

The Anatomy and Physiology of the Respiratory System

Instructional Objectives

By the end of this chapter, the student should be able to:

1. Describe the four major components and the primary functions of the upper airways.
2. Identify the structures and the three primary functions of the nose.
3. Identify the structures and function of the upper airways and pharynx.
4. Describe the structure and function of the larynx.
5. Discuss the structure and function of the tracheobronchial tree.
6. Identify the location (generation) and structure of the cartilaginous and noncartilaginous airways.
7. Describe the structure and function of the bronchial blood supply.
8. Describe the sites of gas exchange including the structure and function.
9. Describe the structure and function of the pulmonary vascular system.
10. Discuss the structure and function of the lymphatic system.
11. Identify the effects of sympathetic and parasympathetic nervous systems have on the following: heart, bronchial smooth muscle, bronchial glands, salivary glands, stomach, intestines, and eyes.
12. Identify the structures of the lungs and lung segments from the anterior, posterior, lateral, and medial views.
13. Identify the components of the mediastinum.
14. Identify the components of the pleural membranes.
15. Identify the components of the bony thorax.
16. Describe the structure and function of the diaphragm.
17. Describe the structure and function of the accessory muscles of expiration and inspiration.

Key Terms

- Nose
- Oral cavity
- Pharynx
- Filter
- Humidify
- Nasal bones
- Frontal process of the maxilla
- Lateral nasal cartilage
- Greater alar cartilage
- Lesser alar cartilages
- Septal cartilage
- Fibrous fatty tissue
- Flaring nostrils (or nasal flaring)
- Nasal septum
- Perpendicular plate of the ethmoid
- Vomer
- Septal cartilage
- Nasal bones
- Frontal process of the maxilla
- Cribriform plate of the ethmoid
- Palatine process of the maxilla
- Palatine bones
- Soft palate
- Nares
- Vestibule
- Vibrissae
- Stratified squamous epithelium
- Pseudostratified ciliated columnar epithelium
- Turbinates (conchae)
- Paranasal sinuses
- Olfactory region
- Choanae
- Nosebleeds (epistaxis)
- Rhinitis
- Nasal congestion
- Sinusitis
- Vestibule
- Tongue
- Hard palate
- Palatine process of the maxilla

- Palatine bones
- Soft palate
- Uvula
- Levator veli palatinum muscle
- Palatopharyngeal muscles
- Stratified squamous epithelium
- Palatine arches
- Palatoglossal arch
- Palatopharyngeal arch
- Palatine tonsils
- Nasopharynx
- Pseudostratified ciliated columnar epithelium
- Pharyngeal tonsils (adenoids)
- Pharyngotympanic (auditory) tubes (Eustachian tubes)
- Oropharynx
- Lingual tonsil
- Stratified squamous epithelium
- Vallecula epiglottica
- Laryngopharynx
- Esophagus
- Epiglottis
- Aryepiglottic folds
- Adenoids
- Otitis media
- Thyroid cartilage
- Cricoid cartilage
- Arytenoid cartilages
- Corniculate cartilages
- Cuneiform cartilages
- False vocal folds
- True vocal folds
- Vocal ligament
- Glottis (rima glottidis)
- Epithelial lining above and below the vocal cords
- Laryngitis
- Croup syndrome
- Extrinsic laryngeal muscles
- Infrahyoid group
- Sternohyoid
- Sternothyroid
- Thyrohyoid
- Omohyoid
- Suprahyoid group
- Stylohyoid
- Mylohyoid
- Digastric
- Geniohyoid
- Stylopharyngeus
- Intrinsic laryngeal muscles
- Posterior cricoarytenoid
- Lateral cricoarytenoid
- Transverse arytenoid
- Thyroarytenoid
- Cricothyroid
- Valsalva maneuver
- Tracheobronchial tree
- Epithelial lining
- Mucous blanket
- Sol layer
- Gel layer
- Goblet cells
- Bronchial glands (submucosal glands)
- Mucociliary transport mechanism
- Lamina propria
- Peribronchial sheath
- Mast cells
- Immunologic mechanism
- Trachea
- Carina
- Main stem bronchi
- Lobar bronchi
- Segmental bronchi
- Subsegmental bronchi
- Bronchioles
- Terminal bronchioles
- Canals of Lambert
- Clara cells
- Bronchial arteries
- Azygos veins
- Hemiazygos veins
- Intercostal veins
- Respiratory bronchioles
- Alveolar ducts
- Alveolar sacs
- Primary lobule
- Acinus
- Terminal respiratory unit
- Lung parenchyma
- Type I cell (squamous pneumocyte)
- Type II cell (granular pneumocyte)
- Pulmonary surfactant
- Pores of Kohn
- Alveolar macrophages (Type III alveolar cells)
- Tight space
- Loose space
- Arteries
- Tunica intima
- Tunica media
- Tunica adventitia
- Arterioles (resistance vessels)
- Endothelial layer
- Elastic layer
- Smooth-muscle fibers
- Capillaries
- Venules and veins (capacitance vessels)
- Lymphatic vessels
- Lymphatic nodes
- Juxta-alveolar lymphatic vessels
- Sympathetic nervous system
- Neural transmitters
- Epinephrine
- Norepinephrine
- Beta₂ receptors
- Alpha receptors
- Parasympathetic nervous system
- Acetylcholine
- Lung apex
- Lung base
- Mediastinal border
- Hilum

- Upper lobe
- Middle lobe
- Lower lobe
- Oblique fissure
- Horizontal fissure
- Lung segments
- Apical
- Posterior
- Anterior
- Lateral
- Medial
- Superior
- Medial basal
- Anterior basal
- Lateral basal
- Posterior basal
- Superior lingula
- Inferior lingula
- Postural drainage therapy
- Parietal pleurae
- Visceral pleurae
- Pleural cavity
- Pleurisy
- Friction rub
- Pleural effusion
- Empyema
- Thoracentesis
- Pneumothorax
- Thoracic vertebrae
- Sternum
- Manubrium
- Xiphoid process
- True ribs
- False ribs
- Floating ribs
- Thoracentesis
- Hemidiaphragms
- Central tendon
- Phrenic nerves
- Lower thoracic nerves
- External intercostal muscles
- Scalene muscles
- Sternocleidomastoid muscles
- Pectoralis major muscles
- Trapezius muscles
- Rectus abdominis muscles
- External abdominis obliquus muscles
- Internal abdominis obliquus muscles
- Transversus abdominis muscles
- Internal intercostal muscle

MindTap Solutions

Why Do I Need to Know Answers

1. D. Since the oral air passageway is partially blocked by the tongue during feeding, this further exacerbates air entry for gas exchange—already limited by the choanal atresia. Cyanosis may develop during feeding for this reason. Interestingly, cyanosis may improve during crying as the oral airway is used during this time, increasing airflow to the lungs and gas exchange capabilities.

Knowledge Check Answers

1.1 The Upper Airways

1. b
2. b
3. c

1.2 The Lower Airways

1. d
2. a

1.3 The Sites of Gas Exchange

1. c

1.4 The Lymphatic System

1. d

1.5 Neural Control of the Lungs

1. b

1.6 The Lungs

1. a

1.7 The Pleural Membranes

1. b

1.8 The Muscles of Ventilation

1. d
2. a

Practice Quiz Answers

1. a
2. d
3. a
4. b
5. a
6. d
7. a
8. d
9. d
10. b
11. c
12. c
13. c
14. a
15. d
16. a
17. b
18. c
19. b
20. a

Career Readiness Questions for MindTap

1. Pneumothorax

How could broken ribs from a motor vehicle crash allow air to enter the potential space between the pleurae, causing a pneumothorax?

2. Asthma

A friend contacts you after he was recently diagnosed with asthma. He admits that he does not understand anything about his condition or his medications and states he hopes he will be cured soon. What could you tell him about asthma and its management?

Final Exam Answers

1. a
2. d
3. d
4. a
5. d
6. b
7. a
8. c
9. a
10. a
11. c
12. c
13. b

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- 14. a
- 15. c
- 16. c
- 17. d
- 18. b