CHAPTER 17

The Respiratory System

OBJECTIVES

After studying this chapter, you should be able to:

1. Explain the function of the respiratory system.
2. Name the organs of the system.
3. Define the parts of the internal nose and their functions.
4. Name the three areas of the pharynx and explain their anatomy.
5. Name the cartilages and membranes of the larynx and how they function.
6. Explain how the anatomy of the trachea prevents collapse during breathing and allows for esophageal expansion during swallowing.
7. Explain what is meant by the term bronchial tree.
8. Describe the structure and function of the lungs and pleura.
9. Describe the overall process of gas exchange in the lungs and tissues.
10. Define ventilation, external respiration, and internal respiration.

ACTIVITIES

A. Completion

Fill in the blank spaces with the correct term.

1. There are two systems responsible for supplying oxygen and eliminating carbon dioxide; they are the __ and the __ systems.
2. The bridge of the nose is formed by the __ bones.
3. The underside of the external nose has two openings called __.
4. Posteriorly, the internal nose connects with the __.
5. The nasal septum divides the left and right __ __.

NAME: ___________________________ DATE: ____________
6. The interior structures of the nose have __ functions.
7. Olfactory receptors are located in the membrane of the ___ meatus.
8. The adenoid tonsils are located in the posterior wall of the ___ ___.
9. The opening of the oropharynx is called the ___.
10. The voice box is the ___.
11. The epiglottis forms a lid over the ___.
12. The paired rod-shaped cartilage structures of the larynx are the ___ cartilages.
13. The false vocal cords are the ___ ___.
14. The goblet cells of the trachea produce ___.
15. There are 16 to 20 incomplete rings of ___ cartilage in the trachea.
16. The lobar bronchi are the ___ bronchi, and the segmental bronchi are the ___ bronchi.
17. The pleural membrane covering the wall of the cavity is the ___ and the membrane covering the lungs is the ___.
18. The air sacs where gas exchange takes place are the ___.
19. Movement of air between the atmosphere and the lungs is called ___.
20. Internal respiration is the exchange of gases between the blood and ___.
21. ___ ___ affects the secretory cells of the lungs.
22. Any infection in the lungs is known as ___.
23. Whooping cough is also known as ___.
24. The disease caused by excessive exposure to asbestos, silica, or coal dust is ___ ___.
25. Bronchitis causes a swelling of the ___ ___ of the bronchi.
26. Respiratory distress syndrome is also known as ___ ___ disease.
27. Laryngitis is an inflammation of the mucosal membrane lining of the ___.
28. ___ can result from a loss of pressure in the lung or reduced elastic recoil of a lung.

B. Matching

Match the term on the right with the definition on the left.

____ 29. food convert to ATP  a. epiglottis
____ 30. internal nose to pharynx  b. oropharynx
____ 31. separates nasal cavities  c. cystic fibrosis
____ 32. sense of smell  d. thyroid cartilage
____ 33. another name for auditory tubes  e. vocal folds
____ 34. passage for food and air  f. pleural membrane
____ 35. single piece in the larynx  g. tertiary bronchi
____ 36. Adam's apple  h. corniculate cartilage
____ 37. leaf-shaped cartilage  i. internal respiration
____ 38. paired, cone-shaped  j. cricoid cartilage
____ 39. false vocal cords  k. nasal septum
C. Key Terms
Use the text to look up the following terms. Write the definition or explanation.

49. Alveolar-capillary membrane/respiratory membrane:

50. Alveolar ducts/atria:

51. Alveolar sacs:

52. Arytenoid cartilages:

53. Asthma:

54. Bronchial tree:

55. Bronchopulmonary segment:
56. Emphysema:


57. Epiglottis:


58. External respiration:


59. Fauces:


60. Glottis:


61. Inferior meatus:


62. Internal nares:


63. Internal respiration:


64. Larynx:


65. Lobules:
66. Middle meatus:

67. Nasopharynx:

68. Olfactory stimuli:

69. Parietal pleura:

70. Partial pressure:

71. Superior meatus:

72. Surfactant:

73. Trachea:

74. Ventilation/breathing:

75. Visceral pleura:
D. Labeling Exercise

76. Label the parts of the respiratory system as indicated in Figure 17-1.

A. ___________________________  F. ___________________________

B. ___________________________  G. ___________________________

C. ___________________________  H. ___________________________

D. ___________________________  I. ___________________________

E. ___________________________
77. Label the parts of the nasal cavity and pharynx as indicated in Figure 17-2.

Figure 17-2

A. ____________________________  
B. ____________________________  
C. ____________________________  
D. ____________________________  
E. ____________________________  
F. ____________________________  
G. ____________________________  
H. ____________________________  

Frontal sinus
Sphenoid sinus
Pharyngeal tonsil
Opening of auditory tube
Palatine tonsil
Lingual tonsil
Epiglottis
Tracheal cartilages
E. Coloring Exercise

78. Using Figure 17-3, color the hyoid bone green, the larynx red, the lungs blue, and the primary bronchi orange.

![Figure 17-3](image)

F. Critical Thinking

Answer the following questions in complete sentences.

79. How is the nose the first line of defense against foreign material?

80. How does material inadvertently enter the trachea?
81. What are the functions of the C rings of cartilage in the trachea?

82. Why is it called the “bronchial tree”?

83. Explain emphysema.

84. How do the nervous system and the respiratory system assist each other?

85. Explain fetal respiration.

86. What effect will age-related changes have on the respiratory system?

87. Using an online reference, identify the types of activities performed by a respiratory therapist.
G. Crossword puzzle

Complete the crossword puzzle using the following clues.

**ACROSS**
1. Cone-shaped cartilage
3. Adam's apple cartilage
5. Alveolar ducts
6. Many small compartments
7. Covers glottis
10. Breathing muscle
12. Segmented bronchi
13. Carries oxygen
15. Lung infection
20. Prevents collapse of alveoli
23. Converts food to ATP
25. Tubes from the trachea to the lungs
26. Destruction of alveoli walls
27. Anterior nasal cavities

**DOWN**
1. Cartilage of larynx
2. Opening of oropharynx
4. Pharynx
5. Air sacs
8. Space between vocal cords
9. Voice box
11. Shelf passageways
14. Exchange of gases
16. Nasal cavity bones
17. External nares
18. Windpipe
19. Pleuritis
21. Breathing
22. Ladle-shaped cartilage
24. Whooping cough
CASE STUDY

During a smog alert, Liam, a 60-year-old man, is admitted to the emergency room. Liam, who was walking around outdoors during the alert, is experiencing extreme shortness of breath. Physical assessment reveals that Liam has an enlarged thoracic cavity. Liam states he has been smoking at least two packs of cigarettes a day since adolescence. He also says that he has been trying various smoking cessation programs for years without success. Liam is transferred to the medical unit and the admitting nurse notifies Liam’s pulmonologist about his condition.

QUESTIONS

1. Given his symptoms and history, what condition do you think Liam might have developed?

2. What are the major risk factors for the development of this disorder?

3. What vital respiratory structure is destroyed by this condition?

4. How is this disease treated?

5. What is the role of a pulmonologist?

CHAPTER QUIZ

1. Along with the respiratory system, which system has the responsibility of supplying oxygen and eliminating carbon dioxide?

   a. muscular
   b. cardiovascular
   c. nervous
   d. integumentary
   e. none of the above

   Answer:

2. The lacrimal ducts empty into the

   a. nose
   b. mouth
   c. throat
   d. trachea
   e. none of the above

   Answer:

3. The nasal septum is made of

   a. epithelial tissue
   b. tendons
   c. bone
   d. cartilage
   e. none of the above

   Answer:
4. Which of the following is NOT a function of the vestibules?
   a. warm incoming air
   b. smell
   c. filter air
   d. help create speech sounds
   e. peristalsis

**Answer:**

5. Olfactory receptors are located in the
   a. superior meatus
   b. middle meatus
   c. inferior meatus
   d. oropharynx
   e. none of the above

**Answer:**

6. Microorganisms that enter with air and are filtered out are destroyed by
   a. cilia
   b. mucus
   c. enzymes and acid
   d. hairs
   e. none of the above

**Answer:**

7. The pharynx is divided into how many portions?
   a. 2
   b. 3
   c. 4
   d. 5
   e. none of the above

**Answer:**

8. Which portion of the pharynx connects with the esophagus?
   a. eustachian tube
   b. oropharynx
   c. nasopharynx
   d. laryngopharynx
   e. none of the above

**Answer:**

9. Which of the following is a single cartilage in the larynx?
   a. thyroid
   b. cuneiform
   c. arytenoid
   d. corniculate
   e. none of the above

**Answer:**

10. Which of the following cartilages is rod shaped?
    a. cricoid
    b. arytenoid
    c. corniculate
    d. thyroid
    e. none of the above

**Answer:**

11. Together with the epiglottis, which of the following helps to keep food or liquids from entering the larynx?
    a. corniculate cartilage
    b. cuneiform cartilage
    c. vestibular folds
    d. vocal folds
    e. none of the above

**Answer:**

12. Which of the following structures function as resonating chambers?
    a. pharynx
    b. mouth
    c. nasal cavities
    d. paranasal sinuses
    e. all of the above

**Answer:**

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13. Where does the trachea divide into left and right primary bronchi?
   a. cricoid cartilage  d. fifth cervical vertebra
   b. fifth thoracic vertebra  e. none of the above
   c. arytenoid cartilage

   **Answer:**

14. If the C-shaped incomplete rings of cartilage in the trachea were complete closed rings, what would you
    NOT be able to do?
   a. inhale  d. talk
   b. eat  e. exhale
   c. swallow

   **Answer:**

15. If a foreign object gets by the trachea, it would most likely get caught in the
   a. right primary bronchus  d. tertiary bronchi
   b. left primary bronchus  e. none of the above
   c. secondary bronchi

   **Answer:**

16. Which of the bronchi are segmented?
   a. right primary  d. tertiary
   b. left primary  e. none of the above
   c. secondary

   **Answer:**

17. The lungs are
   a. rod shaped  d. cone shaped
   b. wedge shaped  e. none of the above
   c. leaf shaped

   **Answer:**

18. The right lung has how many lobes?
   a. 1  d. 4
   b. 2  e. none of the above
   c. 3

   **Answer:**

19. The left lung has how many lobes?
   a. 1  d. 4
   b. 2  e. none of the above
   c. 3

   **Answer:**

20. Which does a lobule NOT contain?
   a. lymphatic vessel  d. bronchioles
   b. a venule  e. pleura
   c. an arteriole

   **Answer:**

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21. Atria are found in the
   a. bronchopulmonary segment
e   b. alveolar ducts
c. alveoli
   d. segmented bronchi
e. none of the above

Answer:

22. The third process of respiration is
   a. inhalation
e. exhalation
   b. external respiration
   c. internal respiration
e. none of the above

Answer:

23. Destruction of the walls of the alveoli occurs in which disease?
   a. emphysema
e. pulmonary fibrosis
   b. bronchitis
c. cystic fibrosis
   d. none of the above

Answer:

24. The disease common in infants is
   a. emphysema
e. pertussis
   b. pulmonary fibrosis
c. hyaline membrane disease
e. none of the above

Answer:

25. Which of the following is an inherited disease?
   a. cystic fibrosis
e. pertussis
   b. pulmonary fibrosis
c. hyaline membrane disease
e. none of the above

Answer:

26. Which of the following is a chronic bacterial infection?
   a. influenza
e. SIDS
   b. tuberculosis
c. hyaline membrane disease
e. none of the above

Answer:

27. Which of the following is caused by exposure to a gram-negative bacterium that produces an acute pneumonia?
   a. atelectasis
e. SIDS
   b. lung cancer
c. Legionnaires disease
e. influenza

Answer:

28. Which of the following is the most common cause of cancer deaths in the United States?
   a. lung cancer
e. nasal cancer
   b. mouth cancer
c. throat cancer
e. gastric cancer

Answer: