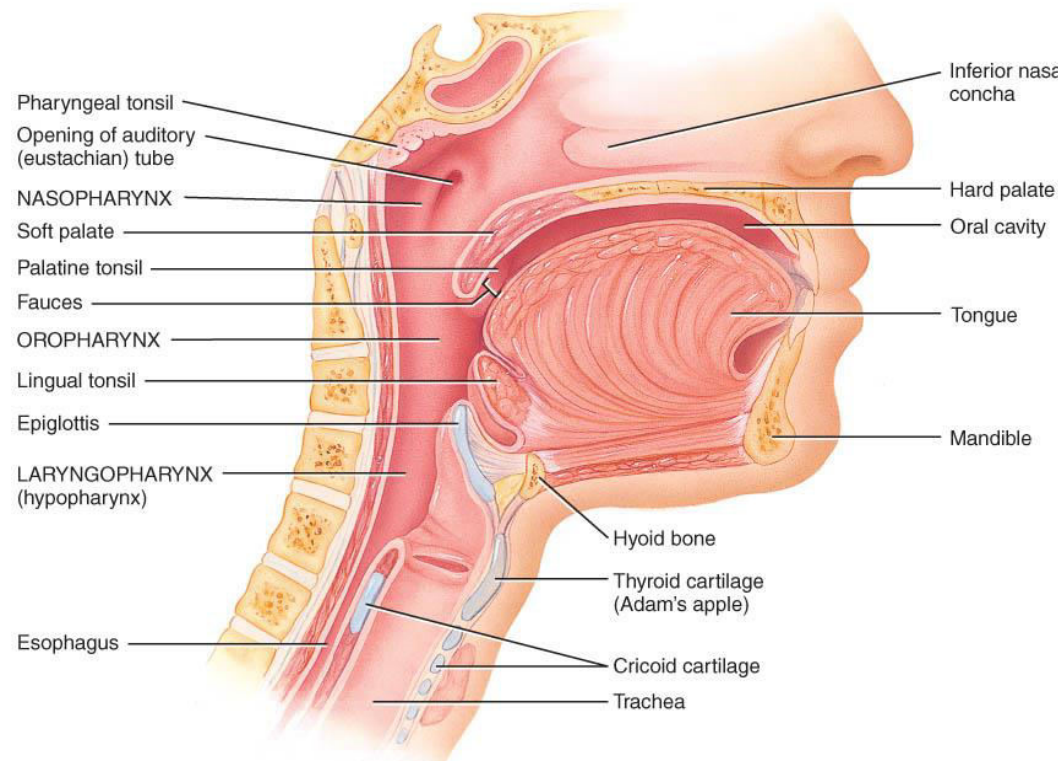




# Nasopharynx



Nasopharynx  
 Oropharynx  
 Laryngopharynx  
**Regions of the pharynx**

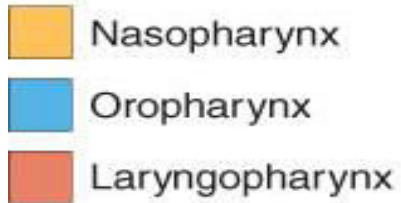
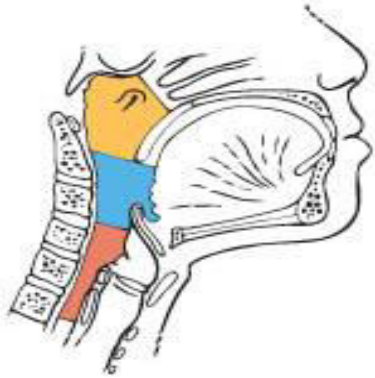


**From choanae to soft palate**

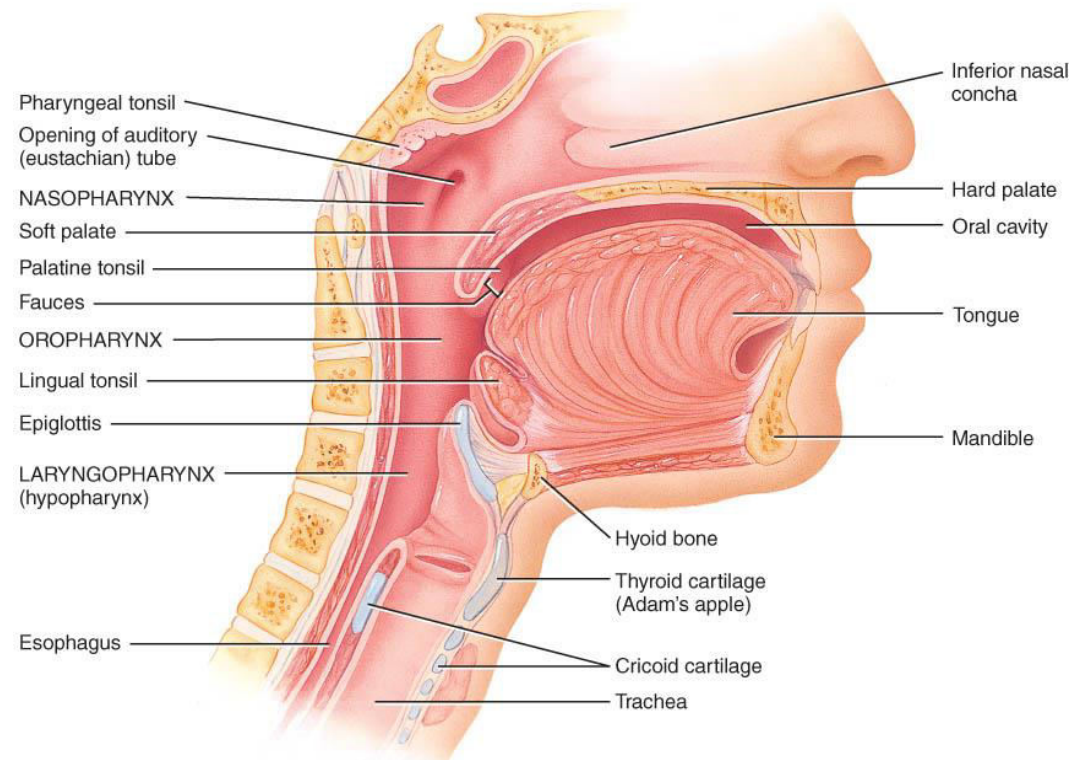
- openings of auditory (Eustachian) tubes from middle ear cavity
- adenoids or pharyngeal tonsil in roof

Passageway for air only

# Oropharynx



Regions of the pharynx

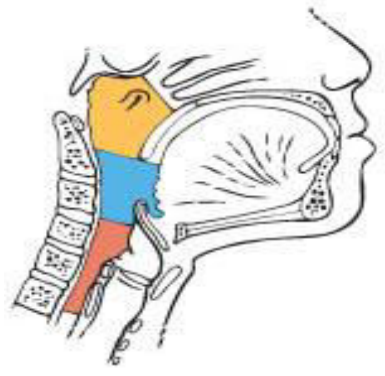


## From soft palate to epiglottis

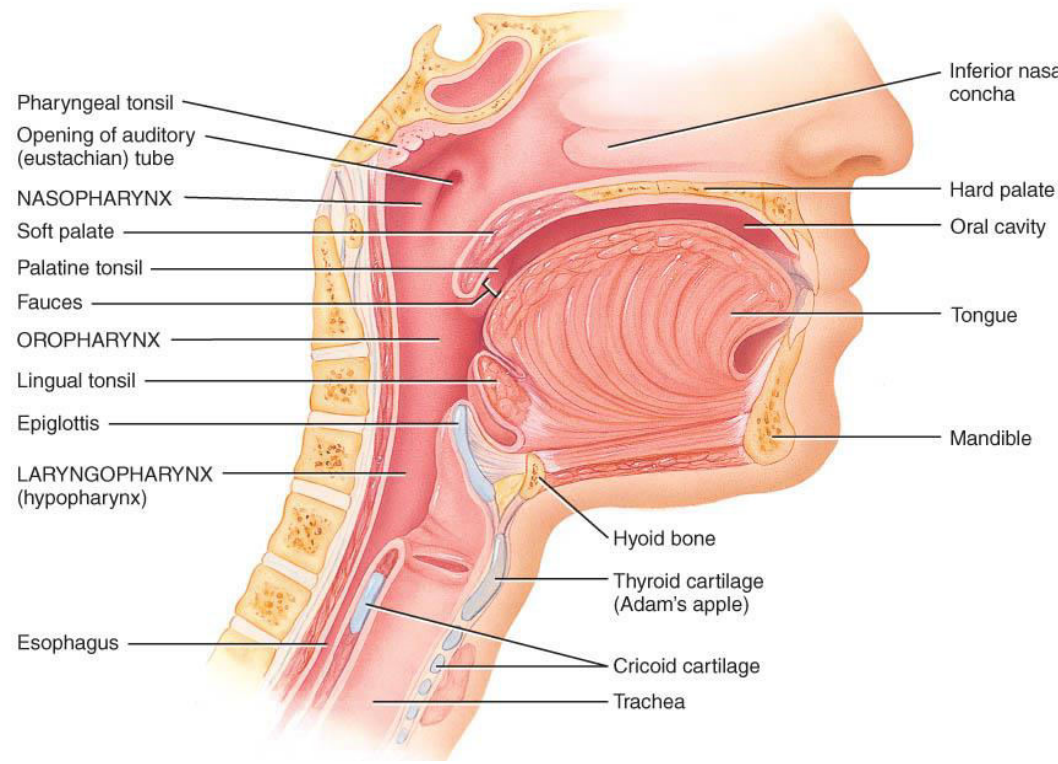
- fauces is opening from mouth into oropharynx
- palatine tonsils found in side walls, lingual tonsil in tongue

Common passageway for food & air

# Laryngopharynx



Nasopharynx  
 Oropharynx  
 Laryngopharynx  
**Regions of the pharynx**

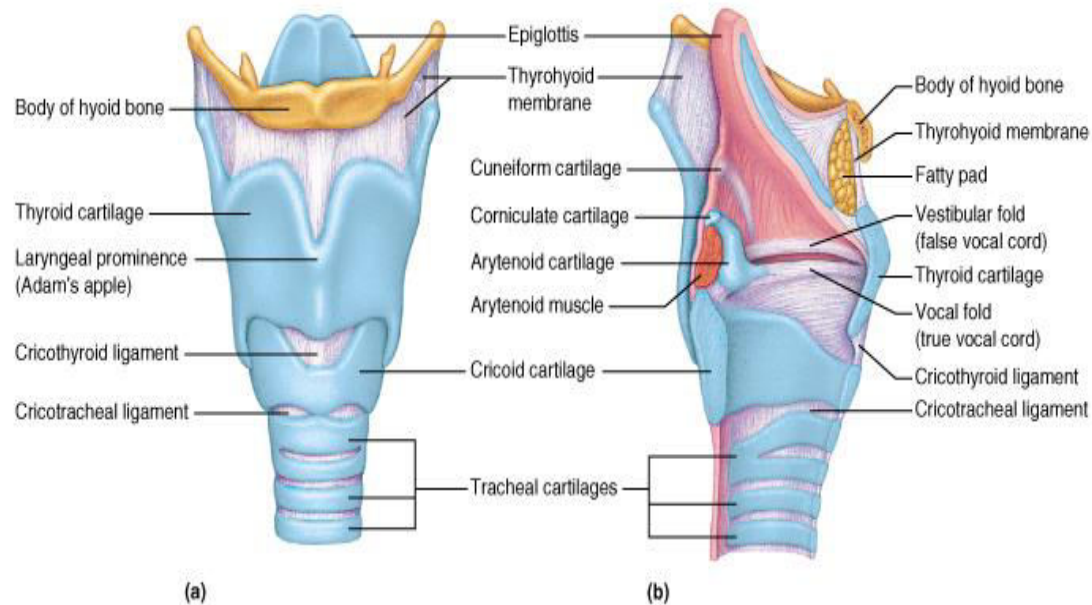


**Extends from epiglottis to cricoid cartilage**

Common passageway for food & air & ends as esophagus inferiorly

# Larynx - Overview

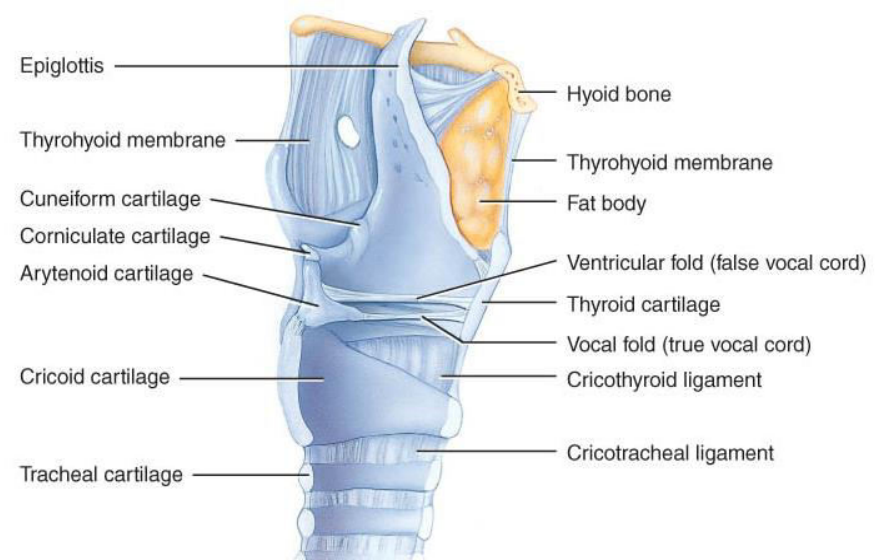
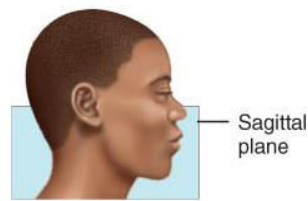
- The *larynx* (*voice box*) is a passageway that connects the pharynx with the trachea.
- It contains the **thyroid cartilage** (Adam's apple)
- **the epiglottis**, which prevents food from entering the larynx;
- **the cricoid cartilage**, which connects the larynx and trachea
- and the paired **arytenoid, corniculate, and cuneiform** cartilages.
- Voice Production
  - The *larynx* contains *vocal folds* (*true vocal cords*), which produce sound.



Copyright © 2001 Benjamin Cummings, an imprint of Addison Wesley Longman, Inc.

# Cartilages of the Larynx

---



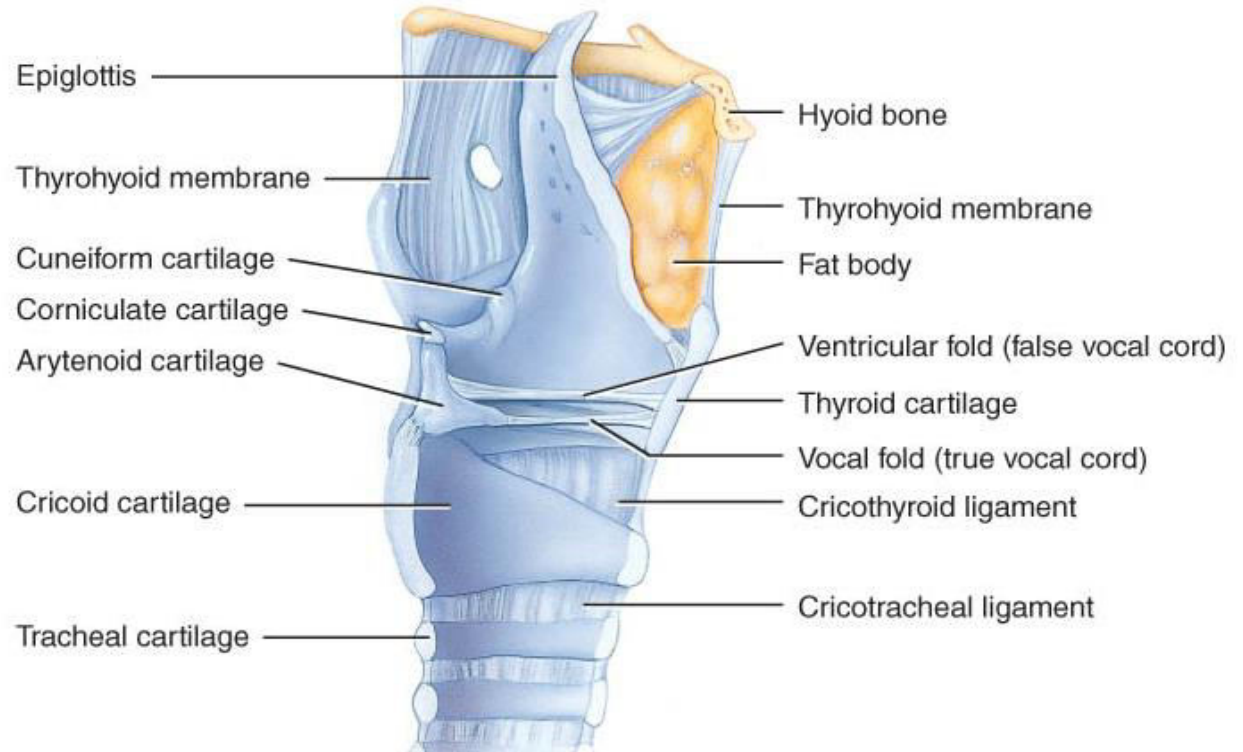
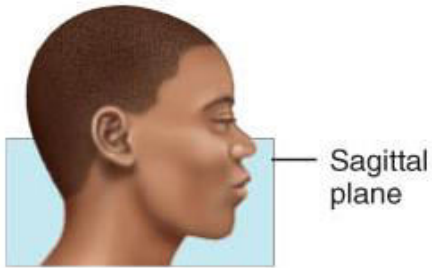
Thyroid cartilage forms Adam's apple

Epiglottis---leaf-shaped piece of elastic cartilage

- which prevents food from entering the larynx;
- Cricoid cartilage---ring of cartilage attached to top of trachea

Pair of arytenoid cartilages sit upon cricoid

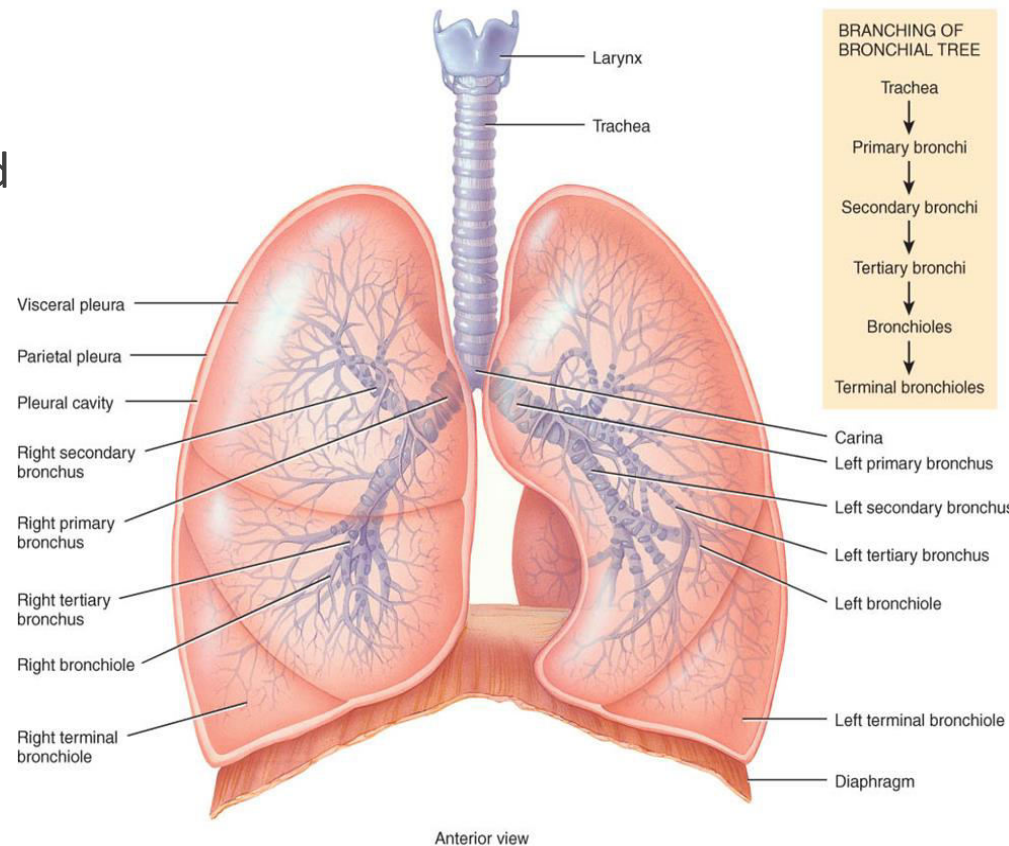
# Vocal Cords



- **False vocal cords** (ventricular folds) found above vocal folds (**true vocal cords**)
- True vocal cords attach to arytenoid cartilages

# Trachea

- The *trachea* (*windpipe*) extends from the larynx to the primary bronchi.
- It is composed of smooth muscle and C-shaped rings of cartilage.
- The cartilage rings keep the airway open.
- The cilia of the epithelium sweep debris away from the lungs and back to the throat to be swallowed.
- Size is 5 in long & 1in diameter
- Extends from larynx to T5 anterior to the esophagus and then splits into bronchi



# Tracheostomy and Intubation

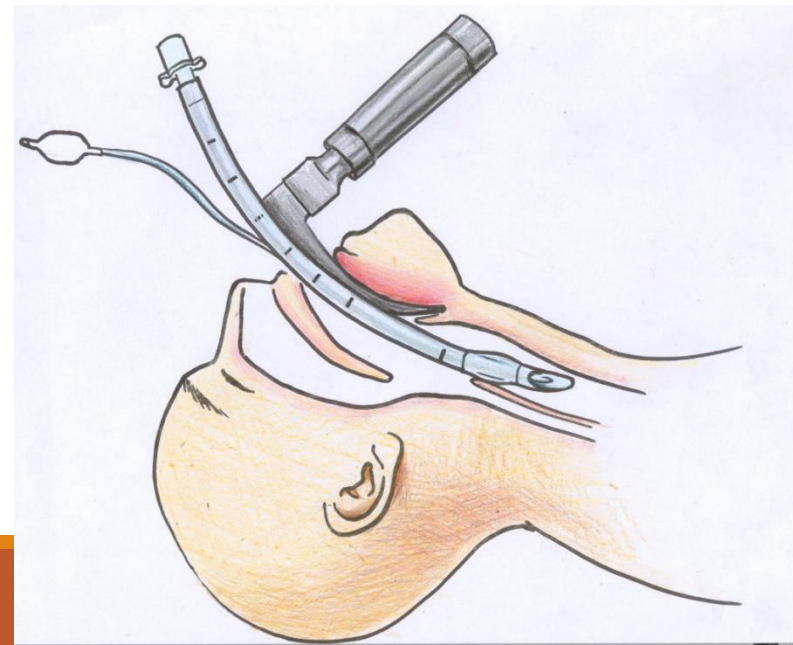
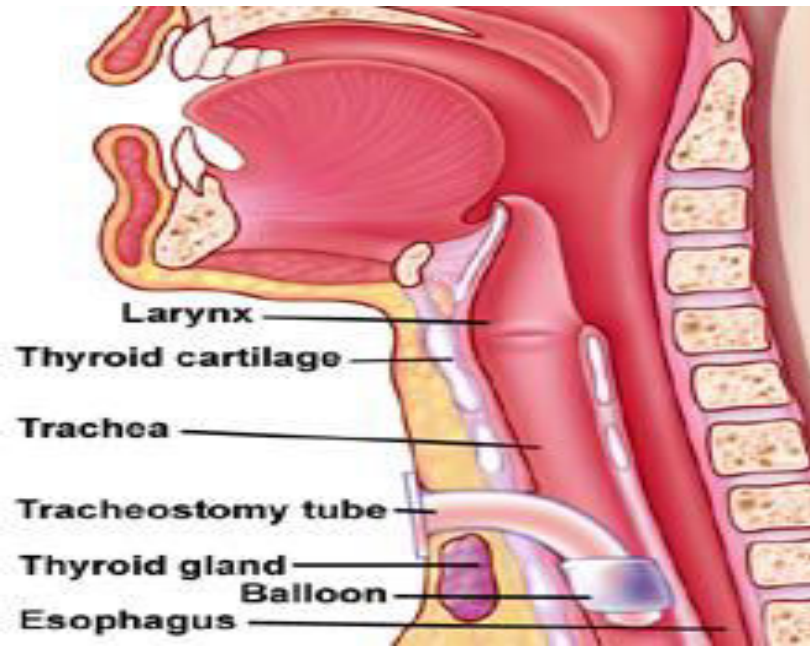
---

Reestablishing airflow past an airway obstruction

- crushing injury to larynx or chest
- swelling that closes airway
- vomit or foreign object

**Tracheostomy** is incision in trachea below cricoid cartilage if larynx is obstructed

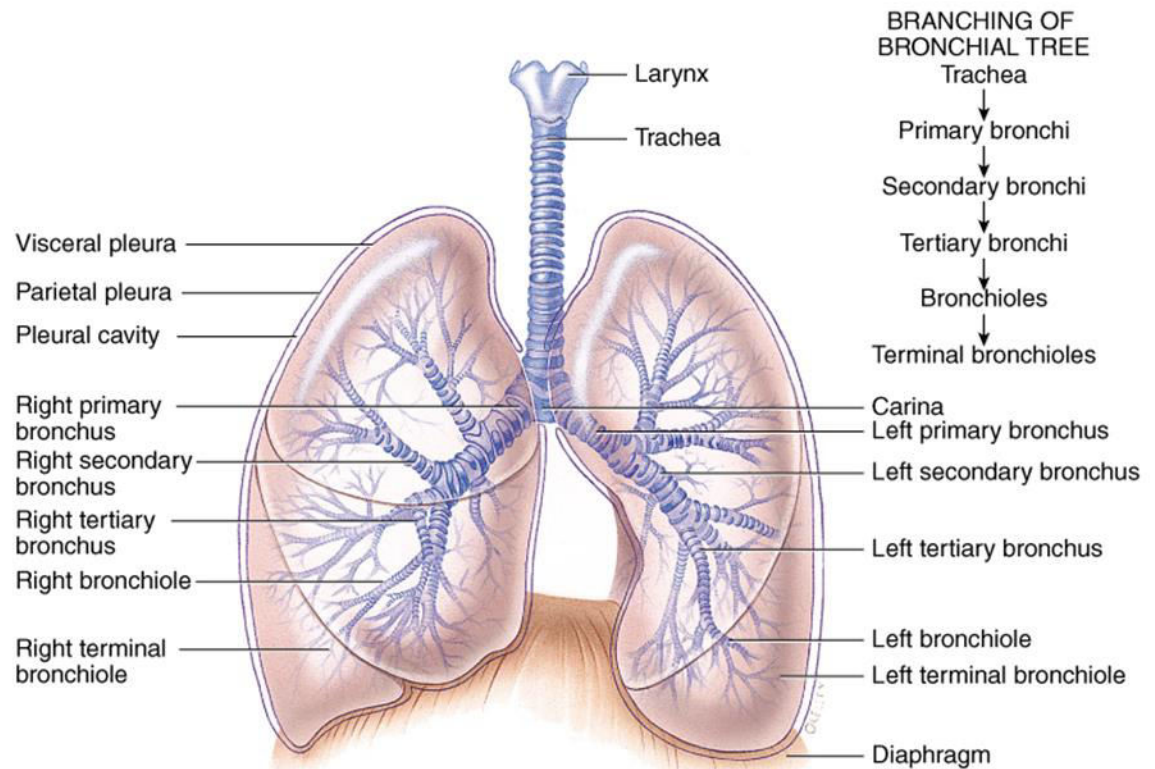
**Intubation** is passing a tube from mouth or nose through larynx and trachea





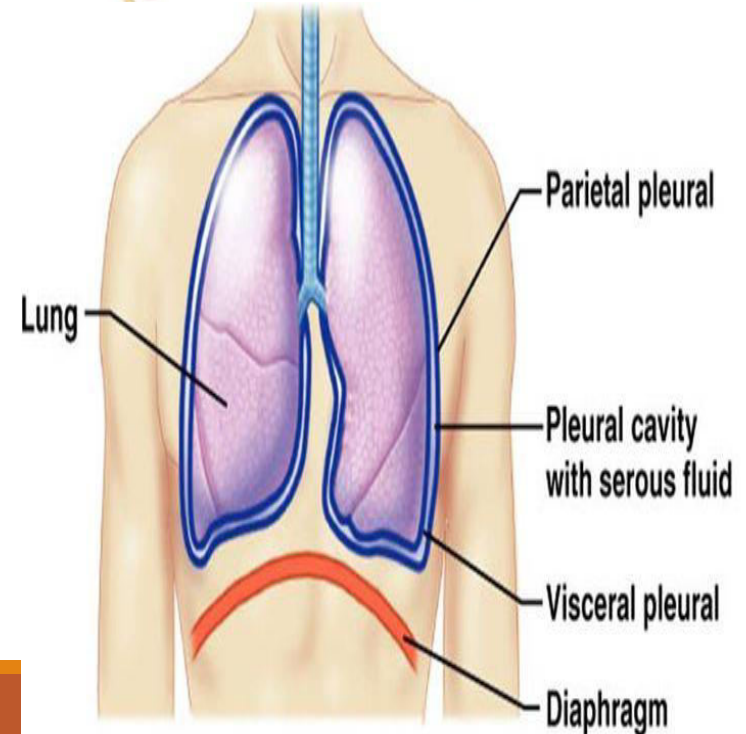
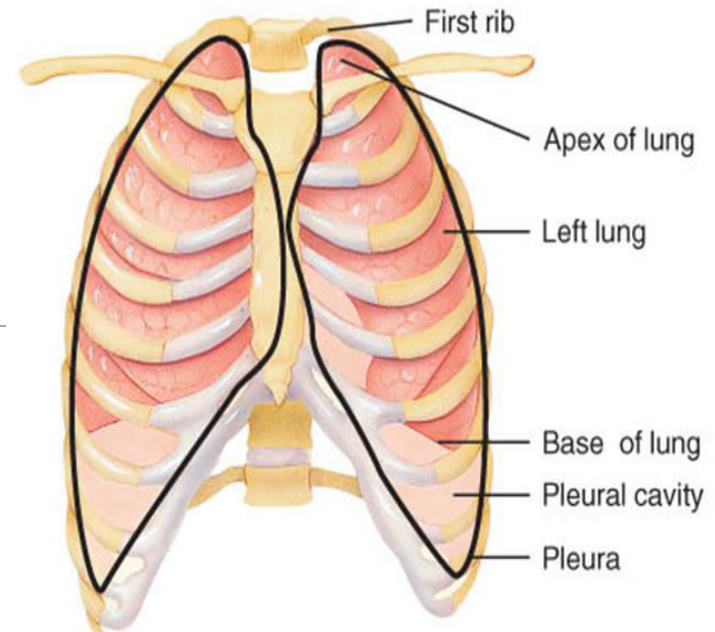
# Bronchi

- The trachea divides into the *right and left primary bronchi*.
- The bronchial tree consists of the trachea, primary bronchi, secondary bronchi, tertiary bronchi, bronchioles, and terminal bronchioles.
- Walls of bronchi contain rings of cartilage.
- Walls of bronchioles contain smooth muscle.



# Lungs - Overview

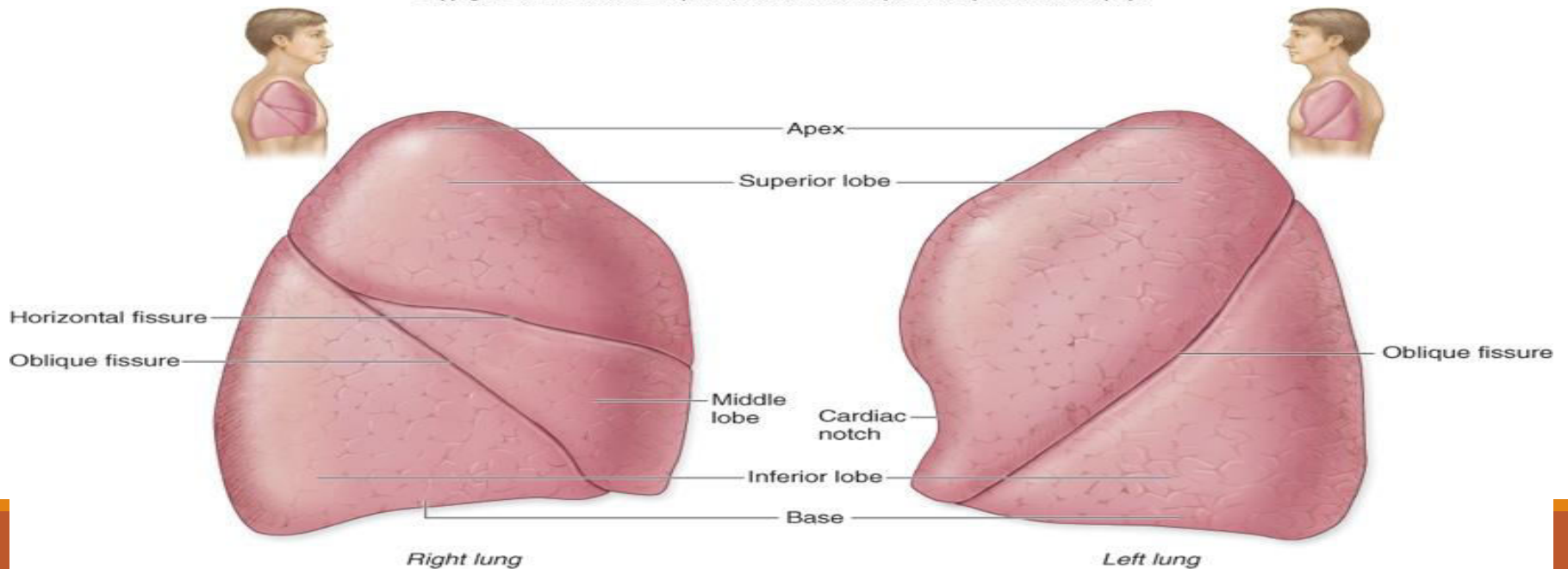
- *Lungs* are paired organs in the thoracic cavity; they are enclosed and protected by the pleural membrane.
- **The *parietal pleura*** is the outer layer which is attached to the wall of the thoracic cavity.
- **The *visceral pleura*** is the inner layer, covering the lungs themselves.
- Between the pleurae is a small potential space, the ***pleural cavity***, which contains a lubricating fluid secreted by the membranes.
- The lungs extend from the diaphragm to just slightly superior to the clavicles and lie against the ribs anteriorly and posteriorly



# Lungs - Overview

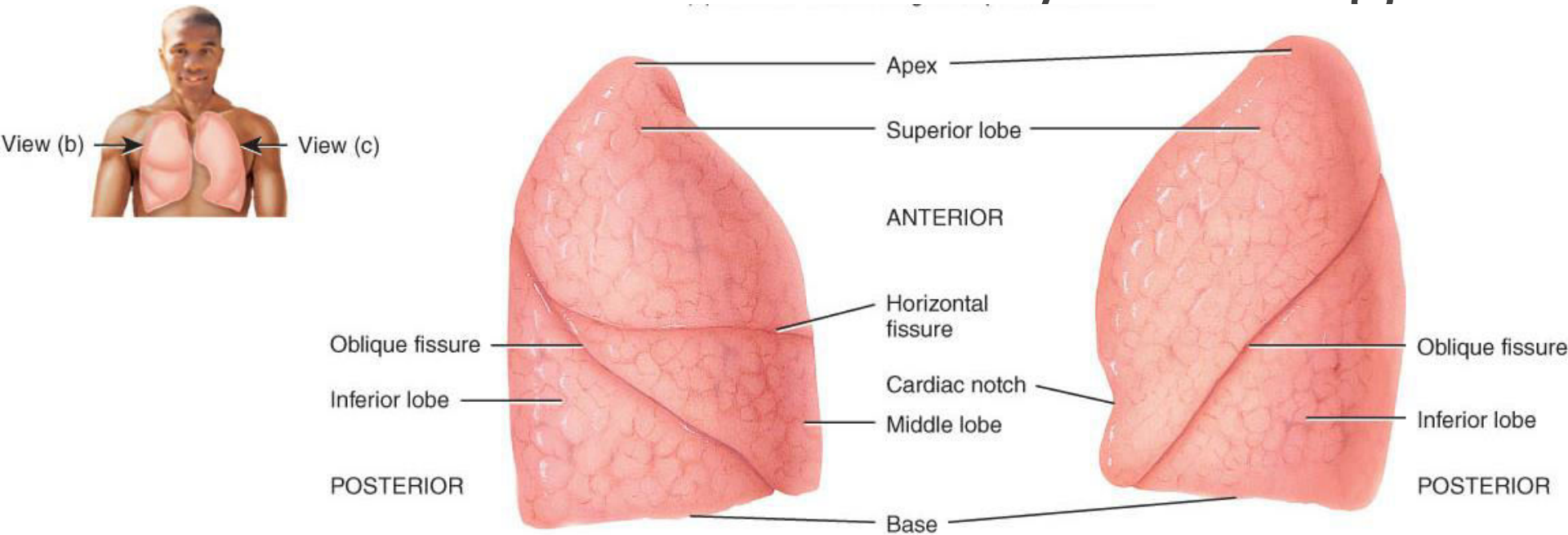
- The lungs almost totally fill the thorax.
- **The right lung** has three lobes separated by two fissures
- **The left lung** has two lobes separated by one fissure. In left there is a depression called the **cardiac notch**. In left lung there is a process below the cardiac notch called **lingula**.

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.



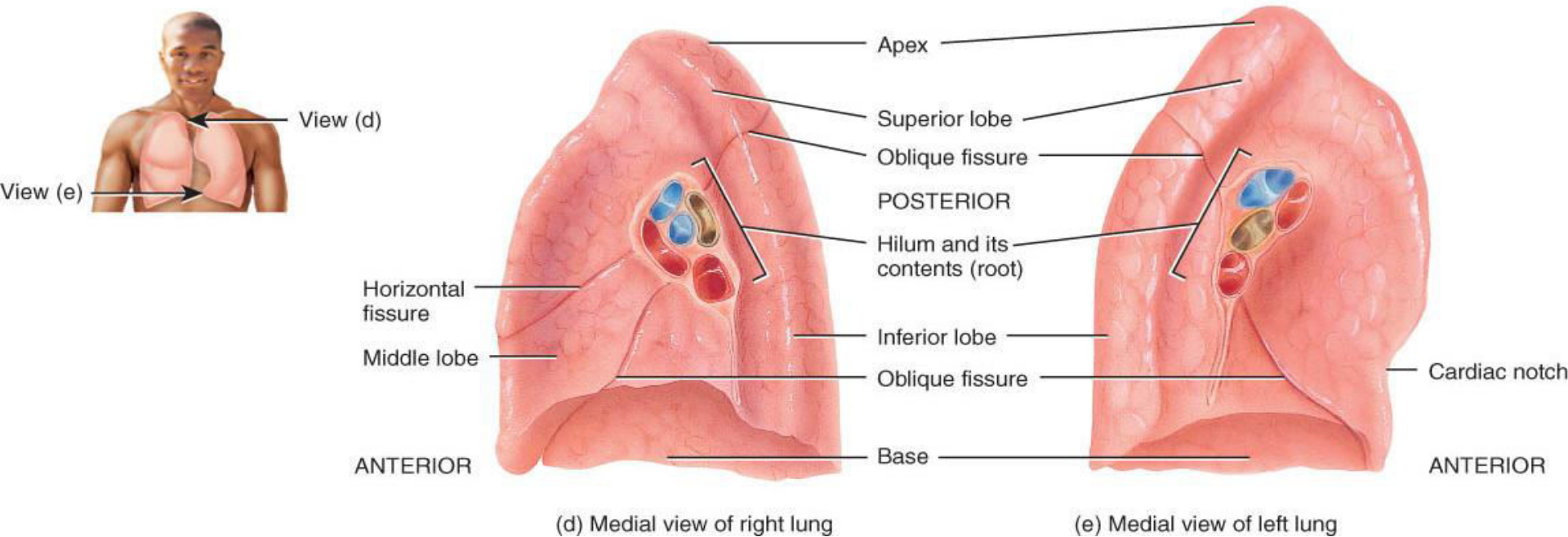
(a) Lateral views

# • Gross Anatomy of Lungs



- Base inferiorly, apex superiorly, costal surface, mediastinal surface
- Oblique & horizontal fissure in right lung results in 3 lobes
- Oblique fissure only in left lung produces 2 lobes

# Mediastinal Surface of Lungs



- Blood vessels & airways enter lungs in mediastinal surface at hilum
- Hilum and contents Forms **root of lungs**