

MULTIPLE CHOICE

1. Who first popularized spirometry for the evaluation of pulmonary function?
- August and Marie Krogh
 - Alvan Barach
 - John Severinghaus
 - John Hutchinson

ANS: D

Hutchinson popularized the concept of using VC to assess lung function, and the names he gave to several other lung compartments are still used today.

DIF: 1 REF: p. 2 OBJ: None MSC: NBRC: None

2. Which of the following are indications for performing spirometry?
- Assess the risk of lung resection.
 - Determine the response to bronchodilator therapy.
 - Assess the severity of restrictive lung disease.
 - Quantify the extent of COPD.
- 1 and 4
 - 2 and 3
 - 1, 2, and 4
 - 2, 3, and 4

ANS: C

Spirometry cannot assess severity of restriction; for that you need to measure lung volumes (see Box 1-2, Chapter 1).

DIF: 1 REF: p. 7 OBJ: EL-2 MSC: NBRC: None

3. The main indication for the measurement of lung volumes is to do which of the following?
- Diagnose or assess the severity of restriction.
 - Evaluate the severity of pulmonary hypertension.
 - Determine the level of cardiopulmonary fitness.
 - Assess the risk of abdominal surgical procedures.

ANS: A

The most common reason for measuring lung volumes is to identify restrictive lung disease.

DIF: 1 REF: p. 35 OBJ: EL-2 MSC: NBRC: None

4. DLCO measurements may be indicated to evaluate pulmonary involvement in which of the following systemic diseases?
- Asthma
 - Sarcoidosis
 - Exertional hypoxemia
 - Guillain-Barré syndrome

ANS: B

Sarcoidosis is the only systemic disease listed that affects gas exchange.

DIF: 1 REF: p. 9 | p. 19 | p. 21 | p. 35 OBJ: EL-2
MSC: NBRC: None

5. Blood gas analysis is used with patients with COPD to do which of the following?
- Monitor airway responsiveness.
 - Determine level of cardiopulmonary fitness.
 - Detect pulmonary hypertension.
 - Assess need for supplementary O₂.

ANS: D

Blood gas analysis is most commonly used to determine the need for supplemental oxygen and to manage patients who require ventilatory support.

DIF: 2 REF: p. 15 OBJ: EL-1
MSC: NBRC: CPFT 2A-2

6. Which of the following cause emphysema?

1. α_1 -Antitrypsin deficiency
 2. Exposure to environmental pollutants
 3. Radiation therapy
 4. Cigarette smoking
- a. 1 and 2
 - b. 3 and 4
 - c. 1, 2, and 4
 - d. 2, 3, and 4

ANS: C

Emphysema is caused primarily by cigarette smoking. Some emphysema is caused by the absence of a protective enzyme. Chronic exposure to environmental pollutants can also contribute to the development of emphysema.

DIF: 1 REF: p. 11 OBJ: EL-3 | AL-2 MSC: NBRC: None

7. An adult patient complains of chest tightness and cough whenever he jogs in cold weather. These symptoms are consistent with which of the following?

- a. Cystic fibrosis
- b. Asthma
- c. Pulmonary hypertension
- d. Idiopathic pulmonary fibrosis

ANS: B

Agents or events that cause an asthmatic episode are called triggers (see Box 1-7, Chapter 1). Antigens such as animal dander, pollens, and dusts are the most common triggers. Other common triggers include exposure to air pollutants and exercise in cold or dry air.

DIF: 2 REF: p. 16 OBJ: EL-3 MSC: NBRC: None

8. Which of the following statements concerning tumors in the upper airway is true?

- a. There may be variable or fixed obstruction.
- b. Fixed obstruction will be present.
- c. Variable obstruction will be present.
- d. Small airway obstruction will result.

ANS: A

Tumors involving the upper airway may cause variable or fixed obstruction.

DIF: 2 REF: p. 19 OBJ: EL-2
MSC: NBRC: CPFT 3C-3

9. Sarcoidosis is a systemic disorder that usually causes which of the following?

- a. A restrictive ventilatory defect
- b. An obstructive ventilatory defect
- c. Hyperreactive airways
- d. Primary pulmonary hypertension

ANS: A

Restriction is often associated with the following: interstitial lung diseases, including idiopathic fibrosis, pneumoconioses, and sarcoidosis.

DIF: 1 REF: p. 19 | p. 21 OBJ: EL-3 MSC: NBRC: None

10. For which of the following conditions might pulmonary function testing be contraindicated?

- a. Vocal cord dysfunction
- b. Untreated pneumothorax
- c. Congestive heart failure (CHF)
- d. Bronchiolitis obliterans

ANS: B

Pulmonary function tests are usually contraindicated in the presence of pneumothorax. However, undiagnosed pneumothorax may present a risk if pulmonary function studies are performed.

DIF: 1 REF: p. 23 OBJ: EL-4
MSC: NBRC: CPFT 2B-6

11. Which of the following correctly describe(s) appropriate physical measurements before pulmonary function testing?
1. Actual body weight should be used to calculate predicted values.
 2. Standing height should be measured when the patient is barefoot.
 3. Arm span should be used instead of height for a patient with kyphosis.
 4. Age should be recorded to the nearest decade (10 years).
- a. 1 only
 - b. 2 and 3
 - c. 1, 2, and 4
 - d. 1, 2, 3, and 4

ANS: B

Various physical measurements are required for estimating each patient's expected level of pulmonary function. Age to the nearest month, height to the nearest 0.1 cm, and weight are usually recorded in addition to the patient's gender. Race or ethnic origin should also be recorded. (Although body weight is recorded, it is not used to calculate predicted values.)

DIF: 1 REF: p. 29 OBJ: None
MSC: NBRC: CPFT 3A-20

12. In addition to explaining the procedure for each pulmonary function test to the patient, the pulmonary function technologist should do which of the following?
- a. Briefly explain the physiologic basis of the test.
 - b. Demonstrate the correct performance of the test maneuver.
 - c. Limit feedback to the patient to reduce the placebo effect.
 - d. Explain the exact number of efforts that will be required for each test.

ANS: B

In addition to a description of the test, the maneuver should always be demonstrated.

DIF: 1 REF: p. 32 OBJ: None
MSC: NBRC: CPFT 2B-6

13. The single-breath diffusing capacity test was first described by:
- a. John Severinghaus
 - b. August and Marie Krogh
 - c. Robert Hyatt
 - d. Leland Clark

ANS: B

The basis for the modern single-breath diffusing capacity (DLCO) test was described by August and Marie Krogh in 1911.

DIF: 1 REF: p. 5 OBJ: None MSC: NBRC: None

14. DLCO measurements may be indicated to evaluate gas exchange abnormality in which of the following?
- a. Ketoacidosis
 - b. Myasthenia gravis
 - c. Interstitial lung disease
 - d. Bronchitis

ANS: C

The other options do not affect the alveolar capillary membrane interface.

DIF: 1 REF: p. 9 OBJ: EL-2 MSC: NBRC: None

15. Vocal cord dysfunction will typically affect the flow-volume loop in what way?
- a. Blunt the expiratory portion of the curve
 - b. Blunt both the inspiratory and expiratory portions of the curve
 - c. Blunt the inspiratory portion of the curve
 - d. Have no effect on the curve but cause inspiratory stridor

ANS: C

The vocal cords are normally held open or abducted during inspiration. When damaged, the vocal cords move toward the midline, narrowing the airway opening. This type of obstruction limits flow primarily during inspiration.

DIF: 2 REF: p. 18 OBJ: EL-4
MSC: NBRC: CPFT 3C-3

16. All of the following disease processes are potential causes of a restrictive pattern except:
- a. Interstitial lung disease (e.g., fibrosis, sarcoidosis)
 - b. Kyphoscoliosis
 - c. Asthma
 - d. Neuromuscular disorders

ANS: C

Asthma causes airway obstruction.

DIF: 1 REF: p. 21 | p. 22 | p. 23 OBJ: EL-3
MSC: NBRC: None

17. The following data are obtained from a subject complaining of shortness of breath:

	Predicted	Found	% Pred
TLCpl	5.76	3.18	55
RVpl	2.38	1.18	50
FVC	3.38	2.10	62
FEV ₁	2.63	1.88	71
FEV ₁ /FVC	78	89	
DLCO	23.1	6.0	26

These data are most consistent with which disease entity?

- Pulmonary fibrosis
- Kyphoscoliosis
- Obesity
- Emphysema

ANS: A

Excerpt from the restrictive disease discussion: These reductions in VC and TLC occur as fibrosis causes the lungs to become stiff. Pulmonary fibrosis is the only disease entity listed that causes a reduction in lung volumes and affects the alveolar capillary interface (e.g., reduced DLCO).

DIF: 3 REF: p. 20 OBJ: EL-3
 MSC: NBRC: RPFT 3C-4b

18. Lou Gehrig, a famous New York Yankee baseball player, is often associated with which neuromuscular disease?

- Amyotrophic lateral sclerosis
- Guillain-Barré syndrome
- Diaphragm paralysis syndrome
- Myasthenia gravis

ANS: A

Amyotrophic lateral sclerosis (ALS, or Lou Gehrig's disease) affects the anterior horn cells of the spinal cord (motor neurons).

DIF: 1 REF: p. 24 OBJ: EL-3 MSC: NBRC: None

19. The following data are obtained from a subject complaining of shortness of breath:

	Predicted	Found	% Pred
TLCpl	6.59	4.12	63
RVpl	2.43	3.01	124
FVC	4.16	1.14	28
FEV ₁	3.16	1.16	37
FEV ₁ /FVC	76	99	
MEP	+190	63	33
MIP	-101	-56	55

These data are most consistent with which disease entity?

- Obesity
- Pectus excavatum
- Pulmonary fibrosis
- Myasthenia gravis

ANS: D

Progression of a myasthenic crisis can be assessed using VC and respiratory pressures. Results would yield a reduction in lung volumes and respiratory muscle pressures, as seen in this case.

DIF: 3 REF: p. 24 OBJ: EL-3
 MSC: NBRC: RPFT 3C-4b

20. All of the following pulmonary function tests may be used to follow the effect of treatment for congestive heart failure except:

- Lung volumes
- Arterial blood gases
- Diffusing capacity
- Maximal respiratory pressures

ANS: D

Pulmonary function tests, particularly lung volumes and DLCO, may be used to monitor the effects of treatment. Arterial blood gases may also assist in assessing gas exchange, but the respiratory muscles are not affected.

DIF: 2 REF: p. 25 OBJ: EL-4 MSC: NBRC: None

21. All of the following anthropometric measurements are essential for pulmonary function testing except:

- Height
- Percent body fat
- Gender
- Age

ANS: B

Age, height, and weight are usually recorded in addition to the patient's sex. Race or ethnic origin should also be recorded.

DIF: 1 REF: p. 29 OBJ: None
 MSC: NBRC: CPFT 3A-20

22. There are three essential components to an FVC maneuver. Which of the following is the first phase of the maneuver?
- A deep breath to TLC
 - Continued exhalation to RV
 - The initial blast of inspiratory breath after emptying the lungs fully

ANS: A

According to the American Thoracic Society-European Respiratory Society (ATS-ERS) guidelines, the first important portion of the maneuver is the deep breath to TLC before the initial blast.

DIF: 1 REF: p. 31 OBJ: None
MSC: NBRC: CPFT 2A-6

23. According to the ATS-ERS general considerations guidelines, all of the following should be avoided before lung function testing except:
- Smoking within 1 hour of testing
 - Wearing restrictive clothing
 - Eating a large meal within 2 hours of testing
 - Consuming alcohol within 4 hours of testing

ANS: B

According to the ATS-ERS general guidelines, all should be avoided before testing except wearing restrictive clothing.

DIF: 1 REF: p. 28 OBJ: None
MSC: NBRC: CPFT 2B-6

24. According to the ATS-ERS general considerations guidelines, all of the following laboratory variables must be recorded except:
- Ambient temperature
 - Date and time of test
 - When the equipment was last cleaned
 - Barometric pressure

ANS: C

According to the ATS-ERS general guidelines, all variables listed must be recorded except equipment cleaning.

DIF: 1 REF: p. 31 | p. 32 OBJ: None MSC: NBRC: None

25. Who is credited with first describing the flow-volume curve?
- Hyatt
 - Hutchinson
 - Tiffeneau
 - Fowler

ANS: A

Hyatt is recognized for first describing the flow-volume curve in the 1950s.

DIF: 1 REF: p. 3 OBJ: None MSC: NBRC: None

26. Which of the following is an indication for a cardiopulmonary exercise test?
- Vocal cord dysfunction
 - Pulmonary rehabilitation prescription
 - Exercise-induced asthma
 - Undefined cough

ANS: B

Understanding the physiologic basis for the patient's exercise limitation is an important aspect in prescribing effective therapy such as pulmonary rehabilitation.

DIF: 1 REF: p. 10 OBJ: AL-1 MSC: NBRC: None

27. A patient with cystic fibrosis may present with an increased:
- FRC_{pl} and RV/TLC ratio
 - FVC and FEV₁
 - VA and DLCO
 - MIP and MEP

ANS: A

Cystic fibrosis results in gas trapping as the disease progresses, which is revealed in lung volume measurements.

DIF: 2 REF: p. 10 | p. 11 OBJ: AL-2
MSC: NBRC: CPFT 3C-3

28. Technologist-driven protocols allow a selection of tests related to the:

- a. Diagnosis
- b. Clinical question asked
- c. Physician interpretation
- d. Work of breathing

ANS: B

The initial tests performed should be based on the clinical question to be answered by the pulmonary function testing. Additional tests are determined based on the results of the selected tests associated with the clinical question.

DIF: 1 REF: p. 30 | p. 31 OBJ: AL-3 MSC: NBRC: None

29. According to the ATS-ERS recommendations, which of the following activities should be avoided before testing lung function?

1. Smoking within 1 hour of testing
2. Vigorous exercise 30 minutes before testing
3. Eating a large meal 2 hours before testing
4. Consuming alcohol within 24 hours of testing

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

ANS: D

Consuming alcohol should be avoided 4 hours before the test; otherwise, all other recommendations are correct.

DIF: 1 REF: p. 28 OBJ: EL-1
MSC: NBRC: CPFT 2B-6