ONLINE COMPANION

Comprehensive Textbook of Pulmonology

Question Bank: 300 board-style questions with answers and explanations

Chapter 1. Structure and Function of the Respiratory System

1. A man aspirates a peanut while upright. Which airway is the fragment most likely to enter?

- **A** Left upper lobe bronchus
- **B** Left main bronchus
- **C** Right upper lobe apical segment
- **D** Right main bronchus
- **E** Lingular bronchus

2. Which change most directly explains why alveolar ventilation falls when a patient breathes rapidly and shallowly at the same minute ventilation?

- **A** A larger fraction of each breath ventilates dead space
- **B** Airway resistance falls at high flow
- **C** Lung compliance rises at small tidal volumes, so less gas reaches the alveoli
- **D** Carbon dioxide production falls
- **E** The respiratory quotient rises

3. In the upright lung at rest, which region has the highest ventilation-perfusion ratio?

- **A** The middle lobe
- **B** The apex
- **C** The posterior basal segments
- **D** The base
- **E** The hilum

4. Which structure produces most of the work of quiet inspiration in a healthy adult?

- **A** The external intercostal muscles
- **B** The abdominal wall muscles
- **C** The diaphragm
- **D** The scalene muscles
- **E** The sternocleidomastoid muscles

5. A rightward shift of the oxyhemoglobin dissociation curve is produced by which change?

- **A** Fetal hemoglobin
- **B** Carbon monoxide binding
- **C** A fall in 2,3-bisphosphoglycerate
- **D** Alkalosis
- **E** A rise in temperature

6. Surfactant deficiency causes which change in lung mechanics?

- **A** Increased compliance with air trapping and a raised residual volume
- **B** Reduced airway resistance
- **C** Increased diffusing capacity from a thinner alveolar lining layer
- **D** Increased residual volume from emphysema
- **E** Reduced compliance with a tendency of small alveoli to collapse

7. Which statement about the bronchial circulation is correct?

- **A** It is the source of most pulmonary embolism
- **B** It arises from the systemic circulation and supplies the airway walls
- **C** It carries deoxygenated blood to the alveoli for gas exchange
- **D** It drains entirely into the systemic veins and never reaches the left atrium
- **E** It is a low-pressure circuit like the pulmonary arteries

8. Peripheral chemoreceptors in the carotid bodies respond chiefly to which stimulus?

- **A** A rise in hemoglobin concentration
- **B** A fall in arterial oxygen tension
- **C** A fall in cerebrospinal fluid pH alone
- **D** Lung stretch
- **E** A fall in oxygen content from anemia

9. Which test change best distinguishes diffusion limitation from ventilation-perfusion mismatch as a cause of hypoxemia?

- **A** A raised PaCO2
- **B** Complete correction of hypoxemia with supplemental oxygen at rest and on exercise
- **C** A normal alveolar-arterial gradient
- **D** Hypoxemia only at altitude
- **E** Desaturation that worsens with exercise and a low diffusing capacity

10. Which lung volume cannot be measured by spirometry alone?

- **A** Inspiratory reserve volume
- **B** Tidal volume
- **C** Expiratory reserve volume
- **D** Residual volume
- **E** Vital capacity

Chapter 2. Approach to the Patient with Respiratory Symptoms

11. A 58-year-old smoker has had cough for 10 weeks with a normal chest radiograph and no red flags. He takes lisinopril. What is the most appropriate first step?

- **A** Stop the ACE inhibitor and reassess
- **B** Start a long course of oral corticosteroids
- **C** Start empiric antituberculous therapy
- **D** Prescribe a codeine cough suppressant indefinitely
- **E** Order bronchoscopy

12. Which feature most strongly suggests that hemoptysis is massive and life-threatening?

- **A** Blood-streaked sputum on most mornings for the past 3 days
- **B** Gas exchange compromise or airway obstruction from blood
- **C** Bleeding that stops spontaneously within an hour of arrival
- **D** Hemoptysis in a nonsmoker
- **E** A history of bronchitis

13. A patient reports breathlessness lying flat that improves on sitting up. Which condition is least likely to explain this?

- **A** Large ascites
- **B** Left ventricular failure with raised left atrial pressure
- **C** Pulmonary arterial hypertension with a normal left heart
- **D** Bilateral diaphragm paralysis
- **E** Severe obesity

14. Which examination finding best indicates a pleural effusion rather than lobar consolidation?

- **A** Expiratory wheeze
- **B** Stony dullness with reduced breath sounds and reduced vocal resonance
- **C** Coarse crackles with egophony
- **D** Bronchial breathing with increased vocal resonance and whispering pectoriloquy
- **E** Hyperresonance with absent breath sounds

15. Which sign on examination of a breathless patient with COPD suggests marked hyperinflation?

- **A** Unilateral tracheal deviation
- **B** Pulsus alternans
- **C** Clubbing of the fingers with loss of the nail fold angle
- **D** Bronchial breathing at one base with increased vocal resonance over the same area
- **E** Reduced cricosternal distance with paradoxical inward movement of the lower ribs

16. A 65-year-old with new finger clubbing and weight loss is seen. Which cause should be excluded first?

- **A** Uncomplicated COPD
- **B** Obstructive sleep apnea
- **C** Lung cancer
- **D** Asthma
- **E** Sarcoidosis without fibrosis

17. Which test best identifies the system that limits exercise in a breathless patient whose resting tests are normal?

- **A** A resting echocardiogram alone
- **B** Serum D-dimer
- **C** Repeat spirometry with bronchodilator testing on a separate day
- **D** A resting echocardiogram with estimation of pulmonary artery pressure alone
- **E** Cardiopulmonary exercise testing to define the limiting system

18. Platypnea with orthodeoxia, breathlessness and desaturation on sitting up that improve lying flat, suggests which mechanism?

- **A** Anemia
- **B** Bilateral diaphragm paralysis with paradoxical abdominal movement when upright
- **C** Left ventricular failure
- **D** An intrapulmonary or intracardiac shunt that increases when upright
- **E** Airflow obstruction

Chapter 3. Pulmonary Function, Blood Gases and Exercise Testing

19. Spirometry shows FEV1/FVC 0.62, below the lower limit of normal, FVC 92% predicted and FEV1 58% predicted. How is this pattern described?

- **A** Restriction
- **B** Normal
- **C** Mixed obstruction and restriction
- **D** Nonspecific pattern
- **E** Obstruction

20. Which finding confirms a restrictive ventilatory defect?

- **A** A reduced FVC with a normal FEV1/FVC ratio on spirometry alone
- **B** A low diffusing capacity
- **C** A reduced peak flow
- **D** Total lung capacity below the lower limit of normal
- **E** A high residual volume

21. An arterial blood gas shows pH 7.30, PaCO2 60 mm Hg and bicarbonate 29 mmol/L. What is the most likely disturbance?

- **A** Pure acute respiratory acidosis
- **B** Chronic fully compensated respiratory acidosis
- **C** Metabolic acidosis with respiratory compensation
- **D** Acute on chronic respiratory acidosis
- **E** Metabolic alkalosis

22. Which condition typically raises the diffusing capacity for carbon monoxide?

- **A** Emphysema
- **B** Anemia
- **C** Alveolar hemorrhage
- **D** Pulmonary vascular disease
- **E** Pulmonary fibrosis

23. During cardiopulmonary exercise testing a patient stops with a peak oxygen uptake of 60% predicted, a heart rate reserve of 40 beats/min and minute ventilation reaching maximal voluntary ventilation. What limits exercise?

- **A** Ventilatory limitation
- **B** Peripheral muscle disease
- **C** Poor effort
- **D** Cardiac limitation
- **E** Deconditioning

24. A large inspiratory and expiratory plateau on the flow-volume loop, unchanged by phase of breathing, indicates which lesion?

- **A** Small airway disease
- **B** Fixed upper airway obstruction
- **C** Variable intrathoracic obstruction
- **D** Neuromuscular weakness
- **E** Variable extrathoracic obstruction

25. Which pulse oximetry problem leads to falsely reassuring readings in a patient with smoke inhalation?

- **A** Carboxyhemoglobin read as oxyhemoglobin
- **B** Poor peripheral perfusion
- **C** Methemoglobin reading 85% regardless of true saturation
- **D** Motion artifact
- **E** Nail polish

26. The bronchodilator response is now judged against which threshold under the current interpretive standard?

- **A** A fall in residual volume of 100 mL
- **B** An increase of 12% and 200 mL from the baseline FEV1 or FVC, as the sole criterion
- **C** Any increase in peak flow
- **D** A change greater than 10% of the predicted value in FEV1 or FVC
- **E** A rise of 5% in FEV1/FVC

Chapter 4. Thoracic Imaging, Bronchoscopy and Tissue Diagnosis

27. On a posteroanterior chest radiograph, loss of the right heart border with preserved right hemidiaphragm suggests disease in which lobe?

- **A** Right lower lobe
- **B** Lingula
- **C** Right upper lobe apex
- **D** Right middle lobe
- **E** Left lower lobe

28. A patient with suspected interstitial lung disease needs imaging. Which CT protocol is most appropriate?

- **A** Contrast-enhanced CT pulmonary angiography with thin reconstructions acquired in the pulmonary arterial phase
- **B** Low-dose screening CT performed once a year with standard soft-tissue reconstruction
- **C** Thin-section noncontrast CT with inspiratory and expiratory images, with prone images when needed
- **D** PET-CT
- **E** Abdominal CT including the lung bases

29. Which procedure is preferred to stage the mediastinum in suspected non-small cell lung cancer with enlarged nodes on CT?

- **A** Sputum cytology
- **B** Endobronchial ultrasound-guided needle aspiration
- **C** Bronchoalveolar lavage
- **D** Transthoracic needle biopsy of the primary only
- **E** Surgical mediastinoscopy as the first step in every case

30. Which complication is most common after CT-guided transthoracic needle biopsy of a lung nodule?

- **A** Pneumothorax
- **B** Tumor seeding of the tract
- **C** Death
- **D** Hemothorax requiring surgery
- **E** Air embolism

31. Lung ultrasound in a breathless patient shows bilateral diffuse B-lines. What does this pattern indicate?

A Pleural effusion only
B Normal aerated lung
C Consolidation with dynamic air bronchograms in both bases
D Pneumothorax with absent lung sliding on both sides
E Interstitial syndrome such as pulmonary edema

32. Which radiation dose consideration best favors low-dose CT over standard CT for lung cancer screening?

A Better detection of pure ground-glass nodules than a standard-dose scan
B Ability to give intravenous contrast
C Repeated annual examinations in healthy people
D Higher contrast resolution
E Mediastinal staging accuracy

33. When is bronchoalveolar lavage most useful in diffuse lung disease?

A To diagnose infection, alveolar hemorrhage or alveolar proteinosis
B To diagnose pulmonary embolism
C To measure lung volumes
D To make a confident diagnosis of idiopathic pulmonary fibrosis without imaging
E To stage lung cancer

34. A positron emission tomography scan shows intense uptake in a 2.5 cm lung mass. Which statement is correct?

A Inflammatory and infectious lesions can also be avid, so tissue confirmation is needed
B Avidity of this degree proves malignancy, so mediastinal sampling and tissue diagnosis can be omitted safely
C Avidity proves malignancy
D Low-grade adenocarcinomas and carcinoids are always intensely avid on PET
E Uptake below the mediastinal blood pool excludes cancer in lesions of every size

Chapter 5. Asthma

35. Which feature best supports a diagnosis of asthma in an adult with episodic wheeze?

A Symptoms at night only
B A normal chest radiograph
C A raised total IgE with sensitization to house dust mite
D Documented variable expiratory airflow limitation
E A family history of eczema

36. For an adult with mild asthma not on treatment, which approach does GINA prefer?

A Oral corticosteroid bursts as needed
B Daily oral montelukast alone
C As-needed low-dose ICS-formoterol
D As-needed short-acting beta agonist alone
E Daily long-acting beta agonist alone

37. Which biomarker pattern predicts response to anti-IL-5 therapy in severe asthma?

- **A** Low FeNO with normal eosinophils
- **B** Positive aspergillus precipitins with a normal eosinophil count
- **C** High total IgE with no eosinophilia
- **D** Neutrophilic sputum
- **E** A raised blood eosinophil count with frequent exacerbations

38. A woman with asthma has nasal polyps and develops bronchospasm 30 minutes after ibuprofen. What is the most likely diagnosis?

- **A** Exercise-induced bronchoconstriction
- **B** Eosinophilic granulomatosis with polyangiitis
- **C** Aspirin-exacerbated respiratory disease
- **D** Allergic bronchopulmonary aspergillosis
- **E** Vocal cord dysfunction

39. During a severe asthma attack, which finding is most concerning for impending respiratory failure?

- **A** Peak flow 60% of best
- **B** Wheeze on auscultation
- **C** Tachycardia of 110 beats/min
- **D** A normal or rising PaCO2
- **E** Respiratory alkalosis

40. Which statement about FeNO is correct?

- **A** It is raised by current smoking
- **B** It is specific for asthma
- **C** It predicts response to anti-IgE therapy only and to no other biologic
- **D** It is a direct measure of airway hyperresponsiveness and rises after inhaled corticosteroids are started
- **E** It reflects type 2 airway inflammation and falls with inhaled corticosteroids

41. A teenager has sudden episodes of throat tightness and inspiratory stridor during sport, with normal spirometry between episodes. What is the most likely diagnosis?

- **A** Inducible laryngeal obstruction
- **B** Tracheomalacia
- **C** Exercise-induced bronchoconstriction
- **D** Foreign body
- **E** Anaphylaxis

42. Which is the main concern with regular use of a short-acting beta agonist without an inhaled corticosteroid?

- **A** Oral candidiasis
- **B** Pneumonia
- **C** Increased risk of severe exacerbations and death
- **D** Tachyphylaxis to oral corticosteroids during later attacks
- **E** Adrenal suppression

43. In pregnancy, what is the general advice for a woman with well-controlled asthma on inhaled budesonide?

A Replace it with a short-acting beta agonist
B Switch to oral montelukast only
C Start oral corticosteroids prophylactically for the whole pregnancy
D Stop all inhaled medicines in the first trimester and restart them only if symptoms return
E Continue her controller, because uncontrolled asthma poses the greater risk

44. Which test is most useful to confirm asthma in a patient with a typical history and normal spirometry?

A Bronchial challenge testing with methacholine
B Chest CT with expiratory images
C Total IgE
D Sputum culture
E Skin prick testing to a panel of common aeroallergens

45. Which clinical feature should prompt testing for allergic bronchopulmonary aspergillosis in a patient with asthma?

A Nocturnal cough alone
B Mild intermittent symptoms controlled with an as-needed reliever
C Poorly controlled asthma with very high total IgE and central bronchiectasis
D Exercise-induced symptoms
E Seasonal rhinitis with sneezing, itchy eyes and mild wheeze each spring during the pollen season

46. Which feature defines severe asthma?

A Asthma in a smoker
B Asthma with a blood eosinophil count above 300 cells/μL on two occasions while taking low-dose inhaled corticosteroid as the only controller
C Any asthma that has required a single hospital admission at any time in the past, whatever the treatment
D Asthma diagnosed after age 50
E Asthma that needs high-dose inhaled corticosteroid plus a second controller to stay controlled, or remains uncontrolled despite it

47. Which adverse effect is most associated with long-term high-dose inhaled corticosteroids?

A Hypothyroidism
B Hepatotoxicity
C Reduced bone density and cataract
D Peripheral neuropathy and paresthesia
E Hyperkalemia

48. A patient with asthma uses a pressurized inhaler with poor coordination. Which change most improves lung deposition?

A Holding the breath for only 1 second
B Adding a valved spacer
C Taking a rapid forceful inhalation from the inhaler
D Switching to a nebulizer for all doses
E Doubling the dose

49. Which intervention reduces hospital admission and relapse in a severe acute asthma attack treated in the emergency department?

- **A** Routine antibiotics for all patients
- **B** Mucolytics
- **C** Chest physiotherapy hourly
- **D** Sedation
- **E** Early systemic corticosteroids

50. Which biologic targets thymic stromal lymphopoietin?

- **A** Dupilumab
- **B** Benralizumab
- **C** Tezepelumab
- **D** Mepolizumab
- **E** Omalizumab

51. Which feature most suggests that a patient's asthma is occupational?

- **A** A seasonal pattern linked to grass pollen each summer, whatever the work schedule
- **B** Onset in childhood
- **C** Response to inhaled corticosteroids
- **D** Symptoms that improve on days away from work and on holiday
- **E** Symptoms triggered by viral infections

52. What is the role of bronchial thermoplasty in current asthma care?

- **A** Treatment of acute severe attacks
- **B** A replacement for inhaled corticosteroids in patients who prefer not to use daily inhalers at all
- **C** Treatment of COPD
- **D** First-line therapy for moderate asthma
- **E** A limited option for selected severe asthma after biologics, in specialized centers

53. Which statement about montelukast is correct?

- **A** It carries a warning for neuropsychiatric adverse effects
- **B** It is more effective than inhaled corticosteroids as a controller
- **C** It is a bronchodilator for acute attacks
- **D** It causes oral candidiasis
- **E** It is contraindicated in aspirin sensitivity

Chapter 6. Chronic Obstructive Pulmonary Disease

54. Which spirometric finding is required to diagnose COPD?

- **A** A reduced diffusing capacity
- **B** Chronic cough for 3 months
- **C** Pre-bronchodilator FEV1 below 80% predicted
- **D** Emphysema on CT
- **E** Post-bronchodilator FEV1/FVC below 0.7

55. Which treatment reduces mortality in COPD with severe resting hypoxemia?

- **A** Mucolytics
- **B** Inhaled corticosteroid monotherapy at high dose
- **C** Theophylline
- **D** Oxygen during exercise only
- **E** Long-term oxygen for at least 15 hours a day

56. A patient with COPD has two moderate exacerbations a year despite LABA plus LAMA and a blood eosinophil count of 350 cells/μL. Which escalation is most appropriate?

- **A** Add an inhaled corticosteroid
- **B** Start long-term oxygen
- **C** Start long-term oral prednisone
- **D** Stop the LAMA
- **E** Add theophylline

57. Which test should be done once in every patient with COPD?

- **A** Alpha-1 antitrypsin level
- **B** Methacholine challenge test
- **C** Sputum cytology
- **D** Bronchoscopy
- **E** Sweat chloride

58. What is the most effective intervention to slow the decline in lung function in a smoker with COPD?

- **A** Pulmonary rehabilitation
- **B** Long-acting bronchodilators
- **C** Stopping smoking
- **D** Annual influenza vaccination
- **E** Inhaled corticosteroids

59. A COPD exacerbation is treated with systemic corticosteroids. What duration is usually adequate?

- **A** 14 days
- **B** 21 days
- **C** Until spirometry normalizes
- **D** 3 months
- **E** 5 days

60. Which patient with COPD is most likely to benefit from lung volume reduction?

- **A** Upper-lobe predominant emphysema with low exercise capacity after rehabilitation
- **B** FEV1 below 20% with a very low diffusing capacity and homogeneous disease
- **C** Active smoker
- **D** Homogeneous emphysema with high exercise capacity after completing pulmonary rehabilitation
- **E** Predominant chronic bronchitis

61. Which statement about pulmonary rehabilitation after a COPD hospitalization is correct?

- **A** It benefits only patients with mild disease who do not need any supplemental oxygen during exercise
- **B** It is contraindicated with oxygen use
- **C** It improves FEV1 substantially within the first 8 weeks of training
- **D** It should be delayed for 6 months
- **E** Starting within 4 weeks of discharge reduces readmissions and improves outcomes

62. Which complication of roflumilast should be discussed before starting it?

A Tachyarrhythmia from beta-receptor stimulation
B Oral candidiasis
C Pneumonia
D Weight loss, diarrhea and psychiatric effects
E Hyperkalemia

63. In COPD with chronic hypercapnic respiratory failure after hospitalization, which therapy reduces readmission or death?

A Theophylline
B High-flow oxygen at home without any ventilatory support
C Home noninvasive ventilation targeting PaCO2 reduction
D Prophylactic antibiotics alone
E Diaphragm pacing

64. Which pattern of desaturation characterizes the patients for whom LOTT found no benefit from long-term oxygen?

A Polycythemia with PaO2 57 mm Hg
B Hypercapnic respiratory failure
C Resting PaO2 of 50 mm Hg
D Moderate resting desaturation or desaturation with exercise only
E Cor pulmonale with resting hypoxemia, a raised hematocrit and PaO2 of 54 mm Hg

65. Which drug reduces COPD exacerbations in former smokers with frequent exacerbations despite inhaled therapy?

A N-acetylcysteine at any dose in all patients
B Inhaled short-acting beta agonist
C Azithromycin
D Montelukast
E Oral corticosteroid maintenance

66. Which feature distinguishes asthma-COPD overlap that should still be treated as asthma?

A Features of asthma mean an inhaled corticosteroid is needed, and LABA alone must be avoided
B Oral corticosteroids are first line
C Inhaled corticosteroids are contraindicated because of the higher pneumonia risk in patients with COPD
D Treatment should follow COPD guidance only, starting with LABA plus LAMA
E LAMA monotherapy is sufficient

67. Dupilumab is indicated in COPD for which group?

A Patients on long-term oxygen only
B Patients with neutrophilic chronic bronchitis and normal eosinophil counts despite triple therapy
C Alpha-1 antitrypsin deficiency
D Uncontrolled COPD with an eosinophilic phenotype despite triple or dual therapy
E All patients with emphysema

Chapter 7. Bronchiectasis, Cystic Fibrosis and Disorders of the Airways

68. Which test should be part of the initial evaluation of every adult with bronchiectasis?

A PET scan
B Bronchoscopy
C Lung biopsy
D Sweat chloride and full CFTR genetic testing in every adult patient
E Full blood count, immunoglobulins and aspergillus serology

69. A patient with bronchiectasis has three exacerbations a year despite airway clearance. Pseudomonas is not isolated. Which long-term therapy has the strongest evidence?

A Inhaled corticosteroid
B Oral corticosteroid
C Leukotriene antagonist
D Inhaled DNase
E Macrolide therapy

70. What is the mechanism of action of brensocatib?

A Inhibition of dipeptidyl peptidase 1, reducing neutrophil serine protease activation
B Inhibition of mucin gene expression in airway goblet cells
C Direct bactericidal action against Pseudomonas aeruginosa within the bronchial mucus layer of the airway
D Blockade of IL-5
E Inhibition of CFTR

71. Which finding supports the diagnosis of cystic fibrosis?

A Sweat chloride of 20 mmol/L on two occasions
B Normal fecal elastase
C Sweat chloride of 60 mmol/L or more
D Absent CFTR variants
E High IgE

72. What does ivacaftor do in cystic fibrosis?

A Corrects CFTR folding and trafficking from the endoplasmic reticulum
B Replaces CFTR by gene therapy
C Kills Pseudomonas
D Increases the open probability of CFTR at the cell surface
E Thins mucus by cleaving DNA

73. Which organism, when chronically present in cystic fibrosis, may make a patient ineligible at some transplant centers because of poor outcomes?

A Burkholderia cenocepacia
B Streptococcus pneumoniae
C Haemophilus influenzae
D Moraxella catarrhalis
E Staphylococcus aureus

74. Which clinical feature suggests primary ciliary dyskinesia?

A A raised sweat chloride with pancreatic insufficiency
B Recurrent pneumothorax in a tall, thin young man who smokes, with apical blebs on computed tomography
C Neonatal respiratory distress, year-round wet cough from infancy and situs inversus
D Onset of wheeze after age 40
E Hemoptysis in a smoker

75. A patient with rheumatoid arthritis develops progressive airflow obstruction with mosaic attenuation and air trapping on expiratory CT. What is the most likely diagnosis?

A Constrictive bronchiolitis
B Lymphoid interstitial pneumonia
C Pulmonary edema
D Organizing pneumonia
E Usual interstitial pneumonia

76. Which airway clearance approach is recommended for patients with bronchiectasis and chronic sputum?

A Inhaled corticosteroids to reduce sputum volume, prescribed to every patient with daily sputum
B Avoidance of exercise
C Cough suppressants
D Regular airway clearance taught by a respiratory physiotherapist
E Bed rest

77. What is the most common cause of hemoptysis in established cystic fibrosis?

A Bleeding from hypertrophied bronchial arteries
B Rupture of a pulmonary arteriovenous malformation
C Lung cancer
D Mitral stenosis
E Pulmonary embolism

Chapter 8. Idiopathic Interstitial Pneumonias and Progressive Pulmonary Fibrosis

78. Which CT pattern allows a confident diagnosis of idiopathic pulmonary fibrosis in the right clinical setting without biopsy?

A Thin-walled cysts throughout
B Diffuse ground-glass with mosaic attenuation and air trapping
C Peribronchovascular consolidation
D Basal, subpleural reticulation with honeycombing
E Upper-lobe predominant nodules

79. Which drug is approved to slow lung function decline in idiopathic pulmonary fibrosis?

A Prednisone and azathioprine with N-acetylcysteine
B Interferon gamma
C Warfarin
D Bosentan
E Nintedanib

80. How is progressive pulmonary fibrosis defined in a patient with a non-IPF fibrotic interstitial lung disease?

A Persistent cough
B At least two of worsening symptoms, physiologic decline and radiologic progression within a year, without another explanation
C Any new CT abnormality in a patient with a known interstitial lung disease, whatever the symptoms or physiology over the preceding year
D Need for supplemental oxygen at rest
E A single fall in FVC of 2% at one visit, whether or not symptoms or imaging have changed over the year

81. What is the commonest cause of acute exacerbation of idiopathic pulmonary fibrosis?

A Bacterial pneumonia in most cases
B Pulmonary embolism in most cases
C Drug toxicity in most cases
D Usually no cause is found
E Heart failure in most cases

82. Which feature distinguishes nonspecific interstitial pneumonia from usual interstitial pneumonia on CT?

A Ground-glass with reticulation and subpleural sparing, with little honeycombing
B Upper-lobe cysts
C Basal honeycombing
D Diffuse centrilobular nodules with lymph node calcification and upper-zone predominance
E Centrilobular nodules

83. Which supportive measure improves exercise capacity and quality of life in fibrotic interstitial lung disease?

A Inhaled corticosteroids
B Long-term systemic corticosteroids
C Routine anticoagulation
D Pulmonary rehabilitation
E Antibiotic prophylaxis

84. A patient with idiopathic pulmonary fibrosis is 62 years old with declining FVC. When should transplant referral be considered?

A Only after an acute exacerbation requiring admission
B Only after an FVC below 30%
C At or soon after diagnosis in suitable candidates
D Never, because of age
E Only once on oxygen for 2 years

85. Which finding favors a familial pulmonary fibrosis evaluation?

A A heavy smoking history with upper-lobe emphysema and chronic sputum production
B Gastroesophageal reflux
C Male sex
D Age over 70 with gastroesophageal reflux disease
E Two or more affected relatives or early onset with telomere-related features

86. Which smoking-related interstitial lung disease improves with smoking cessation?

A Idiopathic pulmonary fibrosis with established honeycombing
B Asbestosis
C Respiratory bronchiolitis-interstitial lung disease
D Pulmonary alveolar proteinosis
E Lymphangioleiomyomatosis

87. What is the main adverse effect that limits nintedanib?

A Diarrhea
B Bone marrow suppression
C Photosensitivity rash
D Hyperglycemia
E Peripheral neuropathy

88. Which description fits combined pulmonary fibrosis and emphysema?

A Asthma with eosinophilia
B Upper-lobe emphysema with lower-lobe fibrosis and relatively preserved lung volumes but very low DLCO
C Ground-glass from alveolar hemorrhage
D Thin-walled cysts with recurrent pneumothorax in women of childbearing age
E Normal DLCO with severe restriction and basal ground-glass that responds rapidly to oral corticosteroids

Chapter 9. Interstitial Lung Disease in Systemic, Exposure and Drug-Related Settings

89. Which interstitial lung disease pattern is most common in systemic sclerosis?

A Organizing pneumonia
B Nonspecific interstitial pneumonia
C Desquamative interstitial pneumonia
D Usual interstitial pneumonia
E Lymphoid interstitial pneumonia

90. A patient with dermatomyositis rash, skin ulceration, little muscle weakness and rapidly progressive interstitial lung disease most likely has which antibody?

A Anti-TIF1-gamma
B Anti-SRP
C Anti-MDA5
D Anti-Jo-1
E Anti-Mi-2

91. Which feature on history best supports fibrotic hypersensitivity pneumonitis?

A Reflux
B Exposure to birds or feather bedding
C A childhood history of asthma and eczema
D Recent travel
E Smoking

92. Which drug is classically associated with pulmonary fibrosis that is dose-related and worsened by high inspired oxygen?

A Bleomycin
B Metformin
C Lisinopril
D Amoxicillin
E Atorvastatin

93. What is the first step in managing suspected drug-induced pneumonitis?

A Perform transplant evaluation
B Begin anticoagulation
C Stop the suspected drug
D Increase the drug dose
E Start antifibrotics

94. In rheumatoid arthritis, which interstitial lung disease pattern carries the worst prognosis?

A Follicular bronchiolitis
B Usual interstitial pneumonia
C Rheumatoid nodules
D Organizing pneumonia
E Nonspecific interstitial pneumonia

95. Which radiologic finding is most typical of organizing pneumonia?

A Diffuse centrilobular nodules
B Peripheral and peribronchovascular consolidation, sometimes migratory, with a reversed halo sign
C Thin-walled cysts
D Lymphangitic septal thickening
E Basal subpleural honeycombing with traction bronchiectasis and volume loss that is stable over several years

96. Which test helps distinguish chronic eosinophilic pneumonia from other causes of peripheral consolidation?

A Low complement
B Sweat chloride
C A raised serum angiotensin-converting enzyme level
D Positive anti-CCP
E Bronchoalveolar lavage eosinophilia above 25%

97. Which feature defines interstitial pneumonia with autoimmune features?

A Drug-induced pneumonitis
B Interstitial pneumonia with some features of autoimmunity that do not meet criteria for a defined connective tissue disease
C Interstitial disease with confirmed systemic lupus
D Usual interstitial pneumonia in a smoker
E Any interstitial lung disease with a positive antinuclear antibody at low titer alone, even without other clinical or radiologic features

98. Which statement about checkpoint inhibitor pneumonitis is correct?

- **A** It occurs only after 2 years of treatment
- **B** It never recurs on rechallenge, so the checkpoint inhibitor can always be restarted at the same dose
- **C** It is managed by grade, with corticosteroids and drug interruption for grade 2 or more
- **D** Antibiotics alone are adequate
- **E** It is always fatal

99. Which feature of pulmonary involvement is most typical of systemic lupus erythematosus?

- **A** Lymphangioleiomyomatosis
- **B** Pleuritis with or without effusion
- **C** Upper-lobe fibrosis
- **D** Usual interstitial pneumonia in most patients
- **E** Bronchiectasis in most patients

100. Which treatment is first-line for systemic sclerosis-associated interstitial lung disease that needs therapy?

- **A** Pirfenidone alone
- **B** Methotrexate
- **C** High-dose prednisone alone
- **D** Hydroxychloroquine
- **E** Mycophenolate mofetil

Chapter 10. Sarcoidosis and Diffuse Cystic Lung Diseases

101. Which presentation is characteristic of Löfgren syndrome?

- **A** Bilateral hilar lymphadenopathy, erythema nodosum and ankle arthritis with fever
- **B** Cardiac block
- **C** Upper-lobe fibrosis with cavitation
- **D** Lupus pernio and nasal involvement
- **E** Uveitis with parotid enlargement and facial nerve palsy, without fever, adenopathy or skin lesions

102. Which screening should every patient with sarcoidosis have at diagnosis?

- **A** Electrocardiogram, eye examination, calcium and renal function
- **B** PET-CT
- **C** Bone marrow biopsy
- **D** Annual bronchoscopy with lavage and transbronchial biopsy of both lungs
- **E** Brain MRI

103. What is the first-line treatment for symptomatic pulmonary sarcoidosis with impaired lung function?

- **A** Infliximab
- **B** Methotrexate as monotherapy before steroids in all patients
- **C** Observation regardless of symptoms
- **D** Antifibrotics
- **E** Oral corticosteroids

104. A woman with progressive breathlessness has thin-walled cysts throughout both lungs, recurrent pneumothorax and a renal angiomyolipoma. What is the most likely diagnosis?

A Birt-Hogg-Dubé syndrome
B Lymphangioleiomyomatosis
C Pulmonary Langerhans cell histiocytosis
D Lymphoid interstitial pneumonia
E Emphysema

105. Which cyst distribution suggests pulmonary Langerhans cell histiocytosis?

A Upper and mid-zone irregular cysts and nodules sparing the costophrenic angles in a smoker
B Basal subpleural cysts in a nonsmoker
C Random round cysts with angiomyolipoma
D Perivascular cysts with Sjögren syndrome
E Diffuse round thin-walled cysts in a woman with renal angiomyolipomas and recurrent chylous effusions

106. Which features suggest Birt-Hogg-Dubé syndrome in a patient with lung cysts?

A Upper-lobe cysts in a smoker
B Diffuse cysts in a woman with tuberous sclerosis complex and renal angiomyolipomas
C Basal, paramediastinal cysts with skin fibrofolliculomas and renal tumors
D Cysts with Sjögren syndrome
E Cysts with honeycombing

107. What is the preferred treatment for symptomatic autoimmune pulmonary alveolar proteinosis?

A Long-term high-dose systemic corticosteroids
B Methotrexate
C Whole lung lavage or inhaled GM-CSF
D Lung transplantation as first-line
E Antifibrotics

108. Which test confirms autoimmune pulmonary alveolar proteinosis?

A Raised serum vascular endothelial growth factor D
B Serum ACE
C Sweat chloride
D Raised serum anti-GM-CSF antibodies
E Alpha-1 antitrypsin level

109. Which finding mandates evaluation for cardiac sarcoidosis?

A Hypercalciuria
B Palpitations, syncope or conduction abnormality on ECG
C Erythema nodosum
D Uveitis
E Bilateral hilar lymphadenopathy on a routine chest radiograph alone

110. Which statement about pneumothorax in lymphangioleiomyomatosis is correct?

- **A** Recurrence is common, so pleurodesis is considered after the first episode
- **B** Pneumothorax is rare
- **C** Observation alone is always enough
- **D** Pleurodesis is contraindicated in every patient because it prevents later lung transplantation
- **E** It occurs only in men

Chapter 11. Pneumonia and Lower Respiratory Tract Infection

111. Which outpatient regimen is recommended for a previously healthy adult with community-acquired pneumonia and no resistance risk factors?

- **A** Ceftriaxone plus azithromycin intravenously
- **B** Linezolid
- **C** Amoxicillin
- **D** Vancomycin
- **E** Ciprofloxacin

112. Which score helps decide on outpatient treatment in community-acquired pneumonia, combined with clinical judgment?

- **A** STOP-Bang
- **B** Glasgow-Blatchford score
- **C** Pneumonia Severity Index
- **D** Wells score
- **E** CHA2DS2-VASc

113. In severe community-acquired pneumonia, which adjunct reduced mortality in a recent trial?

- **A** Statins
- **B** Hydrocortisone
- **C** Activated protein C
- **D** Routine immunoglobulin
- **E** Inhaled nitric oxide

114. Which test should be done in all adults hospitalized with severe community-acquired pneumonia?

- **A** PET scan
- **B** Bronchoscopy
- **C** Lung biopsy
- **D** Blood and sputum cultures and urinary antigens for pneumococcus and Legionella
- **E** Procalcitonin alone, with antibiotics withheld if the level is below the laboratory threshold

115. What is the recommended minimum duration of antibiotics for uncomplicated community-acquired pneumonia?

- **A** 10 days in all cases
- **B** 3 weeks
- **C** 5 days, provided the patient is clinically stable
- **D** Until the chest radiograph has cleared completely
- **E** 14 days in all cases

116. Which factor most strongly justifies empiric MRSA coverage in community-acquired pneumonia?

- **A** Age over 65 years with diabetes mellitus
- **B** Recent travel
- **C** COPD
- **D** Diabetes
- **E** Prior respiratory isolation of MRSA

117. Which is the most appropriate treatment for influenza in a hospitalized adult?

- **A** No antiviral treatment once symptoms have been present for more than 48 hours
- **B** Antibiotics alone
- **C** Oseltamivir started as soon as possible, regardless of symptom duration
- **D** Amantadine
- **E** Corticosteroids routinely

118. Which organism is classically associated with cavitating pneumonia after influenza in a young adult?

- **A** Staphylococcus aureus
- **B** Chlamydia pneumoniae
- **C** Mycoplasma pneumoniae
- **D** Legionella pneumophila
- **E** Haemophilus influenzae

119. Which finding suggests Legionella pneumonia?

- **A** Cold agglutinins with hemolysis
- **B** Rash on the palms with conjunctivitis after cleaning a cage of recently imported parrots
- **C** Pneumonia with hyponatremia, diarrhea and confusion after exposure to a water system
- **D** Erythema migrans
- **E** Bullous myringitis

120. How is ventilator-associated pneumonia defined by timing?

- **A** Pneumonia occurring in any patient during noninvasive ventilation for at least 6 hours
- **B** Pneumonia arising more than 48 hours after endotracheal intubation
- **C** Any pneumonia in a hospitalized patient
- **D** Pneumonia after discharge
- **E** Pneumonia within 24 hours of admission

121. Which feature is typical of aspiration pneumonia in a patient found on the floor after alcohol intoxication?

- **A** Infiltrates in dependent segments such as the posterior upper lobes or superior lower lobes
- **B** Bilateral hilar adenopathy
- **C** Apical cavitation in a nondependent area only, with sparing of the posterior and basal segments
- **D** Diffuse ground-glass
- **E** Pleural plaques

122. Which immunocompromised patient is at greatest risk of Pneumocystis pneumonia?

- **A** A person with well-controlled diabetes
- **B** A person with IgA deficiency
- **C** A person on low-dose inhaled corticosteroids for asthma for 10 years
- **D** A person after splenectomy
- **E** A person with HIV and a CD4 count below 200 cells/μL

123. Which feature of COVID-19 management in hospitalized patients is supported by RECOVERY?

- **A** Dexamethasone benefited most those patients who were not receiving any supplemental oxygen
- **B** Lopinavir-ritonavir reduced mortality
- **C** Hydroxychloroquine reduced mortality
- **D** Convalescent plasma reduced mortality
- **E** Dexamethasone reduced mortality in patients receiving oxygen or ventilation

124. Which complication should be suspected when a patient with pneumonia has persistent fever after 72 hours of appropriate antibiotics?

- **A** Pulmonary hypertension
- **B** Parapneumonic effusion or empyema
- **C** Antibiotic-induced drug fever in all cases
- **D** Asthma
- **E** Sarcoidosis

125. What is the main role of procalcitonin in lower respiratory tract infection?

- **A** Predicting MRSA
- **B** Distinguishing viral from bacterial pneumonia with certainty
- **C** Diagnosing tuberculosis
- **D** Supporting decisions to stop antibiotics in patients improving clinically
- **E** Deciding whether to withhold antibiotics in suspected pneumonia on its own

126. Which feature identifies severe community-acquired pneumonia by ATS/IDSA criteria?

- **A** Septic shock requiring vasopressors or respiratory failure requiring mechanical ventilation
- **B** Any infiltrate on the chest radiograph in a patient older than 65 years with fever and productive cough
- **C** Age over 65
- **D** Fever above 38 °C
- **E** Cough with sputum

127. Which vaccine reduces invasive pneumococcal disease in older adults?

- **A** Typhoid vaccine
- **B** Varicella vaccine
- **C** Bacille Calmette-Guérin vaccine
- **D** Hepatitis A vaccine
- **E** Pneumococcal conjugate vaccine

Chapter 12. Tuberculosis, Nontuberculous Mycobacteria and Fungal Lung Disease

128. Which test result best indicates latent tuberculosis infection in a BCG-vaccinated adult?

- **A** A positive sputum culture
- **B** A positive interferon-gamma release assay with no evidence of active disease
- **C** A tuberculin skin test of 6 mm
- **D** Upper-lobe cavitation on the chest radiograph with a positive interferon-gamma release assay
- **E** A positive sputum smear

129. Which latent tuberculosis regimen is preferred for its short duration and high completion?

A Six months of daily ethambutol
B Two months of daily rifampin combined with daily pyrazinamide
C Pyrazinamide alone
D Twelve once-weekly doses of isoniazid and rifapentine
E Nine months of daily isoniazid

130. Which visual symptom must be monitored in a patient taking ethambutol?

A Night blindness from vitamin A deficiency caused by malabsorption
B Diplopia from sixth nerve palsy
C Photophobia
D Reduced visual acuity or red-green color discrimination
E Floaters only

131. Which isoniazid adverse effect is prevented by pyridoxine?

A Optic neuritis
B Peripheral neuropathy
C Hyperuricemia
D Rash
E Hepatitis with raised transaminases

132. Which organism causes most nontuberculous mycobacterial lung disease in the United States?

A Mycobacterium xenopi
B Mycobacterium gordonae
C Mycobacterium kansasii in coal miners
D Mycobacterium abscessus
E Mycobacterium avium complex

133. What is the backbone of treatment for macrolide-susceptible nodular-bronchiectatic MAC disease?

A Isoniazid monotherapy
B A macrolide alone
C Fluoroquinolone monotherapy for 6 months after the first negative culture
D A macrolide, rifampin and ethambutol, often three times weekly
E Amikacin alone

134. Which pattern suggests chronic pulmonary aspergillosis?

A Asthma with high IgE
B Mediastinal fibrosis
C Fungal sinusitis in diabetes
D Cavitary lung disease for 3 months with aspergillus IgG and no invasive disease in a person with prior lung damage
E Rapidly progressive nodules with a halo sign and positive serum galactomannan during profound chemotherapy-induced neutropenia

135. Which feature favors invasive pulmonary aspergillosis in a neutropenic patient?

A A smooth-walled cavity with a fungus ball in a nonimmune host
B Bilateral hilar adenopathy
C Lobar consolidation with high fever responding to amoxicillin
D Diffuse ground-glass with high LDH
E Nodules with a halo sign on CT and positive galactomannan

136. Which endemic mycosis is associated with exposure to bird or bat droppings and caves in the Ohio and Mississippi river valleys?

A Coccidioidomycosis
B Cryptococcosis
C Histoplasmosis
D Paracoccidioidomycosis
E Blastomycosis

137. Which regimen is recommended for most adults with drug-resistant tuberculosis resistant to rifampin?

A Isoniazid, rifampin, pyrazinamide and ethambutol for 6 months, with streptomycin added for the first 2 months
B Injectable kanamycin for 2 years
C Streptomycin monotherapy
D An all-oral regimen based on bedaquiline, pretomanid and linezolid, with or without moxifloxacin
E Rifapentine and moxifloxacin

138. When should antiretroviral therapy start in a person with HIV and newly diagnosed pulmonary tuberculosis with a CD4 count of 30 cells/μL?

A After completing tuberculosis treatment
B At 6 months
C Only if the CD4 falls further
D Within 2 weeks of starting tuberculosis treatment
E At the same time as tuberculosis treatment in all cases including meningitis

139. Which statement about coccidioidomycosis is correct?

A It never disseminates
B It is acquired in the southwestern United States and can cause erythema nodosum and thin-walled cavities
C It is limited to immunocompromised people and always requires treatment with amphotericin B for at least 12 months
D It is transmitted person to person
E Treatment is always required

Chapter 13. Pulmonary Nodules, Lung Cancer Screening and Staging

140. A 7 mm solid nodule is found incidentally in a 60-year-old smoker. What does the Fleischner Society advise?

A PET-CT followed by CT-guided biopsy of the nodule within the next week
B Immediate surgical resection
C No follow-up
D CT at 3 years
E CT at 6 to 12 months, then CT at 18 to 24 months

141. Which group is eligible for lung cancer screening under the 2021 USPSTF recommendation?

A Adults 40 to 70 years with any smoking
B Adults 50 to 80 years with at least 20 pack-years who smoke or quit within 15 years
C Anyone with COPD
D Adults 55 to 80 years with at least 30 pack-years only, excluding anyone who quit smoking more than 5 years ago
E Never-smokers over 65

142. What did the NLST demonstrate?

A Annual chest radiography reduced lung cancer mortality more than low-dose CT screening did in older smokers
B Screening had no effect
C Annual sputum cytology was superior
D Low-dose CT screening reduced lung cancer mortality compared with chest radiography
E Screening increased overall mortality

143. Which subsolid nodule feature most raises concern for invasive adenocarcinoma?

A Resolution on follow-up
B Multiple small ground-glass nodules
C A growing solid component
D Stable pure ground-glass for 5 years
E Size under 6 mm

144. In the TNM 9th edition, which change applies to N2 disease?

A N2 now means contralateral nodes
B N2 is merged with N3
C N2 now denotes contralateral mediastinal or supraclavicular nodal involvement
D N2 is removed
E N2 is divided into single-station N2a and multiple-station N2b

145. Which mediastinal node station is accessible by EBUS but not by standard cervical mediastinoscopy?

A Station 7
B Hilar stations 10 and 11
C Station 4R, right lower paratracheal
D Station 2R
E Station 2L

146. What is the best management of a 2.5 cm spiculated nodule in a 65-year-old smoker with good lung function?

A Antibiotics for 10 days and a repeat chest radiograph after 6 weeks
B Repeat CT in 2 years
C No follow-up
D Staging with PET-CT and tissue diagnosis or resection
E Sputum cytology only

147. Which smoking cessation fact applies to lung cancer screening programs?

A Smokers are excluded from screening
B Cessation support should be offered to current smokers at screening
C Cessation is only offered after a cancer diagnosis
D Varenicline is contraindicated in people taking part in lung cancer screening programs
E Screening replaces cessation

148. What is a Lung-RADS category 4B finding?

A A finding with a very suspicious appearance, such as a solid nodule of 15 mm or more
B A perifissural lymph node
C A benign, completely calcified nodule or a nodule with intranodular fat consistent with hamartoma
D A negative scan
E A 3 mm nodule

149. Which statement about PET-CT in nodule evaluation is correct?

A It is most useful for solid nodules of 8 mm or more
B It reliably characterizes pure ground-glass nodules
C It is most useful for nodules under 5 mm
D It replaces biopsy for all nodules
E Negative PET excludes cancer

150. Which mutation testing should be performed on newly diagnosed advanced nonsquamous non-small cell lung cancer?

A KRAS only
B PD-L1 only
C EGFR only
D EGFR testing alone at diagnosis, with other alterations sought only after progression on first-line chemotherapy
E Broad molecular profiling including EGFR, ALK, ROS1, KRAS, BRAF, MET, RET, NTRK and HER2, with PD-L1

151. Which finding on CT most strongly suggests that a solid nodule is benign?

A Spiculated margins with pleural retraction and growth
B Growth over 6 months
C Upper-lobe location
D Diffuse, central, laminated or popcorn calcification
E Size of 25 mm

Chapter 14. Lung Cancer Treatment and Other Thoracic Tumors

152. What is the preferred treatment for a medically fit patient with stage IA peripheral non-small cell lung cancer of 1.5 cm?

A Surgical resection, with segmentectomy an option for small peripheral tumors
B Observation
C Whole-brain radiation
D Immunotherapy alone for 2 years without any local treatment of the primary tumor
E Chemotherapy alone

153. Which treatment follows concurrent chemoradiation for unresectable stage III non-small cell lung cancer without EGFR or ALK alterations?

A Prophylactic cranial irradiation
B Observation only
C Surgical resection
D Further chemotherapy for 2 years
E Consolidation durvalumab

154. Which targeted drug is used first-line for advanced non-small cell lung cancer with an ALK rearrangement?

A Dabrafenib
B Osimertinib or erlotinib
C Erlotinib
D Sotorasib
E Alectinib or lorlatinib

155. Which feature suggests small cell lung cancer rather than non-small cell cancer?

A Pancoast tumor with Horner syndrome
B Slow growth over years
C A central mass with bulky mediastinal nodes and SIADH in a heavy smoker
D Hypercalcemia from PTHrP with a cavitating mass
E A peripheral ground-glass nodule growing slowly over several years in a woman who has never smoked

156. What is first-line treatment for extensive-stage small cell lung cancer?

A Surgical resection followed by thoracic radiotherapy
B Osimertinib
C Surgery
D Platinum-etoposide with an anti-PD-L1 antibody
E Observation

157. A thymoma is found with generalized weakness that worsens through the day. Which antibody is most likely positive?

A Anti-Hu
B Acetylcholine receptor antibody
C Anti-GAD
D Anti-Yo
E Voltage-gated calcium channel antibody

158. What is the most common primary tumor of the anterior mediastinum in adults?

- **A** Bronchogenic cyst
- **B** Neurogenic tumor
- **C** Esophageal cancer
- **D** Thymoma
- **E** Pericardial cyst

159. Which serum marker pattern suggests a nonseminomatous germ cell tumor in a young man with an anterior mediastinal mass?

- **A** Raised prostate-specific antigen alone
- **B** Normal markers
- **C** Raised alpha-fetoprotein or beta-hCG
- **D** Raised CEA alone
- **E** Raised CA-125

160. Which treatment is standard for resectable stage II to IIIA non-small cell lung cancer without EGFR or ALK alterations?

- **A** Radiation therapy alone to the primary tumor and ipsilateral hilum
- **B** Perioperative or neoadjuvant chemoimmunotherapy with surgery
- **C** Surgery alone
- **D** Radiation alone
- **E** Observation

161. What is a key toxicity of thoracic radiotherapy to monitor 1 to 6 months after treatment?

- **A** Radiation pneumonitis
- **B** Hearing loss
- **C** Acute kidney injury
- **D** Hypothyroidism within days
- **E** Acute pancreatitis

162. Which is a typical presentation of a superior sulcus (Pancoast) tumor?

- **A** Cough with sputum
- **B** Shoulder and arm pain with Horner syndrome
- **C** Stridor
- **D** Pleural effusion only
- **E** Hemoptysis with collapse of the left lower lobe

163. Which is the most effective treatment for malignant airway obstruction from a central tumor causing stridor?

- **A** Bronchoscopic debulking with or without stenting
- **B** Observation
- **C** Diuretics
- **D** Oral corticosteroids and nebulized epinephrine alone
- **E** Antibiotics

164. Which statement about carcinoid tumors of the lung is correct?

A They are strongly associated with heavy smoking and are treated with chemotherapy first
B They rarely cause airway obstruction
C They are the commonest lung cancer
D They arise only in the lung periphery
E Typical carcinoids are usually central, slow-growing and treated by resection

Chapter 15. Pleural Disease

165. Pleural fluid protein 40 g/L with serum protein 60 g/L, fluid LDH 120 U/L with serum LDH 200 U/L. How is this fluid classified?

A Chylothorax
B Pseudochylothorax
C Exudate
D Transudate
E Hemothorax

166. Which pleural fluid finding requires chest tube drainage in a parapneumonic effusion?

A Lymphocyte predominance alone
B Glucose 5 mmol/L
C Frank pus or pH below 7.2
D pH 7.4 with clear fluid
E Protein 25 g/L

167. What did MIST2 show about intrapleural therapy for pleural infection?

A DNase alone was most effective
B The combination of tPA and DNase improved drainage and reduced hospital stay and referral to surgery
C tPA alone was most effective
D Intrapleural tPA alone was the most effective regimen and reduced surgical referral more than tPA combined with DNase
E No therapy changed outcomes

168. How should a first symptomatic primary spontaneous pneumothorax in a stable young patient be managed?

A Bilateral pleurodesis
B High-flow oxygen for weeks
C Conservative or ambulatory management are options, with aspiration if intervention is needed
D Immediate video-assisted thoracoscopic surgery with bullectomy and pleurodesis for every first episode
E Mechanical ventilation

169. Which characteristic of pleural fluid suggests chylothorax?

A Cholesterol above 200 mg/dL with cholesterol crystals
B Hematocrit above half of the blood
C Triglycerides above 110 mg/dL with chylomicrons
D pH below 7.2
E Amylase raised

170. Which management is most appropriate for a recurrent symptomatic malignant pleural effusion with a trapped lung?

- **A** Pleurectomy as first-line
- **B** Repeated large-volume thoracentesis indefinitely
- **C** Observation
- **D** Talc pleurodesis
- **E** An indwelling pleural catheter

171. Which fluid finding most supports tuberculous pleurisy?

- **A** Transudate with low protein
- **B** Neutrophil-predominant fluid with pH 6.9 and gram-positive cocci on staining
- **C** High triglycerides
- **D** Lymphocyte-predominant exudate with raised adenosine deaminase
- **E** High amylase

172. Which is the commonest cause of a transudative pleural effusion?

- **A** Malignancy
- **B** Pneumonia
- **C** Heart failure
- **D** Pulmonary embolism
- **E** Tuberculosis

173. Which feature suggests a catamenial pneumothorax?

- **A** Bilateral pneumothorax in cystic fibrosis
- **B** Recurrent right pneumothorax around menstruation in a woman with endometriosis
- **C** Pneumothorax in a tall male smoker
- **D** Pneumothorax after central line insertion
- **E** Pneumothorax with basal lung cysts, facial skin lesions and a family history of renal tumors

174. Which pleural finding on CT suggests malignant pleural disease?

- **A** Simple fluid without thickening
- **B** Calcified pleural plaques on the diaphragm and posterolateral chest wall without effusion
- **C** Rounded atelectasis
- **D** Thin smooth pleural thickening below 1 cm
- **E** Circumferential or nodular pleural thickening over 1 cm involving the mediastinal pleura

175. Which statement about mesothelioma is correct?

- **A** It occurs mainly in children
- **B** It is strongly linked to asbestos exposure with a long latency
- **C** It is caused mainly by cigarette smoking, independent of any asbestos exposure
- **D** It has a short latency of 1 to 2 years
- **E** It responds well to surgery alone in most cases

176. A patient develops hypotension and hypoxemia during removal of 2 L of pleural fluid with chest pain and cough. What is the most likely complication?

- **A** Tension pneumothorax in all cases
- **B** Hemothorax
- **C** Pulmonary embolism
- **D** Vasovagal reaction only
- **E** Reexpansion pulmonary edema

177. Which is the recommended first imaging test at the bedside for a suspected pleural effusion before aspiration?

- **A** Lateral decubitus radiograph only
- **B** MRI
- **C** Ventilation-perfusion scan
- **D** Thoracic ultrasound
- **E** PET-CT

178. What is the main cause of a persistent air leak after drainage of a secondary spontaneous pneumothorax?

- **A** A bronchopleural fistula from diseased lung that fails to seal
- **B** A misplaced drain in the abdomen
- **C** Pleural infection only
- **D** Reexpansion edema
- **E** Excessive suction on the drain in every case, which keeps the lung from reexpanding

Chapter 16. Venous Thromboembolism and Pulmonary Embolism

179. A patient with low clinical probability of pulmonary embolism has a normal D-dimer. What is the next step?

- **A** No imaging; embolism is excluded
- **B** Start anticoagulation
- **C** CT pulmonary angiography within 24 hours
- **D** Ventilation-perfusion scan
- **E** Lower-limb ultrasound

180. Which anticoagulant is preferred for most patients with pulmonary embolism and no cancer, pregnancy or severe renal failure?

- **A** Warfarin without heparin bridging
- **B** A direct oral anticoagulant
- **C** Low-dose subcutaneous heparin
- **D** Unfractionated heparin for 3 months
- **E** Aspirin

181. Which patient with pulmonary embolism should receive systemic thrombolysis?

A A patient with chronic thromboembolic disease
B A normotensive patient with a small subsegmental clot
C All patients with saddle embolus
D A patient with persistent hypotension (high-risk embolism) without contraindications
E A patient with right ventricular dilation on CT but normal troponin and normal blood pressure throughout

182. How long should anticoagulation continue after a first pulmonary embolism provoked by major surgery?

A 3 months
B 2 years
C Indefinitely
D 6 weeks
E 10 days

183. Which score identifies low-risk pulmonary embolism suitable for early discharge?

A CURB-65 of 0
B CHA2DS2-VASc of 0
C Simplified Pulmonary Embolism Severity Index of 0
D Geneva score above 10
E A Wells score above 6 with a positive D-dimer result

184. Which imaging test is preferred in pregnancy when pulmonary embolism is suspected and the chest radiograph is normal?

A Perfusion scan or CTPA, after leg ultrasound if leg symptoms are present
B MRI of the chest only
C D-dimer alone
D No imaging
E Pulmonary angiography as the first test, avoiding CT and scintigraphy entirely

185. What is the role of an inferior vena cava filter in acute venous thromboembolism?

A Reserved for patients who cannot be anticoagulated
B Preferred over anticoagulation
C Routine addition to anticoagulation
D Prevention after every surgery
E Routine addition to anticoagulation in every patient with a proximal clot

186. Which test should follow persistent breathlessness 3 months after pulmonary embolism?

A No further testing
B Repeat D-dimer testing alone, with no further imaging if the level has fallen into the normal range
C Spirometry only
D Echocardiography and ventilation-perfusion scanning to look for chronic thromboembolic disease
E Bronchoscopy

187. Which anticoagulant strategy is preferred for venous thromboembolism in active cancer?

A A direct oral anticoagulant or low-molecular-weight heparin, chosen by bleeding risk
B Warfarin preferred
C No anticoagulation
D Aspirin
E Unfractionated heparin by continuous infusion for at least 6 months, avoiding all oral agents

188. Which feature marks intermediate-high risk pulmonary embolism by ESC criteria?

A A single subsegmental clot
B Right ventricular dysfunction on imaging and raised troponin in a normotensive patient
C Asymptomatic incidental finding
D Hypotension
E A normal right ventricle on echocardiography and a normal troponin with a sPESI score of 0

Chapter 17. Pulmonary Hypertension and Pulmonary Vascular Disorders

189. Which hemodynamic profile defines precapillary pulmonary hypertension?

A mPAP above 20 mm Hg, PAWP 15 mm Hg or less and PVR above 2 Wood units
B mPAP above 25 mm Hg with PAWP above 15 mm Hg and PVR below 2 Wood units
C Normal mPAP
D mPAP above 20 with PAWP above 15 and PVR 1 Wood unit
E PVR below 2 Wood units

190. Which screening test is most useful when pulmonary hypertension is suspected?

A Transthoracic echocardiography
B Exercise ECG
C Spirometry
D Plain chest radiography with lateral view
E D-dimer

191. Which initial treatment is recommended for most newly diagnosed patients with PAH at low or intermediate risk without cardiopulmonary comorbidities?

A Anticoagulation alone
B Initial combination of an endothelin receptor antagonist and a PDE5 inhibitor
C Supportive therapy only
D A high-dose calcium channel blocker for every newly diagnosed patient regardless of vasoreactivity
E Intravenous epoprostenol monotherapy

192. Which patients with PAH should receive high-dose calcium channel blockers?

A Patients with portopulmonary hypertension
B Patients with connective tissue disease
C Those with idiopathic, heritable or drug-associated PAH who show acute vasoreactivity at catheterization
D Patients with chronic thromboembolic disease
E All patients with PAH, whatever the cause or vasoreactivity, because calcium channel blockers are inexpensive and safe

193. What is the treatment of choice for operable chronic thromboembolic pulmonary hypertension?

- **A** Inferior vena cava filter
- **B** Bosentan
- **C** Pulmonary endarterectomy at an expert center
- **D** Riociguat alone, with surgery reserved for failure
- **E** Thrombolysis

194. Which adverse effects are associated with sotatercept?

- **A** Hypokalemia and hypomagnesemia requiring regular oral replacement
- **B** Hypoglycemia
- **C** Hepatic failure in most patients
- **D** Raised hemoglobin, thrombocytopenia, telangiectasia and bleeding
- **E** Pulmonary fibrosis

195. Which pulmonary hypertension group is commonest?

- **A** Group 2, from left heart disease
- **B** Group 1, pulmonary arterial hypertension
- **C** Group 5, unclear mechanisms
- **D** Group 3, lung disease
- **E** Group 4, chronic thromboembolic

196. What is the first-line treatment for life-threatening diffuse alveolar hemorrhage from ANCA-associated vasculitis?

- **A** Inhaled corticosteroids
- **B** Broad-spectrum antibiotics alone until bronchoscopy cultures return
- **C** Anticoagulation
- **D** High-dose corticosteroids with rituximab or cyclophosphamide
- **E** Bronchodilators

197. What is the usual cause of hypoxemia in hepatopulmonary syndrome?

- **A** Intrapulmonary vascular dilatations causing shunting
- **B** Airflow obstruction
- **C** Hypoventilation
- **D** Large pleural effusions
- **E** Pulmonary arterial hypertension from portal hypertension

198. Which is the main pulmonary complication of hereditary hemorrhagic telangiectasia requiring screening?

- **A** Lung cancer
- **B** Bronchiectasis
- **C** Pulmonary arteriovenous malformations
- **D** Pulmonary fibrosis with basal honeycombing
- **E** Pneumothorax

199. Which feature predicts a poor prognosis in PAH risk assessment?

A Cardiac index above 2.5
B WHO functional class IV with high NT-proBNP
C Normal right atrial area
D No syncope
E 6-minute walk distance above 440 m with no syncope

200. Which drug is contraindicated with riociguat?

A Diuretics
B Ambrisentan or any endothelin receptor antagonist
C Warfarin
D Sildenafil or any PDE5 inhibitor
E Oxygen

Chapter 18. Sleep-Disordered Breathing and Sleep Medicine

201. How is obstructive sleep apnea severity graded by the apnea-hypopnea index?

A Severity is not graded
B Mild 10 to 19, moderate 20 to 39, severe 40 or more
C Mild 5 to 14, moderate 15 to 29, severe 30 or more events per hour
D Mild 1 to 4, moderate 5 to 9, severe 10 or more events per hour of sleep
E By oxygen saturation only

202. Which patient is suitable for home sleep apnea testing?

A An adult with high pretest probability of moderate to severe obstructive apnea without major comorbidity
B A patient with suspected central apnea on opioids
C A patient with severe COPD on long-term oxygen who reports snoring, witnessed apneas and morning headaches
D A child with snoring
E A patient with neuromuscular weakness

203. Which is the first-line treatment for symptomatic moderate obstructive sleep apnea?

A Positive airway pressure
B Tonsillectomy in all adults
C Tracheostomy
D Sedative hypnotics
E Oxygen alone

204. What did the SAVE trial show about CPAP?

A CPAP worsened outcomes
B CPAP did not reduce cardiovascular events in patients with cardiovascular disease and moderate to severe OSA
C CPAP halved all-cause mortality in patients with established cardiovascular disease and moderate to severe sleep apnea
D CPAP reduced stroke in all patients
E CPAP cured hypertension

205. Which treatment is contraindicated in symptomatic heart failure with reduced ejection fraction and predominantly central sleep apnea?

- **A** Oxygen
- **B** Phrenic nerve stimulation
- **C** CPAP
- **D** Adaptive servo-ventilation
- **E** Optimization of heart failure therapy

206. Which feature of a patient with excessive daytime sleepiness suggests narcolepsy type 1?

- **A** Leg discomfort relieved by moving
- **B** Delayed sleep onset with late waking
- **C** Early morning awakening with low mood
- **D** Snoring with witnessed apneas and morning headache
- **E** Cataplexy with sleep-onset REM periods

207. Which drug is an option for obstructive sleep apnea in adults with obesity?

- **A** Sodium oxybate for all patients
- **B** Tirzepatide
- **C** Benzodiazepines
- **D** Zolpidem
- **E** Opioids

208. What is the first-line treatment for chronic insomnia in adults?

- **A** Cognitive behavioral therapy for insomnia
- **B** Alcohol at bedtime
- **C** Long-term benzodiazepine hypnotics taken nightly
- **D** Melatonin for all patients
- **E** Antihistamines

209. Which treatment is indicated for restless legs syndrome with low serum ferritin?

- **A** Antipsychotics
- **B** Benzodiazepines
- **C** Dopamine agonists at high dose
- **D** CPAP
- **E** Iron supplementation

210. Which component of hypoglossal nerve stimulation candidacy is required?

- **A** Prior tracheostomy
- **B** A body mass index above 45 kg/m2 with predominantly central apneas on polysomnography
- **C** AHI below 5
- **D** Absence of complete concentric collapse at the velum on drug-induced sleep endoscopy
- **E** Central apnea predominance

211. Which statement about drowsy driving in obstructive sleep apnea is correct?

- **A** Caffeine fully removes the risk
- **B** Untreated sleepy patients have a higher crash risk, and effective treatment reduces it
- **C** Treatment increases crash risk
- **D** Only commercial drivers are at risk
- **E** Sleep apnea does not affect driving safety, so no advice about driving is needed for any patient

212. Which feature distinguishes REM sleep behavior disorder?

- **A** Bruxism
- **B** Dream enactment with loss of REM atonia, often preceding a synucleinopathy
- **C** Leg jerks every 30 seconds
- **D** Night terrors
- **E** Sleepwalking and confusional arousals in children arising from slow-wave sleep

213. Which mechanism explains opioid-induced sleep-disordered breathing?

- **A** Pulmonary fibrosis
- **B** Increased chemosensitivity
- **C** Central apnea and ataxic breathing from respiratory depression
- **D** Diaphragm hypertrophy
- **E** Enlargement of the upper airway with increased chemosensitivity to CO2

214. Which obstructive sleep apnea consequence has the strongest causal evidence of improvement with CPAP?

- **A** Daytime sleepiness and blood pressure
- **B** Diabetes remission
- **C** All-cause mortality and cancer incidence
- **D** Prevention of stroke
- **E** Weight loss

215. Which feature defines a hypopnea under the AASM recommended rule?

- **A** Any snoring event
- **B** Airflow reduction of 90% or more for at least 10 seconds regardless of oxygen saturation or arousal
- **C** Desaturation of 1%
- **D** Airflow reduction for 3 seconds
- **E** Airflow reduction of 30% or more for 10 seconds with 3% desaturation or an arousal

Chapter 19. Hypoventilation, Neuromuscular and Chest Wall Disorders

216. Which arterial blood gas finding defines obesity hypoventilation syndrome in a patient with obesity and sleep-disordered breathing?

- **A** Nocturnal desaturation alone
- **B** Raised bicarbonate alone
- **C** PaO2 below 80 mm Hg only
- **D** Raised serum bicarbonate above 27 mmol/L alone, without measuring PaCO2
- **E** Awake PaCO2 of 45 mm Hg or more at sea level without another cause

217. Which positive airway pressure is first-line for stable outpatients with obesity hypoventilation and severe obstructive apnea?

- **A** Diaphragm pacing
- **B** Bilevel noninvasive ventilation in all patients
- **C** Tracheostomy
- **D** CPAP
- **E** Oxygen alone

218. In amyotrophic lateral sclerosis, which measurement supports starting noninvasive ventilation?

- **A** DLCO below 60%
- **B** FVC below 50% predicted or a low maximal inspiratory pressure, with symptoms
- **C** An FEV1/FVC ratio below 0.7 with a normal FVC and no symptoms of hypoventilation
- **D** Normal PaCO2 with no symptoms
- **E** Peak flow above 400 L/min

219. Which test best detects early diaphragm weakness in a patient with neuromuscular disease?

- **A** Peak expiratory flow measured upright and after exercise
- **B** FEV1/FVC ratio
- **C** Resting oxygen saturation
- **D** Chest radiograph
- **E** A fall in FVC of more than 20% from upright to supine

220. Which feature of Guillain-Barré syndrome predicts the need for intubation?

- **A** Ambulatory status
- **B** Reflexes preserved
- **C** Normal vital capacity with distal numbness and preserved reflexes in the arms
- **D** Vital capacity below 20 mL/kg with rapid progression and bulbar weakness
- **E** Peripheral numbness only

221. Which therapy improves cough effectiveness in neuromuscular disease with a weak cough?

- **A** Inhaled corticosteroids at high dose
- **B** Bronchodilators
- **C** Mucolytics alone
- **D** Mechanical insufflation-exsufflation
- **E** Sedation

222. Which condition causes hypoventilation through chest wall restriction?

- **A** Sarcoidosis
- **B** Severe persistent asthma
- **C** Bronchiectasis
- **D** Pulmonary embolism
- **E** Severe kyphoscoliosis

223. Which finding suggests bilateral diaphragm paralysis?

- **A** A unilateral raised hemidiaphragm on chest radiograph with normal vital capacity when lying supine
- **B** Hemoptysis
- **C** Severe orthopnea with paradoxical inward abdominal movement on inspiration when supine
- **D** Wheeze
- **E** Clubbing

224. Which oxygen strategy is appropriate in chronic hypercapnic respiratory failure?

- **A** High-flow oxygen titrated to keep saturation at 100% at all times
- **B** Controlled oxygen targeting saturations of 88% to 92%
- **C** Oxygen only at night
- **D** Oxygen titrated to PaO2 above 150 mm Hg
- **E** No oxygen under any circumstances

225. Which feature favors tracheostomy ventilation over noninvasive ventilation in neuromuscular disease?

- **A** Good mask tolerance
- **B** Vital capacity of 80%
- **C** Mild nocturnal hypoventilation with good mask tolerance and normal swallowing and cough strength
- **D** Normal swallowing
- **E** Severe bulbar dysfunction with inability to protect the airway or clear secretions

226. Which disorder causes respiratory failure from neuromuscular junction failure that improves with plasma exchange or immunoglobulin?

- **A** Spinal cord injury
- **B** Post-polio syndrome
- **C** ALS
- **D** Myasthenic crisis
- **E** Duchenne muscular dystrophy

227. In which spinal cord injury level is ventilator dependence expected?

- **A** High cervical injury above C3
- **B** Lumbar L1
- **C** C7
- **D** Complete injury at thoracic level T10
- **E** Sacral

Chapter 20. Occupational and Environmental Lung Disease

228. Which finding characterizes pleural plaques from asbestos exposure?

- **A** Lower-lobe fibrosis
- **B** Rounded atelectasis in all patients
- **C** Discrete, often calcified parietal pleural thickening on the diaphragm and lateral chest wall
- **D** Malignant transformation into mesothelioma in most patients within 10 years of first detection on CT
- **E** Restrictive physiology in most patients

229. A stonemason who cuts engineered stone develops rapidly progressive nodular lung disease. What is the most likely diagnosis?

- **A** Byssinosis
- **B** Asbestosis
- **C** Berylliosis
- **D** Hypersensitivity pneumonitis
- **E** Accelerated silicosis

230. Which disease is clinically and pathologically indistinguishable from sarcoidosis?

- **A** Silicosis
- **B** Chronic beryllium disease
- **C** Coal workers' pneumoconiosis
- **D** Siderosis
- **E** Asbestosis

231. Which test should be ordered in suspected carbon monoxide poisoning?

- **A** Pulse oximetry alone on room air
- **B** Chest radiograph only
- **C** Carboxyhemoglobin by co-oximetry
- **D** D-dimer
- **E** Spirometry

232. What is the most likely occupational lung disease in a worker exposed to cotton dust with chest tightness on the first day back after a weekend?

- **A** Siderosis
- **B** Berylliosis
- **C** Asbestosis
- **D** Silicosis
- **E** Byssinosis

233. Which feature distinguishes work-exacerbated asthma from occupational asthma?

- **A** New sensitization to a workplace agent such as isocyanates in a previously healthy worker
- **B** Asthma from isocyanates
- **C** Asthma from latex allergy
- **D** Preexisting asthma worsened by work conditions without a new sensitizer
- **E** Asthma after a single massive irritant exposure

234. Which cancer risk increases synergistically with asbestos exposure and smoking?

- **A** Mesothelioma
- **B** Laryngeal papilloma
- **C** Lymphoma
- **D** Lung cancer
- **E** Thymoma

235. Which statement about e-cigarette or vaping use-associated lung injury (EVALI) is correct?

- **A** It was caused by nicotine alone in commercially sold nicotine-only devices
- **B** It presents only with wheeze
- **C** It was linked mainly to vitamin E acetate in THC-containing products
- **D** It never needs corticosteroids
- **E** It is a chronic fibrosing disease of decades

236. Which agent causes acute lung injury in silo fillers?

- **A** Cotton dust
- **B** Carbon dioxide only
- **C** Methane
- **D** Silica
- **E** Nitrogen dioxide

237. Which smoke inhalation finding suggests cyanide toxicity?

- **A** Hypoglycemia only
- **B** Hypertension
- **C** Isolated expiratory wheeze with a normal lactate and normal blood pressure
- **D** Severe lactic acidosis with hypotension after a house fire
- **E** Normal lactate

Chapter 21. Acute Respiratory Failure, ARDS and Mechanical Ventilation

238. Which ventilation strategy reduces mortality in ARDS?

- **A** Plateau pressure above 35 cm H2O
- **B** Tidal volume of 6 mL/kg predicted body weight with plateau pressure 30 cm H2O or less
- **C** Tidal volume of 12 mL/kg actual body weight with plateau pressure allowed up to 50 cm H2O
- **D** Permissive hyperoxia
- **E** Routine high-frequency oscillation

239. Which intervention reduced mortality in severe ARDS with PaO2/FiO2 below 150?

- **A** Surfactant
- **B** Inhaled nitric oxide given continuously for 7 days
- **C** Aggressive fluid loading
- **D** Prone positioning for at least 16 hours a day
- **E** Routine corticosteroids for all patients

240. What is the main mechanism of benefit of high-flow nasal oxygen in hypoxemic respiratory failure?

- **A** Meeting inspiratory flow demand, washing out dead space and adding some PEEP
- **B** Reducing cardiac output
- **C** Raising PaCO2
- **D** Delivering large mandatory tidal volumes through the nose so that the work of breathing falls to zero
- **E** Replacing the need for supplemental oxygen

241. Which patient with an acute exacerbation of COPD benefits most from noninvasive ventilation?

- **A** Unable to protect the airway
- **B** Cardiac arrest
- **C** Recent upper gastrointestinal surgery with vomiting
- **D** Normal pH with mild hypoxemia
- **E** pH 7.25 to 7.35 with PaCO2 above 45 mm Hg

242. Which approach to sedation is recommended during mechanical ventilation?

- **A** Paralysis for all patients
- **B** Deep sedation with continuous benzodiazepine infusions for all patients until extubation is planned
- **C** Light sedation with daily interruption or protocolized targets, plus spontaneous breathing trials
- **D** Routine benzodiazepine infusions
- **E** Avoidance of analgesia

243. What is the role of ECMO in severe ARDS?

- **A** Contraindicated in all adults
- **B** First-line therapy for all patients with ARDS at diagnosis, before lung-protective ventilation or prone positioning are tried
- **C** Used for mild ARDS
- **D** A rescue option at experienced centers for refractory hypoxemia or hypercapnia despite optimized ventilation
- **E** Replacement for prone positioning

244. Which defines ARDS under the 2024 global definition in a patient on high-flow nasal oxygen?

A PaO2/FiO2 of 300 or less or SpO2/FiO2 of 315 or less with flow of 30 L/min or more, and bilateral opacities not explained by edema
B Need for intubation
C PEEP of 10 cm H2O
D PaO2/FiO2 below 100 mm Hg with unilateral opacities in an intubated patient receiving PEEP of at least 10 cm H2O for a full 24 hours
E Unilateral opacities

245. A ventilated patient suddenly develops high peak pressures with unchanged plateau pressure. What is the most likely cause?

A Mainstem intubation
B Worsening ARDS
C Tension pneumothorax reducing respiratory system compliance on one side
D Increased airway resistance such as bronchospasm or a kinked tube
E Abdominal compartment syndrome

246. Which strategy reduces the duration of ventilation in hypoxemic respiratory failure?

A Liberal fluid loading to maintain a high central venous pressure
B Routine albumin
C Continuous deep sedation
D Conservative fluid management once shock resolves
E Routine tracheostomy on day 2

247. What finding in a ventilated patient with severe asthma signals dynamic hyperinflation?

A Reduced end-expiratory volume
B Rising plateau pressure, hypotension and expiratory flow that does not reach zero
C High compliance
D Low peak pressure, rising blood pressure and expiratory flow that returns to zero early
E Normal blood pressure with low PEEP

248. Which test predicts successful extubation?

A Absence of sedation for 6 hours only
B Passing a spontaneous breathing trial of 30 to 120 minutes
C Tidal volume above 1 L
D A PaO2 above 100 mm Hg on FiO2 0.6
E A normal chest radiograph and a PaO2 above 100 mm Hg on FiO2 0.6

249. Which is a feature of patient self-inflicted lung injury?

A Low respiratory drive with small tidal volumes and bradypnea that allow the injured lung to rest and heal
B Reduced tidal volume
C Bradypnea
D Hypercapnia from sedation
E Strong inspiratory efforts generate large transpulmonary pressures that worsen lung injury

250. Which corticosteroid effect in ARDS has trial support?

A Steroids improve outcomes only in mild ARDS
B Steroids are contraindicated
C Dexamethasone in moderate to severe ARDS increased ventilator-free days and reduced mortality in one trial
D Steroids prevent ARDS in all sepsis
E Methylprednisolone started after 14 days of ARDS reduced mortality in the ARDS Network trial and is now routine

251. What is the main cause of hypoxemia from obesity during mechanical ventilation?

A Atelectasis from reduced end-expiratory lung volume, improved with higher PEEP and recruitment
B Anemia
C Diffusion limitation
D Diffusion limitation from thickened alveolar membranes, which is corrected by lowering PEEP to zero
E Hypoventilation only

252. Which statement about neuromuscular blockade in ARDS is supported by ROSE?

A Blockade improves weaning
B Routine early cisatracurium did not reduce mortality compared with lighter sedation
C Routine early cisatracurium halved mortality in all patients with ARDS, including those with mild disease
D Blockade should be used in all mild ARDS
E Blockade prevents ICU weakness

253. Which is the correct predicted body weight formula use?

A Used to calculate PEEP
B Used only in children
C Used to dose antibiotics
D Calculated from height and sex to set tidal volume
E Calculated from actual weight measured on admission to set tidal volume

254. In a patient with ARDS, which finding indicates that higher PEEP is recruiting lung rather than overdistending it?

A Hypotension with rising dead space
B A rise in plateau pressure with falling compliance
C Rising $PaCO_2$ at the same minute ventilation with a higher dead space
D Worsening oxygenation
E A fall in driving pressure with improved oxygenation

Chapter 22. Sepsis, Shock and the Care of the Critically Ill Patient

255. Which vasopressor is first line in septic shock?

A Vasopressin alone
B Phenylephrine
C Epinephrine
D Dopamine
E Norepinephrine

256. What is the recommended initial fluid resuscitation in sepsis-induced hypoperfusion?

- **A** No fluids until vasopressors are started
- **B** Hydroxyethyl starch boluses of 500 mL until the central venous pressure exceeds 12 mm Hg
- **C** At least 30 mL/kg of intravenous crystalloid within the first 3 hours
- **D** Albumin as first-line in all patients
- **E** Hypotonic saline

257. How quickly should antibiotics be given in probable septic shock?

- **A** After culture results
- **B** Within 24 hours
- **C** Only after imaging
- **D** Within 6 hours, once cultures and imaging results are back
- **E** Within 1 hour of recognition

258. Which glucose target is recommended for critically ill adults on insulin?

- **A** Intensive insulin targeting 80 to 110 mg/dL in all patients
- **B** Start insulin at 180 mg/dL and target 144 to 180 mg/dL
- **C** Target below 70 mg/dL
- **D** Target above 250 mg/dL
- **E** No glucose monitoring

259. Which delirium management strategy is supported in the ICU?

- **A** Physical restraints
- **B** Benzodiazepine infusion
- **C** Nonpharmacologic bundles such as ABCDEF with early mobility and sleep promotion
- **D** Routine haloperidol for prevention in every ventilated patient from the day of admission
- **E** Deep sedation

260. Which test indicates fluid responsiveness in a ventilated patient?

- **A** Increase in stroke volume after a passive leg raise
- **B** Heart rate
- **C** Pulmonary artery wedge pressure alone
- **D** Urine output alone
- **E** A central venous pressure below 8 mm Hg measured once

261. What is the target hemoglobin for transfusion in most stable critically ill adults?

- **A** 5 g/dL
- **B** 9 g/dL in all patients
- **C** 10 g/dL
- **D** 12 g/dL
- **E** 7 g/dL

262. Which feature of capillary refill time supports its use in septic shock resuscitation?

A It replaces blood pressure monitoring entirely and predicts fluid responsiveness exactly in every patient with septic shock
B It predicts fluid responsiveness exactly
C It is a bedside measure of peripheral perfusion that guided resuscitation as well as lactate in ANDROMEDA-SHOCK
D It is only valid in children
E It requires a catheter

263. Which patients with septic shock are suggested to receive hydrocortisone?

A All patients with sepsis, whether or not vasopressors are needed
B Patients on no vasopressors
C Only children
D Adults with an ongoing requirement for vasopressors
E Only those with a low random cortisol

264. Which strategy best helps prevent ICU-acquired weakness?

A Early mobilization and avoiding deep sedation and hyperglycemia
B High-dose corticosteroids
C Prophylactic antibiotics
D Bed rest
E Routine neuromuscular blockade and high-dose corticosteroids for all ventilated patients

265. Which feature defines post-intensive care syndrome?

A Delirium during the ICU stay that resolves completely before discharge from hospital
B Pneumonia after discharge
C Weakness lasting 24 hours
D Fever after discharge
E New or worse physical, cognitive or mental health impairment after critical illness

266. Which is the most appropriate stress ulcer prophylaxis approach?

A Prophylaxis for patients with risk factors for gastrointestinal bleeding, such as coagulopathy or shock
B Prophylaxis with a proton pump inhibitor for every ICU patient from admission, whatever their bleeding risk
C No prophylaxis ever
D Antacids only
E Sucralfate for all

267. Which vasopressor complication is most associated with high-dose epinephrine?

A Hyperkalemia
B Raised lactate and tachyarrhythmias
C Bradycardia and atrioventricular block
D Hypothermia
E Hypoglycemia

268. Which goals-of-care practice is supported in the ICU?

A Deciding without surrogates
B Withholding prognosis
C Structured family meetings with clear prognostic communication and shared decision making
D Delaying discussion of prognosis with families until death is imminent, to avoid causing distress
E Avoiding family communication

Chapter 23. Lung Transplantation and Pulmonary Complications of Other Transplants

269. Which is an absolute contraindication to lung transplantation in most programs?

A Pulmonary hypertension
B Recent malignancy with a high risk of recurrence
C Prior pneumothorax
D Need for oxygen
E Age of 60 years in an otherwise healthy candidate

270. Which complication most limits long-term survival after lung transplantation?

A Primary graft dysfunction within 72 hours
B Chronic lung allograft dysfunction
C Phrenic nerve injury
D Bronchial anastomotic dehiscence
E Hyperacute rejection

271. Which finding defines the bronchiolitis obliterans syndrome phenotype of chronic lung allograft dysfunction?

A Acute ground-glass with fever
B Pleural effusion
C Persistent fall in FEV1 of 20% or more from baseline with obstruction and no other cause
D A restrictive pattern with upper-lobe fibrosis and a fall in total lung capacity of at least 10%
E Raised DLCO

272. What is primary graft dysfunction?

A Infection at 6 months
B Acute lung injury of the allograft within 72 hours of transplantation
C Recurrence of the original disease
D Chronic rejection presenting with airflow obstruction after the first year
E Anastomotic stenosis

273. Which infection prophylaxis is standard after lung transplantation?

A Lifelong broad-spectrum intravenous antibiotics and routine isoniazid for every recipient regardless of testing
B Lifelong broad-spectrum antibiotics
C Pneumocystis prophylaxis with trimethoprim-sulfamethoxazole and CMV prophylaxis according to serostatus
D Only influenza vaccination
E No prophylaxis

274. After allogeneic hematopoietic cell transplantation, which pulmonary complication is a form of chronic graft-versus-host disease?

- **A** Idiopathic pneumonia syndrome
- **B** Bronchiolitis obliterans syndrome
- **C** Diffuse alveolar hemorrhage at engraftment
- **D** Engraftment syndrome
- **E** Pulmonary embolism

275. Which treatment is commonly used for bronchiolitis obliterans after hematopoietic cell transplantation?

- **A** Inhaled fluticasone, azithromycin and montelukast (FAM)
- **B** High-dose chemotherapy
- **C** Antifibrotics as first-line
- **D** No treatment
- **E** High-dose chemotherapy followed by a second hematopoietic cell transplantation

276. Which acute rejection finding confirms the diagnosis after lung transplantation?

- **A** Normal biopsy
- **B** Perivascular lymphocytic infiltrates on transbronchial biopsy
- **C** Pleural effusion only
- **D** A rise in FEV1 above baseline with clear lungs on chest radiograph
- **E** Fever alone

277. Which statement about the US composite allocation score is correct?

- **A** It ranks candidates continuously using medical urgency, post-transplant survival and other factors
- **B** It excludes pediatric patients
- **C** It uses geographic boundaries alone
- **D** It began in 2005
- **E** It allocates donor lungs only by time on the waiting list within fixed geographic boundaries around each donor hospital

278. Which noninfectious early complication of hematopoietic cell transplantation presents with progressive bloody lavage?

- **A** Pulmonary veno-occlusive disease
- **B** Post-transplant lymphoproliferative disorder
- **C** Diffuse alveolar hemorrhage
- **D** Bronchiolitis obliterans
- **E** Organizing pneumonia

Chapter 24. Respiratory Therapeutics

279. Which smoking cessation pharmacotherapy was most effective in EAGLES?

- **A** Varenicline
- **B** Bupropion
- **C** Nicotine patch
- **D** Placebo
- **E** All were equal

280. Which inhaler technique error is common with dry powder inhalers?

A A slow, gentle inhalation instead of a fast, forceful one
B Shaking the inhaler before use and attaching it to a valved spacer
C Holding the breath
D Inhaling slowly over 5 seconds as intended
E Using a spacer

281. Which pulmonary rehabilitation component is essential?

A Oxygen for all
B Inhaled corticosteroid optimization
C Bronchoscopy
D Antibiotics
E Supervised exercise training

282. What is the main purpose of an oxygen saturation target of 94% to 98% in most acutely ill adults?

A To reduce the need for monitoring
B To prevent carbon dioxide retention in every patient with breathlessness
C To reach 100% saturation
D To treat breathlessness without hypoxemia
E To avoid both hypoxemia and the harms of hyperoxemia

283. Which nebulizer statement is correct?

A Nebulizers always deliver more drug to the lungs than inhalers with spacers, so they are needed in every exacerbation
B Pressurized inhalers with spacers are as effective as nebulizers for most acute bronchodilation
C Spacers are ineffective in adults
D Nebulizers are required for all exacerbations
E Nebulizers do not generate aerosols

284. Which counseling approach to smoking cessation is effective?

A Waiting for the patient to raise smoking before giving any advice or medication
B Waiting for patient readiness without advice
C Threatening messages alone
D Brief advice combined with pharmacotherapy and behavioral support
E E-cigarette prohibition counseling only

285. Which inhaled drug class causes urinary retention and dry mouth?

A Inhaled corticosteroids
B Long-acting beta-2 agonists such as salmeterol
C Cromones
D Long-acting muscarinic antagonists
E Leukotriene antagonists

286. Which statement about home oxygen safety is correct?

A Oxygen is not flammable, so smoking nearby carries no added risk
B Oxygen concentrators require no counseling
C Smoking near oxygen is a major fire and burn risk
D Oxygen can be used safely near open flames
E Burns never occur

Chapter 25. Quality, Safety, Ethics and Reading the Evidence

287. A test has sensitivity 90% and specificity 80%. What is its positive likelihood ratio?

A 2
B 1.1
C 4.5
D 0.125
E 9

288. In a trial, an event occurs in 20% of controls and 15% of treated patients. What is the number needed to treat?

A 25
B 5
C 15
D 4
E 20

289. Which design is used to assess whether a new treatment is not worse than standard by more than a prespecified margin?

A Case-control study
B Cohort study
C Superiority trial
D Noninferiority trial
E Cross-sectional survey

290. What is the main advantage of intention-to-treat analysis?

A It increases the effect size
B It replaces blinding
C It measures the effect of perfect adherence to the assigned treatment
D It preserves the balance created by randomization
E It removes all bias from missing data

291. Which quality improvement intervention reduced catheter-related bloodstream infections across Michigan ICUs?

A New antibiotic-coated catheters used without any change in insertion practice or culture
B An evidence-based checklist for central line insertion with a culture of safety
C Fewer nurses
D Daily catheter replacement
E Routine antifungal prophylaxis

292. Which ethical principle supports withdrawing a treatment that no longer serves the patient's goals?

A Physicians alone decide without discussion
B Only courts can decide
C Withholding and withdrawing treatment are ethically equivalent
D Withdrawal of a treatment once started is always ethically different from withholding it
E Treatment once started must continue

293. What does GRADE certainty of evidence describe?

- **A** Confidence that the estimate of effect is close to the true effect
- **B** The journal impact factor
- **C** Statistical significance only
- **D** The number of studies
- **E** The strength of the recommendation and the number of studies that support it

294. Which bias arises when a screening test detects disease earlier without extending life?

- **A** Attrition bias
- **B** Confounding by indication
- **C** Selection bias in a trial
- **D** Recall bias
- **E** Lead-time bias

295. When a surrogate decision-maker is needed, what standard should guide decisions?

- **A** The surrogate's own preferences about what they would want for themselves
- **B** Substituted judgment based on what the patient would have wanted
- **C** Hospital cost
- **D** The physician's preferences alone
- **E** Random choice

296. Which statement about a composite endpoint is correct?

- **A** It always increases precision without drawbacks, so each component need not be reported separately
- **B** It measures only mortality
- **C** It avoids the need for statistical testing
- **D** Results are hard to interpret when components differ greatly in importance and frequency
- **E** It removes bias

297. Which factor most strongly increases the posttest probability of disease after a positive test?

- **A** A low prevalence in the tested group
- **B** A high pretest probability
- **C** Low specificity
- **D** A large sample size
- **E** A likelihood ratio of 1

298. What does a hazard ratio of 0.75 with a 95% confidence interval of 0.60 to 0.94 indicate?

- **A** No significant difference
- **B** An absolute risk reduction of 25%
- **C** A 75% lower risk of the event, with no meaningful uncertainty about the size of the effect
- **D** A 25% lower hazard of the event with the treatment, statistically significant
- **E** Increased risk

299. Which is a key element of disclosure after a medical error?

- **A** Disclosure only if the patient or family asks directly what went wrong
- **B** An honest explanation, an apology and steps to prevent recurrence
- **C** Disclosure only if asked
- **D** Blaming the patient
- **E** Changing the record

300. Which approach reduces ventilator-associated events and pneumonia?

A Minimizing sedation, daily breathing trials and head-of-bed elevation in a bundle
B Daily ventilator circuit changes with routine tracheostomy on the first day of ventilation
C Deep sedation
D Daily circuit changes
E Prophylactic antibiotics for all

Answers and Explanations

Chapter 1. Structure and Function of the Respiratory System

1. Answer D. Right main bronchus
The right main bronchus is wider, shorter and more vertical than the left, so aspirated material in an upright person usually passes into it and then into the right lower lobe. The left main bronchus leaves the trachea at a sharper angle. The trap is choosing an upper lobe segment, which is favored mainly when aspiration occurs lying on one side.

2. Answer A. A larger fraction of each breath ventilates dead space
Anatomic dead space is roughly fixed per breath, so when tidal volume falls and rate rises, a larger share of each breath stays in the conducting airways. Minute ventilation can be unchanged while alveolar ventilation falls and PaCO2 rises. Resistance, compliance and carbon dioxide production do not explain the effect.

3. Answer B. The apex
Both ventilation and perfusion increase toward the base, but perfusion increases more steeply because of gravity. The apex therefore has the highest ratio, a relatively high alveolar oxygen tension and low carbon dioxide tension. The base has the lowest ratio. This gradient explains why some infections with high oxygen requirements favor the apices.

4. Answer C. The diaphragm
The diaphragm generates most of the tidal volume during quiet breathing, descending and expanding the lower rib cage through its zone of apposition. Intercostals and scalenes contribute and become more active with effort, sternocleidomastoids are accessory muscles recruited in distress, and abdominal muscles act in active expiration.

5. Answer E. A rise in temperature
Heat, acidosis, rising carbon dioxide and higher 2,3-bisphosphoglycerate all lower hemoglobin's affinity for oxygen and shift the curve to the right, which favors unloading in active tissue. Alkalosis, low 2,3-bisphosphoglycerate, carbon monoxide and fetal hemoglobin increase affinity and shift it to the left.

6. Answer E. Reduced compliance with a tendency of small alveoli to collapse
Surfactant lowers surface tension, more so as an alveolus shrinks, which stabilizes alveoli of different sizes and keeps compliance high. Without it, surface tension stays high, the lung becomes stiff and small alveoli empty into larger ones and collapse. Air trapping and higher compliance are features of emphysema, not surfactant loss.

7. Answer B. It arises from the systemic circulation and supplies the airway walls
Bronchial arteries usually arise from the aorta or intercostal arteries and nourish the airways, supporting structures and visceral pleura at systemic pressure. Part of their venous return drains into the pulmonary veins, a small physiologic shunt. Their systemic pressure explains why bronchial bleeding causes most massive hemoptysis.

8. Answer B. A fall in arterial oxygen tension
The carotid bodies sense arterial oxygen tension, responding strongly once PaO2 falls below about 60 mm Hg, and also respond to arterial carbon dioxide and pH. Central chemoreceptors sense the pH of cerebrospinal fluid. Anemia lowers oxygen content without lowering PaO2, so it does not stimulate the carotid bodies much.

9. Answer E. Desaturation that worsens with exercise and a low diffusing capacity
Diffusion limitation becomes evident when transit time shortens during exercise and is usually accompanied by a low diffusing capacity, as in interstitial disease. Both diffusion limitation and mismatch widen the alveolar-arterial gradient and respond to oxygen. A normal gradient with high $PaCO_2$ points to hypoventilation.

10. Answer D. Residual volume
Residual volume is the gas left after a maximal exhalation, so it never leaves the lungs and cannot be measured by a spirometer. It, and the capacities that include it such as functional residual capacity and total lung capacity, require body plethysmography, gas dilution or washout. The other volumes are exhaled or inhaled and can be recorded.

Chapter 2. Approach to the Patient with Respiratory Symptoms

11. Answer A. Stop the ACE inhibitor and reassess
ACE inhibitors cause a dry cough in a meaningful minority of users, and stopping the drug is both diagnostic and therapeutic, though resolution can take weeks. Bronchoscopy is reserved for features suggesting airway disease or malignancy. Steroids, antituberculous treatment and indefinite opioids are not first steps for chronic cough with a clear chest film.

12. Answer B. Gas exchange compromise or airway obstruction from blood
The danger of hemoptysis lies in asphyxiation rather than exsanguination, so the definition that matters clinically is bleeding that impairs gas exchange or threatens the airway, or that causes hemodynamic instability. Volume thresholds vary between sources. Streaked sputum, a bronchitis history or spontaneous cessation do not define massive bleeding.

13. Answer C. Pulmonary arterial hypertension with a normal left heart
Orthopnea arises when lying down raises venous return in left heart failure, or when the abdomen pushes a weak diaphragm upward, as in bilateral paralysis, ascites or obesity. Pulmonary arterial hypertension usually causes exertional breathlessness without orthopnea, because left atrial pressure is normal. The trap is assuming every breathless patient is orthopneic.

14. Answer B. Stony dullness with reduced breath sounds and reduced vocal resonance
Fluid in the pleural space damps the transmission of sound, giving stony dullness, quiet breath sounds and reduced vocal resonance. Consolidation transmits sound well, giving bronchial breathing and increased resonance. Hyperresonance with absent sounds suggests pneumothorax, and wheeze points to airflow obstruction.

15. Answer E. Reduced cricosternal distance with paradoxical inward movement of the lower ribs
Hyperinflation shortens the distance between the cricoid cartilage and the sternal notch and flattens the diaphragm, which then pulls the lower rib margins inward on inspiration (Hoover sign). Clubbing is not a feature of COPD itself and should prompt a search for cancer, bronchiectasis or fibrosis.

16. Answer C. Lung cancer
New clubbing in an older adult with weight loss is lung cancer until shown otherwise. Other pulmonary causes include bronchiectasis, lung abscess, empyema and fibrotic lung disease. Asthma, uncomplicated COPD and sleep apnea do not cause clubbing, so its presence in a patient with these conditions points to another process.

17. Answer E. Cardiopulmonary exercise testing to define the limiting system

When resting spirometry, imaging and echocardiography are unrevealing, cardiopulmonary exercise testing measures oxygen uptake, ventilatory reserve, cardiac response and gas exchange during exertion, separating cardiac, ventilatory, pulmonary vascular and deconditioning limitation. Repeating resting tests rarely adds information, and D-dimer has no role in chronic breathlessness.

18. Answer D. An intrapulmonary or intracardiac shunt that increases when upright

Platypnea-orthodeoxia arises when upright posture increases right-to-left shunting, through a patent foramen ovale or through basal arteriovenous malformations as in hepatopulmonary syndrome or hereditary hemorrhagic telangiectasia. Diaphragm paralysis and heart failure cause the opposite pattern, breathlessness lying flat.

Chapter 3. Pulmonary Function, Blood Gases and Exercise Testing

19. Answer E. Obstruction

A ratio below the lower limit of normal defines obstruction. FVC is normal, so there is no suggestion of restriction, which in any case needs total lung capacity to confirm. Severity is graded on the FEV1 z-score or percent predicted. A nonspecific pattern describes reduced FEV1 and FVC with a normal ratio and normal total lung capacity.

20. Answer D. Total lung capacity below the lower limit of normal

Restriction means a reduced total lung capacity, which requires plethysmography or gas dilution. A low FVC with a normal ratio only suggests restriction, since air trapping and poor effort can produce the same spirometry. Diffusing capacity reflects gas transfer, not lung volume, and a high residual volume indicates trapping.

21. Answer D. Acute on chronic respiratory acidosis

In acute respiratory acidosis bicarbonate rises about 1 mmol/L per 10 mm Hg of carbon dioxide, and in chronic acidosis about 3.5 to 4 mmol/L. A rise of 20 mm Hg would predict about 26 acutely and about 31 to 32 chronically. A bicarbonate of 29 sits between, fitting an acute rise on a chronic background, as in a COPD exacerbation.

22. Answer C. Alveolar hemorrhage

Free hemoglobin in the alveoli binds carbon monoxide and raises the measured diffusing capacity, as do polycythemia, asthma in some patients and left-to-right shunts. Emphysema, fibrosis and pulmonary vascular disease lower it by reducing the surface or capillary blood volume, and anemia lowers it unless corrected for hemoglobin.

23. Answer A. Ventilatory limitation

When ventilation at peak exercise approaches maximal voluntary ventilation, leaving no breathing reserve, while heart rate reserve remains, the ventilatory system is limiting, typically in airflow obstruction. Cardiac limitation exhausts heart rate reserve with an early anaerobic threshold and preserved breathing reserve. Poor effort leaves both reserves.

24. Answer B. Fixed upper airway obstruction

Flattening of both limbs reflects a fixed narrowing, such as tracheal stenosis, that limits flow whatever the transmural pressure. A variable extrathoracic lesion flattens the inspiratory limb, and a variable intrathoracic lesion flattens the expiratory limb. Small airway disease produces a concave expiratory curve rather than a plateau.

25. Answer A. Carboxyhemoglobin read as oxyhemoglobin

Standard two-wavelength oximeters cannot distinguish carboxyhemoglobin from oxyhemoglobin, so saturation appears normal while oxygen content is low. Co-oximetry on a blood sample measures the fractions directly. Methemoglobinemia tends to drive readings toward about 85%, and perfusion, motion and nail polish make readings unreliable rather than falsely normal.

26. Answer D. A change greater than 10% of the predicted value in FEV1 or FVC

The 2022 ERS/ATS interpretive standard expresses bronchodilator responsiveness as a change of more than 10% relative to the predicted value of FEV1 or FVC, which reduces bias by sex, height and baseline severity. The older criterion of 12% and 200 mL from baseline is still widely quoted, which is the trap.

Chapter 4. Thoracic Imaging, Bronchoscopy and Tissue Diagnosis

27. Answer D. Right middle lobe

The silhouette sign occurs when an opacity touches a structure of similar density. The right middle lobe abuts the right heart border, so middle lobe disease effaces it while the hemidiaphragm, bordered by the lower lobe, stays visible. Lingular disease effaces the left heart border instead.

28. Answer C. Thin-section noncontrast CT with inspiratory and expiratory images, with prone images when needed

High-resolution, thin-section noncontrast CT defines the pattern of fibrosis. Expiratory images reveal air trapping that suggests hypersensitivity pneumonitis, and prone images separate dependent atelectasis from early subpleural fibrosis. Contrast is not needed, and screening or angiographic protocols are not designed for this question.

29. Answer B. Endobronchial ultrasound-guided needle aspiration

Endosonography, by endobronchial or esophageal ultrasound, is the preferred first test for sampling mediastinal nodes and staging lung cancer. Mediastinoscopy is kept for when needle sampling is negative but suspicion remains high. Sampling only the primary leaves the nodal stage unknown.

30. Answer A. Pneumothorax

Pneumothorax is the commonest complication, more frequent with emphysema, deep lesions and multiple pleural passes, and only a minority need a drain. Pulmonary hemorrhage and hemoptysis are next. Air embolism, tract seeding and death are rare but serious, so consent should cover them.

31. Answer E. Interstitial syndrome such as pulmonary edema

Multiple B-lines in both lungs mark an interstitial syndrome, most often cardiogenic edema in the acute setting, though fibrosis and ARDS can also produce them. Normal lung shows A-lines with lung sliding, pneumothorax shows absent sliding with A-lines, and consolidation shows a tissue-like pattern.

32. Answer C. Repeated annual examinations in healthy people

Screening exposes healthy people to repeated examinations, so the protocol uses a reduced dose that still detects nodules against the high natural contrast of air. Low-dose CT has worse soft-tissue resolution and is not used for staging. Contrast is not given.

33. Answer A. To diagnose infection, alveolar hemorrhage or alveolar proteinosis

Lavage samples the alveolar space and is most useful when it shows organisms, progressively bloodier returns or hemosiderin-laden macrophages, or milky fluid with periodic acid-Schiff positive material. A lymphocytosis supports hypersensitivity pneumonitis or sarcoidosis. It cannot diagnose idiopathic pulmonary fibrosis.

34. Answer A. Inflammatory and infectious lesions can also be avid, so tissue confirmation is needed
Fluorodeoxyglucose uptake reflects glucose metabolism, so granulomatous disease, infection and inflammation give false positives, and indolent tumors such as adenocarcinoma in situ and carcinoids can give false negatives. PET guides where to sample but does not replace tissue diagnosis or invasive nodal staging when nodes are abnormal.

Chapter 5. Asthma

35. Answer D. Documented variable expiratory airflow limitation
Asthma is diagnosed from a characteristic history together with documented variable expiratory airflow limitation, such as bronchodilator responsiveness, excessive peak flow variability or a positive challenge test. IgE, imaging and family history are supportive at most, and nocturnal symptoms alone are not specific.

36. Answer C. As-needed low-dose ICS-formoterol
GINA prefers as-needed low-dose ICS-formoterol for mild asthma, because it lowers severe exacerbations compared with a short-acting beta agonist alone. Reliever-only short-acting beta agonist leaves inflammation untreated and is associated with exacerbations and death. Long-acting beta agonist monotherapy is unsafe in asthma.

37. Answer E. A raised blood eosinophil count with frequent exacerbations
Anti-IL-5 and anti-IL-5 receptor antibodies reduce exacerbations most in patients with eosinophilic asthma and a history of exacerbations, with response rising with the blood eosinophil count. Allergic IgE-driven disease points to anti-IgE therapy, and low type 2 markers predict little benefit, though tezepelumab acts across phenotypes.

38. Answer C. Aspirin-exacerbated respiratory disease
Asthma, chronic rhinosinusitis with nasal polyps and respiratory reactions to aspirin or other COX-1 inhibitors make up aspirin-exacerbated respiratory disease, driven by altered leukotriene metabolism. Leukotriene modifiers, aspirin desensitization and biologics can help. Selective COX-2 inhibitors are usually tolerated.

39. Answer D. A normal or rising PaCO2
Hyperventilation lowers PaCO2 early in an attack, so a normal or rising value in a breathless patient signals fatigue and impending failure. A silent chest, confusion and inability to speak are other markers. Alkalosis, moderate tachycardia, audible wheeze and peak flow above half of best are less ominous.

40. Answer E. It reflects type 2 airway inflammation and falls with inhaled corticosteroids
FeNO rises with IL-13-driven type 2 inflammation and falls with inhaled corticosteroid use and adherence, so it supports diagnosis and monitoring. Smoking lowers FeNO. It is raised in eosinophilic bronchitis and allergic rhinitis, so it is not specific, and it does not measure hyperresponsiveness.

41. Answer A. Inducible laryngeal obstruction
Inducible laryngeal obstruction causes inappropriate glottic or supraglottic narrowing, giving inspiratory noise and throat tightness that start and stop abruptly with exertion. Laryngoscopy during provocation confirms it. Exercise-induced bronchoconstriction causes expiratory wheeze that peaks after exercise and responds to bronchodilators.

42. Answer C. Increased risk of severe exacerbations and death
Regular or frequent short-acting beta agonist use without anti-inflammatory therapy increases severe exacerbations and asthma deaths, partly through receptor downregulation and unopposed inflammation. Dispensing of three or more canisters a year marks risk. Adrenal suppression, thrush and pneumonia are corticosteroid effects.

43. Answer E. Continue her controller, because uncontrolled asthma poses the greater risk
Poorly controlled asthma raises the risk of preeclampsia, preterm birth and low birth weight, while inhaled corticosteroids have reassuring safety data. Continuing effective controller therapy is advised. Stopping treatment is a common cause of exacerbations in pregnancy.

44. Answer A. Bronchial challenge testing with methacholine
When spirometry is normal, a bronchial challenge shows airway hyperresponsiveness, and a negative methacholine test in a symptomatic patient not taking inhaled corticosteroids makes current asthma unlikely. Allergy testing defines sensitization, not asthma, and imaging is for alternative diagnoses.

45. Answer C. Poorly controlled asthma with very high total IgE and central bronchiectasis
Allergic bronchopulmonary aspergillosis presents with difficult asthma, expectoration of brown plugs, high total IgE, aspergillus sensitization and central bronchiectasis or mucoid impaction. Screening patients with difficult asthma for aspergillus sensitization is recommended. The other features are common in ordinary asthma.

46. Answer E. Asthma that needs high-dose inhaled corticosteroid plus a second controller to stay controlled, or remains uncontrolled despite it
Severe asthma is asthma that remains uncontrolled despite adherent high-dose ICS-LABA with good technique and treated comorbidities, or that worsens when treatment is reduced. Difficult-to-treat asthma from poor adherence or technique must be addressed first. Eosinophilia defines a phenotype, not severity.

47. Answer C. Reduced bone density and cataract
High-dose inhaled corticosteroids are absorbed systemically and, over years, are associated with lower bone density, cataract, glaucoma, skin bruising and adrenal suppression. Local effects include dysphonia and thrush. Stepping down to the lowest effective dose limits these risks.

48. Answer B. Adding a valved spacer
A valved holding chamber removes the need to coordinate actuation with inhalation, slows the aerosol and reduces oropharyngeal deposition, improving delivery to the lungs. Pressurized inhalers need a slow, deep inhalation and a breath hold of about 10 seconds. Nebulizers are not needed for most patients.

49. Answer E. Early systemic corticosteroids
Systemic corticosteroids given within the first hour reduce hospital admission and relapse, and should be given to all patients with moderate or severe attacks alongside bronchodilators and oxygen to target saturation. Antibiotics are reserved for evidence of bacterial infection. Sedation is dangerous outside the ICU.

50. Answer C. Tezepelumab
Tezepelumab blocks thymic stromal lymphopoietin, an epithelial cytokine upstream of type 2 and other inflammatory pathways, so it reduces exacerbations across eosinophil levels. Omalizumab binds IgE, mepolizumab binds IL-5, benralizumab binds the IL-5 receptor and dupilumab blocks the IL-4 receptor alpha subunit.

51. Answer D. Symptoms that improve on days away from work and on holiday
Work-related asthma is suggested when symptoms or peak flow worsen on workdays and improve on rest days and holidays. Serial peak flow recording at and away from work supports the diagnosis, and specific inhalation challenge confirms it in specialized centers. Early removal from exposure improves the outlook.

52. Answer E. A limited option for selected severe asthma after biologics, in specialized centers
Bronchial thermoplasty reduces airway smooth muscle with radiofrequency heat and modestly lowers exacerbations in selected severe asthma, but it causes short-term worsening and has largely been displaced by biologics. Guidelines restrict it to specialized centers and registries. It is not used acutely or in COPD.

53. Answer A. It carries a warning for neuropsychiatric adverse effects

Leukotriene receptor antagonists are less effective than inhaled corticosteroids as controllers and are not rescue bronchodilators. The FDA added a boxed warning for neuropsychiatric events, including sleep disturbance, depression and suicidal thoughts, so benefits should be weighed. They can help aspirin-exacerbated respiratory disease.

Chapter 6. Chronic Obstructive Pulmonary Disease

54. Answer E. Post-bronchodilator FEV1/FVC below 0.7

COPD requires persistent airflow obstruction on post-bronchodilator spirometry, conventionally FEV1/FVC below 0.7 in GOLD, in a person with compatible symptoms or exposures. Emphysema on CT and chronic bronchitis can exist without obstruction. Pre-bronchodilator values overestimate obstruction.

55. Answer E. Long-term oxygen for at least 15 hours a day

In patients with resting PaO2 at or below 55 mm Hg, or 56 to 59 with cor pulmonale or polycythemia, long-term oxygen used for at least 15 hours daily prolongs survival. LOTT found no benefit in moderate desaturation. Smoking cessation also improves survival, as do selected interventions such as rehabilitation after hospitalization and home ventilation for persistent hypercapnia.

56. Answer A. Add an inhaled corticosteroid

GOLD recommends adding an inhaled corticosteroid when exacerbations continue on dual bronchodilators and blood eosinophils are 100 cells/μL or more, with the greatest benefit at 300 or more. Long-term oral corticosteroids are harmful. Theophylline adds little and has a narrow therapeutic window.

57. Answer A. Alpha-1 antitrypsin level

The WHO and major guidelines advise testing everyone with COPD for alpha-1 antitrypsin deficiency once, because it is underdiagnosed, affects family members and has specific therapy. Sweat chloride is for cystic fibrosis, and bronchoscopy and cytology are not screening tests.

58. Answer C. Stopping smoking

Smoking cessation is the only intervention shown to slow the accelerated decline in FEV1, as the Lung Health Study found. Bronchodilators and inhaled corticosteroids improve symptoms and exacerbations, and rehabilitation improves exercise capacity and quality of life, but none alters the fall in FEV1 as clearly.

59. Answer E. 5 days

A 5-day course of oral prednisone was noninferior to 14 days for reexacerbation in the REDUCE trial and reduced corticosteroid exposure. Longer courses add adverse effects without benefit. Blood eosinophil counts can identify patients unlikely to need steroids.

60. Answer A. Upper-lobe predominant emphysema with low exercise capacity after rehabilitation

In the National Emphysema Treatment Trial, upper-lobe predominant emphysema with low post-rehabilitation exercise capacity gained survival from surgery. Very low FEV1 with homogeneous disease or very low diffusing capacity carried high mortality. Bronchoscopic valves need intact fissures without collateral ventilation.

61. Answer E. Starting within 4 weeks of discharge reduces readmissions and improves outcomes

Early rehabilitation after an exacerbation, ideally within weeks of discharge, improves exercise capacity and quality of life and reduces readmissions. Benefit is seen across severity, and patients using oxygen can take part. Rehabilitation improves function without changing FEV1.

62. Answer D. Weight loss, diarrhea and psychiatric effects
Roflumilast, an oral PDE4 inhibitor for severe COPD with chronic bronchitis and exacerbations, causes diarrhea, nausea, weight loss, insomnia and, rarely, depression and suicidal thoughts. Pneumonia and thrush are associated with inhaled corticosteroids. A lower starting dose can improve tolerance.

63. Answer C. Home noninvasive ventilation targeting PaCO2 reduction
In patients with persistent hypercapnia weeks after an exacerbation, home noninvasive ventilation set to reduce PaCO2 combined with oxygen prolonged the time to readmission or death in HOT-HMV. High-intensity settings aimed at carbon dioxide reduction were used in the positive trials.

64. Answer D. Moderate resting desaturation or desaturation with exercise only
LOTT enrolled stable COPD with moderate resting desaturation of 89 to 93% or exercise-induced desaturation, and found no effect of oxygen on time to death or first hospitalization. Severe resting hypoxemia remains the indication for long-term oxygen.

65. Answer C. Azithromycin
Daily azithromycin reduced exacerbations in patients at high risk, with greater benefit in former smokers. Hearing loss, QT prolongation and macrolide resistance must be considered. Long-term oral corticosteroids are harmful, and montelukast has no role in COPD.

66. Answer A. Features of asthma mean an inhaled corticosteroid is needed, and LABA alone must be avoided
When a patient has features of both conditions, guidelines advise including an inhaled corticosteroid and never using long-acting bronchodilator monotherapy, because of the asthma risk. Bronchodilators are then added as for COPD. Overlap is a description, not a separate disease.

67. Answer D. Uncontrolled COPD with an eosinophilic phenotype despite triple or dual therapy
Dupilumab reduced moderate and severe exacerbations in COPD with blood eosinophils of 300 cells/μL or more despite maximal inhaled therapy, in the BOREAS and NOTUS trials, and is approved as add-on maintenance for an eosinophilic phenotype. It is not a treatment for emphysema in general.

Chapter 7. Bronchiectasis, Cystic Fibrosis and Disorders of the Airways

68. Answer E. Full blood count, immunoglobulins and aspergillus serology
Guidelines recommend a minimum etiological panel: blood count, serum immunoglobulins, tests for allergic bronchopulmonary aspergillosis and sputum culture including mycobacteria. Cystic fibrosis testing, ciliary studies and autoimmune tests are targeted by the clinical picture. Bronchoscopy is reserved for localized disease or a suspected foreign body.

69. Answer E. Macrolide therapy
Long-term macrolides reduce exacerbations in non-cystic fibrosis bronchiectasis with frequent exacerbations, after excluding nontuberculous mycobacteria. Recombinant DNase is harmful in non-cystic fibrosis bronchiectasis. Inhaled antibiotics are used for chronic Pseudomonas, and brensocatib is a newer option.

70. Answer A. Inhibition of dipeptidyl peptidase 1, reducing neutrophil serine protease activation
Brensocatib inhibits dipeptidyl peptidase 1, the enzyme that activates neutrophil elastase and related serine proteases during neutrophil maturation, reducing protease-driven airway damage. It reduced exacerbations in the ASPEN trial. Skin and dental adverse effects are monitored.

71. Answer C. Sweat chloride of 60 mmol/L or more
A sweat chloride of 60 mmol/L or higher in a person with clinical features or a positive newborn screen confirms cystic fibrosis, and two disease-causing CFTR variants support it. Values of 30 to 59 are intermediate and need further testing. Low fecal elastase indicates pancreatic insufficiency.

72. Answer D. Increases the open probability of CFTR at the cell surface
Ivacaftor is a potentiator that increases channel opening of CFTR already at the cell surface, so it works alone for gating variants. Correctors such as elexacaftor and tezacaftor improve folding and trafficking of F508del CFTR. Dornase alfa cleaves DNA in sputum.

73. Answer A. Burkholderia cenocepacia
Burkholderia cenocepacia is associated with rapid decline, cepacia syndrome and poor outcomes after transplantation, so many centers regard it as a relative or absolute contraindication. Strict infection control separates patients. Staphylococcus and Haemophilus are common early colonizers.

74. Answer C. Neonatal respiratory distress, year-round wet cough from infancy and situs inversus
Primary ciliary dyskinesia presents with unexplained neonatal respiratory distress at term, daily wet cough and rhinitis from early life, otitis media and laterality defects in about half. Low nasal nitric oxide, ciliary motion analysis, electron microscopy and genetics confirm it.

75. Answer A. Constrictive bronchiolitis
Constrictive (obliterative) bronchiolitis narrows small airways by fibrosis, giving progressive fixed obstruction and mosaic attenuation with air trapping. It occurs with rheumatoid arthritis, after transplantation, toxic inhalation and some drugs. Interstitial patterns show reticulation rather than air trapping.

76. Answer D. Regular airway clearance taught by a respiratory physiotherapist
Patients with chronic productive cough should be taught an airway clearance technique, such as active cycle of breathing or oscillating positive expiratory pressure, and perform it regularly, with hypertonic saline in selected patients. Pulmonary rehabilitation helps those with limited exercise capacity.

77. Answer A. Bleeding from hypertrophied bronchial arteries
Chronic infection and inflammation enlarge bronchial arteries, which can bleed, sometimes massively. Large hemoptysis is treated with bronchial artery embolization, and antibiotics treat the accompanying exacerbation. Cancer and embolism are uncommon causes in young patients with cystic fibrosis.

Chapter 8. Idiopathic Interstitial Pneumonias and Progressive Pulmonary Fibrosis

78. Answer D. Basal, subpleural reticulation with honeycombing
A typical usual interstitial pneumonia pattern, basal and subpleural reticulation with honeycombing with or without traction bronchiectasis, in a patient without an alternative cause is diagnostic of idiopathic pulmonary fibrosis in a multidisciplinary discussion. Mosaic attenuation suggests hypersensitivity pneumonitis.

79. Answer E. Nintedanib
Nintedanib and pirfenidone slow the decline in FVC, and nerandomilast has been approved more recently. PANTHER-IPF showed that prednisone, azathioprine and N-acetylcysteine increased death and hospitalization. Interferon gamma, warfarin and endothelin antagonists failed or caused harm.

80. Answer B. At least two of worsening symptoms, physiologic decline and radiologic progression within a year, without another explanation
The 2022 guideline defines progressive pulmonary fibrosis by at least two of three criteria within the past year: worse symptoms, physiologic progression (an absolute FVC decline of 5% or more, or DLCO decline of 10% or more) and radiologic progression, without an alternative explanation. Nintedanib is recommended for it.

81. Answer D. Usually no cause is found
Acute exacerbation is an acute respiratory deterioration with new bilateral ground-glass opacity; it may be triggered by infection, surgery or aspiration, but often no trigger is found. Embolism, heart failure and infection must be sought. Mortality is high.

82. Answer A. Ground-glass with reticulation and subpleural sparing, with little honeycombing
Nonspecific interstitial pneumonia shows symmetric basal ground-glass and fine reticulation with traction bronchiectasis and often relative sparing of the immediate subpleural lung, with little or no honeycombing. It is frequently associated with connective tissue disease and has a better prognosis than usual interstitial pneumonia.

83. Answer D. Pulmonary rehabilitation
Pulmonary rehabilitation improves walking distance, breathlessness and quality of life in interstitial lung disease, and ambulatory oxygen helps those who desaturate. Corticosteroids are harmful in idiopathic pulmonary fibrosis, and anticoagulation increased mortality in a trial.

84. Answer C. At or soon after diagnosis in suitable candidates
Idiopathic pulmonary fibrosis is the commonest indication for lung transplantation and can progress unpredictably, so international consensus advises referral at diagnosis for potentially suitable candidates. Late referral risks death on the waiting list. Age alone is not an absolute barrier.

85. Answer E. Two or more affected relatives or early onset with telomere-related features
Familial pulmonary fibrosis is suggested by affected relatives, early onset, and features of short telomere syndromes such as premature graying, cytopenias and liver disease. Variants in telomere genes and surfactant genes are found. Testing affects transplant planning and family counseling.

86. Answer C. Respiratory bronchiolitis-interstitial lung disease
Respiratory bronchiolitis-interstitial lung disease and desquamative interstitial pneumonia are smoking-related and usually improve when smoking stops. Pulmonary Langerhans cell histiocytosis also often regresses. Idiopathic pulmonary fibrosis is associated with smoking but does not improve with cessation.

87. Answer A. Diarrhea
Diarrhea is the most frequent adverse effect of nintedanib, managed with hydration, loperamide and dose reduction, and liver enzymes must be monitored. Photosensitivity rash and nausea are typical of pirfenidone. Both drugs need monitoring of liver tests.

88. Answer B. Upper-lobe emphysema with lower-lobe fibrosis and relatively preserved lung volumes but very low DLCO
In combined pulmonary fibrosis and emphysema, smokers have upper-lobe emphysema and lower-lobe fibrosis; the opposing effects on compliance preserve lung volumes, while the diffusing capacity falls sharply. Pulmonary hypertension and lung cancer are common.

Chapter 9. Interstitial Lung Disease in Systemic, Exposure and Drug-Related Settings

89. Answer B. Nonspecific interstitial pneumonia
Systemic sclerosis-associated interstitial lung disease most often shows a nonspecific interstitial pneumonia pattern. Mycophenolate is first-line therapy, nintedanib slows FVC decline, and tocilizumab is an option in early disease with inflammation. Anti-topoisomerase I antibodies mark higher risk.

90. Answer C. Anti-MDA5
Anti-MDA5 dermatomyositis, often with little muscle weakness and skin ulceration, is linked to rapidly progressive interstitial lung disease with high mortality, needing early combination immunosuppression. Anti-synthetase antibodies such as Jo-1 also cause lung disease but usually less rapidly progressive. Anti-TIF1-gamma is linked to cancer.

91. Answer B. Exposure to birds or feather bedding
Hypersensitivity pneumonitis is caused by inhaled antigens, most commonly avian proteins and molds, and identifying the exposure supports the diagnosis and allows avoidance. CT shows mosaic attenuation and air trapping with fibrosis that may be mid or upper zone. An exposure is not found in many patients.

92. Answer A. Bleomycin
Bleomycin causes dose-related lung injury and fibrosis, and high oxygen concentrations during later anesthesia can precipitate toxicity, so oxygen is limited. Amiodarone, nitrofurantoin, methotrexate and checkpoint inhibitors are other common causes of drug-induced lung disease.

93. Answer C. Stop the suspected drug
Withdrawal of the suspected drug is the key step, with corticosteroids for moderate or severe disease, particularly with checkpoint inhibitor pneumonitis. Infection should be excluded. Rechallenge is avoided after severe reactions.

94. Answer B. Usual interstitial pneumonia
Rheumatoid arthritis interstitial lung disease most often shows a usual interstitial pneumonia pattern, which carries a prognosis similar to idiopathic pulmonary fibrosis. Risk factors include male sex, smoking and high antibody titers. Nintedanib is used for progressive fibrosis.

95. Answer B. Peripheral and peribronchovascular consolidation, sometimes migratory, with a reversed halo sign
Organizing pneumonia shows patchy peripheral or peribronchovascular consolidation that may migrate, and the reversed halo sign of central ground-glass surrounded by a consolidated rim. It responds to corticosteroids but often relapses on tapering. It may be idiopathic or secondary.

96. Answer E. Bronchoalveolar lavage eosinophilia above 25%
Chronic eosinophilic pneumonia shows peripheral consolidation, the photographic negative of pulmonary edema, with blood or lavage eosinophilia, often above 25% in lavage. It responds dramatically to corticosteroids. Asthma frequently accompanies it.

97. Answer B. Interstitial pneumonia with some features of autoimmunity that do not meet criteria for a defined connective tissue disease
Interstitial pneumonia with autoimmune features is a research classification for patients with an interstitial pneumonia and some clinical, serologic or morphologic features suggesting autoimmunity, without meeting criteria for a defined connective tissue disease. Isolated low-titer ANA does not qualify.

98. Answer C. It is managed by grade, with corticosteroids and drug interruption for grade 2 or more
Immune checkpoint inhibitor pneumonitis is graded by symptoms and extent; grade 2 and above requires holding the drug and corticosteroids, and grade 3 or 4 requires permanent discontinuation and admission. Most cases occur within months but can occur any time. Infection must be excluded.

99. Answer B. Pleuritis with or without effusion
Pleuritis, with or without effusion, is the commonest thoracic manifestation of systemic lupus. Acute lupus pneumonitis, alveolar hemorrhage, shrinking lung syndrome and pulmonary hypertension are less common. Chronic interstitial lung disease is less frequent than in systemic sclerosis.

100. Answer E. Mycophenolate mofetil
Mycophenolate is first-line, having matched oral cyclophosphamide with better tolerability in SLS II. High-dose corticosteroids are avoided because of scleroderma renal crisis. Nintedanib and tocilizumab are added or used in selected patients, and rituximab is an alternative.

Chapter 10. Sarcoidosis and Diffuse Cystic Lung Diseases

101. Answer A. Bilateral hilar lymphadenopathy, erythema nodosum and ankle arthritis with fever
Löfgren syndrome is an acute sarcoidosis presentation with bilateral hilar adenopathy, erythema nodosum or periarticular ankle inflammation and fever, and usually resolves without treatment. Its classic features allow diagnosis without biopsy. Lupus pernio predicts chronic disease.

102. Answer A. Electrocardiogram, eye examination, calcium and renal function
Baseline screening for extrapulmonary disease includes an electrocardiogram for conduction disease, an ophthalmologic examination, serum calcium and renal and liver function. Cardiac MRI or PET follows symptoms or ECG abnormalities. Routine brain imaging and bone marrow biopsy are not needed.

103. Answer E. Oral corticosteroids
Oral corticosteroids are first-line for symptomatic pulmonary sarcoidosis with impairment or risk of organ damage. Methotrexate is the usual steroid-sparing agent, and infliximab is reserved for refractory disease. Many patients with asymptomatic disease need no treatment.

104. Answer B. Lymphangioleiomyomatosis
Lymphangioleiomyomatosis affects women, sporadically or with tuberous sclerosis complex, causing diffuse round thin-walled cysts, pneumothorax, chylous effusions and angiomyolipomas. A serum VEGF-D level of 800 pg/mL or more with typical cysts can confirm it. Sirolimus stabilizes lung function.

105. Answer A. Upper and mid-zone irregular cysts and nodules sparing the costophrenic angles in a smoker
Pulmonary Langerhans cell histiocytosis occurs almost exclusively in smokers, with nodules that cavitate into bizarre cysts predominantly in the upper and middle zones, sparing the bases. Smoking cessation is central. Birt-Hogg-Dubé causes basal paramediastinal cysts.

106. Answer C. Basal, paramediastinal cysts with skin fibrofolliculomas and renal tumors
Birt-Hogg-Dubé syndrome, from FLCN variants, causes lower-zone cysts adjacent to the mediastinum and fissures, pneumothorax, facial fibrofolliculomas and renal tumors, so renal surveillance is needed. Diagnosis rests on genetics and clinical features.

107. Answer C. Whole lung lavage or inhaled GM-CSF
Autoimmune alveolar proteinosis results from antibodies against GM-CSF that impair macrophage surfactant clearance. Whole lung lavage removes the material, and inhaled GM-CSF improved gas exchange in trials. Corticosteroids are not helpful and may increase infection.

108. Answer D. Raised serum anti-GM-CSF antibodies
A raised serum anti-GM-CSF antibody level confirms autoimmune alveolar proteinosis in a patient with crazy-paving on CT and milky lavage. VEGF-D supports lymphangioleiomyomatosis, and serum ACE is nonspecific in sarcoidosis.

109. Answer B. Palpitations, syncope or conduction abnormality on ECG
Cardiac sarcoidosis causes heart block, ventricular arrhythmias, heart failure and sudden death. Symptoms such as palpitations or syncope, or an abnormal ECG, should prompt cardiac MRI or FDG-PET and review by a cardiologist. Hilar adenopathy and erythema nodosum do not by themselves predict cardiac involvement.

110. Answer A. Recurrence is common, so pleurodesis is considered after the first episode
Pneumothorax affects most patients with lymphangioleiomyomatosis during their disease and recurs often, so pleurodesis is advised after the first episode. Prior pleurodesis increases bleeding during transplant surgery but is not a contraindication.

Chapter 11. Pneumonia and Lower Respiratory Tract Infection

111. Answer C. Amoxicillin
The ATS/IDSA guideline recommends amoxicillin for healthy outpatients, with doxycycline or, where pneumococcal macrolide resistance is low, a macrolide as alternatives. Ciprofloxacin has poor pneumococcal activity, and vancomycin, linezolid and intravenous combinations are for inpatients with specific risks.

112. Answer C. Pneumonia Severity Index
The ATS/IDSA guideline prefers the Pneumonia Severity Index over CURB-65, used with clinical judgment, to decide where to treat. The other scores apply to pulmonary embolism, sleep apnea, atrial fibrillation and upper gastrointestinal bleeding.

113. Answer B. Hydrocortisone
In the CAPE COD trial, early hydrocortisone reduced 28-day mortality in severe community-acquired pneumonia admitted to intensive care, excluding influenza and septic shock. Influenza and aspiration were excluded, so steroids are avoided in influenza pneumonia. Statins and immunoglobulin are not recommended.

114. Answer D. Blood and sputum cultures and urinary antigens for pneumococcus and Legionella
For severe pneumonia, or when MRSA or Pseudomonas coverage is started, guidelines recommend blood and respiratory cultures, with pneumococcal and Legionella urinary antigens in severe disease. Procalcitonin should not be used alone to withhold antibiotics.

115. Answer C. 5 days, provided the patient is clinically stable
Antibiotics should continue until clinical stability and for at least 5 days in total. Radiographic clearance lags weeks behind clinical recovery and does not guide duration. Longer courses are needed for complications such as empyema, abscess and some pathogens.

116. Answer E. Prior respiratory isolation of MRSA
Prior respiratory isolation of MRSA or Pseudomonas is the strongest indication for empiric coverage. Recent hospitalization with parenteral antibiotics and local validated risk factors also count. Coverage should be stopped if cultures and nasal PCR are negative.

117. Answer C. Oseltamivir started as soon as possible, regardless of symptom duration
Hospitalized patients with influenza should start oseltamivir as soon as possible, even beyond 48 hours of symptoms, because benefit persists in severe disease. Adamantanes are inactive against current strains. Corticosteroids are associated with harm in influenza pneumonia.

118. Answer A. Staphylococcus aureus
Staphylococcus aureus, including toxin-producing MRSA strains, causes severe necrotizing and cavitating pneumonia after influenza. Streptococcus pneumoniae and Streptococcus pyogenes are other post-influenza causes. Atypical organisms rarely cavitate.

119. Answer C. Pneumonia with hyponatremia, diarrhea and confusion after exposure to a water system
Legionnaires' disease can present with high fever, hyponatremia, diarrhea, confusion and raised liver enzymes after exposure to contaminated water systems. The urinary antigen detects serogroup 1. Treatment uses a fluoroquinolone or azithromycin. Bullous myringitis and cold agglutinins suggest Mycoplasma.

120. Answer B. Pneumonia arising more than 48 hours after endotracheal intubation
Ventilator-associated pneumonia arises more than 48 hours after intubation, and hospital-acquired pneumonia arises 48 hours or more after admission in nonventilated patients. Empiric therapy follows local antibiograms and MRSA and Pseudomonas risk, and 7 days is usual.

121. Answer A. Infiltrates in dependent segments such as the posterior upper lobes or superior lower lobes
Aspiration while supine affects the posterior segments of the upper lobes and superior segments of the lower lobes, and upright aspiration affects the basal segments. Routine anaerobic coverage is no longer recommended unless abscess or empyema is suspected.

122. Answer E. A person with HIV and a CD4 count below 200 cells/μL
Pneumocystis pneumonia occurs in HIV with CD4 counts below 200 cells/μL and in people on prolonged high-dose corticosteroids, after transplantation or with hematologic cancers. Prophylaxis with trimethoprim-sulfamethoxazole is given to these groups. Splenectomy predisposes to encapsulated bacteria.

123. Answer E. Dexamethasone reduced mortality in patients receiving oxygen or ventilation
RECOVERY showed that dexamethasone reduced 28-day mortality in patients receiving oxygen or invasive ventilation, with no benefit, and possible harm, in those not needing respiratory support. Hydroxychloroquine, lopinavir-ritonavir and convalescent plasma did not reduce mortality.

124. Answer B. Parapneumonic effusion or empyema
Failure to improve suggests a resistant or unusual organism, a complication such as empyema or abscess, or an alternative diagnosis. Chest ultrasound or CT detects effusions, and pleural fluid with pH below 7.2 or pus needs drainage.

125. Answer D. Supporting decisions to stop antibiotics in patients improving clinically
Procalcitonin-guided stopping of antibiotics reduces exposure without harm. The ATS/IDSA guideline advises against using it alone to decide on starting antibiotics for confirmed pneumonia, because sensitivity for bacterial infection is limited.

126. Answer A. Septic shock requiring vasopressors or respiratory failure requiring mechanical ventilation
Either major criterion, septic shock needing vasopressors or respiratory failure needing mechanical ventilation, defines severe pneumonia, as do three or more minor criteria such as respiratory rate of 30 or more, confusion, urea elevation, multilobar infiltrates and hypotension needing fluids.

127. Answer E. Pneumococcal conjugate vaccine
Pneumococcal conjugate vaccines, alone or followed by polysaccharide vaccine depending on the product, reduce invasive pneumococcal disease and vaccine-type pneumonia and are recommended for older adults and people with chronic disease. Influenza and RSV vaccines are also advised for older adults.

Chapter 12. Tuberculosis, Nontuberculous Mycobacteria and Fungal Lung Disease

128. Answer B. A positive interferon-gamma release assay with no evidence of active disease
Interferon-gamma release assays use antigens absent from BCG and most nontuberculous mycobacteria, so they are preferred in BCG-vaccinated people. Latent infection requires excluding active disease by symptoms and chest radiograph. Smear, culture and cavitation indicate active tuberculosis.

129. Answer D. Twelve once-weekly doses of isoniazid and rifapentine
Short rifamycin-based regimens, 3 months of weekly isoniazid and rifapentine, 4 months of daily rifampin or 3 months of daily isoniazid and rifampin, are preferred because of high completion and lower hepatotoxicity. Rifampin plus pyrazinamide is not recommended because of severe liver injury.

130. Answer D. Reduced visual acuity or red-green color discrimination
Ethambutol causes dose-related optic neuritis, presenting with reduced acuity and loss of red-green color discrimination. Baseline and monthly testing is advised, and the drug is stopped if vision changes. The risk is higher with renal impairment.

131. Answer B. Peripheral neuropathy
Isoniazid interferes with pyridoxine metabolism and can cause peripheral neuropathy, so pyridoxine is given to people at risk, such as those with diabetes, alcohol use, HIV, malnutrition or pregnancy. Pyridoxine does not prevent hepatitis. Hyperuricemia is a pyrazinamide effect.

132. Answer E. Mycobacterium avium complex
Mycobacterium avium complex is the commonest cause, presenting as nodular bronchiectasis in older women or fibrocavitary disease in smokers. Diagnosis needs symptoms, imaging and at least two positive sputum cultures, or one bronchoscopic culture. Mycobacterium gordonae is usually a contaminant.

133. Answer D. A macrolide, rifampin and ethambutol, often three times weekly
Guidelines recommend a three-drug regimen of azithromycin, rifampin and ethambutol, given three times weekly for noncavitary nodular-bronchiectatic disease, continued for 12 months after culture conversion. Macrolide monotherapy breeds resistance. Amikacin is added for cavitary or refractory disease.

134. Answer D. Cavitary lung disease for 3 months with aspergillus IgG and no invasive disease in a person with prior lung damage
Chronic pulmonary aspergillosis affects people with structural lung disease such as prior tuberculosis or COPD, with cavities, sometimes aspergilloma, for at least 3 months and positive aspergillus IgG. Invasive aspergillosis with halo signs occurs in neutropenia and transplantation.

135. Answer E. Nodules with a halo sign on CT and positive galactomannan
In neutropenia, CT nodules with surrounding ground-glass (halo sign), later cavitation with an air crescent, and positive serum or lavage galactomannan support invasive aspergillosis. Voriconazole or isavuconazole is first-line. Diffuse ground-glass with high LDH suggests Pneumocystis.

136. Answer C. Histoplasmosis
Histoplasma capsulatum is endemic in the Ohio and Mississippi valleys and is acquired from soil enriched by bird or bat droppings, as in caves and old buildings. Coccidioidomycosis is endemic in the southwestern desert, and blastomycosis overlaps with histoplasmosis around the Great Lakes.

137. Answer D. An all-oral regimen based on bedaquiline, pretomanid and linezolid, with or without moxifloxacin

For multidrug or rifampin-resistant tuberculosis, short all-oral regimens of bedaquiline, pretomanid and linezolid, with moxifloxacin when susceptible (BPaLM), are recommended for 6 months. Injectable agents are no longer preferred. Linezolid toxicity requires monitoring of blood counts and neuropathy.

138. Answer D. Within 2 weeks of starting tuberculosis treatment

With CD4 counts below 50 cells/μL, starting antiretroviral therapy within 2 weeks of tuberculosis treatment reduces death and AIDS events, at the cost of more immune reconstitution syndrome. Higher counts allow starting within 8 weeks. Tuberculous meningitis is an exception where early therapy is not advised.

139. Answer B. It is acquired in the southwestern United States and can cause erythema nodosum and thin-walled cavities

Coccidioides is inhaled from desert soil in the southwestern United States and northern Mexico; primary infection may cause valley fever with erythema nodosum, and residual thin-walled cavities can form. Most immunocompetent people recover without therapy, but dissemination occurs, especially in some ethnic groups and in pregnancy.

Chapter 13. Pulmonary Nodules, Lung Cancer Screening and Staging

140. Answer E. CT at 6 to 12 months, then CT at 18 to 24 months

For a single solid nodule of 6 to 8 mm in a high-risk patient, Fleischner recommends CT at 6 to 12 months and again at 18 to 24 months. Nodules under 6 mm in high-risk people may have optional CT at 12 months. Larger nodules call for CT at 3 months, PET-CT or tissue sampling.

141. Answer B. Adults 50 to 80 years with at least 20 pack-years who smoke or quit within 15 years

The USPSTF recommends annual low-dose CT for adults 50 to 80 years with at least 20 pack-years who currently smoke or quit within the past 15 years. The 2023 American Cancer Society guideline removed the years-since-quitting limit. Screening stops when health limits life expectancy or surgery.

142. Answer D. Low-dose CT screening reduced lung cancer mortality compared with chest radiography

The National Lung Screening Trial found that three annual low-dose CT screens reduced lung cancer mortality by about 20% compared with chest radiography in high-risk adults. NELSON confirmed a reduction against no screening. False positives and overdiagnosis are the main harms.

143. Answer C. A growing solid component

In part-solid nodules, the size and growth of the solid component best predict invasive adenocarcinoma. Pure ground-glass nodules are often indolent and need longer follow-up, and transient nodules that resolve are inflammatory. Multiple ground-glass nodules are managed by the dominant one.

144. Answer E. N2 is divided into single-station N2a and multiple-station N2b

The ninth edition of the TNM classification subdivides N2 into N2a, single-station involvement, and N2b, multiple-station involvement, reflecting different survival, and subdivides M1c into M1c1 and M1c2 by single or multiple organ systems.

145. Answer B. Hilar stations 10 and 11

Standard cervical mediastinoscopy reaches stations 2, 4 and 7, while EBUS can also sample hilar and interlobar nodes (stations 10 and 11) and EUS reaches stations 8 and 9. Aortopulmonary window nodes (5 and 6) need other approaches.

146. Answer D. Staging with PET-CT and tissue diagnosis or resection
A solid spiculated nodule over 8 mm in a high-risk patient carries a high probability of cancer, so PET-CT and invasive mediastinal staging when indicated, followed by biopsy or surgical resection, are appropriate. Long surveillance intervals risk progression.

147. Answer B. Cessation support should be offered to current smokers at screening
Screening is an opportunity to treat tobacco dependence, and guidelines require that current smokers are offered evidence-based cessation support. Stopping smoking reduces lung cancer and overall mortality. Current smokers are eligible for screening.

148. Answer A. A finding with a very suspicious appearance, such as a solid nodule of 15 mm or more
Lung-RADS categories 4A, 4B and 4X describe suspicious findings with rising probability of malignancy; 4B includes solid nodules of 15 mm or more at baseline and new or growing large nodules, needing chest CT, PET-CT or tissue sampling. Benign and negative findings fall in categories 1 and 2.

149. Answer A. It is most useful for solid nodules of 8 mm or more
PET-CT has useful sensitivity for solid nodules of about 8 mm or more, and guides staging. It is unreliable in subsolid nodules, small nodules and indolent tumors, and false positives arise from infection and inflammation. A negative PET lowers but does not exclude risk.

150. Answer E. Broad molecular profiling including EGFR, ALK, ROS1, KRAS, BRAF, MET, RET, NTRK and HER2, with PD-L1
Comprehensive next-generation sequencing for actionable alterations and PD-L1 immunohistochemistry should precede first-line treatment of advanced nonsquamous lung cancer, because targeted therapy outperforms chemotherapy and immunotherapy for driver-positive tumors.

151. Answer D. Diffuse, central, laminated or popcorn calcification
Benign calcification patterns, diffuse, central, laminated or popcorn, indicate granuloma or hamartoma, and intranodular fat suggests hamartoma. Spiculation, upper-lobe location, growth and larger size raise the probability of cancer, as in the Brock model.

Chapter 14. Lung Cancer Treatment and Other Thoracic Tumors

152. Answer A. Surgical resection, with segmentectomy an option for small peripheral tumors
Surgery is standard for early-stage disease in fit patients. JCOG0802 and CALGB 140503 showed that segmentectomy or sublobar resection is noninferior or superior to lobectomy for small peripheral tumors of 2 cm or less. Stereotactic radiotherapy is used for patients unfit for surgery.

153. Answer E. Consolidation durvalumab
The PACIFIC trial showed that durvalumab after chemoradiation improved progression-free and overall survival. In EGFR-mutated disease, osimertinib after chemoradiation is used instead. Pneumonitis is the main complication to monitor.

154. Answer E. Alectinib or lorlatinib
Next-generation ALK inhibitors such as alectinib, brigatinib and lorlatinib are first-line for ALK-positive disease and penetrate the central nervous system. Osimertinib targets EGFR, sotorasib KRAS G12C and dabrafenib BRAF V600E.

155. Answer C. A central mass with bulky mediastinal nodes and SIADH in a heavy smoker
Small cell lung cancer typically presents in heavy smokers as a central mass with bulky nodes and early metastases, and with paraneoplastic syndromes such as SIADH and Lambert-Eaton syndrome. Hypercalcemia from PTHrP suggests squamous carcinoma. Ground-glass lesions suggest adenocarcinoma.

156. Answer D. Platinum-etoposide with an anti-PD-L1 antibody
Platinum-etoposide combined with atezolizumab or durvalumab is standard first-line therapy for extensive-stage disease, followed by maintenance immunotherapy. Thoracic radiotherapy and brain imaging surveillance or cranial irradiation are considered for responders.

157. Answer B. Acetylcholine receptor antibody
Myasthenia gravis, with fatigable weakness, occurs in a large minority of patients with thymoma and is associated with acetylcholine receptor antibodies. Thymectomy is part of management. Voltage-gated calcium channel antibodies point to Lambert-Eaton syndrome, usually with small cell cancer.

158. Answer D. Thymoma
Thymic epithelial tumors are the commonest anterior mediastinal tumors in adults, alongside lymphoma, germ cell tumors and thyroid masses. Neurogenic tumors arise in the posterior mediastinum, and bronchogenic and pericardial cysts are in the middle mediastinum.

159. Answer C. Raised alpha-fetoprotein or beta-hCG
Nonseminomatous germ cell tumors usually raise alpha-fetoprotein and often beta-hCG, and markedly raised levels can justify treatment without biopsy. Pure seminoma does not raise alpha-fetoprotein. Markers also guide response to chemotherapy.

160. Answer B. Perioperative or neoadjuvant chemoimmunotherapy with surgery
Neoadjuvant chemotherapy with nivolumab improved event-free survival and pathologic response in CheckMate 816, and perioperative regimens with pembrolizumab or durvalumab are also approved. Adjuvant osimertinib is used for EGFR-mutated tumors.

161. Answer A. Radiation pneumonitis
Radiation pneumonitis typically appears 1 to 6 months after thoracic radiotherapy with cough, breathlessness and ground-glass or consolidation conforming to the radiation field. Moderate or severe cases are treated with corticosteroids. Risk rises with lung dose and with immunotherapy.

162. Answer B. Shoulder and arm pain with Horner syndrome
Apical tumors invade the brachial plexus, sympathetic chain and ribs, causing shoulder and ulnar arm pain and Horner syndrome of ptosis, miosis and anhidrosis. Treatment is induction chemoradiation followed by resection in resectable cases.

163. Answer A. Bronchoscopic debulking with or without stenting
Central malignant airway obstruction is relieved by rigid or flexible bronchoscopic interventions such as mechanical debulking, thermal ablation and airway stents, followed by systemic or radiation therapy where possible. Steroids may help briefly, but definitive airway restoration needs intervention.

164. Answer E. Typical carcinoids are usually central, slow-growing and treated by resection
Typical carcinoids are low-grade neuroendocrine tumors, often central endobronchial lesions causing wheeze, obstruction or hemoptysis, not strongly linked to smoking, and treated by lung-sparing resection with excellent survival. Atypical carcinoids are more aggressive.

Chapter 15. Pleural Disease

165. Answer C. Exudate
The protein ratio is 0.67, above 0.5, so one of Light's criteria is met and the fluid is an exudate; the LDH ratio of 0.6 does not exceed the threshold, but one criterion is enough. Light's criteria are very sensitive for exudates but can misclassify diuresed transudates, where a serum-pleural albumin gradient above 12 g/L supports a transudate.

166. Answer C. Frank pus or pH below 7.2
Pus, positive Gram stain or culture, or pH below 7.2 indicate a complicated parapneumonic effusion or empyema needing drainage. Intrapleural tPA with DNase improves drainage when fluid is loculated. Small free-flowing effusions with normal pH usually resolve with antibiotics.

167. Answer B. The combination of tPA and DNase improved drainage and reduced hospital stay and referral to surgery
In MIST2, tPA plus DNase improved radiographic drainage and reduced hospital stay and surgical referral, while either agent alone did not. Intrapleural streptokinase in MIST1 did not reduce death or surgery.

168. Answer C. Conservative or ambulatory management are options, with aspiration if intervention is needed
BTS 2023 offers conservative care, needle aspiration or ambulatory devices for symptomatic primary pneumothorax, guided by patient priorities. Brown and colleagues found conservative management noninferior for lung reexpansion at 8 weeks. Surgery is for recurrence or persistent air leak.

169. Answer C. Triglycerides above 110 mg/dL with chylomicrons
Chylothorax is confirmed by triglycerides above 110 mg/dL or chylomicrons, from thoracic duct disruption by surgery, lymphoma or lymphangioleiomyomatosis. Pseudochylothorax has high cholesterol and crystals from long-standing effusions. A pleural hematocrit above half of blood defines hemothorax.

170. Answer E. An indwelling pleural catheter
Pleurodesis fails when the lung cannot reexpand, so a trapped lung is managed with an indwelling pleural catheter. For expandable lung, either an indwelling catheter or talc pleurodesis is reasonable, chosen by patient priorities.

171. Answer D. Lymphocyte-predominant exudate with raised adenosine deaminase
Tuberculous pleurisy produces a lymphocytic exudate with high adenosine deaminase in high-prevalence settings; pleural fluid culture is often negative, and pleural biopsy has the highest yield. Low mesothelial cells are typical.

172. Answer C. Heart failure
Heart failure causes most transudative effusions, usually bilateral, followed by cirrhosis and nephrotic syndrome. NT-proBNP in pleural fluid or serum supports heart failure when Light's criteria misclassify diuresed effusions.

173. Answer B. Recurrent right pneumothorax around menstruation in a woman with endometriosis
Catamenial pneumothorax recurs within days of menstruation, usually on the right, linked to thoracic endometriosis and diaphragmatic defects. Treatment combines surgery with hormonal suppression.

174. Answer E. Circumferential or nodular pleural thickening over 1 cm involving the mediastinal pleura
Nodular, circumferential or mediastinal pleural thickening and thickening over 1 cm suggest malignancy, such as mesothelioma or metastases. Calcified diaphragmatic plaques indicate asbestos exposure, not malignancy. Thoracoscopic biopsy has the highest diagnostic yield.

175. Answer B. It is strongly linked to asbestos exposure with a long latency
Pleural mesothelioma is strongly associated with asbestos exposure, with latency of decades, and is not caused by smoking. Combination immunotherapy with nivolumab and ipilimumab improved survival over chemotherapy in unresectable disease.

176. Answer E. Reexpansion pulmonary edema
Reexpansion pulmonary edema can follow rapid drainage of large effusions, particularly with chronically collapsed lung, causing cough, chest discomfort and hypoxemia. Stopping drainage when symptoms develop is advised. Pleural manometry can guide safe removal.

177. Answer D. Thoracic ultrasound

Thoracic ultrasound detects small effusions, shows septations and pleural nodularity, and guides needle site selection, reducing pneumothorax and organ puncture. Guidelines recommend ultrasound guidance for all pleural procedures for fluid.

178. Answer A. A bronchopleural fistula from diseased lung that fails to seal

Secondary pneumothorax in COPD or other lung disease often leaks for days because diseased lung heals poorly. Leaks persisting beyond about 5 days warrant thoracic surgical review, or endobronchial valves or autologous blood patch in nonsurgical candidates.

Chapter 16. Venous Thromboembolism and Pulmonary Embolism

179. Answer A. No imaging; embolism is excluded

In patients with low or intermediate probability, a normal D-dimer excludes pulmonary embolism with low failure rates. Age-adjusted or probability-adjusted cutoffs (YEARS, PEGeD) safely reduce imaging. High-probability patients go straight to imaging.

180. Answer B. A direct oral anticoagulant

Direct oral anticoagulants such as apixaban or rivaroxaban are preferred over vitamin K antagonists for most patients. They are avoided in antiphospholipid syndrome with triple positivity, pregnancy and severe renal impairment. Aspirin is not adequate treatment.

181. Answer D. A patient with persistent hypotension (high-risk embolism) without contraindications

Systemic thrombolysis is indicated for high-risk embolism with persistent hypotension or shock. In intermediate-high-risk normotensive patients, PEITHO found that routine thrombolysis prevented decompensation but increased major and intracranial bleeding, so it is reserved for deterioration.

182. Answer A. 3 months

Embolism provoked by a major transient risk factor such as surgery has a low recurrence risk after stopping, so 3 months is adequate. Unprovoked embolism or persistent risk factors favor extended therapy if bleeding risk allows.

183. Answer C. Simplified Pulmonary Embolism Severity Index of 0

A simplified PESI of 0 identifies low 30-day mortality, and with Hestia criteria, adequate home support and no right ventricular dysfunction can support outpatient treatment. Wells and Geneva estimate pretest probability, not prognosis.

184. Answer A. Perfusion scan or CTPA, after leg ultrasound if leg symptoms are present

If leg symptoms exist, compression ultrasound may confirm thrombosis and avoid chest imaging. With a normal chest radiograph a perfusion scan is often chosen, and CTPA is also acceptable; both carry low fetal radiation doses. Adapted YEARS reduces imaging.

185. Answer A. Reserved for patients who cannot be anticoagulated

Filters are reserved for acute venous thromboembolism when anticoagulation is contraindicated, and should be removed when it can be started. Adding filters to anticoagulation did not reduce recurrent embolism in PREPIC2.

186. Answer D. Echocardiography and ventilation-perfusion scanning to look for chronic thromboembolic disease

Persistent breathlessness or functional limitation after 3 months of anticoagulation should prompt echocardiography and a ventilation-perfusion scan, which is more sensitive than CT for chronic thromboembolic disease, followed by right heart catheterization and expert review if abnormal.

187. Answer A. A direct oral anticoagulant or low-molecular-weight heparin, chosen by bleeding risk
Low-molecular-weight heparin and direct oral anticoagulants are both options in cancer-associated thrombosis; edoxaban, rivaroxaban and apixaban are effective, with a higher bleeding risk in gastrointestinal and genitourinary cancers for some agents. Warfarin is less effective.

188. Answer B. Right ventricular dysfunction on imaging and raised troponin in a normotensive patient
Intermediate-high-risk embolism combines right ventricular dysfunction on imaging and raised cardiac troponin without hypotension. These patients are anticoagulated and monitored closely, with rescue reperfusion if they decompensate.

Chapter 17. Pulmonary Hypertension and Pulmonary Vascular Disorders

189. Answer A. mPAP above 20 mm Hg, PAWP 15 mm Hg or less and PVR above 2 Wood units
The 2022 ESC/ERS guideline and 7th World Symposium define pulmonary hypertension as mPAP above 20 mm Hg, and precapillary disease adds PAWP of 15 or less and PVR above 2 Wood units. Raised PAWP indicates postcapillary disease.

190. Answer A. Transthoracic echocardiography
Echocardiography estimates the probability of pulmonary hypertension from tricuspid regurgitant velocity and other signs, and assesses the left heart. Right heart catheterization confirms the diagnosis. Ventilation-perfusion scanning screens for chronic thromboembolic disease.

191. Answer B. Initial combination of an endothelin receptor antagonist and a PDE5 inhibitor
Initial dual oral therapy with an endothelin receptor antagonist and a PDE5 inhibitor is recommended, based on trials such as AMBITION. High-risk patients need parenteral prostacyclin. Calcium channel blockers suit only vasoreactive patients.

192. Answer C. Those with idiopathic, heritable or drug-associated PAH who show acute vasoreactivity at catheterization
Only patients with idiopathic, heritable or drug-associated PAH who meet vasoreactivity criteria during catheterization benefit from high-dose calcium channel blockers, and long-term response must be confirmed. Others may deteriorate on these drugs.

193. Answer C. Pulmonary endarterectomy at an expert center
Pulmonary endarterectomy can cure operable chronic thromboembolic pulmonary hypertension. Balloon pulmonary angioplasty and riociguat treat inoperable or residual disease. Lifelong anticoagulation is recommended.

194. Answer D. Raised hemoglobin, thrombocytopenia, telangiectasia and bleeding
Sotatercept, an activin signaling inhibitor, increases hemoglobin, lowers platelets, and is associated with telangiectasia and bleeding, so blood counts are checked before doses. It reduced clinical worsening when added to background therapy in STELLAR and ZENITH.

195. Answer A. Group 2, from left heart disease
Left heart disease causes most pulmonary hypertension, followed by lung disease and hypoxia. Treatment targets the underlying condition, and PAH drugs are not recommended for group 2 disease. Inhaled treprostinil is approved for pulmonary hypertension with interstitial lung disease.

196. Answer D. High-dose corticosteroids with rituximab or cyclophosphamide
Diffuse alveolar hemorrhage from vasculitis is treated with pulse corticosteroids and rituximab or cyclophosphamide, with supportive care. PEXIVAS found no benefit of plasma exchange on death or end-stage kidney disease, and a reduced-dose steroid regimen was noninferior.

197. Answer A. Intrapulmonary vascular dilatations causing shunting

Hepatopulmonary syndrome combines liver disease, intrapulmonary vascular dilatations shown on contrast echocardiography, and impaired oxygenation, often worse upright. Liver transplantation reverses it. Portopulmonary hypertension is a different complication.

198. Answer C. Pulmonary arteriovenous malformations

Pulmonary arteriovenous malformations cause right-to-left shunting, hypoxemia and paradoxical emboli including stroke and brain abscess. Screening with contrast echocardiography and embolization of feeding arteries prevents complications. Antibiotic prophylaxis is advised before dental procedures.

199. Answer B. WHO functional class IV with high NT-proBNP

Risk tools such as the ESC/ERS four-strata model use functional class, 6-minute walk distance and NT-proBNP. Class IV symptoms, short walk distance, high natriuretic peptides, syncope and right heart failure predict high mortality.

200. Answer D. Sildenafil or any PDE5 inhibitor

Riociguat and PDE5 inhibitors both act on the nitric oxide pathway and together cause hypotension, so the combination is contraindicated, as is use with nitrates. Riociguat can be combined with endothelin receptor antagonists.

Chapter 18. Sleep-Disordered Breathing and Sleep Medicine

201. Answer C. Mild 5 to 14, moderate 15 to 29, severe 30 or more events per hour

Severity uses events per hour of sleep: 5 to 14 mild, 15 to 29 moderate and 30 or more severe, with oxygen desaturation and symptoms informing decisions. Home sleep apnea testing is appropriate for uncomplicated adults with suspected moderate to severe disease.

202. Answer A. An adult with high pretest probability of moderate to severe obstructive apnea without major comorbidity

Home testing is appropriate for uncomplicated adults with a high pretest probability. In-laboratory polysomnography is preferred for significant cardiopulmonary disease, neuromuscular disease, suspected hypoventilation, chronic opioid use, stroke and severe insomnia.

203. Answer A. Positive airway pressure

Positive airway pressure is first-line, improving sleepiness, quality of life and blood pressure. Oral appliances suit patients who cannot tolerate or prefer an alternative to positive airway pressure, and hypoglossal nerve stimulation, weight loss including tirzepatide, and surgery are options in selected patients.

204. Answer B. CPAP did not reduce cardiovascular events in patients with cardiovascular disease and moderate to severe OSA

SAVE found no reduction in cardiovascular events with CPAP in patients with established cardiovascular disease and obstructive sleep apnea, though mean use was only about 3.3 hours a night. CPAP did improve sleepiness, mood and quality of life.

205. Answer D. Adaptive servo-ventilation

SERVE-HF found increased cardiovascular mortality with adaptive servo-ventilation in heart failure with ejection fraction of 45% or less and predominantly central apnea, so it is contraindicated in that group. Optimizing heart failure therapy is the first step.

206. Answer E. Cataplexy with sleep-onset REM periods
Narcolepsy type 1 combines sleepiness with cataplexy, brief loss of muscle tone triggered by emotion, or low cerebrospinal fluid hypocretin. Multiple sleep latency testing shows short sleep latency and two or more sleep-onset REM periods. Restless legs causes leg discomfort relieved by movement.

207. Answer B. Tirzepatide
Tirzepatide is approved for moderate to severe obstructive sleep apnea in adults with obesity, having reduced the apnea-hypopnea index in SURMOUNT-OSA. Sedatives and opioids can worsen breathing during sleep.

208. Answer A. Cognitive behavioral therapy for insomnia
Cognitive behavioral therapy for insomnia, which combines sleep restriction, stimulus control, cognitive therapy and sleep hygiene, is first-line, with durable benefit. Hypnotics have a limited role. Alcohol fragments sleep.

209. Answer E. Iron supplementation
Iron replacement is advised when ferritin is below 75 ng/mL or transferrin saturation is low. Alpha-2-delta ligands such as gabapentin enacarbil and pregabalin are preferred first-line drugs, because dopamine agonists cause augmentation.

210. Answer D. Absence of complete concentric collapse at the velum on drug-induced sleep endoscopy
Hypoglossal nerve stimulation suits patients with moderate to severe obstructive apnea who cannot use positive airway pressure, within body mass index limits, and without complete concentric collapse at the velum on drug-induced sleep endoscopy. Central apnea predominance excludes it.

211. Answer B. Untreated sleepy patients have a higher crash risk, and effective treatment reduces it
Untreated obstructive sleep apnea with sleepiness increases motor vehicle crash risk, and CPAP reduces it. Clinicians should advise patients about drowsy driving and follow local regulations for commercial and private drivers.

212. Answer B. Dream enactment with loss of REM atonia, often preceding a synucleinopathy
REM sleep behavior disorder causes dream enactment because normal REM atonia is lost, shown on polysomnography, and is a strong early marker of Parkinson disease, Lewy body dementia and multiple system atrophy. Safety measures and melatonin or clonazepam are used.

213. Answer C. Central apnea and ataxic breathing from respiratory depression
Chronic opioids depress respiratory drive and cause central apneas and irregular ataxic breathing, often with hypoventilation and worsened obstructive events. Dose reduction is the first step, and adaptive servo-ventilation may help selected patients.

214. Answer A. Daytime sleepiness and blood pressure
Randomized trials show that CPAP reduces daytime sleepiness, improves quality of life and modestly lowers blood pressure, especially in resistant hypertension. Effects on mortality and cardiovascular events have not been shown, and CPAP can be associated with small weight gain.

215. Answer E. Airflow reduction of 30% or more for 10 seconds with 3% desaturation or an arousal
The AASM recommended hypopnea rule requires at least a 30% fall in airflow for 10 seconds or more with a 3% desaturation or an arousal. An apnea is a 90% or greater fall in airflow for at least 10 seconds. Some payers require the 4% desaturation rule.

Chapter 19. Hypoventilation, Neuromuscular and Chest Wall Disorders

216. Answer E. Awake PaCO2 of 45 mm Hg or more at sea level without another cause
Obesity hypoventilation syndrome requires a body mass index of 30 kg/m2 or more, sleep-disordered breathing and awake daytime PaCO2 of 45 mm Hg or more, after excluding other causes. A serum bicarbonate below 27 mmol/L makes it unlikely and can be used to screen.

217. Answer D. CPAP
The ATS guideline suggests CPAP rather than noninvasive ventilation for stable outpatients with obesity hypoventilation and severe obstructive apnea, based on Pickwick, in which CPAP and NIV produced similar long-term outcomes. NIV suits those without severe obstructive apnea or who fail CPAP.

218. Answer B. FVC below 50% predicted or a low maximal inspiratory pressure, with symptoms
Noninvasive ventilation prolongs survival and improves quality of life in ALS. Criteria include symptoms of hypoventilation with FVC below 50% predicted, low maximal inspiratory pressure or sniff nasal pressure, daytime hypercapnia or nocturnal desaturation. Obstruction indices are not relevant.

219. Answer E. A fall in FVC of more than 20% from upright to supine
Diaphragm weakness causes the vital capacity to fall substantially lying supine, and a drop of more than 20% to 25% suggests significant weakness. Maximal inspiratory and sniff pressures and diaphragm ultrasound add information. Resting saturation is normal until late.

220. Answer D. Vital capacity below 20 mL/kg with rapid progression and bulbar weakness
Respiratory failure in Guillain-Barré syndrome is predicted by the 20/30/40 rule: vital capacity below 20 mL/kg, maximal inspiratory pressure weaker than minus 30 cm H2O or maximal expiratory pressure below 40 cm H2O, together with rapid progression, bulbar dysfunction and autonomic instability.

221. Answer D. Mechanical insufflation-exsufflation
Mechanical insufflation-exsufflation and manually assisted cough raise peak cough flow and clear secretions, reducing infections and hospital admissions. A peak cough flow below 270 L/min identifies those who benefit.

222. Answer E. Severe kyphoscoliosis
Severe kyphoscoliosis, thoracoplasty and fibrothorax restrict the chest wall, reduce compliance and can cause chronic hypercapnic respiratory failure, first during sleep. Noninvasive ventilation treats symptoms and improves survival.

223. Answer C. Severe orthopnea with paradoxical inward abdominal movement on inspiration when supine
Bilateral diaphragm paralysis causes marked orthopnea and paradoxical abdominal motion when supine, because the abdominal contents move into the chest on inspiration. Vital capacity falls sharply supine. Unilateral paralysis is often asymptomatic.

224. Answer B. Controlled oxygen targeting saturations of 88% to 92%
In patients at risk of hypercapnic failure, excessive oxygen worsens hypercapnia through loss of hypoxic vasoconstriction, the Haldane effect and reduced drive, so a target of 88% to 92% is used. Hypoxemia must still be corrected.

225. Answer E. Severe bulbar dysfunction with inability to protect the airway or clear secretions
Noninvasive ventilation fails when bulbar weakness prevents airway protection and secretion clearance, or when support is needed nearly continuously, and tracheostomy ventilation may then be chosen in line with the patient's goals. Advance care planning should occur early.

226. Answer D. Myasthenic crisis
Myasthenic crisis causes respiratory failure from impaired neuromuscular transmission and is treated with ventilatory support and plasma exchange or intravenous immunoglobulin, followed by immunotherapy. Cholinesterase inhibitors are often held while ventilated.

227. Answer A. High cervical injury above C3
Phrenic motor neurons arise from C3 to C5, so complete injuries above C3 abolish diaphragm function and need ventilation or diaphragm pacing. Injuries at C5 and below preserve the diaphragm but weaken cough and intercostal function.

Chapter 20. Occupational and Environmental Lung Disease

228. Answer C. Discrete, often calcified parietal pleural thickening on the diaphragm and lateral chest wall
Pleural plaques are markers of asbestos exposure, typically calcified on the diaphragm and posterolateral chest wall, usually asymptomatic and not premalignant. Asbestosis is interstitial fibrosis, and diffuse pleural thickening can restrict.

229. Answer E. Accelerated silicosis
Engineered stone contains very high crystalline silica, and dry cutting has caused outbreaks of accelerated and acute silicosis in young workers, sometimes progressing to transplant. Silicosis raises tuberculosis and lung cancer risk and autoimmune disease.

230. Answer B. Chronic beryllium disease
Chronic beryllium disease causes non-necrotizing granulomas like sarcoidosis, and the beryllium lymphocyte proliferation test identifies sensitization. Exposure occurs in aerospace, electronics and metal industries. Removal from exposure and corticosteroids are used.

231. Answer C. Carboxyhemoglobin by co-oximetry
Pulse oximetry overestimates saturation in carbon monoxide poisoning, so carboxyhemoglobin must be measured by co-oximetry. Treatment is high-flow oxygen, with hyperbaric oxygen considered for severe cases with neurologic features.

232. Answer E. Byssinosis
Byssinosis, from cotton, flax and hemp dust, causes chest tightness on the first working day of the week, Monday chest tightness, with cross-shift falls in FEV1. Chronic disease leads to fixed obstruction.

233. Answer D. Preexisting asthma worsened by work conditions without a new sensitizer
Work-exacerbated asthma is preexisting asthma worsened by workplace irritants, exercise or temperature, while occupational asthma is caused by the workplace, through sensitization or irritant exposure such as reactive airways dysfunction syndrome.

234. Answer D. Lung cancer
Asbestos and smoking multiply lung cancer risk, whereas mesothelioma risk is related to asbestos but not smoking. Smoking cessation is especially important for asbestos-exposed workers, and screening may be considered for those eligible.

235. Answer C. It was linked mainly to vitamin E acetate in THC-containing products
The 2019 EVALI outbreak was strongly linked to vitamin E acetate in illicit THC vaping products, presenting with respiratory, gastrointestinal and constitutional symptoms and bilateral ground-glass opacities. Many patients improved with corticosteroids after infection was excluded.

236. Answer E. Nitrogen dioxide
Fresh silage releases nitrogen dioxide, which can cause acute pulmonary edema and later bronchiolitis obliterans in silo filler's disease. Organic dust toxic syndrome from moldy silage causes a flu-like illness without sensitization.

237. Answer D. Severe lactic acidosis with hypotension after a house fire
Burning plastics release hydrogen cyanide, and a lactate above about 8 to 10 mmol/L after smoke inhalation suggests cyanide toxicity. Hydroxocobalamin is the antidote, given with oxygen for carbon monoxide.

Chapter 21. Acute Respiratory Failure, ARDS and Mechanical Ventilation

238. Answer B. Tidal volume of 6 mL/kg predicted body weight with plateau pressure 30 cm H2O or less
The ARDS Network trial showed that 6 mL/kg predicted body weight with plateau pressure of 30 cm H2O or less reduced mortality compared with 12 mL/kg. High-frequency oscillation increased or did not change mortality. Predicted, not actual, body weight is used.

239. Answer D. Prone positioning for at least 16 hours a day
PROSEVA showed that prone positioning for long sessions in moderate to severe ARDS reduced mortality. Inhaled nitric oxide improves oxygenation without lowering mortality, and surfactant has not helped adults.

240. Answer A. Meeting inspiratory flow demand, washing out dead space and adding some PEEP
High-flow nasal oxygen supplies heated humidified gas at flows high enough to match patient demand, keeping FiO2 reliable, washing out nasopharyngeal dead space and generating modest positive pressure. FLORALI suggested lower mortality than standard oxygen in hypoxemic failure.

241. Answer E. pH 7.25 to 7.35 with PaCO2 above 45 mm Hg
Noninvasive ventilation reduces intubation and mortality in COPD exacerbations with respiratory acidosis, pH of 7.35 or below and PaCO2 above 45 mm Hg. Cardiac arrest, coma and inability to protect the airway are contraindications.

242. Answer C. Light sedation with daily interruption or protocolized targets, plus spontaneous breathing trials
Light sedation, analgesia first and paired daily awakening and spontaneous breathing trials shortened ventilation and reduced mortality in the ABC trial. Benzodiazepines are associated with delirium. Neuromuscular blockade is reserved for selected severe ARDS.

243. Answer D. A rescue option at experienced centers for refractory hypoxemia or hypercapnia despite optimized ventilation
EOLIA and its post hoc analysis suggested benefit from venovenous ECMO in very severe ARDS refractory to optimal ventilation and proning, at experienced centers. It is not a substitute for lung-protective ventilation and prone positioning.

244. Answer A. PaO2/FiO2 of 300 or less or SpO2/FiO2 of 315 or less with flow of 30 L/min or more, and bilateral opacities not explained by edema
The global definition broadens ARDS to nonintubated patients on high-flow nasal oxygen at 30 L/min or more, allows SpO2/FiO2 of 315 or less when SpO2 is 97% or less, and accepts ultrasound for bilateral opacities.

245. Answer D. Increased airway resistance such as bronchospasm or a kinked tube
Peak pressure reflects both resistance and compliance, while plateau pressure reflects compliance. A rise in peak with stable plateau indicates resistance, from secretions, bronchospasm or tube obstruction. Pneumothorax and mainstem intubation raise both.

246. Answer D. Conservative fluid management once shock resolves
FACTT showed that conservative fluid management after shock resolution increased ventilator-free days in acute lung injury without worsening organ failure. Early tracheostomy did not improve mortality.

247. Answer B. Rising plateau pressure, hypotension and expiratory flow that does not reach zero
In severe obstruction, incomplete exhalation traps gas, raising intrinsic PEEP and plateau pressure, reducing venous return and causing hypotension. Low rate, small tidal volumes, longer expiratory time and permissive hypercapnia limit hyperinflation.

248. Answer B. Passing a spontaneous breathing trial of 30 to 120 minutes
A spontaneous breathing trial on low pressure support or T-piece for 30 to 120 minutes predicts success, with a rapid shallow breathing index below 105 as a screen. Prophylactic noninvasive ventilation or high-flow oxygen after extubation helps high-risk patients.

249. Answer E. Strong inspiratory efforts generate large transpulmonary pressures that worsen lung injury
Vigorous inspiratory efforts in injured lungs can produce large swings in transpulmonary pressure and high tidal volumes, possibly worsening injury. Delayed intubation in patients failing noninvasive support has been associated with worse outcomes.

250. Answer C. Dexamethasone in moderate to severe ARDS increased ventilator-free days and reduced mortality in one trial
In DEXA-ARDS, dexamethasone started early in moderate to severe ARDS increased ventilator-free days and reduced mortality. ARDS Network LaSRS found that starting methylprednisolone after 14 days increased mortality. Guidance on steroids in ARDS varies.

251. Answer A. Atelectasis from reduced end-expiratory lung volume, improved with higher PEEP and recruitment
Obesity lowers functional residual capacity and causes dependent atelectasis, especially supine and anesthetized, which is improved by adequate PEEP, recruitment maneuvers and upright positioning. Tidal volume is still set by predicted body weight.

252. Answer B. Routine early cisatracurium did not reduce mortality compared with lighter sedation
ROSE found no mortality benefit from routine early cisatracurium with deep sedation in moderate to severe ARDS, compared with lighter sedation. Blockade is reserved for refractory dyssynchrony or severe hypoxemia.

253. Answer D. Calculated from height and sex to set tidal volume
Predicted body weight is derived from height and sex, because lung size relates to height rather than to actual weight. Using actual weight in obesity would deliver injurious tidal volumes.

254. Answer E. A fall in driving pressure with improved oxygenation
If raising PEEP recruits collapsed alveoli, compliance rises, so driving pressure (plateau minus PEEP) falls and oxygenation improves. A rise in driving pressure, dead space and $PaCO_2$ or hypotension suggests overdistension. Driving pressure is strongly associated with survival in ARDS.

Chapter 22. Sepsis, Shock and the Care of the Critically Ill Patient

255. Answer E. Norepinephrine
Norepinephrine is recommended first line, targeting an initial mean arterial pressure of 65 mm Hg. Vasopressin is added rather than escalating norepinephrine when pressure remains inadequate, and dopamine causes more arrhythmias.

256. Answer C. At least 30 mL/kg of intravenous crystalloid within the first 3 hours
The Surviving Sepsis Campaign suggests at least 30 mL/kg of crystalloid within the first 3 hours, guided by reassessment of dynamic measures, capillary refill and lactate. Balanced crystalloids are suggested over saline, and starches increase kidney injury.

257. Answer E. Within 1 hour of recognition
In possible septic shock or probable sepsis, antimicrobials should be given immediately, ideally within 1 hour of recognition, after obtaining cultures without delay. Each hour of delay is associated with increased mortality.

258. Answer B. Start insulin at 180 mg/dL and target 144 to 180 mg/dL
NICE-SUGAR found that intensive control with a target of 81 to 108 mg/dL increased mortality and severe hypoglycemia compared with a target of 180 mg/dL or less. Guidelines start insulin at 180 mg/dL and aim for 144 to 180 mg/dL.

259. Answer C. Nonpharmacologic bundles such as ABCDEF with early mobility and sleep promotion
Bundles that address pain, spontaneous awakening and breathing trials, sedation choice, delirium monitoring, early mobility and family engagement reduce delirium and improve outcomes. Antipsychotics do not prevent delirium or reduce its duration.

260. Answer A. Increase in stroke volume after a passive leg raise
Dynamic tests such as passive leg raising with stroke volume measurement, or pulse pressure variation in fully ventilated patients in sinus rhythm, predict fluid responsiveness better than static pressures such as central venous pressure.

261. Answer E. 7 g/dL
TRICC and later trials support a restrictive threshold of 7 g/dL for most critically ill adults without acute coronary syndrome or active bleeding. Liberal transfusion did not improve outcomes.

262. Answer C. It is a bedside measure of peripheral perfusion that guided resuscitation as well as lactate in ANDROMEDA-SHOCK
ANDROMEDA-SHOCK compared resuscitation targeting capillary refill time with lactate and found less organ dysfunction at 72 hours and a nonsignificant trend to lower mortality. The Surviving Sepsis Campaign suggests capillary refill as an adjunct.

263. Answer D. Adults with an ongoing requirement for vasopressors
The Surviving Sepsis Campaign suggests intravenous corticosteroids for adults with septic shock and an ongoing vasopressor requirement, typically hydrocortisone 200 mg per day. ADRENAL showed faster shock resolution without a mortality difference.

264. Answer A. Early mobilization and avoiding deep sedation and hyperglycemia
ICU-acquired weakness arises from critical illness polyneuropathy and myopathy, increased by sepsis, hyperglycemia, corticosteroids and immobility. Early mobilization within the first days, as in Schweickert's trial, improved functional independence at discharge.

265. Answer E. New or worse physical, cognitive or mental health impairment after critical illness
Post-intensive care syndrome describes new or worsening impairments in physical function, cognition and mental health that persist after critical illness, affecting survivors and families. Follow-up clinics, rehabilitation and diaries may help.

266. Answer A. Prophylaxis for patients with risk factors for gastrointestinal bleeding, such as coagulopathy or shock
Stress ulcer prophylaxis with a proton pump inhibitor or H2 blocker is suggested for patients at risk of bleeding, such as those with coagulopathy, shock or chronic liver disease. Universal prophylaxis is not supported.

267. Answer B. Raised lactate and tachyarrhythmias
Epinephrine stimulates beta-2 receptors, raising lactate through aerobic glycolysis and causing tachycardia and arrhythmias. It is a second-line agent added to norepinephrine when cardiac output is inadequate. Dobutamine may be added for myocardial dysfunction.

268. Answer C. Structured family meetings with clear prognostic communication and shared decision making
Proactive family conferences with clear information, empathic communication and shared decision making reduce surrogate anxiety, depression and post-traumatic stress symptoms and align care with patient values.

Chapter 23. Lung Transplantation and Pulmonary Complications of Other Transplants

269. Answer B. Recent malignancy with a high risk of recurrence
Recent malignancy with high recurrence risk, active infection that cannot be controlled, significant uncorrectable other organ dysfunction, active substance use and poor adherence or support are contraindications. Age alone and pulmonary hypertension are not absolute.

270. Answer B. Chronic lung allograft dysfunction
Chronic lung allograft dysfunction, in bronchiolitis obliterans and restrictive phenotypes, is the main cause of death beyond the first year, with infection and cancer. Primary graft dysfunction dominates the first 72 hours.

271. Answer C. Persistent fall in FEV1 of 20% or more from baseline with obstruction and no other cause
Bronchiolitis obliterans syndrome is a persistent FEV1 decline of 20% or more from the post-transplant baseline with an obstructive pattern, after excluding other causes. The restrictive phenotype adds a fall in total lung capacity and fibrosis on imaging and has a worse prognosis.

272. Answer B. Acute lung injury of the allograft within 72 hours of transplantation
Primary graft dysfunction is ischemia-reperfusion injury of the allograft within 72 hours, graded by PaO2/FiO2 and bilateral infiltrates. Severe grade 3 disease increases early mortality and the later risk of chronic lung allograft dysfunction.

273. Answer C. Pneumocystis prophylaxis with trimethoprim-sulfamethoxazole and CMV prophylaxis according to serostatus
Lung transplant recipients receive Pneumocystis prophylaxis, cytomegalovirus prophylaxis or preemptive monitoring based on donor and recipient serostatus, and often antifungal prophylaxis. Latent tuberculosis is screened and treated before transplant.

274. Answer B. Bronchiolitis obliterans syndrome
Bronchiolitis obliterans syndrome after allogeneic transplantation is the lung manifestation of chronic graft-versus-host disease, causing fixed obstruction. Diffuse alveolar hemorrhage, engraftment syndrome and idiopathic pneumonia syndrome occur early.

275. Answer A. Inhaled fluticasone, azithromycin and montelukast (FAM)
Inhaled fluticasone, azithromycin and montelukast stabilized lung function in a pilot study and is commonly used with systemic graft-versus-host therapy, though azithromycin raised relapse concerns in one trial. Ruxolitinib and belumosudil are options for steroid-refractory chronic graft-versus-host disease.

276. Answer B. Perivascular lymphocytic infiltrates on transbronchial biopsy
Acute cellular rejection is graded on transbronchial biopsy by perivascular lymphocytic infiltrates (A grades) and airway inflammation (B grades). It is treated with pulse corticosteroids. Antibody-mediated rejection needs donor-specific antibodies and other criteria.

277. Answer A. It ranks candidates continuously using medical urgency, post-transplant survival and other factors
The composite allocation score, adopted in March 2023, ranks lung transplant candidates continuously by medical urgency, expected post-transplant survival, biologic disadvantages, patient access and placement efficiency, replacing fixed geographic boundaries.

278. Answer C. Diffuse alveolar hemorrhage
Diffuse alveolar hemorrhage after hematopoietic transplantation presents with hypoxemia and progressively bloodier lavage returns, often around engraftment, and carries high mortality despite high-dose corticosteroids.

Chapter 24. Respiratory Therapeutics

279. Answer A. Varenicline
In EAGLES, varenicline produced higher abstinence rates than bupropion, nicotine patch or placebo, in smokers with and without psychiatric disorders, without a significant increase in neuropsychiatric adverse events. Combination nicotine replacement is also highly effective.

280. Answer A. A slow, gentle inhalation instead of a fast, forceful one
Dry powder inhalers need a fast, deep inspiration to deaggregate the powder, while pressurized inhalers need a slow inhalation. Patients with weak inspiratory flow may need a pressurized inhaler with a spacer or a soft mist inhaler.

281. Answer E. Supervised exercise training
Exercise training, endurance and resistance, is the core of pulmonary rehabilitation, supplemented by education, self-management and psychosocial support. Rehabilitation improves exercise capacity, breathlessness and quality of life in COPD and other chronic lung diseases.

282. Answer E. To avoid both hypoxemia and the harms of hyperoxemia
BTS guidance targets 94% to 98% for most acutely ill patients and 88% to 92% for those at risk of hypercapnic failure. Oxygen treats hypoxemia, not breathlessness, and liberal oxygen has been associated with higher mortality.

283. Answer B. Pressurized inhalers with spacers are as effective as nebulizers for most acute bronchodilation
For acute bronchodilation in asthma and COPD, pressurized inhalers with spacers are as effective as nebulizers, and nebulizers are kept for patients unable to use them or needing continuous treatment. Nebulizers generate infectious aerosols.

284. Answer D. Brief advice combined with pharmacotherapy and behavioral support
Brief advice from clinicians increases quit attempts, and combining pharmacotherapy with behavioral support is most effective. Opt-out treatment in hospital improves cessation. E-cigarettes with behavioral support were more effective than nicotine replacement in one trial.

285. Answer D. Long-acting muscarinic antagonists

Muscarinic antagonists such as tiotropium can cause dry mouth, urinary retention and acute angle-closure glaucoma if the mist contacts the eye. Beta agonists cause tremor and tachycardia, and inhaled corticosteroids cause dysphonia and thrush.

286. Answer C. Smoking near oxygen is a major fire and burn risk

Oxygen supports combustion, and smoking while using home oxygen causes facial burns and house fires. Clinicians should assess smoking and counsel patients and families before prescribing, and fire breaks in tubing reduce harm.

Chapter 25. Quality, Safety, Ethics and Reading the Evidence

287. Answer C. 4.5

The positive likelihood ratio is sensitivity divided by 1 minus specificity: 0.9 divided by 0.2 equals 4.5. The negative likelihood ratio is 1 minus sensitivity divided by specificity: 0.1 divided by 0.8, or 0.125.

288. Answer E. 20

The absolute risk reduction is 20% minus 15%, or 5%, so the number needed to treat is 1 divided by 0.05, which is 20. The relative risk reduction is 25%, which sounds larger and is the trap.

289. Answer D. Noninferiority trial

A noninferiority trial tests whether the new treatment is not worse than the comparator by more than a prespecified margin, justified clinically. Per-protocol analyses are important because intention-to-treat can bias toward noninferiority.

290. Answer D. It preserves the balance created by randomization

Analyzing patients in the groups to which they were randomized preserves the balance of known and unknown confounders and reflects the effect of a treatment strategy in practice. It does not solve missing data, which needs separate handling.

291. Answer B. An evidence-based checklist for central line insertion with a culture of safety

The Keystone program combined an evidence-based insertion checklist, hand hygiene, full barrier precautions, chlorhexidine skin preparation, avoiding the femoral site and removing unneeded catheters, with a safety culture, and reduced infections sharply and sustainably.

292. Answer C. Withholding and withdrawing treatment are ethically equivalent

Most ethics frameworks hold that there is no ethical difference between withholding and withdrawing a treatment that is no longer consistent with the patient's values or goals. Decisions are shared with patients or surrogates.

293. Answer A. Confidence that the estimate of effect is close to the true effect

GRADE rates certainty as high, moderate, low or very low, downgrading for risk of bias, inconsistency, indirectness, imprecision and publication bias. Strength of recommendation is a separate judgment that also weighs values, preferences and resources.

294. Answer E. Lead-time bias

Lead-time bias makes survival from diagnosis appear longer because diagnosis is earlier, even if death occurs at the same time. Randomized screening trials comparing mortality avoid this bias; length-time bias and overdiagnosis are separate problems with screening.

295. Answer B. Substituted judgment based on what the patient would have wanted

Surrogates should use substituted judgment, deciding as the patient would have, informed by advance directives and prior statements. When the patient's wishes are unknown, the best-interest standard applies.

296. Answer D. Results are hard to interpret when components differ greatly in importance and frequency
Composite endpoints increase event rates and power but may be driven by frequent, less important components, such as hospitalization, while the most important, such as death, is unchanged. Each component should be reported.

297. Answer B. A high pretest probability
Posttest probability depends on pretest probability and the likelihood ratio. A positive result in a high-prevalence setting has a higher positive predictive value. A likelihood ratio of 1 does not change probability.

298. Answer D. A 25% lower hazard of the event with the treatment, statistically significant
A hazard ratio of 0.75 means a 25% relative reduction in the instantaneous event rate, and the confidence interval excluding 1 indicates statistical significance. Absolute benefit depends on baseline risk.

299. Answer B. An honest explanation, an apology and steps to prevent recurrence
Disclosure involves a prompt, honest explanation of what happened, an expression of regret or apology, and description of steps taken to prevent recurrence. Communication-and-resolution programs support patients and staff.

300. Answer A. Minimizing sedation, daily breathing trials and head-of-bed elevation in a bundle
Bundles that minimize sedation, pair awakening and breathing trials, elevate the head of the bed and promote early mobility reduce ventilator days and ventilator-associated events. Routine circuit changes do not help.