Part I. Clinical Applications

1. Joanne Willis, a long-time smoker, is complaining that she has developed a persistent cough. What is your first guess as to her condition? What has happened to her bronchial cilia?

2. Barbara is rushed to the emergency room after an auto accident. The 8th through 10th ribs on her left side have been fractured and have punctured the lung. What term is used to indicate lung collapse? Will both lungs collapse? Why or why not?

3. I. M. Good decides to run outside all winter long in spite of the cold weather. How does running in cold weather affect the respiratory passageways and the lungs?

4. R. U. Hurt is a 68-year-old man who has been a two-pack-a-day smoker for the last 20 years. After a series of pulmonary tests his doctor informs him that he has emphysema. Explain what emphysema is and why it results in difficulty in breathing.
RESPIRATORY DISORDERS

Match the terms in Column B with the pathologic conditions described in Column A.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lack or cessation of breathing</td>
<td>Apnea</td>
</tr>
<tr>
<td>2. Normal breathing in terms of rate and depth</td>
<td>Asthma</td>
</tr>
<tr>
<td>3. Labored breathing, or &quot;air hunger&quot;</td>
<td>Chronic bronchitis</td>
</tr>
<tr>
<td>4. Chronic oxygen deficiency</td>
<td>Dyspnea</td>
</tr>
<tr>
<td>5. Condition characterized by fibrosis of the lungs and an increase in size of the alveolar chambers</td>
<td>Emphysema</td>
</tr>
<tr>
<td>6. Condition characterized by increased mucus production, which clogs respiratory passageways and promotes coughing</td>
<td>Eupnea</td>
</tr>
<tr>
<td>7. Respiratory passageways narrowed by bronchiolar spasms</td>
<td>Hypoxia</td>
</tr>
<tr>
<td>8. Together called COPD</td>
<td>Lung cancer</td>
</tr>
<tr>
<td>9. Incidence strongly associated with cigarette smoking; outlook is poor</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>10. Infection spread by airborne bacteria; a recent alarming increase in drug users and AIDS victims</td>
<td></td>
</tr>
</tbody>
</table>

DEVELOPMENTAL ASPECTS OF THE RESPIRATORY SYSTEM

Mrs. Jones gave birth prematurely to her first child. At birth, the baby weighed 2 lb 8 oz. Within a few hours, the baby had developed severe dyspnea and was becoming cyanotic. Therapy with a positive pressure ventilator was prescribed. Answer the following questions related to the situation just described. Place your responses in the answer blanks.

11. The infant's condition is referred to as ____________________________

12. It occurs because of a relative lack of ____________________________

13. The function of the deficient substance is to ____________________________

14. Explain what the positive pressure apparatus accomplishes. ____________________________
Match the following terms with their definition. Terms can be used more than once.

Apnea  hypocapnia  Hypoxia  Eupnea
Hypercapnia  hyperventilation  tachypnea  Epistaxis  Rhinitis

15. Decreased carbon dioxide levels
16. Chronic or acute inflammation of the mucous membrane of the nose
17. Rapid breathing rate
18. Loss of blood from the nose due to trauma, infection, allergy, or bleeding disorders.
19. Normal, quiet breathing
20. Increased carbon dioxide levels
21. Absence of breathing

**Part II**

Use the key choices to correctly complete the following statements, which refer to gas exchanges in the body. Insert the correct letter response in the answer blanks.

**Key Choices**

A. Active transport
B. Air of alveoli to capillary blood
C. Carbon dioxide-poor and oxygen-rich
D. Capillary blood to alveolar air
E. Capillary blood to tissue cells
F. Diffusion
G. Higher concentration
H. Lower concentration
I. Oxygen-poor and carbon dioxide-rich
J. Tissue cells to capillary blood

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1. All gas exchanges are made by (1). When substances pass in this manner, they move from areas of their (2) to areas of their (3). Thus oxygen continually passes from the (4) and then from the (5). Conversely, carbon dioxide moves from the (6) and from (7). From there it passes out of the body during expiration. As a result of such exchanges, arterial blood tends to be (8) while venous blood is (9).

2. ____________

3. ____________

4. ____________

5. ____________

6. ____________

7. ____________

8. ____________

9. ____________

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Complete the following statements by inserting your answers in the answer blanks.

10. Most oxygen is transported bound to ____________ inside the red blood cells. Conversely, most carbon dioxide is carried in the form of ____________ in the _____________. Carbon monoxide poisoning is lethal because carbon monoxide competes with ____________ for binding sites.
Using the key choices, select the terms identified in the following descriptions by inserting the appropriate term in the answer blanks.

**Key Choices**

- Alveoli
- Epiglottis
- Palate
- Main bronchi
- Vocal cords
- Bronchioles
- Esophagus
- Parietal pleura
- Trachea
- Conchae
- Glottis
- Phrenic
- Visceral pleura

14. Smallest conducting respiratory passageways
15. Separates the oral and nasal cavities
16. Major nerve, stimulating the diaphragm
17. Food passageway posterior to the trachea
18. Closes off the larynx during swallowing
19. Windpipe
20. Actual site of gas exchanges
21. Pleural layer covering the thorax walls
22. Pleural layer covering the lungs
23. Lumen of larynx
24. Fleshy lobes in the nasal cavity which increase its surface area
25. Vibrate with expired air

Using the key choices, select the terms identified in the following descriptions by inserting the appropriate term in the answer blanks.

**Key Choices**

- Atmospheric pressure
- B. Intrapulmonary pressure
- C. Intrapleural pressure

26. In healthy lungs, it is always lower than atmospheric pressure (that is, it is negative pressure)
27. Pressure of air outside the body
28. As it decreases, air flows into the passageways of the lungs
29. As it increases over atmospheric pressure, air flows out of the lungs
30. If this pressure becomes equal to the atmospheric pressure, the lungs collapse
31. Rises well over atmospheric pressure during a forceful cough
32. Also known as intra-alveolar pressure
Part IV

D. Label the Figure — Spirogram Lung Volumes and Capacities

Study the sample spirogram in Figure 16.2. Complete the figure by writing the names of the following lung volumes and capacities on the correct answer lines: Expiratory reserve, Inspiratory reserve, Vital, Residual, Functional residual, Total lung, and Tidal. If you need help, study figure 16.17 in the text. Good luck!

A. Match 'n' Spell — Respiratory Volumes and Terms

For each of the following numbered statement below, select the correct term from the column on the right.

8. "shortness of breath" feeling
   9. maximum volume inspired after normal inspiration
   10. reduced vital capacity (as in pulmonary fibrosis)
   11. tidal volume X (times) breaths per minute
   12. maximum inspiration to maximum expiration
   13. maximum volume expired after normal expiration
   14. normal, comfortable breathing at rest

15. forced expiratory volume (FEV)
   16. restrictive disorder
   17. obstructive disorder
   18. dyspnea
   19. apnea
   20. eupnea

16. unforced normal volume inspired or expired
   17. reduced FEV\(_{1.0}\) (as in asthma)
   18. remaining lung volume after maximum expiration
   19. complete cessation of breathing
   20. total chest volume after maximum inspiration
The following section concerns respiratory volume measurements. Using the key choices, select the terms identified in the following descriptions by inserting the appropriate term or letter in the answer blanks.

**Key Choices**

<table>
<thead>
<tr>
<th>Dead space volume</th>
<th>Inspiratory reserve volume (IRV)</th>
<th>Tidal volume (TV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expiratory reserve volume (ERV)</td>
<td>Residual volume (RV)</td>
<td>Vital capacity (VC)</td>
</tr>
</tbody>
</table>

20. Respiratory volume inhaled or exhaled during normal breathing

21. Air in respiratory passages that does not contribute to gas exchange

22. Total amount of exchangeable air

23. Gas volume that allows gas exchange to go on continuously

24. Amount of air that can still be exhaled (forcibly) after a normal exhalation