



# 12

## Chest and Lungs

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### LEARNING OBJECTIVES

*After studying Chapter 12 in the textbook and completing this section of the workbook, students should be able to:*

1. Describe anatomy and physiology of the chest and lungs.
2. Describe interview questions pertinent to chest and lung examination.
3. Identify appropriate equipment used for chest and lung examination.
4. Discuss inspection, palpation, percussion, and auscultation techniques for examination of the chest and lungs.
5. Identify age-specific variations in chest and lung examination.
6. Identify examination findings associated with various conditions of the chest and lungs.

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### TEXTBOOK REVIEW

**Chapter 12 Chest and Lungs (pages 356–413)**

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### CONTENT REVIEW QUESTIONS

#### Multiple Choice

*Circle the correct answer for each of the following questions.*

1. As the chest of a newborn is examined, bowel sounds are auscultated in the chest. What is the significance of this finding? This is:
  - a. a normal finding in newborns.
  - b. an abnormal but benign finding in children until age 2.
  - c. abnormal and possibly indicates an enlarged liver.
  - d. abnormal and possibly indicates a diaphragmatic hernia.

2. Which of the following patients demonstrates the highest risk factor for respiratory disability?
  - a. a patient with a history of hypertension
  - b. a child who has had a previous respiratory infection
  - c. a patient with paraplegia
  - d. an extremely thin female patient
  
3. An adult male patient complains of a “persistent cold that will not go away.” He is a nonsmoker; his skin color is normal. Which one of the following is most important to this patient’s history?
  - a. allergy tests and treatment plans
  - b. expectations for treatment and care
  - c. experiences with difficult breathing
  - d. previous sports injuries and rehabilitation
  
4. The health care professional is examining the chest of a 22-year-old female who is 8 months pregnant. The patient has a wide thoracic cage. Which of the following best explains this finding?
  - a. She may have lung disease, such as emphysema.
  - b. She may be hypoxic and may require oxygen supplementation.
  - c. She may be pregnant with twins, causing abdominal contents to be forced up and out.
  - d. This is considered a normal finding with advanced pregnancy.
  
5. In which of the following conditions should the examiner expect the costal angle to be greater than 90 degrees?
  - a. chronic obstructive pulmonary disease
  - b. pneumothorax
  - c. infant respiratory distress syndrome
  - d. atelectasis
  
6. Which of the following findings indicates respiratory distress in the infant or young child?
  - a. respiratory rate of 30 breaths per minute
  - b. irregular respiratory pattern
  - c. observation of sternal and supraclavicular retractions with breathing
  - d. auscultation of bronchovesicular sounds throughout the lung field
  
7. The examiner notes a diaphragmatic excursion of 4 cm on the right side and 8 cm on the left side. What do these findings mean?
  - a. The patient may have a pleural effusion.
  - b. The patient may have a pneumothorax.
  - c. Asymmetrical findings are common in well-conditioned adults.
  - d. This is a normal finding because the right lung is larger than the left lung.
  
8. During percussion, the patient holds his or her arms in front in order to:
  - a. expose maximum lung area.
  - b. make the ribs protrude.
  - c. prevent attacks of coughing.
  - d. reduce discomfort.
  
9. Which of the following examination techniques is not typically done when examining the chest and lungs of a newborn?
  - a. general survey
  - b. inspection
  - c. percussion
  - d. auscultation

10. The patient tells the examiner, "I have been coughing up a lot of yellowish-green phlegm." The examiner should suspect:
  - a. viral infection.
  - b. tuberculosis.
  - c. pulmonary edema.
  - d. bacterial pneumonia.
  
11. In order to best visualize subtle retractions on a patient, the examiner should:
  - a. place the patient in a supine position.
  - b. stand directly behind the patient.
  - c. ensure that the light source angles toward the patient.
  - d. position the patient directly under a bright examination light.
  
12. Which of the following findings could indicate an intrathoracic infection?
  - a. malodorous breath
  - b. protrusion of the clavicle
  - c. clubbing of the nail beds
  - d. Kussmaul's respirations
  
13. Which finding is considered unusual for a newborn?
  - a. sneezing
  - b. coughing
  - c. prominence of xiphoid process
  - d. nose breathing
  
14. In the older adult, which finding can occur in the absence of disease as a result of age-related changes of the chest or lungs?
  - a. hyperresonance
  - b. productive cough
  - c. asymmetric expansion of the chest
  - d. pulmonary infiltrate
  
15. A newborn infant with a small chest-to-head size ratio is usually associated with:
  - a. maternal diabetes.
  - b. cocaine use during pregnancy.
  - c. intrauterine growth retardation.
  - d. a normal finding.
  
16. Hamman's sign can best be heard when the patient is:
  - a. in a supine position.
  - b. lying on the left side.
  - c. sitting completely upright.
  - d. positioned with the head elevated 30 degrees.
  
17. In addition to severe respiratory distress, which of the following findings may be indicative of a pneumothorax with mediastinal shift?
  - a. hemoptysis
  - b. pleural friction fremitus
  - c. vesicular lung sounds over the peripheral lung field
  - d. tracheal deviation away from midline position

18. A mother tells the examiner that her 2-year-old child has a cough that “sounds just like a bark.” Given this history, what other findings should the examiner anticipate with respiratory examination?
  - a. wheezing and coarse crackles bilaterally
  - b. labored breathing and inspiratory stridor
  - c. hyperresonance with percussion
  - d. productive, blood-tinged, or “rusty” sputum
19. A 4-year-old child is brought to the emergency department. The examiner notes Kussmaul’s respirations of 50 per minute. The child has no fever, no cough; good air movement in lungs, with no abnormal breath sounds auscultated. Which of the following questions would be most helpful for the examiner to ask the parents?
  - a. “What is his normal respiratory rate?”
  - b. “What would you like for me to do for him?”
  - c. “Do you think he may have swallowed a toy?”
  - d. “Where do you keep your medications at home?”
20. Which type of apnea is considered normal?
  - a. deglutition apnea
  - b. secondary apnea
  - c. sleep apnea
  - d. apneustic apnea
21. The best time to evaluate vocal and tactile resonance on a young child is while the child is:
  - a. lying down, asleep.
  - b. lying down, awake.
  - c. sitting quietly in parent’s lap.
  - d. crying.
22. The examiner should expect that the ratio of respiratory rate to heart rate is approximately:
  - a. 1:2.
  - b. 1:4.
  - c. 1:6.
  - d. 1:8.
23. A patient with long-standing COPD has come to the clinic complaining that his breathing is getting more difficult over the last couple of weeks. Which of the following questions would best help the examiner understand the hypoxia a patient is experiencing?
  - a. “Do you think oxygen will help you?”
  - b. “In what way has your activity level been affected?”
  - c. “Do you have a cough?”
  - d. “Have you been taking your medications?”
24. A patient has an undiagnosed tumor in the middle lobe of the right lung, which has caused atelectasis. What finding would exist that might make the examiner suspicious of this problem?
  - a. low-pitched grating sound heard during inspiration and expiration
  - b. hyperresonance in right middle lobe
  - c. diminished or absent breath sounds in right middle lobe
  - d. coarse crackles auscultated throughout lung field
25. Which examination finding is consistent with emphysema?
  - a. decreased tactile fremitus
  - b. dullness with chest percussion
  - c. trachea in midline position
  - d. an ammonia-like odor on the patient’s breath

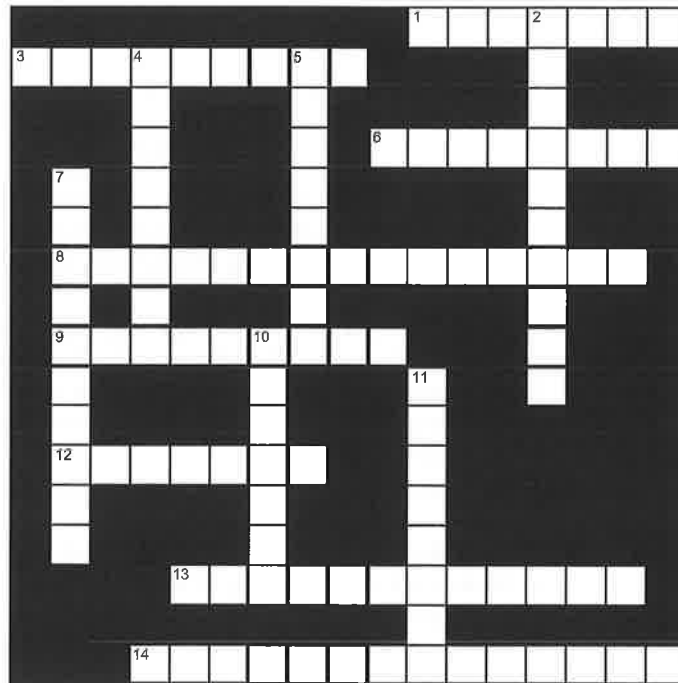
## Terminology Review

### Matching

Match the type of respiration on the left with the correct description on the right.

Type of Respiration	Description
26. _____ Kussmaul's	a. Irregular breaths varying in depth and interrupted by intervals of apnea but lacking repetitive pattern; associated with increased intracranial pressure
27. _____ Cheyne-Stokes	b. Low-pitched, low-intensity sounds heard over healthy lung tissue
28. _____ Biot's	c. Sonorous wheezes
29. _____ Hamman's sign	d. Spoken word transmitted through lung fields; usually muffled and indistinct
30. _____ vesicular	e. Increase of intensity of spoken sound with accompanying nasal sound
31. _____ bronchovesicular	f. Deep and usually rapid; associated with metabolic acidosis
32. _____ crackles	g. Whisper can be clearly heard through the stethoscope; associated with consolidation of lungs
33. _____ rhonchi	h. Intervals of apnea followed by crescendo/decrecendo sequence of breathing; often associated with dying
34. _____ wheeze	i. Typically moderate in intensity; heard over major bronchi
35. _____ vocal resonance	j. Mediastinal crunch; variety of sound including loud crackles and clicking or gurgling sounds; associated with mediastinal emphysema
36. _____ bronchophony	k. Continuous, high-pitched musical sound; almost a whistle; heard on inspiration or expiration
37. _____ pectoriloquy	l. Abnormal sound, more often heard on inspiration; characterized by discrete discontinuous sounds; rales
38. _____ egophony	m. Greater clarity and increased loudness of spoken words

**Crossword Puzzle**



**Across**

1. Costal angle at the base of this structure where ribs separate
3. Dyspnea while lying down
6. Vibration sensation palpated over the chest while the patient speaks
8. Juncture also known as angle of Louis
9. Dyspnea increases in an upright posture
12. Location of pectus carinatum
13. Caused by accumulation of air in the pleural space
14. Sound commonly percussed over the lung field of a patient with COPD

**Down**

2. Barrel-chested patient's ribs are more like this
4. Type of breathing one would expect to observe in a patient with an acute rib fracture
5. Accumulation of excess nonpurulent fluid in the pleural space
7. Coughing up blood
10. Serous membranes enclosing the lungs
11. Crinkly sensation palpated on the chest; indicates air in the subcutaneous tissue

**CONCEPTS APPLICATION**

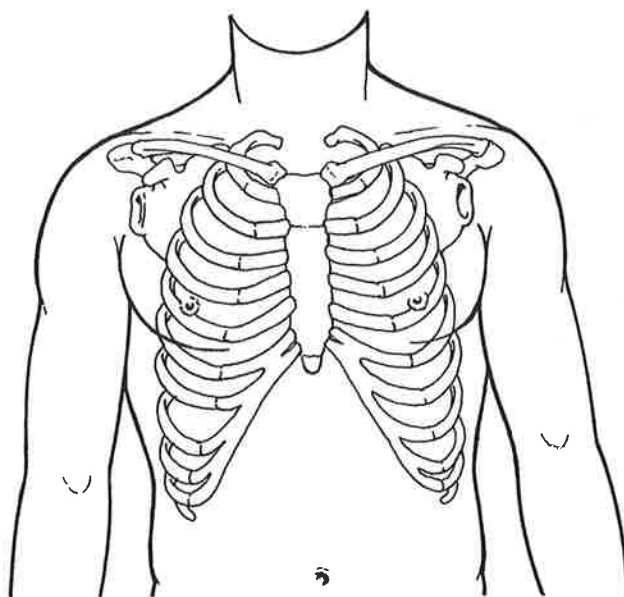
**Activity 1**

*In the table below are pairs of respiratory conditions that may have similar findings. For each pair of conditions, write the examination technique that will allow the examiner to differentiate between the two. Choose from these techniques: percussion, auscultation, tactile fremitus, or sputum analysis. Support your answers.*

<i>Conditions</i>	<i>Similar Findings</i>	<i>Examination Technique</i>
Tuberculosis vs. pneumonia	Dyspnea, fever, malaise, productive cough	
Pneumothorax vs. atelectasis	Dyspnea, diminished breath sounds	
Pneumonia vs. pleural effusion	Fever, shortness of breath, dullness to percussion	
Asthma vs. emphysema	Dyspnea, diminished lung sounds, diminished fremitus	

**Activity 2**

1. On the illustration below, indicate the location of the lung sounds you should expect to hear with auscultation of the anterior chest, using “B” for bronchial sounds, “BV” for bronchovesicular sounds, and “V” for vesicular sounds.
2. Indicate the location of the manubrium with “M” and the angle of Louis with “AL.”
3. Indicate the location of the costal angle with “CA.”







4. What kind of problems do you anticipate this patient will have?

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### CRITICAL THINKING

1. Mr. Louis Jackson is a 72-year-old male who is seen in the clinic for a routine examination. During the interview Mr. Jackson tells the interviewer that he smokes. When questioned further, he indicates he has been smoking “roughly 60 years.” He states, “I started smoking cigarettes when I was about 14 years old. Until I was about 25, I smoked a pack maybe every 3 days or so. Then I started smoking about a 1/2 pack a day until the age of 40. Since that time, I’ve smoked about a pack a day.” Mr. Jackson adds, “I knew I should quit, but I never really wanted to very much. I decided that when I got up to a pack a day, I would never smoke more than that.”  
Based on the information given, calculate Mr. Jackson’s pack-year history.
2. Mr. Pena is a 41-year-old migrant worker from Mexico who comes to the clinic where you work. Through an interpreter, you learn he has had a fever with night sweats, fatigue, frequent coughing with reddish sputum and weight loss. What significance do these symptoms have?
3. Mrs. Marino tells you all three of her children have had problems with coughing and some trouble breathing ever since they moved into a new apartment 2 months ago. She also tells you they have not had fevers with these symptoms. What type of interview questions should be asked to further explore these symptoms?

