FULL-LENGTH PRACTICE TEST 7

Practice Test 7: Pulmonology

60 Questions — Recommended Time: 60 Minutes

1. A 62-year-old man with a 40-pack-year smoking history presents with progressive dyspnea, chronic productive cough, and frequent respiratory infections over the past three years. Pulmonary function tests reveal an FEV1/FVC ratio of 0.58 and an FEV1 of 52% predicted with minimal bronchodilator reversibility. Which of the following is the most likely diagnosis?

A. Asthma

B. Restrictive lung disease

C. Chronic obstructive pulmonary disease

D. Bronchiectasis

2. A 28-year-old woman presents with episodic wheezing, chest tightness, cough, and shortness of breath that worsen at night and with exercise. She reports her symptoms are triggered by cold air and pollen exposure. Spirometry shows an FEV1 of 78% predicted that improves by 15% after bronchodilator administration. Which of the following is the most appropriate long-term controller medication?

A. Low-dose inhaled corticosteroid

B. Oral theophylline

C. Long-acting beta-2 agonist monotherapy

D. Oral prednisone daily

3. A 55-year-old man presents to the emergency department with acute onset of right-sided pleuritic chest pain, dyspnea, and hemoptysis. He underwent right knee replacement surgery two weeks ago and has been immobilized. Heart rate is 110 bpm, respiratory rate is 24, and oxygen saturation is 89% on room air. D-dimer is elevated. Which of the following is the most appropriate next diagnostic study?

A. Chest X-ray

B. Ventilation-perfusion scan

C. Echocardiography

D. CT pulmonary angiography

4. A 35-year-old African American woman presents with bilateral hilar lymphadenopathy on chest X-ray, erythema nodosum, and a dry cough. Laboratory studies reveal an elevated ACE level and hypercalcemia. Biopsy of a mediastinal lymph node reveals non-caseating granulomas. Which of the following is the most likely diagnosis?

A. Tuberculosis

B. Sarcoidosis

C. Lymphoma

D. Histoplasmosis

5. A 70-year-old man with COPD (GOLD Group E) is currently taking a long-acting muscarinic antagonist (tiotropium) alone. He has had two exacerbations requiring oral corticosteroids in the past year. His eosinophil count is 350 cells/μL. Which of the following is the most appropriate step-up in therapy?

A. Add an inhaled corticosteroid and long-acting beta-2 agonist (triple therapy: ICS/LABA/LAMA)

B. Switch to a short-acting beta-2 agonist as needed only

C. Add oral theophylline

D. Start chronic oral prednisone

6. A 45-year-old woman presents with progressive dyspnea and a dry cough over the past six months. She has a history of rheumatoid arthritis. High-resolution CT of the chest reveals bilateral ground-glass opacities with honeycombing and traction bronchiectasis predominantly in the lower lobes. Pulmonary function tests show a restrictive pattern with reduced DLCO. Which of the following is the most likely diagnosis?

A. COPD

B. Chronic hypersensitivity pneumonitis

C. Interstitial lung disease (usual interstitial pneumonia pattern)

D. Pulmonary alveolar proteinosis

7. A 30-year-old man is brought to the emergency department after a motorcycle accident with left-sided chest pain and progressive dyspnea. Examination reveals absent breath sounds on the left, tracheal deviation to the right, distended neck veins, and hypotension. Which of the following is the most appropriate immediate intervention?

A. Chest X-ray before any intervention

B. Endotracheal intubation

C. Left-sided chest tube insertion with underwater seal

D. Needle decompression of the left chest at the second intercostal space, midclavicular line

8. A 58-year-old man with a 30-pack-year smoking history presents with a persistent cough, hemoptysis, and unintentional weight loss of 15 pounds over three months. Chest X-ray reveals a central hilar mass with ipsilateral hilar lymphadenopathy. Which of the following is the most likely diagnosis?

A. Pulmonary hamartoma

B. Lung cancer (most likely squamous cell or small cell carcinoma)

C. Tuberculosis

D. Sarcoidosis

9. A 22-year-old tall, thin man presents with sudden onset of right-sided chest pain and dyspnea at rest. He has no history of trauma or lung disease. Chest X-ray reveals a visible pleural line with absence of lung markings lateral to this line on the right. The pneumothorax occupies approximately 15% of the hemithorax. He is hemodynamically stable with oxygen saturation of 96%. Which of the following is the most appropriate initial management?

A. Observation with supplemental oxygen and repeat imaging in 6 hours

B. Immediate chest tube insertion

C. Emergent needle decompression

D. Video-assisted thoracoscopic surgery

10. A 68-year-old woman with a 20-year history of COPD presents with worsening dyspnea, peripheral edema, elevated jugular venous pressure, and a loud P2 heart sound. Echocardiography reveals right ventricular dilation and elevated pulmonary artery pressures. Which of the following is the most likely diagnosis?

A. Left-sided heart failure

B. Tricuspid regurgitation

C. Constrictive pericarditis

D. Cor pulmonale

11. A 42-year-old woman with a history of asthma presents to the emergency department with severe dyspnea, wheezing, and inability to speak in full sentences. Her peak expiratory flow is 35% of her predicted value. She has already received three nebulized albuterol treatments with minimal improvement. Oxygen saturation is 90% on room air. Which of the following is the most appropriate next step in management?

A. Discharge with an oral corticosteroid taper

B. Administer subcutaneous epinephrine

C. Administer intravenous magnesium sulfate and systemic corticosteroids

D. Start inhaled cromolyn sodium

12. A 50-year-old man is admitted with community-acquired pneumonia. He has a productive cough with rust-colored sputum, fever of 103°F, rigors, and right lower lobe consolidation on chest X-ray. He has no drug allergies and no recent antibiotic use. Which of the following is the most likely causative organism?

A. Mycoplasma pneumoniae

B. Streptococcus pneumoniae

C. Klebsiella pneumoniae

D. Legionella pneumophila

13. A 72-year-old nursing home resident presents with cough productive of foul-smelling sputum, fever, and a chest X-ray showing a cavitary lesion in the superior segment of the right lower lobe. He has a history of dysphagia and recurrent aspiration. Which of the following is the most likely diagnosis?

A. Pulmonary tuberculosis

B. Squamous cell carcinoma with cavitation

C. Pulmonary embolism with infarction

D. Lung abscess

14. A 40-year-old woman presents with progressive dyspnea on exertion over six months, syncope with exercise, and lower extremity edema. She has no history of lung disease or left-sided heart disease. Echocardiography reveals an estimated pulmonary artery systolic pressure of 65 mmHg with normal left ventricular function. Right heart catheterization confirms a mean pulmonary artery pressure of 35 mmHg. Which of the following is the most likely diagnosis?

A. Pulmonary arterial hypertension

B. Chronic thromboembolic pulmonary hypertension

C. Left-sided heart failure with preserved ejection fraction

D. COPD-related pulmonary hypertension

15. A 65-year-old man with COPD presents with increased dyspnea, increased sputum production, and change in sputum color from white to green over the past three days. He is afebrile with an oxygen saturation of 91% on room air. Which of the following is the most appropriate treatment for this acute exacerbation?

A. IV vancomycin and piperacillin-tazobactam

B. Short-acting bronchodilators, systemic corticosteroids, and an oral antibiotic (azithromycin or doxycycline)

C. Inhaled corticosteroids alone

D. Emergent intubation and mechanical ventilation

16. A 25-year-old man presents with chronic sinusitis, bronchiectasis, and situs inversus (dextrocardia confirmed on chest X-ray). He has had recurrent respiratory infections since childhood. Which of the following is the most likely underlying diagnosis?

A. Kartagener syndrome (primary ciliary dyskinesia)

B. Cystic fibrosis

C. Common variable immunodeficiency

D. Alpha-1 antitrypsin deficiency

17. A 48-year-old man with HIV (CD4 count 85 cells/μL) presents with two weeks of progressive dyspnea, dry cough, and fever. Chest X-ray reveals bilateral diffuse interstitial infiltrates. Lactate dehydrogenase (LDH) is elevated. Induced sputum reveals organisms on Gomori methenamine silver stain. Which of the following is the most likely causative organism?

A. Mycobacterium tuberculosis

B. Cytomegalovirus

C. Cryptococcus neoformans

D. Pneumocystis jirovecii

18. A 55-year-old woman undergoes thoracentesis for a large right-sided pleural effusion. Pleural fluid analysis reveals a protein ratio (pleural/serum) of 0.6, LDH ratio (pleural/serum) of 0.7, and pleural fluid LDH greater than two-thirds the upper limit of normal for serum. Which of the following best classifies this effusion?

A. Transudative effusion

B. Exudative effusion

C. Chylothorax

D. Hemothorax

19. A 60-year-old man with small cell lung cancer presents with facial swelling, distended neck and chest wall veins, and upper extremity edema that is worse in the morning. He reports headache and dizziness when bending forward. Which of the following is the most likely diagnosis?

A. Cardiac tamponade

B. Pulmonary embolism

C. Superior vena cava syndrome

D. Tension pneumothorax

20. A 38-year-old woman who is 32 weeks pregnant presents with acute onset of dyspnea, pleuritic chest pain, and tachycardia. She has a swollen left lower extremity. D-dimer is elevated. Which of the following is the most appropriate diagnostic study?

A. CT pulmonary angiography with abdominal shielding

B. Bilateral lower extremity venous Doppler ultrasound only

C. Ventilation-perfusion scan as the sole imaging modality

D. Conventional pulmonary angiography

21. A 70-year-old man with a 50-pack-year smoking history presents with a 2-centimeter solitary pulmonary nodule discovered on CT scan. The nodule has irregular (spiculated) margins, is located in the right upper lobe, and was not present on a CT scan two years ago. Which of the following is the most appropriate next step?

A. Repeat CT scan in 3 months

B. Reassurance and no follow-up

C. Empiric antibiotic therapy for 6 weeks

D. PET scan or tissue biopsy for further evaluation

22. A 32-year-old man presents with progressive dyspnea, chronic productive cough with copious purulent sputum, and recurrent respiratory infections. High-resolution CT reveals dilated, thickened airways with a "signet ring sign" and tram-track opacities. Which of the following is the most likely diagnosis?

A. COPD

B. Bronchiectasis

C. Interstitial lung disease

D. Lung cancer

23. A 60-year-old woman with a history of breast cancer treated five years ago presents with progressive dyspnea and a large left-sided pleural effusion. Thoracentesis reveals bloody pleural fluid with positive cytology for malignant cells. Which of the following is the most likely cause of her pleural effusion?

A. Congestive heart failure

B. Pulmonary embolism

C. Malignant pleural effusion

D. Parapneumonic effusion

24. A 45-year-old farmer presents with fever, chills, dyspnea, and a dry cough that occurs 4 to 8 hours after working with moldy hay. Symptoms resolve when he is away from the farm. Chest X-ray reveals diffuse ground-glass opacities in the upper lobes. Which of the following is the most likely diagnosis?

A. Hypersensitivity pneumonitis (farmer's lung)

B. Occupational asthma

C. Organic dust toxic syndrome

D. Allergic bronchopulmonary aspergillosis

25. A 56-year-old man with a history of congestive heart failure presents with progressive dyspnea and bilateral pleural effusions. Pleural fluid analysis reveals a protein ratio (pleural/serum) of 0.2, LDH ratio (pleural/serum) of 0.3, and pleural fluid LDH well below two-thirds the upper limit of normal for serum. Which of the following is the most likely cause of his effusion?

A. Pneumonia

B. Malignancy

C. Pulmonary embolism

D. Congestive heart failure (transudative effusion)

26. A 28-year-old woman with cystic fibrosis presents with increased cough, sputum production, and decreased pulmonary function. Sputum culture grows mucoid Pseudomonas aeruginosa. Which of the following is the most appropriate antibiotic approach?

A. Oral amoxicillin for 10 days

B. Combination antipseudomonal therapy with an IV beta-lactam plus an aminoglycoside or inhaled tobramycin

C. Oral azithromycin alone

D. Trimethoprim-sulfamethoxazole for 14 days

27. A 65-year-old man presents with a chronic cough that has been present for eight weeks. He takes lisinopril for hypertension, has no smoking history, and his chest X-ray is normal. He reports a dry, nonproductive, tickling cough. Which of the following is the most likely cause of his chronic cough?

A. ACE inhibitor-induced cough

B. COPD

C. Lung cancer

D. Pulmonary fibrosis

28. A 50-year-old construction worker with a 25-year history of asbestos exposure presents with progressive dyspnea and dry cough. Chest X-ray reveals bilateral pleural plaques and lower lobe interstitial fibrosis. Pulmonary function tests show a restrictive pattern with reduced DLCO. Which of the following is the most likely diagnosis?

A. Silicosis

B. Coal workers' pneumoconiosis

C. Asbestosis

D. Berylliosis

29. A 40-year-old man from Southeast Asia presents with a three-month history of cough with blood-streaked sputum, night sweats, low-grade fever, and unintentional weight loss of 10 pounds. Chest X-ray reveals a cavitary lesion in the right upper lobe. Which of the following is the most appropriate initial diagnostic test?

A. Bronchoscopy with biopsy

B. CT-guided needle biopsy

C. Tuberculin skin test and chest X-ray

D. Sputum acid-fast bacilli smear and culture

30. A 58-year-old man with newly diagnosed community-acquired pneumonia is being treated as an outpatient. He has no comorbidities, no recent antibiotic use, and no drug allergies. Which of the following is the most appropriate empiric antibiotic regimen?

A. Intravenous ceftriaxone plus azithromycin

B. Oral amoxicillin or doxycycline

C. Oral levofloxacin as first-line therapy

D. IV vancomycin plus piperacillin-tazobactam

31. A 48-year-old woman presents with a two-year history of progressive exertional dyspnea and dry cough. She has a history of scleroderma (systemic sclerosis). Pulmonary function tests show FVC 62% predicted, FEV1/FVC ratio 0.85, and DLCO 45% predicted. High-resolution CT shows ground-glass opacities and fibrosis in the lower lobes. Which of the following PFT patterns is demonstrated?

A. Obstructive pattern

B. Restrictive pattern with impaired gas exchange

C. Normal pulmonary function

D. Mixed obstructive-restrictive pattern

32. A 70-year-old man with COPD on home oxygen therapy presents with morning headache, daytime somnolence, and confusion. Arterial blood gas reveals pH 7.32, $PaCO_2$ 58 mmHg, PaO_2 55 mmHg, and HCO_3 34 mEq/L. Which of the following best describes this acid-base disturbance?

A. Acute respiratory acidosis

B. Metabolic alkalosis

C. Chronic respiratory acidosis with metabolic compensation

D. Acute respiratory alkalosis

33. A 35-year-old woman presents with episodic wheezing and dyspnea. She has a history of allergic bronchopulmonary aspergillosis. Chest CT reveals central bronchiectasis with mucoid impaction. Laboratory studies show elevated total IgE, positive Aspergillus-specific IgE and IgG, and peripheral eosinophilia. Which of the following is the most appropriate initial treatment?

A. Oral corticosteroids

B. Inhaled albuterol alone

C. Voriconazole monotherapy

D. Surgical resection of affected bronchi

34. A 52-year-old obese man presents with excessive daytime sleepiness, loud snoring, witnessed apneic episodes, and morning headaches. His BMI is 38. Polysomnography reveals an apnea-hypopnea index of 35 events per hour with oxygen desaturation to 78%. Which of the following is the most appropriate first-line treatment?

A. Uvulopalatopharyngoplasty

B. Oral appliance therapy

C. Weight loss counseling alone

D. Continuous positive airway pressure (CPAP)

35. A 42-year-old man is admitted to the ICU with acute respiratory distress syndrome (ARDS) secondary to sepsis. He is intubated and mechanically ventilated. His PaO2/FiO2 ratio is 85 mmHg. Which of the following is the most appropriate ventilator strategy?

A. High tidal volume ventilation at 12 mL/kg ideal body weight

B. Permissive hypercapnia with no limits on plateau pressure

C. Low tidal volume ventilation at 6 mL/kg ideal body weight with plateau pressure below 30 cmH2O

D. Pressure support ventilation with high PEEP only

36. A 55-year-old woman presents with gradually progressive dyspnea and a chest X-ray showing bilateral hilar lymphadenopathy and diffuse reticulonodular infiltrates. Bronchoscopy with bronchoalveolar lavage reveals a CD4/CD8 ratio greater than 3.5:1. Transbronchial biopsy shows non-caseating granulomas. Which of the following is the most likely diagnosis?

A. Lymphoma

B. Sarcoidosis

C. Tuberculosis

D. Hypersensitivity pneumonitis

37. A 60-year-old man with a history of squamous cell lung cancer presents with severe hypercalcemia (calcium 14.2 mg/dL), confusion, and dehydration. PTH level is appropriately suppressed. Which of the following is the most likely mechanism of his hypercalcemia?

A. Tumor secretion of parathyroid hormone-related peptide (PTHrP)

B. Primary hyperparathyroidism

C. Vitamin D toxicity

D. Osteolytic bone metastases

38. A 48-year-old woman with systemic lupus erythematosus presents with acute onset of dyspnea, pleuritic chest pain, and fever. Chest X-ray reveals bilateral pleural effusions and bibasilar atelectasis. Pleural fluid analysis shows an exudative effusion with elevated ANA titers. Which of the following is the most likely cause of her pleural effusions?

A. Congestive heart failure

B. Parapneumonic effusion

C. Pulmonary embolism

D. Lupus pleuritis (serositis)

39. A 25-year-old man with a history of poorly controlled asthma presents with acute severe exacerbation. ABG reveals pH 7.38, PaCO2 40 mmHg, PaO2 72 mmHg. His respiratory rate is 32 breaths per minute and he appears fatigued. Which of the following is the most concerning aspect of this ABG?

A. The low PaO2 alone

B. A normal PaCO2 in the setting of severe asthma exacerbation indicates impending respiratory failure

C. The pH is too high

D. These ABG findings are entirely reassuring

40. A 45-year-old woman who is an IV drug user presents with fever, cough, and multiple bilateral round pulmonary infiltrates on chest X-ray that appear to cavitate. Blood cultures are positive for Staphylococcus aureus. Echocardiography reveals a tricuspid valve vegetation. Which of the following is the most likely pulmonary diagnosis?

A. Community-acquired pneumonia

B. Pulmonary tuberculosis

C. Septic pulmonary emboli from right-sided endocarditis

D. Metastatic lung disease

41. A 72-year-old man with COPD and a recent hospitalization for pneumonia presents with progressive right-sided pleuritic chest pain, fever, and a chest X-ray showing a loculated right-sided pleural effusion with an air-fluid level. Thoracentesis reveals turbid fluid with pH 6.9, glucose less than 40 mg/dL, and LDH greater than 1000 IU/L. Gram stain shows gram-positive cocci. Which of the following is the most appropriate management?

A. Oral antibiotics and outpatient follow-up

B. Intravenous antibiotics alone without drainage

C. Repeat thoracentesis in 48 hours

D. Chest tube drainage (tube thoracostomy) with intravenous antibiotics

42. A 20-year-old man with cystic fibrosis has progressive decline in lung function despite optimal medical therapy. His FEV1 has declined to 28% predicted. He has been hospitalized four times in the past year for pulmonary exacerbations. Which of the following is the most appropriate next consideration?

A. Referral for lung transplant evaluation

B. Initiation of chronic oral corticosteroids

C. Addition of a fourth inhaled antibiotic

D. Hospice referral without further intervention

43. A 68-year-old woman presents with a two-month history of progressive dyspnea and nonproductive cough. She has a history of rheumatoid arthritis and was started on methotrexate six months ago. Chest X-ray reveals new bilateral diffuse interstitial infiltrates. Which of the following is the most likely diagnosis?

A. Rheumatoid lung disease progression

B. Community-acquired pneumonia

C. Methotrexate-induced pneumonitis

D. Pulmonary embolism

44. A 30-year-old man presents with acute onset of fever, productive cough with rust-colored sputum, and right lower lobe consolidation on chest X-ray. He has no comorbidities but has a penicillin allergy (anaphylaxis). Which of the following is the most appropriate empiric antibiotic?

A. Amoxicillin

B. Doxycycline or a respiratory fluoroquinolone

C. Ceftriaxone

D. Trimethoprim-sulfamethoxazole

45. A 55-year-old man with long-standing COPD is found to have an alpha-1 antitrypsin level of 35 mg/dL (normal 100-300 mg/dL). CT of the chest reveals predominantly basilar panacinar emphysema. He is a lifelong nonsmoker. Which of the following is the most characteristic finding that distinguishes alpha-1 antitrypsin deficiency emphysema from smoking-related emphysema?

A. Basilar predominance with panacinar pattern, compared to upper lobe centrilobular pattern in smoking-related emphysema

B. Upper lobe predominance

C. Presence of bullae

D. Diffuse ground-glass opacities

46. A 62-year-old man with known COPD presents with acute worsening of dyspnea. Arterial blood gas reveals pH 7.28, PaCO2 68 mmHg, PaO2 52 mmHg, and HCO3 26 mEq/L. He is alert but using accessory muscles of respiration. Which of the following is the most appropriate next step?

A. Endotracheal intubation and invasive mechanical ventilation

B. High-flow oxygen at 15 L/min by non-rebreather mask

C. Observation with supplemental oxygen by nasal cannula at 6 L/min

D. Bilevel positive airway pressure (BiPAP) non-invasive ventilation

47. A 45-year-old woman presents with a chronic dry cough for the past three months. She has no history of smoking, asthma, or ACE inhibitor use. She reports frequent heartburn and a sour taste in her mouth, especially at night. Chest X-ray is normal. Spirometry is normal. Which of the following is the most likely cause of her chronic cough?

A. Gastroesophageal reflux disease

B. Post-nasal drip syndrome

C. Eosinophilic bronchitis

D. Idiopathic pulmonary fibrosis

48. A 65-year-old man with a history of lung cancer undergoes surgical resection. Postoperatively, a chest tube is placed. On the second postoperative day, continuous bubbling is noted in the water seal chamber of the chest drainage system during both inspiration and expiration. Which of the following is the most likely cause?

A. Normal postoperative finding

B. Chest tube occlusion

C. Persistent air leak (bronchopleural fistula)

D. Hemothorax

49. A 52-year-old man presents with gradually progressive dyspnea and "Velcro-like" inspiratory crackles on lung auscultation. He has a history of chronic exposure to asbestos. Chest X-ray shows bilateral lower lobe reticular opacities. PFTs reveal a restrictive pattern. He has digital clubbing. HRCT reveals honeycombing and ground-glass opacities predominantly in the lower lobes. Which of the following is the most important prognostic indicator?

A. Degree of digital clubbing

B. Decline in forced vital capacity and DLCO over time

C. Presence of asbestos exposure history

D. Degree of honeycombing on initial CT

50. A 40-year-old man presents to the emergency department with sudden onset of severe dyspnea and right-sided chest pain after being stabbed in the right chest wall. Examination reveals absent breath sounds on the right with dullness to percussion at the base and hyperresonance at the apex. He is hypotensive. Which of the following is the most likely diagnosis?

A. Tension pneumothorax

B. Cardiac tamponade

C. Massive pulmonary embolism

D. Hemopneumothorax

51. A 72-year-old woman presents with recurrent episodes of aspiration pneumonia. She has a history of stroke and has difficulty swallowing. Chest X-ray reveals infiltrates in the right lower lobe and right middle lobe. Which of the following is the most important preventive measure?

A. Speech-language pathology evaluation and swallowing rehabilitation

B. Prophylactic oral antibiotics

C. Chronic proton pump inhibitor therapy

D. Placement of a nasogastric feeding tube

52. A 55-year-old man presents to the emergency department with massive hemoptysis (approximately 500 mL of blood in 24 hours). He is hemodynamically unstable with ongoing bleeding. Which of the following is the most appropriate immediate management priority?

A. Urgent CT angiography of the chest

B. Obtain sputum cultures

C. Airway protection with endotracheal intubation, position patient with bleeding side down

D. Schedule elective bronchoscopy in 48 hours

53. A 28-year-old woman with well-controlled asthma on a low-dose ICS/LABA combination presents for a routine visit. She reports using her rescue inhaler once weekly and has had no nocturnal symptoms or exacerbations in the past three months. PFTs are normal. Which of the following best describes her current level of asthma control?

A. Uncontrolled asthma requiring step-up therapy

B. Well-controlled asthma

C. Partially controlled asthma

D. Severe persistent asthma

54. A 62-year-old man with a history of congestive heart failure and chronic kidney disease presents with dyspnea. Chest X-ray reveals bilateral pleural effusions, pulmonary vascular congestion, and Kerley B lines. Which of the following is the most appropriate initial treatment?

A. Thoracentesis of both pleural effusions

B. Empiric antibiotics for suspected pneumonia

C. Bronchoscopy with bronchoalveolar lavage

D. IV diuretic therapy (furosemide)

55. A 50-year-old man presents with a chronic cough, recurrent hemoptysis, and a central lung mass on CT scan. Bronchoscopy reveals an endobronchial lesion. Biopsy shows nests of cells with keratin pearls and intercellular bridges. Which of the following is the most likely histologic type of lung cancer?

A. Squamous cell carcinoma

B. Adenocarcinoma

C. Small cell carcinoma

D. Large cell carcinoma

56. A 48-year-old man undergoes a PPD (tuberculin skin test) as part of employment screening at a hospital. After 48 hours, the induration measures 12 mm. He has no known risk factors for tuberculosis, no symptoms, and a normal chest X-ray. Which of the following is the most appropriate interpretation and management?

A. Negative result requiring no further action

B. Positive result requiring four-drug therapy for active tuberculosis

C. Positive result (induration ≥15 mm is the threshold for no risk factors, so this 12 mm result is negative) requiring no treatment

D. Positive result requiring isoniazid for 9 months

57. A 60-year-old woman with a history of breast cancer presents with progressive dyspnea and a chest X-ray showing a large right-sided pleural effusion. After therapeutic thoracentesis removes 1.5 liters of fluid, she develops sudden onset of dyspnea, cough, and hypoxemia. Repeat chest X-ray shows new unilateral pulmonary edema on the right side. Which of the following is the most likely diagnosis?

A. Recurrent pleural effusion

B. Re-expansion pulmonary edema

C. Acute pulmonary embolism

D. Tension pneumothorax from thoracentesis

58. A 35-year-old woman presents with progressive dyspnea and is found to have a lymphangioleiomyomatosis on lung biopsy. She has a history of seizures and facial angiofibromas. CT of the abdomen reveals bilateral renal angiomyolipomas. Which of the following is the most likely associated systemic condition?

A. Sarcoidosis

B. Neurofibromatosis type 1

C. Marfan syndrome

D. Tuberous sclerosis complex

59. A 68-year-old man presents with progressive dyspnea and a dry cough over 12 months. He has no occupational exposures or connective tissue disease. HRCT reveals bilateral, predominantly basilar, subpleural honeycombing with traction bronchiectasis and minimal ground-glass opacity. PFTs show a restrictive pattern with reduced DLCO. Which of the following is the most likely diagnosis?

A. Idiopathic pulmonary fibrosis

B. Nonspecific interstitial pneumonia

C. Cryptogenic organizing pneumonia

D. Sarcoidosis

60. A 55-year-old man with small cell lung cancer presents with progressive facial and upper extremity swelling, hyponatremia (sodium 118 mEq/L), decreased serum osmolality, and concentrated urine (urine osmolality 450 mOsm/kg). He is euvolemic. Which of the following is the most likely cause of his hyponatremia?

A. Adrenal insufficiency

B. Psychogenic polydipsia

C. Syndrome of inappropriate antidiuretic hormone secretion (SIADH)

D. Cerebral salt wasting

PRACTICE TEST 7: ANSWER KEY WITH EXPLANATIONS

Pulmonology

1. C. Chronic obstructive pulmonary disease. COPD is characterized by persistent airflow limitation that is not fully reversible, defined by a post-bronchodilator FEV1/FVC ratio below 0.70. This patient's 40-pack-year smoking history is the primary risk factor, and his FEV1 of 52% predicted classifies him as GOLD Stage II (moderate). The minimal bronchodilator reversibility distinguishes COPD from asthma, which typically shows significant reversibility (12% and 200 mL improvement). Progressive dyspnea, chronic productive cough, and recurrent infections are hallmark features of COPD.

2. A. Low-dose inhaled corticosteroid. Inhaled corticosteroids (ICS) are the cornerstone of long-term asthma controller therapy, reducing airway inflammation, preventing exacerbations, and improving lung function. For mild persistent asthma (symptoms more than twice weekly but not daily), low-dose ICS is the preferred Step 2 therapy per GINA guidelines. Long-acting beta-2 agonist (LABA) monotherapy is contraindicated in asthma due to increased risk of severe exacerbations and death without concurrent ICS. The 15% bronchodilator reversibility confirms the diagnosis of asthma.

3. D. CT pulmonary angiography. CT pulmonary angiography (CTPA) is the gold standard imaging study for diagnosing pulmonary embolism, offering high sensitivity (95-100%) and specificity (97%). This patient has classic risk factors (recent surgery, immobilization) and presentation (pleuritic chest pain, dyspnea, hemoptysis, tachycardia, hypoxemia) for PE. The elevated D-dimer supports the clinical suspicion but is nonspecific. Wells criteria would classify this patient as high probability, mandating definitive imaging rather than relying on D-dimer alone to exclude PE.

4. B. Sarcoidosis. Sarcoidosis is a systemic granulomatous disease of unknown etiology that most commonly affects young adults, with higher prevalence in African Americans and Northern Europeans. Bilateral hilar lymphadenopathy is the most common radiographic finding (present in approximately 50-80% of cases). Erythema nodosum (painful red nodules on the shins) is a common extrapulmonary manifestation. Non-caseating granulomas on biopsy distinguish sarcoidosis from tuberculosis, which produces caseating granulomas. Elevated ACE and hypercalcemia from granulomatous production of 1,25-dihydroxyvitamin D are supportive findings.

5. A. Add an inhaled corticosteroid and long-acting beta-2 agonist (triple therapy). For COPD patients with frequent exacerbations despite LAMA monotherapy and eosinophil counts of 300 or more cells/μL, escalation to triple therapy (ICS/LABA/LAMA) is recommended. The elevated eosinophil count predicts a favorable response to ICS. Triple therapy has been shown to reduce exacerbation frequency and

improve lung function compared to dual bronchodilator therapy alone in this population. Chronic oral corticosteroids are avoided due to significant systemic side effects including osteoporosis, diabetes, and myopathy.

6. C. Interstitial lung disease (usual interstitial pneumonia pattern). Rheumatoid arthritis is commonly associated with interstitial lung disease, with the UIP pattern being the most common fibrotic pattern. Ground-glass opacities represent active inflammation, while honeycombing and traction bronchiectasis indicate established fibrosis — both predominantly affecting the lower lobes. The restrictive PFT pattern (reduced FVC with preserved or elevated FEV1/FVC ratio) and reduced DLCO (impaired gas exchange from thickened alveolar-capillary membrane) are characteristic of interstitial lung disease. Treatment includes immunosuppression and antifibrotic agents.

7. D. Needle decompression of the left chest at the second intercostal space, midclavicular line. This presentation — absent breath sounds, tracheal deviation away from the affected side, distended neck veins (impaired venous return), and hypotension — is the classic presentation of tension pneumothorax, a life-threatening emergency requiring immediate intervention without waiting for imaging. Needle decompression at the second intercostal space, midclavicular line converts the tension pneumothorax to a simple pneumothorax, followed by definitive chest tube placement. The tension pneumothorax causes mediastinal shift compressing the contralateral lung and obstructing venous return to the heart.

8. B. Lung cancer (most likely squamous cell or small cell carcinoma). A central hilar mass in a heavy smoker with hemoptysis and weight loss is lung cancer until proven otherwise. Central (hilar) location is most characteristic of squamous cell carcinoma and small cell carcinoma, while adenocarcinoma typically presents as a peripheral nodule or mass. Squamous cell carcinoma is the most common centrally located non-small cell lung cancer and is strongly associated with smoking. Hemoptysis occurs from tumor erosion into bronchial vasculature. Tissue diagnosis through bronchoscopy with biopsy is essential for staging and treatment planning.

9. A. Observation with supplemental oxygen and repeat imaging in 6 hours. A small primary spontaneous pneumothorax (less than 2-3 cm or less than 15-20% of hemithorax) in a hemodynamically stable patient with mild symptoms can be managed conservatively with observation, supplemental high-flow oxygen (which accelerates pneumothorax reabsorption by increasing the nitrogen gradient), and serial imaging to confirm resolution. Primary spontaneous pneumothorax typically occurs in tall, thin young men without underlying lung disease. Chest tube insertion is indicated for large pneumothoraces, hemodynamic instability, or failed conservative management.

10. D. Cor pulmonale. Cor pulmonale is right ventricular hypertrophy and dilation secondary to pulmonary hypertension caused by chronic lung disease. Long-standing COPD causes chronic hypoxic vasoconstriction, vascular remodeling, and destruction of the pulmonary capillary bed, leading to elevated pulmonary artery pressures. Signs include peripheral edema, elevated JVP, hepatomegaly, and a loud P2 (pulmonic component of S2 reflecting pulmonary hypertension). Treatment focuses on optimizing the underlying lung disease, supplemental oxygen to reduce hypoxic vasoconstriction, and diuretics for fluid management.

11. C. Administer intravenous magnesium sulfate and systemic corticosteroids. This patient is experiencing a severe asthma exacerbation (status asthmaticus) with PEF below 40% predicted and poor response to initial bronchodilator therapy. IV magnesium sulfate is a bronchial smooth muscle relaxant indicated for severe exacerbations refractory to initial treatment. Systemic corticosteroids (IV methylprednisolone or oral prednisone) are essential to reduce airway inflammation and should be administered early. Continuous nebulized albuterol and ipratropium should continue. If the patient fails to improve, endotracheal intubation and mechanical ventilation may become necessary.

12. B. Streptococcus pneumoniae. Streptococcus pneumoniae remains the most common cause of community-acquired pneumonia across all age groups. The classic presentation includes abrupt onset of high fever with rigors, productive cough with rust-colored sputum (from blood-tinged purulent material), and lobar consolidation on chest X-ray. Gram stain typically shows gram-positive lancet-shaped diplococci. Mycoplasma pneumoniae produces an atypical presentation with gradual onset, dry cough, and diffuse infiltrates. Klebsiella pneumoniae is associated with alcoholism and produces "currant jelly" sputum.

13. D. Lung abscess. A cavitary lesion in the superior segment of the right lower lobe (the most common site for aspiration when recumbent) with foul-smelling sputum in a patient with aspiration risk factors is classic for a lung abscess. Lung abscesses typically result from aspiration of oropharyngeal anaerobic bacteria (Bacteroides, Peptostreptococcus, Fusobacterium) with subsequent necrotizing infection. Foul-smelling (putrid) sputum is highly suggestive of anaerobic infection. Treatment is prolonged antibiotics (clindamycin or amoxicillin-clavulanate) for 4 to 6 weeks. Surgical intervention is reserved for failure of medical therapy.

14. A. Pulmonary arterial hypertension. Pulmonary arterial hypertension is defined hemodynamically by a mean pulmonary artery pressure above 20 mmHg with a pulmonary artery wedge pressure of 15 mmHg or less (precapillary) on right heart catheterization. Exertional dyspnea is the most common presenting symptom, while exertional syncope reflects inability to increase cardiac output with exercise. The absence of left-sided heart disease, chronic lung disease, or thromboembolic disease in a young woman suggests WHO Group 1 PAH (idiopathic or associated with connective tissue disease). Treatment includes pulmonary vasodilators including endothelin receptor antagonists, PDE5 inhibitors, and prostacyclin analogs.

15. B. Short-acting bronchodilators, systemic corticosteroids, and an oral antibiotic. An acute COPD exacerbation presenting with increased dyspnea, increased sputum volume, and purulent sputum change (Anthonisen criteria type I — all three cardinal symptoms) warrants a combination of short-acting bronchodilators (albuterol and ipratropium), systemic corticosteroids (oral prednisone 40 mg for 5 days), and antibiotics (azithromycin, doxycycline, or amoxicillin-clavulanate). Antibiotics are indicated when at least two of three cardinal symptoms are present, particularly with increased sputum purulence. This patient's stable hemodynamics and adequate oxygenation do not warrant intubation.

16. A. Kartagener syndrome (primary ciliary dyskinesia). Kartagener syndrome is the classic triad of situs inversus, chronic sinusitis, and bronchiectasis resulting from primary ciliary dyskinesia — an

autosomal recessive disorder causing dysmotile cilia. Defective ciliary function impairs mucociliary clearance in the respiratory tract (leading to chronic sinusitis and bronchiectasis), causes random organ lateralization during embryogenesis (producing situs inversus in approximately 50% of PCD patients), and affects sperm motility (causing male infertility). Diagnosis is confirmed by electron microscopy of cilia showing absent or defective dynein arms.

17. D. Pneumocystis jirovecii. Pneumocystis jirovecii pneumonia (PJP) is the most common opportunistic infection in HIV/AIDS patients with CD4 counts below 200 cells/μL. The classic presentation includes subacute onset of progressive dyspnea, dry cough, and fever with bilateral diffuse interstitial infiltrates on chest X-ray and elevated LDH. Diagnosis is confirmed by identifying organisms on Gomori methenamine silver (GMS) or direct fluorescent antibody staining of induced sputum or bronchoalveolar lavage. First-line treatment is trimethoprim-sulfamethoxazole with adjunctive corticosteroids when PaO2 is below 70 mmHg.

18. B. Exudative effusion. Light's criteria classify a pleural effusion as exudative if any one of three criteria is met — pleural fluid protein/serum protein ratio greater than 0.5, pleural fluid LDH/serum LDH ratio greater than 0.6, or pleural fluid LDH greater than two-thirds the upper limit of normal for serum LDH. This patient meets all three criteria, confirming an exudative effusion. Exudative effusions indicate local disease processes (infection, malignancy, inflammation, pulmonary embolism) with increased capillary permeability or lymphatic obstruction. Transudative effusions result from systemic conditions (heart failure, cirrhosis, nephrotic syndrome) with altered hydrostatic or oncotic pressures.

19. C. Superior vena cava syndrome. SVC syndrome results from obstruction of the superior vena cava, most commonly from extrinsic compression by malignancy (lung cancer, particularly small cell, and lymphoma account for the majority of cases). Classic findings include facial and upper extremity edema (worse in the morning and when supine), distension of neck and chest wall collateral veins, headache, and dizziness exacerbated by bending forward (increased venous pressure). CT with contrast confirms the diagnosis and identifies the level and cause of obstruction. Treatment addresses the underlying malignancy with radiation, chemotherapy, or SVC stenting.

20. A. CT pulmonary angiography with abdominal shielding. CTPA is the recommended first-line imaging study for suspected PE in pregnancy when clinical suspicion is high and lower extremity ultrasound is either negative or unavailable. While radiation exposure is a concern, CTPA delivers a relatively low fetal dose (especially with abdominal shielding) and is the most accurate diagnostic study. If lower extremity DVT is confirmed on compression ultrasonography, anticoagulation can be initiated without further imaging, but a negative ultrasound does not exclude PE. V/Q scan is an alternative when CTPA is contraindicated.

21. D. PET scan or tissue biopsy for further evaluation. A new solitary pulmonary nodule with spiculated (irregular) margins in a heavy smoker has a very high probability of malignancy. Spiculated margins, growth over time (new compared to prior imaging), upper lobe location, and significant smoking history are all independent risk factors for malignancy. PET-CT is useful for further characterization — metabolic activity (SUV greater than 2.5) suggests malignancy. Tissue diagnosis through CT-guided

biopsy, bronchoscopy, or surgical excision is ultimately required. Watchful waiting is inappropriate for high-probability lesions.

22. B. Bronchiectasis. Bronchiectasis is irreversible dilation and destruction of the bronchial walls from chronic infection and inflammation, producing chronic productive cough with copious purulent sputum and recurrent respiratory infections. The "signet ring sign" on CT (dilated bronchus larger than its accompanying pulmonary artery in cross-section) and "tram-track" opacities (thickened, dilated airways seen longitudinally) are pathognomonic HRCT findings. Common causes include cystic fibrosis, primary ciliary dyskinesia, prior severe infections, immunodeficiency, and allergic bronchopulmonary aspergillosis. Treatment focuses on airway clearance, treatment of infections, and management of the underlying cause.

23. C. Malignant pleural effusion. A bloody (hemorrhagic) pleural effusion with positive cytology for malignant cells in a patient with a history of breast cancer confirms a malignant pleural effusion from metastatic disease. Breast cancer and lung cancer are the two most common causes of malignant pleural effusion. Malignant effusions are exudative and often hemorrhagic due to tumor invasion of pleural vessels. Cytologic examination of pleural fluid has a sensitivity of approximately 60% for detecting malignancy. Management includes therapeutic thoracentesis for symptom relief and pleurodesis or indwelling pleural catheter for recurrent effusions.

24. A. Hypersensitivity pneumonitis (farmer's lung). Hypersensitivity pneumonitis is an immune-mediated inflammatory lung disease caused by inhalation of organic antigens. Farmer's lung results from exposure to thermophilic actinomycetes in moldy hay. The acute form presents with fever, chills, cough, and dyspnea occurring 4 to 8 hours after antigen exposure (type III and IV hypersensitivity reactions). Symptom resolution with antigen avoidance is characteristic. Upper lobe predominance on imaging distinguishes HP from many other interstitial lung diseases. Chronic HP can progress to irreversible fibrosis if exposure continues.

25. D. Congestive heart failure (transudative effusion). This pleural fluid analysis meets none of Light's criteria for an exudative effusion — protein ratio 0.2 (less than 0.5), LDH ratio 0.3 (less than 0.6), and LDH well below two-thirds the upper limit of normal — confirming a transudative effusion. CHF is the most common cause of transudative pleural effusions, resulting from elevated hydrostatic pressure in the pulmonary capillaries. Transudative effusions require treatment of the underlying systemic condition (diuresis for CHF) rather than pleural procedures. Other causes include cirrhosis, nephrotic syndrome, and hypoalbuminemia.

26. B. Combination antipseudomonal therapy with an IV beta-lactam plus an aminoglycoside or inhaled tobramycin. Pseudomonas aeruginosa is the most important chronic respiratory pathogen in cystic fibrosis, and mucoid phenotype development indicates chronic colonization with biofilm formation. Acute pulmonary exacerbations with Pseudomonas require aggressive combination antipseudomonal therapy to achieve adequate drug levels and prevent resistance emergence. Typical regimens include an IV antipseudomonal beta-lactam (piperacillin-tazobactam, ceftazidime, meropenem) plus an

aminoglycoside or a fluoroquinolone. Chronic suppressive therapy with inhaled tobramycin or aztreonam helps reduce exacerbation frequency.

27. A. ACE inhibitor-induced cough. ACE inhibitors cause a chronic dry cough in approximately 5 to 20 percent of patients due to accumulation of bradykinin and substance P in the lungs (normally degraded by ACE). The cough is characteristically dry, nonproductive, and tickling in quality. It can develop within days to months of starting the medication and resolves within 1 to 4 weeks of discontinuation. Switching to an angiotensin receptor blocker (ARB), which does not affect bradykinin metabolism, typically resolves the cough while maintaining antihypertensive benefit. The three most common causes of chronic cough with a normal chest X-ray are upper airway cough syndrome (post-nasal drip), asthma, and GERD.

28. C. Asbestosis. Asbestosis is pulmonary fibrosis caused by chronic inhalation of asbestos fibers, developing after a latency period of 15 to 20 years. Bilateral pleural plaques (calcified or uncalcified) on chest X-ray are the most common manifestation of prior asbestos exposure and are essentially pathognomonic. Lower lobe predominant interstitial fibrosis, restrictive PFTs, and reduced DLCO are characteristic. Asbestosis significantly increases the risk of malignant mesothelioma and lung cancer (synergistic with smoking for lung cancer risk). Silicosis produces upper lobe nodular disease, and coal workers' pneumoconiosis also predominantly affects the upper lobes.

29. D. Sputum acid-fast bacilli smear and culture. The combination of chronic cough with hemoptysis, night sweats, fever, weight loss, and an upper lobe cavitary lesion in a patient from a tuberculosis-endemic area is highly suspicious for pulmonary tuberculosis. Sputum AFB smear and culture (three consecutive morning specimens) is the initial diagnostic test. Mycobacterial culture on Löwenstein-Jensen or liquid media remains the gold standard for definitive diagnosis and drug susceptibility testing, though results may take 2 to 8 weeks. Nucleic acid amplification tests (GeneXpert MTB/RIF) provide rapid results and detect rifampin resistance simultaneously.

30. B. Oral amoxicillin or doxycycline. For outpatient treatment of community-acquired pneumonia in previously healthy patients without comorbidities or recent antibiotic exposure, current ATS/IDSA guidelines recommend either amoxicillin or doxycycline as first-line monotherapy. If comorbidities are present (chronic heart, lung, liver, or renal disease, diabetes, alcoholism, malignancy, or immunosuppression), combination therapy with a beta-lactam plus a macrolide or a respiratory fluoroquinolone monotherapy is recommended. IV antibiotics are reserved for hospitalized patients. The choice between outpatient and inpatient management is guided by severity scoring tools such as the CURB-65 or Pneumonia Severity Index.

31. B. Restrictive pattern with impaired gas exchange. A restrictive pattern on PFTs is defined by reduced FVC (below 80% predicted) with a preserved or elevated FEV1/FVC ratio (above 0.70). This patient's FVC of 62% with an FEV1/FVC of 0.85 confirms restriction. The significantly reduced DLCO (45% predicted) indicates impaired gas exchange from thickening of the alveolar-capillary membrane by fibrosis. Interstitial lung disease associated with connective tissue diseases (scleroderma, rheumatoid arthritis, polymyositis) characteristically produces this pattern. Serial FVC and DLCO measurements are used to monitor disease progression and treatment response.

32. C. Chronic respiratory acidosis with metabolic compensation. The elevated PaCO2 (58 mmHg) indicates respiratory acidosis (CO2 retention), and the elevated bicarbonate (34 mEq/L) indicates chronic metabolic compensation by the kidneys retaining bicarbonate to buffer the acidosis. In acute respiratory acidosis, bicarbonate rises approximately 1 mEq/L for every 10 mmHg increase in PaCO2, while chronic compensation produces a rise of approximately 3.5 mEq/L per 10 mmHg. The near-normal pH (7.32) despite significant CO2 elevation confirms chronic compensation. This pattern is typical of advanced COPD with chronic hypercapnic respiratory failure.

33. A. Oral corticosteroids. Allergic bronchopulmonary aspergillosis is an immunologic reaction to Aspergillus fumigatus colonization of the airways, occurring primarily in patients with asthma or cystic fibrosis. Diagnostic criteria include asthma, central bronchiectasis with mucoid impaction, elevated total IgE (typically above 1000 IU/mL), positive Aspergillus-specific IgE and IgG, and peripheral eosinophilia. Oral corticosteroids are first-line treatment to suppress the immune response and prevent progressive lung damage. Itraconazole is added as adjunctive antifungal therapy to reduce fungal burden and allow corticosteroid dose reduction.

34. D. Continuous positive airway pressure (CPAP). CPAP is the gold standard first-line treatment for moderate to severe obstructive sleep apnea (AHI greater than 15 events/hour or AHI 5-15 with symptoms). CPAP acts as a pneumatic splint to maintain upper airway patency during sleep, preventing airway collapse, apneas, and hypopneas. An AHI of 35 with desaturation to 78% indicates severe OSA. Weight loss is recommended as an adjunctive measure but is insufficient as sole therapy for severe disease. Oral appliances are an alternative for mild to moderate OSA or patients intolerant of CPAP. Surgical options are reserved for CPAP-refractory cases.

35. C. Low tidal volume ventilation at 6 mL/kg ideal body weight with plateau pressure below 30 cmH2O. The ARDSNet lung-protective ventilation strategy has been proven to reduce mortality in ARDS by minimizing ventilator-induced lung injury (volutrauma and barotrauma). The protocol uses low tidal volumes (6 mL/kg ideal body weight, not actual weight), plateau pressures maintained below 30 cmH2O, adequate PEEP to maintain alveolar recruitment, and permissive hypercapnia as needed. A PaO2/FiO2 ratio of 85 classifies this as severe ARDS (below 100). Prone positioning for more than 12 hours daily has also been shown to improve survival in severe ARDS.

36. B. Sarcoidosis. The combination of bilateral hilar lymphadenopathy, diffuse reticulonodular infiltrates, elevated BAL CD4/CD8 ratio (greater than 3.5:1 is highly suggestive), and non-caseating granulomas on transbronchial biopsy is diagnostic of sarcoidosis. The elevated CD4/CD8 ratio reflects the T-helper lymphocyte predominant alveolitis characteristic of sarcoidosis. This distinguishes it from hypersensitivity pneumonitis (which has a low CD4/CD8 ratio with CD8 predominance) and tuberculosis (which produces caseating granulomas). Most sarcoidosis patients have spontaneous remission; corticosteroids are indicated for symptomatic or progressive disease.

37. A. Tumor secretion of parathyroid hormone-related peptide (PTHrP). Squamous cell carcinoma of the lung is the most common malignancy associated with humoral hypercalcemia of malignancy through secretion of PTHrP, which mimics the calcium-elevating effects of parathyroid hormone. PTHrP

increases osteoclastic bone resorption and renal calcium reabsorption while promoting phosphate excretion. The appropriately suppressed PTH level distinguishes this from primary hyperparathyroidism. Treatment includes aggressive IV hydration, calcitonin for rapid effect, bisphosphonates (zoledronic acid) for sustained calcium lowering, and definitive treatment of the underlying malignancy.

38. D. Lupus pleuritis (serositis). Pleuritis (serositis) is one of the most common pulmonary manifestations of systemic lupus erythematosus, occurring in approximately 40 to 60 percent of patients during the disease course. Pleural effusions are typically bilateral, exudative, and may contain elevated ANA titers and anti-dsDNA antibodies in the pleural fluid. Pleuritic chest pain is common. Lupus serositis is included in the SLICC classification criteria for SLE. Treatment includes NSAIDs for mild disease and systemic corticosteroids for moderate to severe pleuritis. The acute onset with pleuritic pain, fever, and exudative effusion distinguishes it from transudative effusions of heart failure.

39. B. A normal PaCO2 in the setting of severe asthma exacerbation indicates impending respiratory failure. During a severe asthma exacerbation, patients hyperventilate due to hypoxemia and increased respiratory drive, producing respiratory alkalosis with a low PaCO2 as a compensatory response. A PaCO2 that normalizes (40 mmHg) in a patient who is tachypneic, fatigued, and in respiratory distress is an ominous sign indicating respiratory muscle fatigue and inability to maintain the compensatory hyperventilation. Rising PaCO2 indicates impending respiratory failure requiring preparation for intubation and mechanical ventilation. This is a critical "red flag" that must not be misinterpreted as reassuring.

40. C. Septic pulmonary emboli from right-sided endocarditis. Multiple bilateral round pulmonary infiltrates that cavitate in an IV drug user with Staphylococcus aureus bacteremia and tricuspid valve vegetation is the classic presentation of septic pulmonary emboli from right-sided (tricuspid valve) infective endocarditis. S. aureus is the most common causative organism in IV drug use-associated endocarditis. Infected thrombi from the tricuspid valve embolize to the pulmonary vasculature, producing multiple peripheral nodular infiltrates that frequently cavitate. Treatment requires prolonged IV antistaphylococcal antibiotics (nafcillin or vancomycin for MRSA) for at least 6 weeks.

41. D. Chest tube drainage (tube thoracostomy) with intravenous antibiotics. This presentation describes a complicated parapneumonic effusion/empyema — a loculated pleural effusion with characteristics indicating frank infection (pH below 7.2, glucose below 40 mg/dL, LDH greater than 1000 IU/L, positive Gram stain, and an air-fluid level suggesting possible bronchopleural communication). Complicated parapneumonic effusions and empyemas require tube thoracostomy for drainage in addition to IV antibiotics. Intrapleural fibrinolytics (tPA with DNase) may be added for loculated collections. Surgical intervention (video-assisted thoracoscopic surgery or decortication) is necessary for inadequate drainage.

42. A. Referral for lung transplant evaluation. An FEV1 below 30% predicted with frequent hospitalizations and progressive decline despite optimal medical therapy indicates advanced cystic fibrosis lung disease requiring evaluation for lung transplantation. Current referral criteria include FEV1 below 30% predicted or rapid decline in FEV1, increasing frequency and severity of exacerbations requiring IV

antibiotics, recurrent or refractory pneumothorax, recurrent or massive hemoptysis, and increasing oxygen dependence. Bilateral sequential lung transplantation is the standard procedure, with a median survival of approximately 8 to 9 years post-transplant.

43. C. Methotrexate-induced pneumonitis. Methotrexate pneumonitis is a hypersensitivity-type drug reaction that can occur at any time during therapy, though it most commonly develops within the first year. Clinical features include subacute onset of dyspnea, nonproductive cough, fever, and bilateral interstitial or ground-glass infiltrates on imaging. The temporal relationship between methotrexate initiation and symptom onset is the key diagnostic clue. Treatment requires immediate discontinuation of methotrexate and systemic corticosteroids for moderate to severe cases. Other drugs associated with pulmonary toxicity include amiodarone, bleomycin, nitrofurantoin, and busulfan.

44. B. Doxycycline or a respiratory fluoroquinolone. For a patient with true penicillin allergy (anaphylaxis), beta-lactam antibiotics including amoxicillin and ceftriaxone should be avoided due to potential cross-reactivity (although the cross-reactivity between penicillins and third-generation cephalosporins is low at approximately 1-2%). Doxycycline is an appropriate first-line alternative for outpatient CAP in healthy patients without comorbidities. A respiratory fluoroquinolone (moxifloxacin or levofloxacin) is another option, typically reserved for patients with comorbidities or recent antibiotic use to preserve fluoroquinolone stewardship.

45. A. Basilar predominance with panacinar pattern, compared to upper lobe centrilobular pattern in smoking-related emphysema. Alpha-1 antitrypsin deficiency-related emphysema characteristically demonstrates basilar predominant panacinar emphysema, in contrast to smoking-related emphysema which produces upper lobe predominant centrilobular emphysema. AAT deficiency results in unchecked neutrophil elastase activity that destroys the entire acinus uniformly (panacinar pattern). Onset is typically earlier (age 30 to 50) and may occur in nonsmokers. Smoking dramatically accelerates disease progression. Treatment includes IV augmentation therapy with pooled human alpha-1 antitrypsin in addition to standard COPD therapy.

46. D. Bilevel positive airway pressure (BiPAP) non-invasive ventilation. The ABG reveals acute respiratory acidosis (pH 7.28, $PaCO_2$ 68) with hypoxemia, indicating acute-on-chronic hypercapnic respiratory failure in COPD. Non-invasive positive pressure ventilation (BiPAP) is the first-line ventilatory support for COPD exacerbations with respiratory acidosis (pH below 7.35), reducing the work of breathing, improving gas exchange, and decreasing the need for intubation and mortality. The patient is alert and cooperative, making NIV appropriate. Intubation is reserved for patients who fail NIV or who have contraindications (altered consciousness, inability to protect airway, hemodynamic instability).

47. A. Gastroesophageal reflux disease. GERD is one of the three most common causes of chronic cough (along with upper airway cough syndrome and asthma) in patients with a normal chest X-ray and spirometry. The mechanism involves vagally mediated cough reflex from acid irritation of the distal esophageal mucosa and/or microaspiration of gastric contents into the airways. The presence of heartburn and nocturnal sour taste supports the diagnosis, though GERD-related cough can occur without typical

reflux symptoms. An empiric trial of proton pump inhibitor therapy for 8 to 12 weeks is both diagnostic and therapeutic.

48. C. Persistent air leak (bronchopleural fistula). Continuous bubbling in the water seal chamber during both inspiration and expiration indicates an ongoing air leak, most likely a bronchopleural fistula — an abnormal communication between the bronchial tree and the pleural space. In a postoperative setting following lung resection, this represents a complication at the bronchial stump or from a parenchymal air leak. Small air leaks may resolve spontaneously with continued chest tube drainage, while large or persistent leaks may require bronchoscopic intervention or surgical repair. Bubbling only during expiration or coughing may represent a smaller air leak.

49. B. Decline in forced vital capacity and DLCO over time. In interstitial lung disease and pulmonary fibrosis, serial decline in FVC and DLCO is the most reliable predictor of disease progression and mortality. A decline in FVC of 10% or more or DLCO of 15% or more over 6 to 12 months is associated with significantly increased mortality. These functional measurements are used to guide treatment decisions including initiation of antifibrotic therapy (pirfenidone or nintedanib), lung transplant referral, and prognostic counseling. While honeycombing indicates established fibrosis, functional decline is a more dynamic and clinically actionable prognostic marker.

50. D. Hemopneumothorax. A penetrating chest injury producing absent breath sounds with both dullness to percussion at the base (blood collecting dependently) and hyperresonance at the apex (air rising superiorly) indicates hemopneumothorax — the simultaneous presence of blood and air in the pleural space. Hypotension may result from hemorrhagic shock, tension physiology, or both. Management requires a large-bore chest tube (typically 36 French) to evacuate both blood and air, with monitoring of chest tube output. Emergent thoracotomy is indicated if initial drainage exceeds 1500 mL or ongoing output exceeds 200 mL/hour for 2 to 4 hours.

51. A. Speech-language pathology evaluation and swallowing rehabilitation. Prevention of aspiration pneumonia in patients with dysphagia centers on identifying the specific swallowing dysfunction and implementing targeted interventions. Speech-language pathology evaluation including a formal swallowing assessment (modified barium swallow or fiberoptic endoscopic evaluation) is the most important preventive measure, providing specific recommendations for safe swallowing strategies, dietary modifications (thickened liquids, altered food consistency), and positioning techniques. Prophylactic antibiotics are not recommended as they promote resistant organisms. Nasogastric tubes do not prevent aspiration and may increase risk.

52. C. Airway protection with endotracheal intubation, position patient with bleeding side down. Massive hemoptysis (more than 300-600 mL in 24 hours) is a life-threatening emergency where asphyxiation from airway flooding, not exsanguination, is the primary cause of death. The immediate priority is airway protection through endotracheal intubation (preferably with a large-bore single-lumen tube for suctioning). Positioning the patient with the bleeding lung dependent (bleeding side down) prevents blood from flooding the contralateral lung. Once stabilized, bronchoscopy, CT angiography, and bronchial artery embolization are used for diagnosis and definitive hemorrhage control.

53. B. Well-controlled asthma. Asthma control is assessed by daytime symptoms (twice weekly or less), rescue inhaler use (twice weekly or less), nighttime symptoms (none), and activity limitation (none). This patient meets all criteria for well-controlled asthma — rescue inhaler use once weekly, no nocturnal symptoms, no exacerbations, and normal PFTs. At this level of control, the current therapy should be maintained for at least 3 months before considering step-down. If control is maintained for 3 or more months, gradual step-down of controller therapy may be considered to find the minimum effective dose.

54. D. IV diuretic therapy (furosemide). Bilateral pleural effusions with pulmonary vascular congestion and Kerley B lines (thickened interlobular septa from pulmonary edema) in a patient with CHF represent transudative effusions from elevated hydrostatic pressure. The appropriate initial treatment is IV loop diuretic therapy (furosemide) to reduce intravascular volume and preload, which will improve both pulmonary edema and pleural effusions. Thoracentesis is not first-line for bilateral transudative effusions because diuresis typically resolves them. Thoracentesis may be considered if effusions persist despite optimal diuretic therapy or if there is concern for an alternative etiology.

55. A. Squamous cell carcinoma. Keratin pearls and intercellular bridges (desmosomes) are the pathognomonic histologic features of squamous cell carcinoma. SCC is the most common centrally located non-small cell lung cancer, often presenting as an endobronchial lesion causing cough, hemoptysis, and obstructive pneumonia. It is strongly associated with smoking and arises from squamous metaplasia of bronchial epithelium. SCC may produce PTHrP causing hypercalcemia. Small cell carcinoma shows small round blue cells with scant cytoplasm. Adenocarcinoma is peripherally located and demonstrates glandular differentiation with mucin production.

56. C. Positive result — 12 mm is negative for a person with no risk factors (threshold ≥15 mm), requiring no treatment. PPD interpretation depends on risk stratification — 5 mm or greater is positive for HIV patients, immunocompromised individuals, and close contacts of active TB; 10 mm or greater is positive for healthcare workers, immigrants from high-prevalence areas, and those with medical risk factors; 15 mm or greater is positive for persons with no known risk factors. As a hospital employee, this individual should be interpreted using the 10 mm threshold for healthcare workers, making 12 mm a positive result requiring chest X-ray (normal in this case) and treatment for latent TB infection with isoniazid for 9 months or rifampin for 4 months.

57. B. Re-expansion pulmonary edema. Re-expansion pulmonary edema is a potentially life-threatening complication that occurs after rapid removal of large volumes of pleural fluid or air, typically developing within hours of thoracentesis. The mechanism involves sudden re-expansion of chronically collapsed lung tissue with increased capillary permeability, reperfusion injury, and surfactant dysfunction. To minimize risk, no more than 1000 to 1500 mL should be removed in a single procedure, and the procedure should be stopped if the patient develops chest tightness, cough, or discomfort. Treatment is supportive with supplemental oxygen and positive pressure ventilation if needed.

58. D. Tuberous sclerosis complex. Tuberous sclerosis complex (TSC) is an autosomal dominant neurocutaneous disorder caused by mutations in TSC1 (hamartin) or TSC2 (tuberin) genes. Lymphangioleiomyomatosis (LAM) — a progressive cystic lung disease caused by proliferation of

abnormal smooth muscle-like cells — occurs almost exclusively in women and is strongly associated with TSC. Other features of TSC include seizures, intellectual disability, facial angiofibromas, cortical tubers, subependymal giant cell astrocytomas, cardiac rhabdomyomas, and renal angiomyolipomas. Sirolimus (mTOR inhibitor) is the targeted treatment for both LAM and renal angiomyolipomas in TSC.

59. A. Idiopathic pulmonary fibrosis. IPF is a chronic, progressive fibrotic interstitial lung disease of unknown cause occurring primarily in older adults (typically over age 60). The HRCT pattern of usual interstitial pneumonia (UIP) — characterized by bilateral, predominantly basilar, subpleural honeycombing with traction bronchiectasis and minimal ground-glass opacity — is highly specific for IPF when clinical criteria are met and other causes are excluded. IPF has a poor prognosis with median survival of 3 to 5 years from diagnosis. Antifibrotic therapies (pirfenidone and nintedanib) slow disease progression but do not reverse fibrosis. Lung transplantation is the only intervention that improves survival.

60. C. Syndrome of inappropriate antidiuretic hormone secretion (SIADH). SIADH is the most common paraneoplastic endocrine syndrome associated with small cell lung cancer, caused by ectopic ADH (vasopressin) production by tumor cells. SIADH produces euvolemic hyponatremia with inappropriately concentrated urine (urine osmolality above 100 mOsm/kg), decreased serum osmolality, and elevated urine sodium (above 40 mEq/L). The euvolemic status distinguishes SIADH from other causes of hyponatremia. Treatment includes fluid restriction for mild cases, hypertonic saline for severe symptomatic hyponatremia, and vasopressin receptor antagonists (tolvaptan). Definitive treatment addresses the underlying malignancy.