## Chapter 3: Pulmonary Function Study Assessments

### MULTIPLE CHOICE

1. Pulmonary function studies are done for all of the following measurements EXCEPT:
   a. the patient's carbon monoxide level.
   b. lung volumes and capacities.
   c. pulmonary diffusion capacity.
   d. forced expiratory flow rates.

   ANS: A
   An arterial blood gas sample must be analyzed to determine a patient's carbon monoxide level. All of the other listed options can be measured on a pulmonary function test.

   REF: p. 48

2. In response to a restrictive lung disorder, the following are typically found:
   1. Decreased lung compliance
   2. Increased ventilatory rate
   3. Decreased tidal volume
   4. Decreased lung rigidity

   a. 1
   b. 2, 3
   c. 2, 3, 4
   d. 1, 2, 3

   ANS: D
   With a restrictive lung disorder, there will be *increased* lung rigidity. This causes decreased lung compliance. As a result, the patient breathes faster and with a smaller tidal volume.

   REF: pp. 48-49

3. A special indirect measurement procedure must be done to find the following:
   a. Inspiratory reserve volume
   b. Residual volume
   c. Expiratory reserve volume
   d. Inspiratory capacity

   ANS: B
   Because the residual volume cannot be measured by spirometry, special procedures and equipment must be used to indirectly measure it. The other listed options can be directly measured by spirometry.

   REF: p. 49

4. Which of the following forced vital capacity test times should be interpreted as normal?
   a. Less than 4 seconds
   b. 4 to 6 seconds
   c. 6 to 8 seconds

d. 8 to 10 seconds

ANS: B
A normal adult will exhale a forced vital capacity (FVC) within 4 to 6 seconds. Patients with restrictive lung diseases may blow out the FVC in less than 4 seconds. Patients with obstructive lung diseases will need more than 6 seconds to blow out the FVC.

REF: p. 49

5. Overall characteristics of pulmonary function testing results on a patient with obstructive lung disease include that:
   a. $FEV_1$ is reduced and $FEV_1\%$ is normal.
   b. $FEV_1$ and $FEV_1\%$ are both increased.
   c. $FEV_1$ and $FEV_1\%$ are both reduced.
   d. $FEV_1$ is increased and $FEV_1\%$ is decreased.

   ANS: C
   Because of airway narrowing problems, a patient with obstructive lung disease will have a reduced $FEV_1$ volume and $FEV_1\%$ flow. A patient with restrictive lung problems may have $FEV_1$ reduced and $FEV_1\%$ normal. The other combinations are not seen.

   REF: p. 51

6. The $FEF_{25\%-75\%}$ is used to evaluate:
   a. flow in large airways.
   b. restrictive lung disease.
   c. maximum breathing effort.
   d. flow in medium-size to small airways.

   ANS: D
   Expiratory flow in medium-size to small airways is assessed by the $FEF_{25\%-75\%}$ test. Other tests would be needed to assess the other listed options.

   REF: p. 51

7. All of the following are true of the peak expiratory flow rate test EXCEPT:
   a. it is effort dependent.
   b. it is taken from the FVC test results.
   c. it is taken from the MVV test results.
   d. it assesses large upper airways.

   ANS: C
   The maximum voluntary ventilation (MVV) test is used to measure the maximum amount of air that can be breathed in a minute. The peak flow requires maximum effort from the patient, is taken from the FVC test, and assesses flow through the large upper airways.

   REF: p. 52

8. Your patient has obstructive lung disease. In response to this, which of the following are typically found?
   1. Decreased lung compliance

2. Increased ventilatory rate
3. Increased tidal volume
4. Decreased ventilator rate

a. 3, 4
b. 2, 3
c. 1, 2
d. 1, 3, 4

ANS: A
Because of narrowed airways, the patient has less work of breathing if the respiratory rate is decreased and the tidal volume is increased. Lung compliance will be normal or increased.

REF: p. 49

9. The pulmonary diffusion capacity of carbon monoxide test is used to:
   a. assess the patient's blood carbon monoxide level.
   b. remove carbon monoxide from the patient's blood.
   c. measure the residual volume.
   d. assess the alveolar-capillary membrane.

   ANS: D
   Alveolar-capillary membrane function is measured by the pulmonary diffusion capacity of carbon monoxide test. A very small amount of carbon monoxide (CO) is inhaled by the patient to perform the test. But, the CO level is not measured in the blood and CO is not removed from the blood.

   REF: p. 53

10. Total lung capacity is composed of all of the following EXCEPT:
    a. IRV.
    b. IC.
    c. ERV.
    d. RV.

    ANS: A
    Total lung capacity (TLC) can be calculated by adding IC, ERV, and RV. Also see Figure 3-1 for other ways to calculate the TLC.

    REF: p. 48