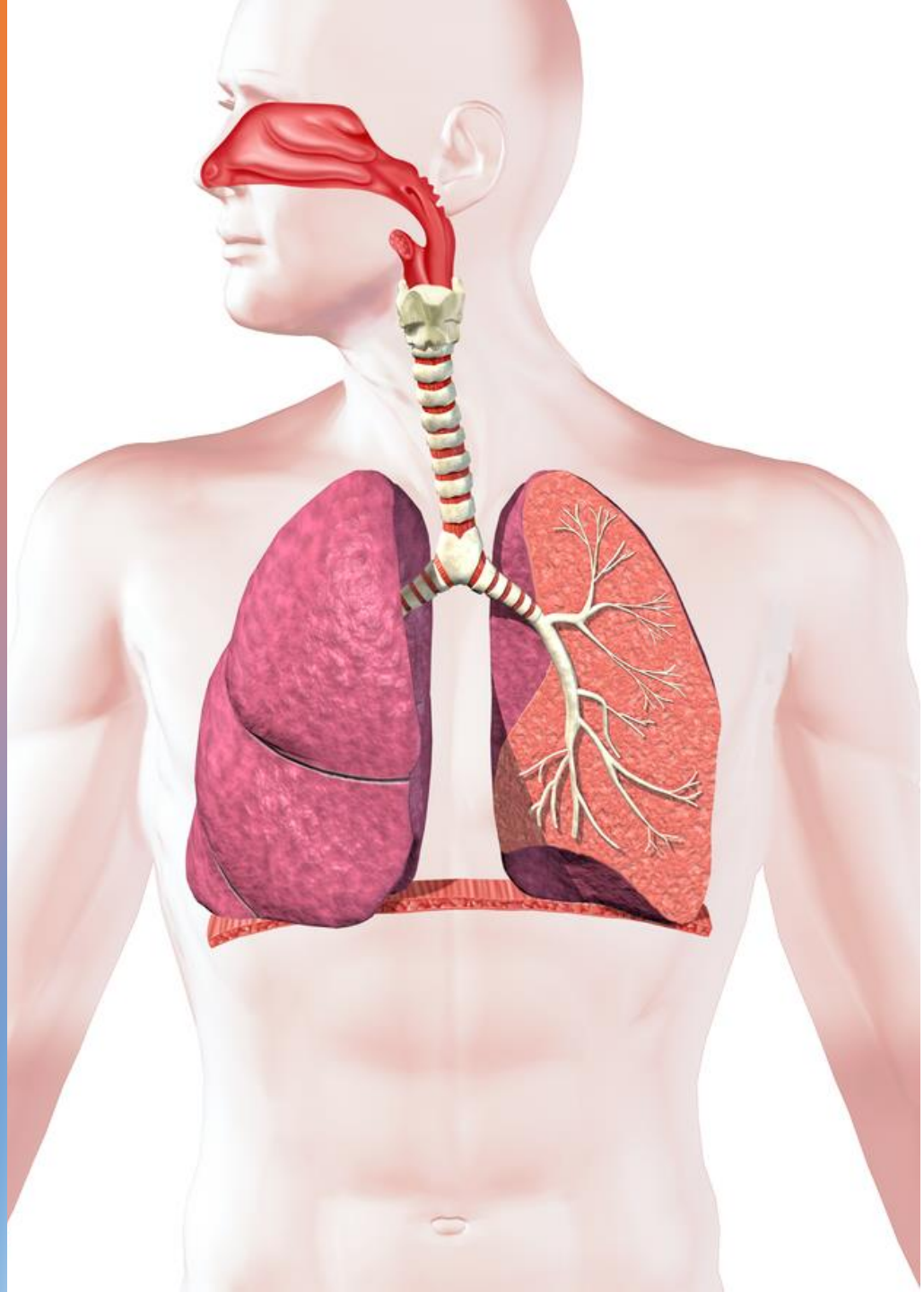

Respiratory system

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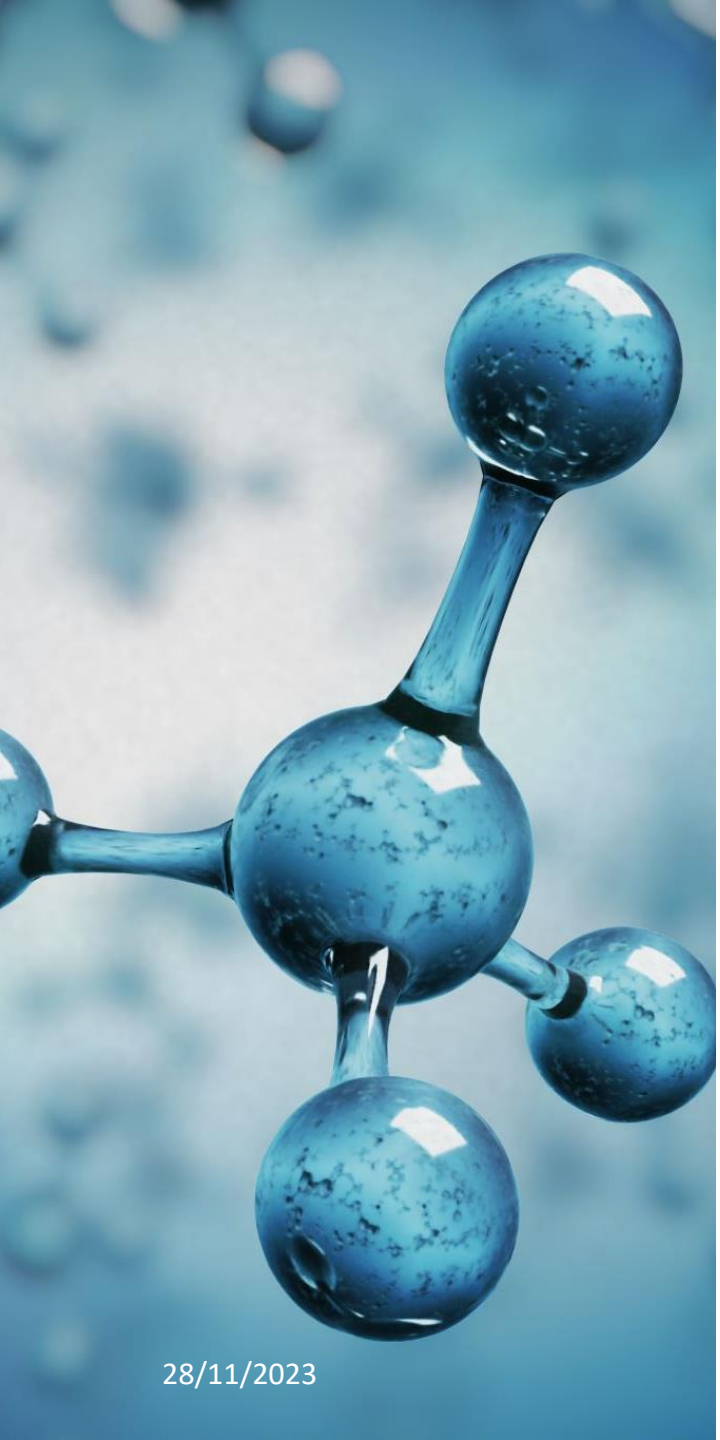
OBJECTIVES

- After completing this chapter and the exercises, the student should be able to:
- 1. Identify the organs of the respiratory system.
- 2. Describe the location and label the structures of the respiratory system.
- 3. List the functions of the respiratory system.
- 4. Identify and define clinical disorders affecting the respiratory system.
- 5. List and explain diagnostic tools and medical procedures used to treat disorders of the respiratory system.



THE RESPIRATORY SYSTEM

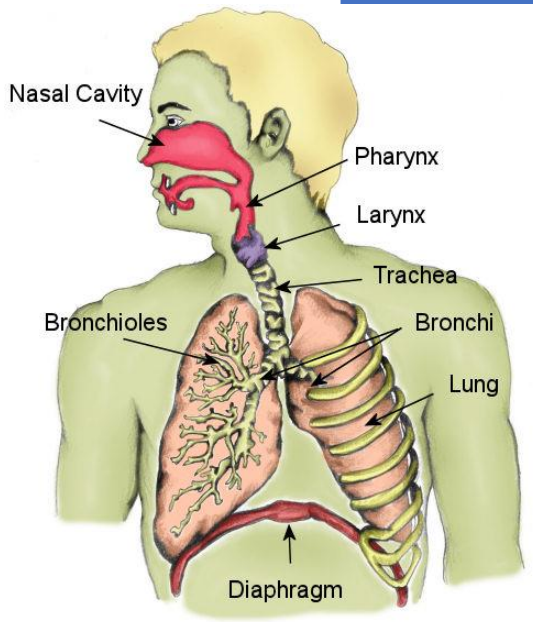
- The respiratory system consists of a series of tubes that transport air into and out of the lungs. Its function is to supply O2 to the body cells and to transport CO2 produced by the body cells into the atmosphere. The respiratory organs also have important functions for normal speech, acid–base balance, hormonal regulation of blood pressure, and defense against foreign material. The respiratory system also allows humans to perceive odors and to filter and moisten air.
- Respiration involves the following processes:
- 1. Pulmonary ventilation (breathing)
- 2. External respiration (diffusion of O2 and CO2 between air in the lungs and the capillaries)
- 3. Internal respiration (diffusion of CO2 and O2 between blood and tissue cells)
- 4. Cellular respiration (use of O2 by the body cells in production of energy and release of CO2 and H2O)

STRUCTURES OF THE RESPIRATORY SYSTEM

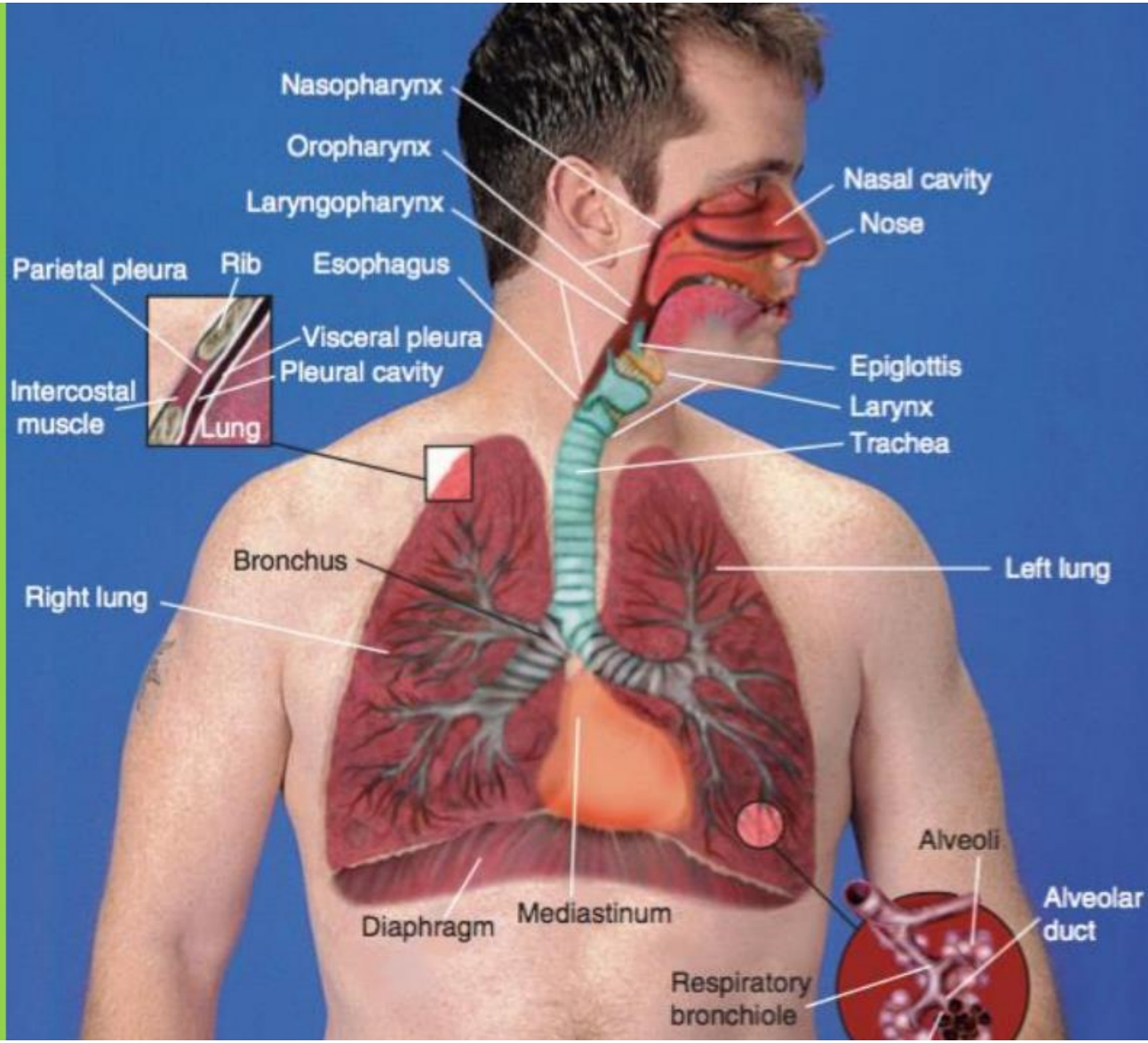
- The **respiratory system** brings oxygen into the body for transportation to the cells. It also removes carbon dioxide and some water waste from the body. For descriptive purposes, the respiratory system is divided into upper and lower respiratory tracts.

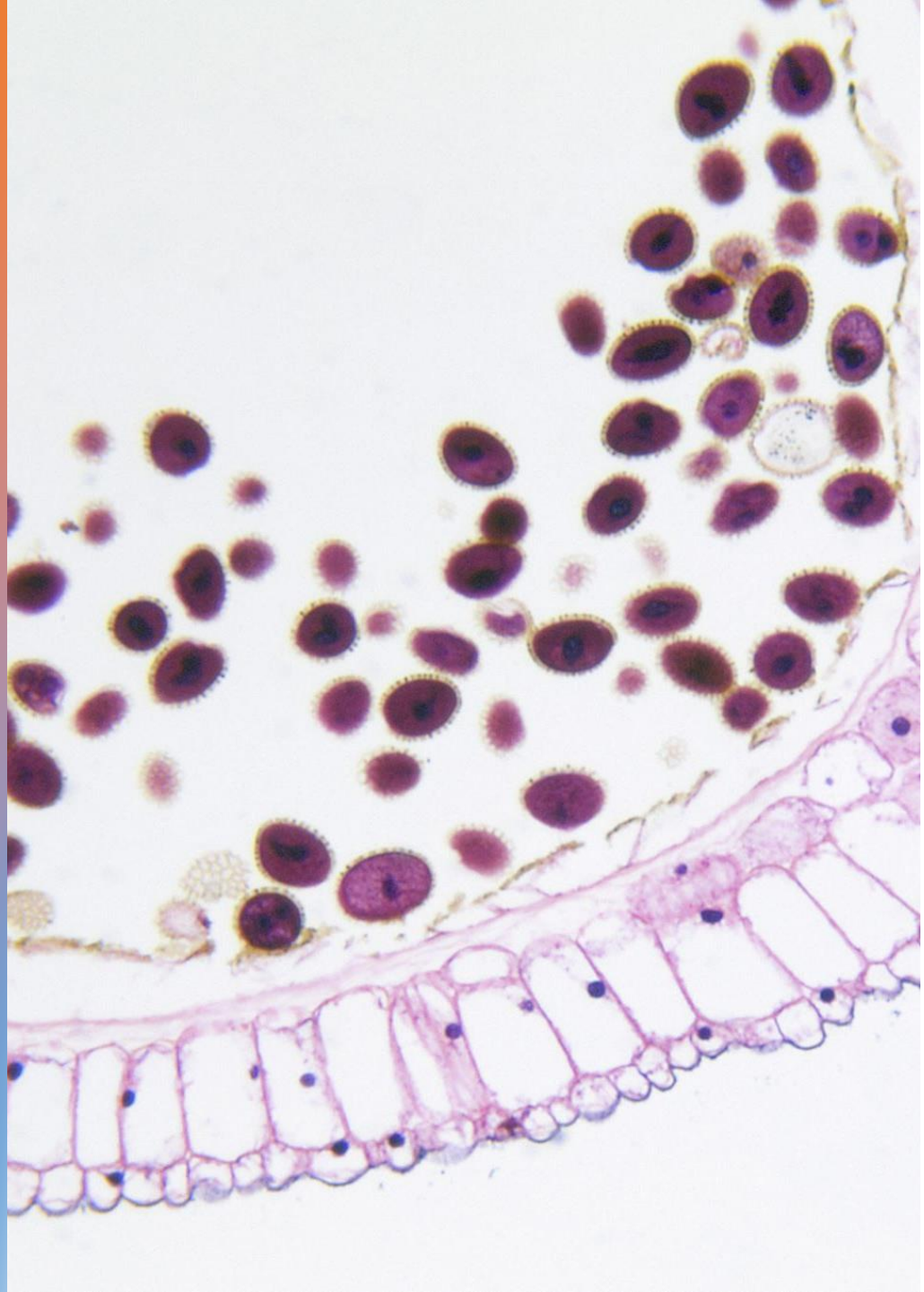
- The **upper respiratory tract** consists of the nose, mouth, pharynx, epiglottis, larynx, and trachea.

- The **lower respiratory tract** consists of the bronchial tree and lungs. These structures are located within, and protected by, the thoracic cavity which is also known as the rib cage.



Structures of the Respiratory System





- **1. Nose** (nostrils or nares): The external portion of the respiratory tract that filters small particles, warms and humidifies incoming air, and receives odors. It is the primary organ for the sense of smell.
- **2. Pharynx (throat):** A five-inch muscular tube that extends from the base of the skull to the esophagus. It is the airway that connects the mouth and nose to the larynx. Although it is a single organ, it is divided into three sections—the nasopharynx, oropharynx, and laryngopharynx. The nasopharynx is behind the nose and serves to equalize pressure on both sides of the tympanic membrane (eardrum).
- **3. Larynx (voice box):** This connects the pharynx with the trachea. It is a short tube shaped like a triangular box and is supported by nine cartilages, three paired and three unpaired. It contains the vocal cords and supporting tissue that make vocal sounds possible.
- **4. Trachea (windpipe):** A four-inch-long tube, the trachea extends into the chest and serves as a passageway for air into the bronchi. It lies in front of the esophagus. It is kept permanently open by 16–20 C-shaped cartilaginous rings.
- **5. Bronchi:** The trachea branches into two tubes called the bronchi (the bronchial tree). Each bronchus enters a lung.

Suffixes for Respiration

Suffix	Meaning	Example	Definition of Example
-pnea	breathing	orthopenia Or-THOP-nē-a	difficulty that is relieved by assuming an upright (ortho-) position
-oxia*	level of oxygen	hypoxia hī-POK-sē-a	decreased amount of oxygen in the tissues
-capnia*	level of carbon dioxide	hypercapnia hī-per-KAP-nē-a	increased carbon dioxide in the tissues
-phonia	difficulty in speaking	dysphonia dis-FŌ-nē-a	difficulty in speaking

*When referring to levels of oxygen and carbon dioxide in the blood, the suffix *-emia* is used, as in hypoxemia, hypercapnemia.

Roots for respiratory passageways

Root	Meaning	Example	Definition of Example
nas/o	nose	intranasal in-tra-NĀ--zal	within the nose
rhin/o	nose	rhinoplasty RĪ-nō-plas-tē	plastic repair of the nose
pharyng/o*	pharynx	Pharyngeal fa-RIN-jē-al	pertaining to the pharynx
laryng/o*	larynx	laryngospasm la-RIN-gō-spazm	spasm (sudden contraction) of the larynx
trache/o	Trachea	Tracheotome TRĀ-kē-ō-tōm	instrument used to incise the trachea
bronch/o, **bronch**/i	Bronchus	Bronchogenic brong-kō-GEN-ik	originating in a bronchus
bronchiol	Bronchiole	Bronchiolectasis brong-kē-ō-LEK-ta-sis	dilatation of the bronchioles

*An e is added to the root before the adjective ending -al.

Roots for the Lungs and Breathing

Root	Meaning	Example	Definition of Example
phren/o	diaphragm	phrenic FREN-ik	pertaining to the diaphragm
phrenic/o	phrenic nerve	phrenicectomy fren-i-SEK-tō-mē	partial excision of the phrenic nerve
pleur/o	pleura	pleurodesis plū-ROD-e-sis	fusion of the pleura
pulm/o, **pulmon**/o	lung	extrapulmonary EKS-tra-pul-mō-ner-ē	outside the lungs
pneumon/o	lung	pneumonitis nū-mō-NĪ-tis	inflammation of the lung; pneumonia
pneum/o, **pneumat**/o	air, gas; also respiration, lung	pneumothorax nū-mō-THŌ-raks	presence of air in the thorax (pleural space)
spir/o	breathing	spirometer spī-ROM-e-ter	instrument for measuring breathing volumes

Symptoms, Conditions and Disorders

Key terms	Definition
dyspnea disp-NĒ-a	Difficult or labored breathing, sometimes with pain; “air hunger”
anoxia an-OK-sē-a	Lack or absence of oxygen in the tissues; often used incorrectly to mean hypoxia
asphyxia as-FIK-sē-a	Condition caused by inadequate intake of oxygen; suffocation (literally “lack of pulse”)
aspiration as-pi-RĀ-shun	The accidental inhalation of food or other foreign material into the lungs. Also means the withdrawal of fluid from a cavity by suction
asthma AZ-ma	A disease characterized by dyspnea and wheezing caused by spasm of the bronchial tubes or swelling of their mucous membranes
cyanosis sī-a-NŌ-sis	Bluish discoloration of the skin caused by lack of oxygen in the blood (adjective: cya-notic)
sleep apnea AP-nē-a	Intermittent periods of breathing cessation during sleep. Central sleep apnea arises from failure of the brain stem to stimulate breathing. Obstructive sleep apnea results from airway obstruction during deep sleep, as from obesity or enlarged tonsils

Symptoms, Conditions and Disorders: continue

Key terms	Definition
empyema *em-pī-Ē-ma*	Accumulation of pus in a body cavity, especially the pleural space; pyothorax
hemothorax *hē-mō-THOR-aks*	Presence of blood in the pleural space
hydrothorax *hī-drō-THOR-aks*	Presence of water in the pleural space
hyperventilation hī-per-ven-ti-LĀ-shun	Increased rate and depth of breathing; increase in the amount of air entering the alveoli
hypoventilation *hī-pō-ven-ti-LĀ-shun*	Decreased rate and depth of breathing; decrease in the amount of air entering the alveoli
influenza *in-flū-EN-za*	An acute, contagious respiratory infection causing fever, chills, headache, and muscle pain; “flu”
pneumonia *nū-MŌ-nē-a*	Inflammation of the lungs generally caused by infection. May involve the bronchioles and alveoli (bronchopneumonia) or one or more lobes of the lung (lobar pneumonia)

Thank you