

TEST BANK

Bontrager's Textbook of Radiographic Positioning and Related Anatomy

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10th Edition

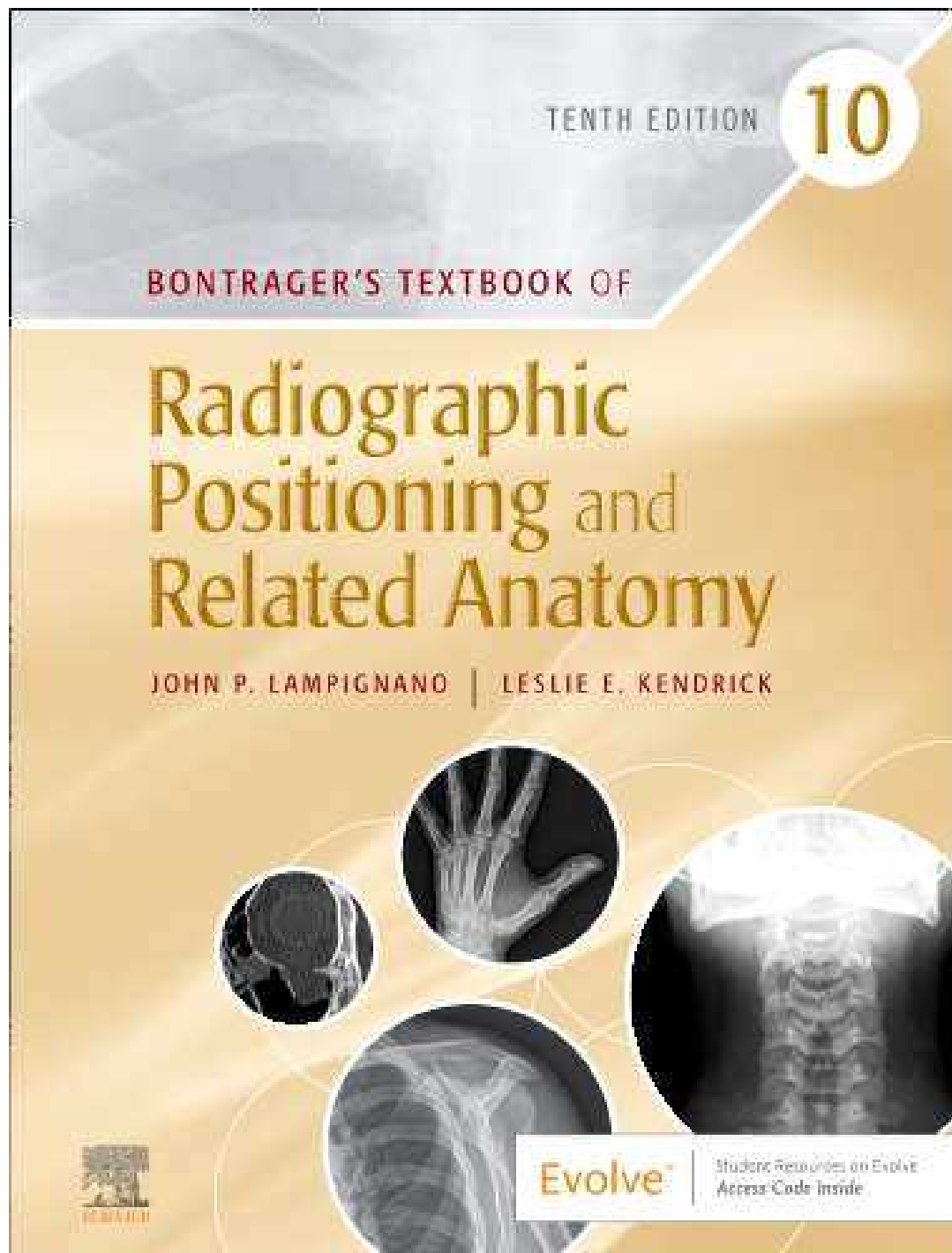


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Chapter 01: Terminology, Positioning, and Imaging Principles

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MULTIPLE CHOICE

1. What type of tissue binds together and supports the various structures of the body?
 - a. Epithelial
 - b. Connective
 - c. Muscular
 - d. Nervous

ANS: B

REF: 3

2. The lowest level of structural organization in the human body is the _____ level.
 - a. molecular
 - b. cellular
 - c. chemical
 - d. atomic

ANS: C

REF: 3

3. What type of tissue covers internal and external surfaces of the body?
 - a. Muscular
 - b. Connective
 - c. Nervous
 - d. Epithelial

ANS: D

REF: 3

4. How many individual body systems comprise the human body?
 - a. 22
 - b. 13
 - c. 10
 - d. 8

ANS: C

REF: 3

5. How many separate bones are found in the adult human body?
 - a. 181
 - b. 215
 - c. 206
 - d. 236

ANS: C

REF: 4

6. Which system of the human body is responsible for the elimination of solid waste?
 - a. Circulatory
 - b. Respiratory
 - c. Urinary
 - d. Digestive

ANS: D REF: 4

7. Which of the following systems of the human body includes all ductless glands of the body?
- Endocrine
 - Integumentary
 - Muscular
 - Glandular

ANS: A REF: 6

8. Which of the following body systems helps to regulate body temperature?
- Circulatory
 - Urinary
 - Endocrine
 - Nervous

ANS: A REF: 7

9. Which of the following bones is part of the axial skeleton?
- Radius
 - Hip bone
 - Clavicle
 - Sternum

ANS: D REF: 7

10. How many bones are there in the adult axial skeleton?
- 206
 - 80
 - 54
 - 126

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ANS: B REF: 7

11. What is the name of the small oval-shaped bone found in tendons?
- Wormian
 - Tendinous
 - Irregular
 - Sesamoid

ANS: D REF: 8

12. Which of the following bones is classified as a long bone?
- Carpal bone
 - Scapula
 - Cranium
 - Humerus

ANS: D REF: 8

13. What is the name of the dense fibrous membrane that covers bone?
- Cancellous portion

- b. Periosteum
- c. Diploë
- d. Medullary portion

ANS: B REF: 9

14. Which of the following bones is classified as a short bone?

- a. Vertebrae
- b. Phalanges (toes)
- c. Scapulae
- d. Carpal (wrist bones)

ANS: D REF: 9

15. Which of the following is a secondary growth center for endochondral ossification?

- a. Diaphysis
- b. Epiphyses
- c. Metaphysis
- d. Articular cartilage

ANS: B REF: 10

16. Which aspect of the long bones is responsible for the production of red blood cells?

- a. Compact bone
- b. Periosteum
- c. Medullary cavity
- d. Spongy or cancellous bone

ANS: D REF: 10 NURSINGTB.COM

17. Examples of “flat” bones are the:

- a. calvaria, ribs, scapulae, and sternum.
- b. ribs, sternum, patella, and ilia of pelvis.
- c. sternum, scapulae, ilia of pelvis, and base of cranium.
- d. sternum and ilia of pelvis only.

ANS: A REF: 9

18. What is the primary center for bone growth termed?

- a. Epiphyses
- b. Diaphysis
- c. Metaphysis
- d. Epiphyseal plate

ANS: B REF: 10

19. Which of the following is NOT a functional classification of joints?

- a. Synarthrosis
- b. Amphiarthrosis
- c. Cartilaginous
- d. Diarthrosis

ANS: C REF: 11

20. The structural term for a freely movable joint is:

- a. fibrous.
- b. cartilaginous.
- c. synovial.
- d. gomphosis.

ANS: C

REF: 11

21. Which of the following joints displays flexion and extension type of movement primarily?

- a. Pivot
- b. Ellipsoidal
- c. Saddle
- d. Ginglymus

ANS: D

REF: 13

22. Which of the following joints is NOT a synovial joint?

- a. Skull suture
- b. Elbow joint
- c. Hip joint
- d. Proximal radioulnar joint

ANS: A

REF: 12 |14

23. Which of the following is classified as a saddle (sellar) joint?

- a. Ankle joint
- b. Temporomandibular joint
- c. Knee joint
- d. Intercarpal joint

ANS: A

REF: 13

24. Which of the following is classified as a bicondylar joint?

- a. Shoulder joint
- b. Temporomandibular joint
- c. First and second cervical vertebra joint
- d. Distal radioulnar joint

ANS: B

REF: 14

25. An upright position with the arms abducted, palms forward, and head forward describes the _____ position.

- a. anteroposterior (AP)
- b. decubitus
- c. anatomic
- d. oblique

ANS: C

REF: 10

26. A representation of the patient's anatomic structures that can be obtained, viewed, manipulated, and stored digitally is the definition for:

- a. radiographic film.

- b. radiography.
- c. radiographic image.
- d. radiographic examination.

ANS: C REF: 16

27. The vertical plane that divides the body into equal right and left halves describes the _____ plane.
- a. coronal
 - b. median or midsagittal
 - c. longitudinal
 - d. horizontal

ANS: B REF: 17

28. A longitudinal plane that divides the body into equal anterior and posterior parts is the _____ plane.
- a. midcoronal
 - b. midsagittal
 - c. horizontal
 - d. oblique

ANS: A REF: 17

29. Which of the following terms describes the sole of the foot?
- a. Palmar
 - b. Dorsum
 - c. Volar
 - d. Plantar

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ANS: D REF: 18

30. Which term describes the back or posterior aspect of the hand?
- a. Dorsum pedis
 - b. Dorsum manus
 - c. Palmar
 - d. Volar

ANS: B REF: 18

31. A position in which the head is lower than the feet is:
- a. Trendelenburg.
 - b. lithotomy.
 - c. Fowler.
 - d. recumbent.

ANS: A REF: 20

32. Which term describes lying down in any position?
- a. Horizontal
 - b. Fowler
 - c. Recumbent
 - d. Anatomic

ANS: C REF: 20

33. A recumbent oblique position in which the patient is lying on the left anterior surface with it rotated toward the image receptor is termed:
- right posterior oblique.
 - left posterior oblique.
 - Sims' position.
 - Fowler position.

ANS: C REF: 21

34. A patient is lying on her back facing the x-ray tube. The right side of her body is turned 20° toward the image receptor. What is this radiographic position?
- LPO (left posterior oblique)
 - RPO (right posterior oblique)
 - RAO (right anterior oblique)
 - LAO (left anterior oblique)

ANS: B REF: 21

35. A patient is erect with the left side directly against the image receptor. The central ray (CR) enters the right side of the body. What is this radiographic position?
- Right lateral
 - Left lateral decubitus
 - Left lateral
 - Dorsal decubitus

ANS: C REF: 21 NURSINGTB.COM

36. A patient is lying on her back. The x-ray tube is horizontally directed with the CR entering the right side of the body. The image receptor is adjacent to the left side of the body. What is the radiographic position?
- Left lateral decubitus
 - Left lateral
 - Right lateral decubitus
 - Dorsal decubitus

ANS: D REF: 22

37. A patient is erect facing the image receptor. The left side of the body is turned 45° toward the image receptor. The CR enters the posterior aspect of the body and exits the anterior. What is this radiographic position?
- LAO
 - LPO
 - Left lateral
 - Posteroanterior (PA)

ANS: A REF: 21

38. What type of projection is created with the CR directed along or parallel to the long axis of a structure or anatomic part?
- Axial

- b. Tangential
- c. Lordotic
- d. Transthoracic

ANS: A REF: 23

39. A projection in which the CR skims a body part to project it in profile is termed:
- a. tangential.
 - b. lordotic.
 - c. axial.
 - d. decubitus.

ANS: A REF: 23

40. What is the general term for a position in which the long axis of the body is angled in relationship to the image receptor rather than the central ray (e.g., special chest projection)?
- a. Axial
 - b. Trendelenburg
 - c. Decubitus
 - d. Lordotic

ANS: D REF: 23

41. The opposite term for supination is:
- a. protraction.
 - b. adduction.
 - c. pronation.
 - d. retraction.

ANS: C REF: 28

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42. Which of the following positions is often used to insert a rectal enema tip before a barium enema study?
- a. Fowler
 - b. Modified Sims'
 - c. Lithotomy
 - d. Trendelenburg

ANS: B REF: 20

43. A dorsoplantar projection would be a radiographic study of:
- a. any anatomic region.
 - b. the hand.
 - c. the foot.
 - d. the skull.

ANS: C REF: 24

44. Moving the foot and toes downward is:
- a. eversion.
 - b. inversion.
 - c. dorsiflexion.
 - d. plantar flexion.

ANS: D REF: 27

45. Movement in the form of a circle is the definition for:
- rotation.
 - retraction.
 - circumduction.
 - protraction.

ANS: C REF: 29

46. Which of the following terms is the opposite of ipsilateral?
- Medial
 - Deviation
 - Contralateral
 - Axiolateral

ANS: C REF: 25

47. The radiographic term *projection* is defined as:
- general position of the patient.
 - path or direction of the central ray.
 - radiographic image as seen from the vantage of the image receptor.
 - computer-assisted image.

ANS: B REF: 30

48. Which of following is NOT one of the evaluation criteria applied in the evaluation of images?
- Patient condition
 - Anatomy demonstrated
 - Collimation and CR
 - Exposure criteria

ANS: A REF: 31

49. A patient enters the emergency department (ED) with a piece of wire in the palm of the hand. What is the minimum number of projections required to be taken for this radiographic study?
- One
 - Two
 - Three
 - Four or more

ANS: B REF: 34

50. Which of the following radiographic procedures often only requires a single AP projection be taken?
- Finger
 - Ribs
 - Chest
 - Pelvis

ANS: D REF: 35

51. What is the final step taken before making the exposure during a positioning routine?
- Image receptor centering
 - Placing anatomic markers on image receptor
 - Ensuring correct gonadal shield placement
 - Collimation adjustments

ANS: C

REF: 34

52. What is the minimal number of projections taken for a study of the femur?
- One
 - Two
 - Three
 - Four

ANS: B

REF: 35

53. What is the minimal number of projections taken for a study of the right hip?
- One
 - Two
 - Three
 - Four

ANS: B

REF: 35

54. What is the minimal number of projections taken for a postreduction (to realign a fracture) study of the ankle?
- One
 - Two
 - Three
 - Four

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ANS: B

REF: 35

55. What is the minimal number of projections taken for a study of the elbow?
- One
 - Two
 - Three
 - Four

ANS: C

REF: 35

56. A patient is erect with the left side of his chest placed against the image receptor. The central ray enters the right side of the upper chest and exits the left. Which specific position has been performed?
- Dorsal decubitus
 - Transthoracic lateral
 - Right lateral
 - Ventral decubitus

ANS: B

REF: 24

57. A patient is erect facing the x-ray tube and leaning the shoulders backward 20° to 30° toward the IR. The central ray is perpendicular to the IR. What specific position has been performed?

- a. Lordotic
- b. Oblique
- c. Kyphotic
- d. Tangential

ANS: A REF: 23

58. The top of the foot is placed against the image receptor with the perpendicular central ray entering the sole of the foot. What specific projection has been performed?
- a. Transpedal
 - b. Plantodorsal
 - c. Axial dorsoplantar
 - d. Tangential plantodorsal

ANS: B REF: 24

59. The patient is lying on her right side on a cart. The anterior surface of the patient is against the image receptor. A horizontal central ray enters the posterior surface and exits the anterior surface of the body. What specific projection/position has been performed?
- a. AP
 - b. PA
 - c. Right lateral decubitus
 - d. Left lateral decubitus

ANS: C REF: 22

60. The patient's head and neck are hyperextended with the top of the skull directly against the image receptor. The central ray enters just below the chin. Which specific projection has been performed?
- a. Submentovertical
 - b. Acanthioparietal
 - c. Parietoacanthial
 - d. Verticosubmental

ANS: A REF: 24

61. Which of the following is NOT one of the four image quality factors of an analog radiograph?
- a. Contrast
 - b. Spatial resolution
 - c. Source image receptor distance (SID)
 - d. Distortion

ANS: C REF: 39

62. The amount of blackness seen on a processed radiograph is called:
- a. fog.
 - b. scatter.
 - c. contrast.
 - d. density.

ANS: D REF: 39

63. Which of the following factors primarily controls radiographic density in the analog image?

- a. kV
- b. mAs
- c. Film-screen speed
- d. Optimal immunomodulating dose (OID)

ANS: B REF: 39-40

64. A radiograph of the hand is underexposed and nondiagnostic. The following analog (film-screen) exposure factors were used: 50 kV, 2 mAs, 40-inch (102 cm) SID. Which of the following sets of exposure factors should be used during the repeat exposure?
- a. 50 kV, 8 mAs, 40 inches (102 cm)
 - b. 50 kV, 1 mAs, 40 inches (102 cm)
 - c. 60 kV, 4 mAs, 40 inches (102 cm)
 - d. 50 kV, 4 mAs, 40 inches (102 cm)

ANS: D REF: 39

65. A ____% increase in kV will increase density the same as doubling the mAs (analog imaging).
- a. 15
 - b. 10
 - c. 100
 - d. 25

ANS: A REF: 42

66. Exposure time is usually expressed in units of:
- a. seconds.
 - b. nanoseconds.
 - c. microseconds.
 - d. milliseconds.

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ANS: D REF: 39

67. What is the primary controlling factor for radiographic contrast in analog imaging?
- a. kV
 - b. mA
 - c. Film-screen speed
 - d. SID

ANS: A REF: 42

68. Which of the following radiographic studies would best benefit by applying the anode heel effect?
- a. Hand
 - b. Skull
 - c. Thoracic spine
 - d. Ribs

ANS: C REF: 40

69. Which of the following devices can be used rather than applying the anode heel effect to compensate for anatomic part thickness differences?

- a. Compensating filters
- b. Copper filters
- c. Graded screens
- d. Added filtration

ANS: A REF: 41

70. Short scale contrast (in the analog image) is the result of:
- a. scatter radiation.
 - b. collimation.
 - c. high kV.
 - d. low kV.

ANS: D REF: 42

71. What is the most effective method to reduce the production of scatter radiation?
- a. Increase kV.
 - b. Increase mAs.
 - c. Collimate.
 - d. Use a grid.

ANS: C REF: 42

72. A radiograph of the abdomen is underexposed and must be repeated. The original **analog** exposure factors used were 65 kV with 25 mAs. The technologist decides to keep the mA at the same level but change the kV to increase radiographic density. How much of an increase is needed in kV to double the density?
- a. 3 to 5 kV
 - b. 9 to 10 kV
 - c. 10 to 15 kV
 - d. 15 to 20 kV

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ANS: B REF: 39

73. What type of radiographic contrast is produced with a high (120) kV technique?
- a. Low contrast, short scale
 - b. High contrast, short scale
 - c. Low contrast, long scale
 - d. High contrast, long scale

ANS: C REF: 42

74. Which of the following controlling factors will most affect radiographic resolution?
- a. kV
 - b. mAs
 - c. Filtration
 - d. Focal spot size

ANS: D REF: 44

75. The unsharp edge of the projected image is termed:
- a. distortion.
 - b. penumbra.

- c. edge loss.
- d. margin distortion.

ANS: B REF: 44

76. A radiograph of the abdomen demonstrates involuntary motion caused by bowel peristalsis (involuntary contractions). Which of the following factors will best eliminate this problem during the repeat exposure?
- a. Decrease SID.
 - b. Turn patient into prone position rather than supine.
 - c. Use higher kV.
 - d. Decrease exposure time.

ANS: D REF: 45

77. Which of the following changes will improve spatial resolution?
- a. Decrease SID.
 - b. Decrease OID.
 - c. Decrease kV.
 - d. None of the above will improve spatial resolution.

ANS: B REF: 44

78. Increasing the SID to 48 inches (123 cm) from 40 inches (102 cm) and adjusting the mAs accordingly will:
- a. increase penumbra.
 - b. along with the use of a small focal spot, decrease penumbra.
 - c. decrease patient skin dose but increase internal dose because of an increase in scatter radiation.
 - d. have no effect on image sharpness or on patient dose.

ANS: B REF: 46-47

79. Each digital image is two dimensional and is formed by a matrix of:
- a. bytes.
 - b. algorithms.
 - c. voxels.
 - d. pixels.

ANS: D REF: 49-50

80. Highly complex mathematical formulas applied during digital processing of the image are termed:
- a. pixels.
 - b. algorithms.
 - c. digital filters.
 - d. matrices.

ANS: B REF: 49

81. The intensity of light that represents the individual pixels in the digital image on the monitor is the definition for:
- a. contrast.

- b. spatial resolution.
- c. brightness.
- d. noise.

ANS: C REF: 50

82. Which of the following factors has the greatest effect on the brightness of the digital image?
- a. kV
 - b. mAs
 - c. Processing software
 - d. Matrix size

ANS: C REF: 50

83. The ability of a digital imaging system to distinguish between similar tissues is the definition for:
- a. edge enhancement.
 - b. contrast resolution.
 - c. sensitivity.
 - d. system response.

ANS: B REF: 50

84. Contrast in the digital image is primarily affected by:
- a. kV.
 - b. mAs.
 - c. matrix size.
 - d. predetermined algorithms.

ANS: D REF: 50

85. The greater the bit depth of a digital system, the greater the:
- a. brightness.
 - b. resolution.
 - c. exposure index.
 - d. contrast resolution.

ANS: D REF: 50

86. Which of the following factors has the greatest effect on spatial resolution of the digital image?
- a. Acquisition pixel size
 - b. Display pixel size
 - c. Use of a grid
 - d. SID

ANS: A REF: 51

87. Misrepresentation of object size or shape as projected onto radiographic recording media is the general definition for:
- a. penumbra.
 - b. distortion.
 - c. magnification.

d. margin loss.

ANS: B REF: 51

88. The number of x-ray photons that strike the digital receptor can be considered as:

- a. noise.
- b. kV.
- c. signal.
- d. density.

ANS: C REF: 52

89. A numerical value that is representative of the exposure projected on the digital image receptor is termed:

- a. algorithm.
- b. variance.
- c. signal-to-noise ratio (SNR).
- d. exposure indicator.

ANS: D REF: 51

90. A random disturbance that obscures or reduces clarity is termed:

- a. signal.
- b. noise.
- c. electrical fluctuation.
- d. variance.

ANS: B REF: 52

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91. The intensity of light that represents the individual pixels in the image on the monitor defines:

- a. density.
- b. brightness.
- c. contrast.
- d. spatial resolution.

ANS: B REF: 50

92. Which of the following factors has the greatest negative impact on SNR?

- a. Excessive kV
- b. Collimation
- c. Insufficient mAs
- d. Long SID

ANS: C REF: 52

93. Which device or technique is most effective in controlling scatter radiation in digital imaging?

- a. Focal spot size
- b. Added filtration
- c. Postprocessing algorithm
- d. Grid

ANS: D REF: 52

94. The application of specific image processing that alters pixel values to the edges of structures is:
- a. smoothing.
 - b. edge enhancement.
 - c. magnification.
 - d. image reversal.

ANS: B REF: 53

95. The adjustment of contrast and brightness of the displayed image is:
- a. brightness.
 - b. equalization.
 - c. edge enhancement.
 - d. bit depth.

ANS: D REF: 53

96. The term *portrait* describes the long dimension of the image receptor that is aligned_____to the long axis of the anatomy.
- a. perpendicular
 - b. diagonal
 - c. parallel
 - d. transverse

ANS: C REF: 57

97. What type of material makes up the receptor in the FPD-TFT system?
- a. Amorphous selenium
 - b. Amorphous silicon
 - c. Calcium tungstate
 - d. Both A and B

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ANS: D REF: 56

98. Which of the following energy sources will erase any residual latent image from an exposed PSP imaging plate?
- a. Low-dose radiation
 - b. Bright light
 - c. Heat
 - d. Ultraviolet light

ANS: B REF: 54

99. A digital storage and image management system defines a:
- a. radiology information system.
 - b. digital archive.
 - c. hospital information system.
 - d. workstation.

ANS: B REF: 59

100. A network system with an array of hardware and software that connects all imaging modalities is termed a(n):

- a. archive.
- b. HIS.
- c. network.
- d. PACS.

ANS: D REF: 58

101. A standard that ensures that all digital imaging equipment can communicate with each other is referred to as:
- a. RIS.
 - b. PACS.
 - c. DICOM and HL7.
 - d. HIS.

ANS: C REF: 58

102. Which of the following is NOT an advantage of a PACS?
- a. Simultaneous viewing of images at multiple locations
 - b. Elimination of misplaced, damaged, or missing films
 - c. Rapid chemical processing of images
 - d. Rapid (electronic) transfer of images within the hospital

ANS: C REF: 58

103. A “soft-copy radiograph” is defined as a:
- a. radiographic image viewed on a computer monitor.
 - b. radiographic image printed on film.
 - c. radiographic image placed on a CD.
 - d. latent radiographic image on a CR imaging plate.

ANS: A REF: 58

104. The application of specific image processing to reduce noise in an image is termed:
- a. filtration.
 - b. photon degradation.
 - c. attenuation.
 - d. smoothing.

ANS: D REF: 59

105. A series of “boxes” that gives form to the image is the definition for:
- a. acquisition matrix.
 - b. pixels.
 - c. bit depth.
 - d. display matrix.

ANS: D REF: 59

106. The range of exposure intensities that will produce an acceptable image is the definition for exposure:
- a. latitude.
 - b. level.
 - c. index.

d. range.

ANS: A REF: 59

107. Changing or enhancing the electronic image to view it from a different perspective or improve its diagnostic quality is the general definition for:
- a. smoothing.
 - b. edge enhancement.
 - c. postprocessing.
 - d. algorithmic conversion.

ANS: C REF: 53

108. What is the complete term for RIS?
- a. Radiographic imaging system
 - b. Radiology interpretation system
 - c. Radiology information system
 - d. Reduced intensity system

ANS: C REF: 58

109. The complete term for SNR is signal-to-noise:
- a. relationship.
 - b. ratio.
 - c. rationale.
 - d. reaction.

ANS: B REF: 52

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110. Which term has replaced exposure in describing the amount of energy transferred to a mass of air by the photons?
- a. REM
 - b. Air kerma
 - c. Coulomb per kilogram
 - d. Roentgen

ANS: B REF: 60

111. Which radiation unit of measurement is used to describe absorbed dose?
- a. Coulomb per kilogram
 - b. Gray
 - c. Sievert
 - d. Curie

ANS: B REF: 60

112. Which traditional unit of radiation measurement describes patient dose?
- a. Roentgen
 - b. Rem
 - c. Coulombs
 - d. Rad

ANS: D REF: 60

113. What is the annual whole body effective dose (ED) for a technologist?
- a. 10 mSv (1 rem) times the years of age
 - b. 20 mSv (200 mrem)
 - c. 50 mSv (5000 mrem)
 - d. 500 mSv (50 rem)

ANS: C REF: 60

114. The annual occupational dose limit for the lens of the eye is:
- a. 150 mSv (15,000 mrem).
 - b. 1 mSv (100 mrem).
 - c. 50 mSv (5 rem).
 - d. 500 mSv (50 rem).

ANS: A REF: 60

115. Where should a personnel dosimeter be worn during fluoroscopy?
- a. On collar inside the lead apron
 - b. On waist inside the lead apron
 - c. On collar outside the lead apron
 - d. On sleeve outside the lead apron

ANS: C REF: 61

116. Which of the following is NOT an ALARA concept?
- a. Collimate when feasible.
 - b. Always wear a personnel dosimeter.
 - c. Use optimal kV techniques.
 - d. Have older technologists rather than younger technologists hold patients.

ANS: D REF: 61

117. Which of the following is NOT one of the cardinal principles of radiation protection?
- a. Shielding
 - b. Filtration
 - c. Time
 - d. Distance

ANS: B REF: 61

118. Pregnant technologists should not exceed _____ dose per month.
- a. 1 mSv (0.1 rem)
 - b. 0.5 mSv (50 mrem)
 - c. 10 mSv (1 rem)
 - d. 300 mSv (30 rem)

ANS: B REF: 62

119. Which of the following patient dose categories carries the highest numerical value of all patient doses?
- a. Effective dose
 - b. Gonadal dose

- c. Midline dose
- d. Entrance skin exposure

ANS: D REF: 62

120. The cumulative (ED) lifetime dose for an occupationally exposed worker is _____ mSv × years of age.
- a. 100
 - b. 50
 - c. 10
 - d. 1

ANS: C REF: 60

121. Which of the following radiographic projections will provide the greatest amount of effective dose (without shielding)?
- a. AP pelvis
 - b. Barium enema
 - c. AP skull
 - d. AP abdomen (using 70 kV)

ANS: B REF: 62

122. What type of collimator will automatically restrict the x-ray beam to the size of the image cassette or image receptor?
- a. Diaphragm
 - b. Positive beam limiting
 - c. Manual collimator
 - d. Electronic focused beam

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ANS: B REF: 64

123. What type of protective shield is NOT in contact with the patient's body?
- a. Shadow shield
 - b. Shaped shield
 - c. Lead mat
 - d. Gonadal flat shield

ANS: A REF: 65

124. A 20-year-old woman is brought into radiology from the ED with a possible fracture of the pelvis. What should the technologist do regarding gonadal shielding?
- a. Perform a PA projection of the pelvis and use gonadal shielding.
 - b. Take an AP projection of the pelvis without using any shielding.
 - c. Cover the area of the ovaries and uterus with a gonad shield for the AP pelvis projection.
 - d. Refuse to take any radiographs without the radiologist's consent.

ANS: B REF: 66

125. Which of the following precautions reduces radiation exposure to the technologist during a fluoroscopic procedure to the greatest degree?

- a. Wearing a protective lead apron of 1-mm lead thickness
- b. Wearing a thyroid shield
- c. Standing as far away as possible from the radiation scatter fields
- d. Turning your back to the fluoroscopy table

ANS: C REF: 68-69

126. When correctly placed, gonadal shielding will reduce dose by _____ if gonads are in the primary x-ray field.
- a. 20% to 50%
 - b. 50% to 90%
 - c. 100%
 - d. None of the above

ANS: B REF: 35

127. Use of gonadal shielding is necessary when the organ of concern lies within or near _____ of the primary beam unless such shielding obscures essential diagnostic information.
- a. 10 inches (25 cm)
 - b. 2 inches (5 cm)
 - c. 1 inch (2.5 cm)
 - d. 6 inches (15 cm)

ANS: B REF: 66

128. The minimum total filtration (inherent plus added) required for diagnostic x-ray equipment producing 70 kV or greater is _____ mm aluminum equivalent.
- a. 1.5
 - b. 2.5
 - c. 0.5
 - d. 4

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ANS: B REF: 63

MATCHING

Select the correct definition for the terms listed below. (Use each choice only once.)

- a. Caudad
 - b. Proximal
 - c. Extension
 - d. Radial deviation
 - e. Inversion
 - f. Dorsiflexion
 - g. Adduction
 - h. Abduction
 - i. Pronation
1. Movement of an arm or leg toward the midline
 2. An inward stress movement of foot
 3. Near the source or the beginning
 4. A CR angle away from the head end

5. Increasing the angle of a joint
6. Movement of an arm or leg away from the midline
7. Decrease angle between foot and lower leg
8. Turn or bend hand and wrist toward radius
9. Rotation of hand with palm down

- | | |
|-----------|---------|
| 1. ANS: G | REF: 28 |
| 2. ANS: E | REF: 27 |
| 3. ANS: B | REF: 25 |
| 4. ANS: A | REF: 25 |
| 5. ANS: C | REF: 26 |
| 6. ANS: H | REF: 28 |
| 7. ANS: F | REF: 27 |
| 8. ANS: D | REF: 26 |
| 9. ANS: I | REF: 28 |

Select the minimum number of projections generally required for each of the anatomic structures.

- a. One projection
- b. Two projections
- c. Three projections

10. Femur
11. Chest
12. Foot
13. Finger
14. Forearm
15. Ankle
16. Elbow
17. Pelvis

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- | | |
|------------|---------|
| 10. ANS: B | REF: 35 |
| 11. ANS: B | REF: 35 |
| 12. ANS: C | REF: 35 |
| 13. ANS: C | REF: 35 |
| 14. ANS: B | REF: 35 |
| 15. ANS: C | REF: 35 |
| 16. ANS: C | REF: 35 |
| 17. ANS: A | REF: 35 |

Match the traditional image receptor (IR) sizes to their metric equivalent.

- a. 35 × 43 cm
 - b. 18 × 24 cm
 - c. 30 × 35 cm
 - d. 24 × 24 cm
 - e. 24 × 30 cm
18. 10 × 12 inches
 19. 14 × 17 inches

- 20. 8 × 10 inches
- 21. 9 × 9 inches
- 22. 11 × 14 inches

- | | |
|------------|---------|
| 18. ANS: E | REF: 57 |
| 19. ANS: A | REF: 57 |
| 20. ANS: B | REF: 57 |
| 21. ANS: D | REF: 57 |
| 22. ANS: C | REF: 57 |

TRUE/FALSE

1. A body system consists of an association of organs that share a common function.

ANS: T REF: 4

2. A lateromedial projection is one in which the lateral aspect of the anatomy part is closest to the image receptor (IR).

ANS: F REF: 19

3. Tangential and axial projections are the same type of projection.

ANS: F REF: 23

4. *Radiographic view* is NOT a valid positioning term in the United States.

ANS: T REF: 30

5. The term *position* can be used for both a lateral and an oblique body position.

ANS: T REF: 30

6. According to the American Registry of Radiologic Technologists (ARRT) Code of Ethics, a radiologic technologist may render a diagnosis during a radiographic examination if requested by the patient.

ANS: F REF: 33

7. According to the ARRT Code of Ethics, radiologic technologists must participate in continuing education activities throughout their professional career.

ANS: T REF: 33

8. According to the ARRT Code of Ethics, a radiologic technologist may discuss a patient's clinical history with a family member.

ANS: F REF: 33

9. It is legally acceptable to write "right" or "left" on a radiograph if the anatomic side marker is not visible.

ANS: F REF: 32

10. The radiographer has the responsibility of communicating with the patient to obtain pertinent clinical information.

ANS: T REF: 33

11. The radiographer may provide a preliminary interpretation of the radiographic study if requested by the patient.

ANS: F REF: 33

12. It is common practice to view a PA projection with the patient's left facing the viewer's right.

ANS: T REF: 36

13. PA or AP oblique projections are placed on the view box with the patient's right side of the body facing the viewer's right.

ANS: F REF: 36

14. Decubitus chest projections are placed for viewing the way the image receptor "sees" them.

ANS: F REF: 36

15. When placing radiographs of the hand on the view box, the digits should be pointing upward.

ANS: T REF: 37 NURSINGTB.COM

16. When placing radiographs of the lower leg, the toes of the foot must be pointing upward.

ANS: F REF: 37

17. When viewing a CT (computed tomography) or MRI (magnetic resonance imaging) image, the patient's right is facing the viewer's left.

ANS: T REF: 37

18. The intensity of the x-ray beam is greatest under the anode as defined by the anode heel effect.

ANS: F REF: 40

19. Increasing the SID will increase distortion of the anatomy.

ANS: F REF: 44-45

20. A 40-inch (102 cm) SID should be the minimal distance used for most radiographic projections.

ANS: T REF: 47

21. Using a table Bucky device will increase magnification of the anatomy as compared with performing the same study on the tabletop.

ANS: T REF: 47

22. The least possible distortion of the anatomy occurs at the point of the central ray.

ANS: T REF: 46

23. The wide dynamic range of digital imaging systems results in fewer repeat exposures, increased efficiency, and operating cost reduction as compared with analog (film-screen) systems.

ANS: T REF: 49

24. In digital imaging, the term *exposure indicator* replaces the analog (film-based) term *density*.

ANS: F REF: 51

25. A low SNR is desirable in digital imaging.

ANS: F REF: 52

26. The photostimulable storage phosphor (PSP) imaging plate is light sensitive and must be processed in a dark environment.

ANS: F REF: 54

27. A PSP-based digital imaging system may be cassette based or cassetteless.

ANS: T REF: 54

28. Thin film transistor (FPD-TFT) digital imaging systems are commonly referred to as *digital radiography* (DR).

ANS: T REF: 56

29. PSP imaging plates are scanned with an ultra-bright light source to produce the visible digital image.

ANS: F REF: 54

30. Depending on the manufacturer, the PSP image may be viewed on the technologist workstation within 5 seconds following plate reading.

ANS: T REF: 54

31. FPD-TFT-based systems can be used for both grid and nongrid examinations.

ANS: T REF: 56

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32. Lead masking/mats should be used when recording multiple images on the same cassette-based PSP system.
- ANS: T REF: 55
33. Close collimation is not recommended when using a PSP imaging system.
- ANS: F REF: 55
34. As a general rule, exposure factors are decreased 5 to 15 kV with digital systems as compared with analog imaging systems.
- ANS: F REF: 55
35. Digital radiography systems are hypersensitive to the effects of scatter radiation.
- ANS: T REF: 56
36. An image receptor placed lengthwise to the long axis of the structure or body is in the portrait orientation.
- ANS: T REF: 57
37. A grid can be left in place for most digital radiographic procedures.
- ANS: T REF: 55
38. The acronym PACS refers to picture archiving and communication system.
- ANS: F REF: 58
39. Exposure indicator is a numeric value that is representative of the level of exposure the image receptor has acquired.
- ANS: T REF: 59
40. PACS should be integrated with an HIS.
- ANS: T REF: 58
41. One gray equals 1000 rad.
- ANS: F REF: 60
42. Système International (SI) has been the national standard for units of radiation measurement since 1958.
- ANS: T REF: 60
43. Thermoluminescent and optically stimulated luminescence dosimeters must be changed every 14 days to ensure an accurate recording of exposure to the technologist.

ANS: F REF: 61

44. The adjustable collimator light field must be accurate within 5% of the selected SID.

ANS: F REF: 64

45. Recent studies indicate that the breasts are more radiosensitive than the gonads.

ANS: T REF: 65

46. The ImageWisely® program is focused on reducing unnecessary exposure in children during imaging procedures.

ANS: F REF: 70

47. The ACE® initiative is a reminder to maintain professional communication between technologists and their patients.

ANS: T REF: 33

48. PACS permits simultaneous viewing of images at multiple locations.

ANS: T REF: 58

49. A Deviation Index (DI) of zero indicates no radiation has reached the digital image receptor.

ANS: F REF: 51

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Chapter 02: Chest

Lampignano: Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition

MULTIPLE CHOICE

1. The two most common landmarks for chest positioning are the:
 - a. top of shoulders and xiphoid process.
 - b. jugular notch and top of shoulders.
 - c. lower margin of thyroid cartilage and vertebra prominens.
 - d. jugular notch and vertebra prominens.

ANS: D

REF: 72

2. The vertebra prominens corresponds to the level of:
 - a. C7.
 - b. C5.
 - c. T2.
 - d. C4-5.

ANS: A

REF: 72

3. The upper margin of the lungs is at the level of the:
 - a. jugular notch.
 - b. vertebra prominens.
 - c. laryngeal prominence.
 - d. sternal angle.

ANS: B

REF: 72

4. What is the name of the structure that serves as a common passageway for both food and air?
 - a. Epiglottis
 - b. Larynx
 - c. Pharynx
 - d. Esophagus

ANS: C

REF: 73

5. The jugular notch is located on the:
 - a. sternum.
 - b. thyroid cartilage.
 - c. seventh cervical vertebra.
 - d. scapula.

ANS: D

REF: 72

6. What is the correct anatomic name for the Adam's apple?
 - a. Sternum
 - b. Epiglottis
 - c. Cricoid cartilage
 - d. Laryngeal prominence

ANS: D

REF: 74

7. What is the name for the structure that serves as a lid over the larynx to prevent aspiration of food or fluid?
- Uvula
 - Epiglottis
 - Hyoid bone
 - Oropharynx

ANS: B

REF: 74

8. Which of the following structures is considered to be most posterior?
- Larynx
 - Esophagus
 - Trachea
 - Hyoid bone

ANS: B

REF: 75

9. The lower concave area of the lung is termed the:
- base.
 - apex.
 - hilum.
 - costophrenic angle.

ANS: A

REF: 77

10. Which of the following structures is considered to be most inferior?
- Epiglottis
 - Hyoid bone
 - Carina
 - Vocal cords

ANS: C

REF: 77

11. The internal prominence or ridge in which the trachea bifurcates into the right and left bronchi is termed the:
- carina.
 - hilum.
 - thyroid cartilage.
 - costophrenic angle.

ANS: A

REF: 76

12. The inner layer of the pleura that encloses the lungs and heart is called the:
- parietal pleura.
 - pericardial sac.
 - pulmonary or visceral pleura.
 - omentum.

ANS: C

REF: 77

13. Air or gas that escapes from the lungs into the pleural cavity results in a condition known as:
- air bronchogram.
 - pneumothorax.
 - hemidiaphragm.
 - hemothorax.

ANS: B

REF: 76

14. Which of the following structures is NOT considered as a mediastinal structure?
- Thymus gland
 - Aorta
 - Trachea
 - Epiglottis

ANS: D

REF: 79

15. The laryngeal prominence is a positioning landmark located at the level of:
- T1.
 - C7.
 - C5.
 - C3.

ANS: C

REF: 74

16. Part **i** refers to the:



- hyoid bone.
- larynx.
- laryngeal prominence.
- epiglottis.

ANS: D

REF: 74

17. Part **ii** refers to the:



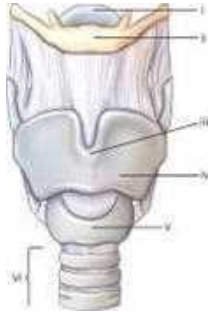
- hyoid bone.
- larynx.

- c. upper thyroid cartilage.
- d. upper border of trachea.

ANS: A

REF: 74

18. Part **iii** refers to the:

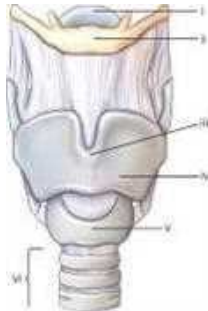


- a. thyroid cartilage.
- b. carina.
- c. laryngeal prominence.
- d. hyoid bone.

ANS: C

REF: 74

19. Part **iv** refers to the:



- a. laryngeal prominence.
- b. carina.
- c. thyroid cartilage.
- d. cricoid cartilage.

ANS: C

REF: 74

20. Part **v** refers to the:



- a. trachea.
- b. larynx.
- c. thyroid cartilage.
- d. cricoid cartilage.

ANS: D

REF: 74

21. Part **vi** refers to the:



- a. trachea.
- b. larynx.
- c. thyroid cartilage.
- d. esophagus.

ANS: A

REF: 74

22. The thyroid gland is located at the approximate level of:

- a. C1-3.
- b. the carina.
- c. the epiglottis.
- d. C5-7.

ANS: D

REF: 75

23. The thymus gland is at its maximum size at:

- a. age 40.
- b. age 21.
- c. puberty.
- d. birth.

ANS: C

REF: 75

24. The heart is located in the anterior chest at the level of:

- a. T10-12.
- b. the thymus gland.
- c. the arch of the aorta.
- d. T5-8.

ANS: D

REF: 77

25. What is a common palpable landmark for the AP chest projection on the obese patient?

- a. Xiphoid process
- b. Costal angle
- c. Jugular notch
- d. Vertebra prominens

ANS: C

REF: 87

26. The central ray (CR) for an anteroposterior (AP) supine, adult chest projection, should be centered:
- a. to the level of T4.
 - b. 3 to 4 inches (8 to 10 cm) below the jugular notch.
 - c. at the vertebra prominens.
 - d. at the xiphoid process.

ANS: B REF: 87

27. For an AP portable chest on an older or hypersthenic male patient, which of the following should occur?
- a. The image receptor generally should be placed portrait.
 - b. The CR should be centered 3 inches (8 cm) below the jugular notch.
 - c. The CR should be centered to the mammillary (nipple) line.
 - d. None of the above should occur.

ANS: B REF: 82 | 86

28. Which one of the following clinical indications often requires the inspiration/expiratory chest series to be taken?
- a. Chronic asthma
 - b. Small pneumothorax
 - c. Pneumoconiosis
 - d. Primary tuberculosis

ANS: B REF: 82 | 89

29. Pleurisy may be demonstrated radiographically by associated:
- a. pleural effusion.
 - b. empyema.
 - c. pneumothorax.
 - d. silicosis.

ANS: A REF: 90

30. What is a common radiographic sign seen on a chest radiograph for a patient with respiratory distress syndrome (RDS)?
- a. Enlargement of heart
 - b. Fluid in apices
 - c. Elevated diaphragm
 - d. Air bronchogram sign

ANS: D REF: 89

31. Which type of body habitus typically requires that the image receptor be placed landscape rather than portrait for a posteroanterior (PA) chest?
- a. Hypersthenic
 - b. Asthenic
 - c. Sthenic
 - d. Hyposthenic

ANS: A REF: 80

32. A general rule states that radiographic grids are required with chest radiography for:
- a. exposure factors using 80 kV or below.
 - b. exposure factors using 100 kV or greater.
 - c. all adults.
 - d. all pediatrics.

ANS: B REF: 81

33. Which of following statements is NOT true?
- a. The right lung contains three lobes.
 - b. The left bronchus is more horizontal than the right bronchus.
 - c. The right bronchus is shorter than the left bronchus.
 - d. The angle of divergence of the left bronchus is greater than that of the right bronchus.

ANS: B REF: 76

34. A well-inspired healthy adult chest PA projection will have a minimum of _____ posterior ribs seen above the diaphragm.
- a. 8
 - b. 7
 - c. 10
 - d. 12

ANS: C REF: 82

35. Which of the following objects does NOT have to be removed or moved before a chest radiography?
- a. Necklace
 - b. Bra
 - c. T-shirt
 - d. Glasses

ANS: D REF: 81

36. Which of the following analog technical factors is ideal for adult chest radiography?
- a. 100 kV, 200 mA, 1/20 seconds, 60-inch (153 cm) source image receptor distance (SID)
 - b. 120 kV, 800 mA, 1/40 seconds, 72-inch (183 cm) SID
 - c. 125 kV, 400 mA, 1/40 seconds, 40-inch (102 cm) SID
 - d. 120 kV, 600 mA, 1/60 seconds, 60-inch (153 cm) SID

ANS: B REF: 81

37. A PA chest radiograph reveals that only seven ribs are seen above the diaphragm on a healthy adult. Which of the following suggestions would improve the inspiration of lungs?
- a. Use higher kV to penetrate the diaphragm.
 - b. Perform chest position supine.
 - c. Take exposure on the second inspiration rather than on the first.
 - d. Use a shorter exposure time.

ANS: C REF: 82

38. A correctly positioned lateral chest radiograph demonstrates some separation of the posterior ribs owing to the divergent x-ray beam. But a separation of greater than _____cm indicates objectionable rotation from a true lateral.
- 0.5
 - 2
 - 3
 - 1

ANS: D

REF: 84

39. What is the primary disadvantage of performing an AP projection of the chest rather than a PA?
- More radiation exposure to the lungs
 - Distortion of the ribs
 - AP projection requires more kV as compared with the PA projection
 - Increased magnification of the heart

ANS: D

REF: 83

40. Of the following factors, which one is most crucial to demonstrate possible air and fluid levels in the chest?
- 72-inch (183-cm) SID
 - High-kV technique
 - Patient in erect or decubitus position
 - Using high mA and short exposure time

ANS: C

REF: 83

41. A PA chest radiograph reveals that the pendulous breasts of the patient are obscuring the base of the lungs. What should be done to lessen the effects of the breast shadow?
- Ask patient to lift breasts up and outward.
 - Use a higher kV (beyond 125) to penetrate tissue.
 - Have patient take a deeper inspiration before exposure.
 - Take an AP rather than PA projection.

ANS: A

REF: 87

42. A PA chest radiograph reveals that the left sternoclavicular joint is closer to the spine than the right joint. What specific positioning error has been committed?
- Left tilt
 - Rotation into the left anterior oblique (LAO) position
 - Right tilt
 - Rotation into the right anterior oblique (RAO) position

ANS: B

REF: 92

43. Which of the following factors must be applied to minimize distortion of the heart?
- 72-inch (183-cm) SID
 - High-kV technique
 - Performing study erect
 - Using high mA and short exposure time

ANS: A

REF: 83

44. Of the following positioning actions, which one will remove most of the scapulae from the lung fields?
- Roll shoulders forward.
 - Depress shoulders.
 - Elevate chin.
 - None of the above is correct.

ANS: A

REF: 92

45. For an average-size female patient, where is the CR placed for a PA projection of the chest?
- 7 inches (18 cm) below the vertebra prominens
 - 3 inches (7.6 cm) below the jugular notch
 - 8 inches (20 cm) below the vertebra prominens
 - 2 inches (5 cm) above the shoulders

ANS: A

REF: 86

46. A condition characterized as an irreversible dilation or widening of bronchi or bronchioles that may result from repeated pulmonary infection or obstruction is termed:
- asthma.
 - bronchitis.
 - bronchiectasis.
 - dyspnea.

ANS: C

REF: 88

47. What type of CR angle is required for the AP semi axial (alternative lordotic) projection for the lung apices?
- None. CR is perpendicular to IR.
 - 10° to 15° caudad.
 - 15° to 20° cephalad.
 - 25° to 35° caudad.

ANS: C

REF: 98

48. Which chest oblique position will best demonstrate the air-filled trachea, heart, and great vessels?
- 45° RAO
 - 60° RAO
 - 45° LAO
 - 60° LAO

ANS: D

REF: 99

49. A patient enters the emergency department (ED) to be treated for severe trauma. The physician orders an AP supine chest to evaluate the lungs. What can the technologist do to reduce the magnification of the heart?
- Place the cassette landscape.
 - Use a short exposure time.
 - Increase source to image receptor distance (SID) as much as possible.

d. Increase SID as much as possible.

ANS: D REF: 96

50. An ambulatory patient comes to radiology with a clinical history of possible pneumonia. The patient complains of pain in the center of her chest. What positioning routine should be performed on this patient?

- a. PA and left lateral projections
- b. PA and right and left lateral projections
- c. PA and both decubitus projections
- d. AP and right lateral projections

ANS: A REF: 89

51. A patient is in the intensive care unit with multiple injuries. The attending physician is concerned about a pleural effusion in the left lung. The patient had surgery recently and cannot stand. Which position/projection would be best to rule out the pleural effusion?

- a. AP supine
- b. Right lateral decubitus
- c. Apical lordotic
- d. Left lateral decubitus

ANS: D REF: 89

52. A patient enters the ED with a possible pneumothorax in the left lung. Because of trauma, the patient cannot stand or sit erect. Which of the following positions would best demonstrate this condition?

- a. AP supine
- b. Right lateral decubitus
- c. Left posterior oblique (LPO) and right posterior oblique (RPO)
- d. Left lateral decubitus

ANS: B REF: 89

53. A patient comes to radiology for a routine chest study. On the PA projection, the radiologist sees a possible calcification near a rib, but she cannot tell whether the calcification is in the lung or on the rib. What additional projections would assist with the diagnosis?

- a. Apical lordotic
- b. Right lateral
- c. Inspiration/expiration PA
- d. Both lateral decubitus

ANS: C REF: 82

54. A patient enters the ED with a possible hemothorax in the right lung. With help, the patient can sit erect on a cart. Which of the following routines would best demonstrate this condition?

- a. Erect PA and erect right lateral on cart
- b. Right lateral decubitus
- c. Left lateral decubitus
- d. RPO and LAO erect

ANS: A REF: 97

55. A patient comes to radiology with a possible mass beneath the right clavicle. The PA and left lateral projections are inconclusive. Which additional projection/position can be taken to demonstrate this possible mass?
- a. AP erect
 - b. Right lateral
 - c. AP and lateral of upper airway
 - d. AP lordotic

ANS: D REF: 98

56. Why must the technologist slightly angle the CR caudad for most AP projections of the chest?
- a. Elongates the carina.
 - b. Prevents overlap of the chin on the upper airway.
 - c. Separates the heart from the great vessels.
 - d. Prevents clavicles from obscuring apices of the lungs.

ANS: D REF: 96

57. Which positioning line must be placed perpendicular to the plane of the IR for an AP projection of the upper airway?
- a. Mentomeatal
 - b. Midcoronal
 - c. Acanthiomeatal
 - d. Orbitomeatal

ANS: C REF: 103

58. Which of the following is NOT a form of occupational lung disease?
- a. Silicosis
 - b. Tuberculosis
 - c. Anthracosis
 - d. Asbestosis

ANS: B REF: 91

59. Which of the following is a condition in which all or part of a lung is collapsed, requiring an increase in manual exposure (analog) factors?
- a. Pneumonia
 - b. Pneumothorax
 - c. Bronchiectasis
 - d. Atelectasis

ANS: D REF: 89

60. Situs inversus is a condition in which:
- a. the heart is located in the left thorax.
 - b. the liver is in the left abdomen.
 - c. all major organs are in the opposite side of the body.
 - d. the thymus gland is absent.

ANS: C REF: 81

61. The CR for an AP supine chest should be aligned:

- a. perpendicular to the long axis of sternum.
- b. at the level of the jugular notch.
- c. at the level of the xiphoid process.
- d. perpendicular to the long axis of the clavicles.

ANS: A

REF: 87 | 96

62. What is the recommended kV range for upper airway projections (analog and digital imaging)?
- a. 50 to 65 kV
 - b. 110 to 120 kV
 - c. 75 to 85 kV
 - d. 90 to 100 kV

ANS: C

REF: 103

MATCHING

Select the exposure factor adjustments needed for the pathologic indication(s) using manual exposure settings (no AEC). Increases or decreases in manual exposure factors are compared with the ideal exposure factors that would be used on a normal, healthy individual.

- a. Increase (+)
 - b. Decrease (-)
 - c. No change (0)
1. Advanced bronchiectasis
 2. Pneumothorax
 3. Severe pulmonary edema
 4. Severe emphysema
 5. Cystic fibrosis (severe)
 6. Pneumonia
 7. Silicosis (severe)
 8. Bronchitis
 9. Epiglottitis
 10. Large pleural effusion
 11. Pleurisy
 12. Tuberculosis (primary or secondary)
 13. Advanced respiratory distress syndrome (RDS)
 14. Mild chronic obstructive pulmonary disease (COPD)
 15. Aspiration in upper airway (mechanical obstruction)
 16. Malignant lung neoplasia
 17. Pulmonary emboli

- | | |
|-----------|------------|
| 1. ANS: C | REF: 88-91 |
| 2. ANS: C | REF: 88-91 |
| 3. ANS: A | REF: 88-91 |
| 4. ANS: B | REF: 88-91 |
| 5. ANS: A | REF: 88-91 |
| 6. ANS: C | REF: 88-91 |

- | | |
|------------|------------|
| 7. ANS: C | REF: 88-91 |
| 8. ANS: C | REF: 88-91 |
| 9. ANS: B | REF: 88-91 |
| 10. ANS: A | REF: 88-91 |
| 11. ANS: C | REF: 88-91 |
| 12. ANS: C | REF: 88-91 |
| 13. ANS: A | REF: 88-91 |
| 14. ANS: C | REF: 88-91 |
| 15. ANS: B | REF: 88-91 |
| 16. ANS: C | REF: 88-91 |
| 17. ANS: C | REF: 88-91 |

*Match the correct disease or condition with the descriptions of radiographic appearance.
(Use each choice only once.)*

- a. Tuberculosis
 - b. Emphysema
 - c. Pneumothorax
 - d. Hemoptysis
 - e. COPD (chronic obstructive pulmonary disease)
 - f. Pneumonia
 - g. Atelectasis
 - h. Pleurisy
 - i. Malignant lung cancer
 - j. Pulmonary edema
18. Lung displaced from chest wall and no lung markings visible on radiograph
 19. Patchy infiltrate with increased radiodensity
 20. Increased lung dimensions (barrel-chested)
 21. Increased diffuse radiodensity in hilar regions and air-fluid levels
 22. Severe cases appear as emphysema
 23. Slight shadows in early stages, larger radiopaque masses in advanced stages
 24. Collapse of all or part of lung
 25. Inflammation of pleura (possible air/fluid levels)
 26. A contagious disease caused by airborne bacteria
 27. Coughing up blood

- | | |
|------------|---------|
| 18. ANS: C | REF: 89 |
| 19. ANS: F | REF: 89 |
| 20. ANS: B | REF: 89 |
| 21. ANS: J | REF: 89 |
| 22. ANS: E | REF: 89 |
| 23. ANS: I | REF: 89 |
| 24. ANS: G | REF: 89 |
| 25. ANS: H | REF: 89 |
| 26. ANS: A | REF: 89 |
| 27. ANS: D | REF: 89 |

TRUE/FALSE

1. The xiphoid process is a reliable positioning landmark for determining the lower margin of the lungs for chest positioning.

ANS: F REF: 72

2. Geriatric patients generally require higher central ray (CR) centering than younger patients for chest radiography.

ANS: T REF: 82

3. Top of image receptor placed approximately 3 inches (7.6 cm) above the shoulders is a recommended centering technique for adult chest radiography.

ANS: F REF: 86

4. Collimation guidelines indicate the upper border of the collimation field should be approximately 3 inches (7.6 cm) above the vertebra prominens.

ANS: F REF: 86

5. An electrocardiography and echocardiography are the same procedure.

ANS: F REF: 88

6. Scoliosis and kyphosis may produce asymmetry of the sternoclavicular joints and rib cage as demonstrated on a PA chest radiograph.

ANS: T REF: 92

7. For anterior oblique radiographs of the chest, the elongated (widened) aspect of the thorax is generally furthest from the image receptor.

ANS: T REF: 99

8. Contrary to common belief, the vertical dimension of an average PA chest is greater than the horizontal dimension.

ANS: F REF: 80-81

9. A small pneumothorax may be detected by performing inspiration and expiration PA projections.

ANS: T REF: 82

10. The CR is centered to midsternum for the AP apical lordotic projection with a 14- × 17-inch (35- × 43-cm) image receptor (IR).

ANS: T REF: 98

11. When performing the lateral projection of the upper airway, exposure should be made during a slow, deep inspiration rather than at the end of the inspiration.

ANS: T REF: 94-95

12. As a general rule, the use of high kV (110 to 120 kV) requires the use of a grid during chest radiography.

ANS: T REF: 81

13. Epiglottitis is a condition that is primarily seen with geriatric patients.

ANS: F REF: 89

Chapter 03: Abdomen**Lampignano: Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition**

MULTIPLE CHOICE

1. Which of the following muscles should be demonstrated on a properly exposed abdomen projection on an average-size patient?
 - a. Latissimus dorsi
 - b. Erector spinae
 - c. Psoas major
 - d. Quadratus lumborum

ANS: C REF: 106

2. Which aspect of the small intestine is considered the shortest?
 - a. Duodenum
 - b. Jejunum
 - c. Cecum
 - d. Ileum

ANS: A REF: 107

3. Which aspect of the large intestine is found between the left and right colic flexures?
 - a. Transverse colon
 - b. Descending colon
 - c. Ascending colon
 - d. Sigmoid colon

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ANS: A REF: 107

4. Which of the following organs is NOT considered an accessory organ for digestion?
 - a. Liver
 - b. Gallbladder
 - c. Spleen
 - d. Pancreas

ANS: C REF: 108

5. Which of the following solid organs is the largest in the abdomen?
 - a. Spleen
 - b. Kidneys
 - c. Pancreas
 - d. Liver

ANS: D REF: 108

6. Which of the following structures is part of the lymphatic system?
 - a. Suprarenal glands
 - b. Inferior vena cava
 - c. Kidneys

d. Spleen

ANS: D REF: 108

7. The prefix *pyelo* refers to the:
- urinary bladder.
 - ureter.
 - renal pelvis.
 - renal cortex.

ANS: C REF: 109

8. Why is the right kidney usually lower in the abdomen than the left kidney?
- Presence of right colic flexure
 - Presence of the liver
 - Presence of the stomach
 - Presence of right suprarenal gland

ANS: B REF: 109

9. The suprarenal glands are part of the_____system.
- exocrine
 - endocrine
 - lymphatic
 - urinary

ANS: B REF: 109

10. What is the name of the double-walled tissue that lines the abdominopelvic cavity?
- Mesentery
 - Omentum
 - Peritoneum
 - Viscera

ANS: C REF: 110

11. Which of the following structures helps stabilize and support the small intestine?
- Mesentery
 - Viscera
 - Peritoneum
 - Omentum

ANS: A REF: 110

12. The greater omentum extends from the transverse colon to the:
- posterior abdominal wall.
 - greater curvature of the stomach.
 - inferior margin of the liver.
 - duodenum.

ANS: B REF: 110

13. What is another common term for the greater omentum?

- a. Mesentery
- b. Adipose layer
- c. Fatty apron
- d. Peritoneum

ANS: C REF: 110

14. In which of the four major quadrants of the abdomen would the cecum be found?
- a. Right upper quadrant
 - b. Left upper quadrant
 - c. Right lower quadrant
 - d. Left lower quadrant

ANS: C REF: 112

15. In which of the four major quadrants of the abdomen would the gallbladder be found?
- a. Right upper quadrant
 - b. Left upper quadrant
 - c. Right lower quadrant
 - d. Left lower quadrant

ANS: A REF: 112

16. Which of the following abdominal regions would contain the right colic (hepatic) flexure?
- a. Right lateral lumbar
 - b. Right inguinal
 - c. Right hypochondriac
 - d. Epigastric

ANS: A REF: 112

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17. The prominent protuberance found on the anterior aspect of the ilium is the:
- a. ischial tuberosity.
 - b. anterior superior iliac spine (ASIS).
 - c. symphysis pubis.
 - d. iliac crest.

ANS: B REF: 113

18. The most inferior positioning landmark on the abdomen/pelvis is the:
- a. ischial tuberosity.
 - b. symphysis pubis.
 - c. anterior superior iliac spine (ASIS).
 - d. iliac crest.

ANS: A REF: 113

19. The xiphoid process is at the vertebral level of:
- a. L2-3.
 - b. T2-3.
 - c. T9-10.
 - d. T5-6.

ANS: C REF: 113

20. Which of the following imaging modalities often requires the use of intravenous, iodinated contrast media for studies of the abdomen, especially for possible neoplasms?
- CT
 - Nuclear medicine
 - Sonography
 - Magnetic resonance

ANS: A REF: 116

21. In which region or compartment of the abdomen is the pancreas located?
- Intraperitoneal
 - Retroperitoneal
 - Infraperitoneal
 - Extraperitoneal

ANS: B REF: 111

22. In which region or compartment is the spleen located?
- Intraperitoneum
 - Retroperitoneum
 - Infraperitoneum
 - Extraperitoneum

ANS: A REF: 111

23. What is the best method to control involuntary motion during abdominal radiography?
- Short exposure time
 - Second breath hold
 - Careful breathing instructions to patient
 - Use of small focal spot

ANS: A REF: 114

24. Which of the following analog exposure factors would produce the desired qualities for an abdominal projection on an average-size adult?
- 75 kV, 400 mA, 1/20 seconds, nongrid, 40-inch (102-cm) SID
 - 90 kV, 600 mA, 1/20 seconds, grid, 40-inch (102-cm) SID
 - 75 kV, 400 mA, 1/15 seconds, grid, 60-inch (153-cm) SID
 - 75 kV, 600 mA, 1/30 seconds, grid, 40-inch (102-cm) SID

ANS: D REF: 114

25. Which term describes an abnormal accumulation of fluid in the peritoneal cavity of the abdomen?
- Adynamic ileus
 - Volvulus
 - Intussusception
 - Ascites

ANS: D REF: 116-117

26. What type of respiration should be employed prior to exposure for the anteroposterior (AP) kidneys, ureter, and bladder (KUB) abdomen projection?
- a. Inspiration
 - b. Expiration
 - c. Shallow breathing during exposure
 - d. Either inspiration or expiration

ANS: B REF: 118

27. To ensure that the inferior margin of the abdomen is included on a KUB radiograph, the technologist should palpate the:
- a. iliac crest.
 - b. ASIS.
 - c. greater trochanter or symphysis pubis.
 - d. inferior costal margin.

ANS: C REF: 118

28. The iliac crest corresponds with the _____ vertebral level.
- a. L1
 - b. L2-3
 - c. T12
 - d. L4-5

ANS: D REF: 113

29. Which of the following topographic landmarks corresponds to the L2-3 vertebral level?
- a. Xiphoid process
 - b. Inferior costal margin
 - c. Jugular notch
 - d. ASIS

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ANS: B REF: 113

30. The preferred imaging modality for examining the gallbladder is:
- a. sonography.
 - b. nuclear medicine.
 - c. barium enema study.
 - d. MRI.

ANS: A REF: 116

31. The technologist most often _____ manual, analog exposure factors for a patient with severe ascites.
- a. increases
 - b. does not change
 - c. decreases
 - d. switches to automatic exposure control (AEC) instead of

ANS: A REF: 117

32. The technologist most often _____ manual, analog exposure factors for the patient with a large ileus.

- a. increases
- b. does not change
- c. decreases
- d. switches to AEC instead of

ANS: C REF: 117

33. At what level should the central ray (CR) be placed for a left lateral decubitus projection of the abdomen?
- a. Iliac crest
 - b. 2 inches (5 cm) above iliac crest
 - c. ASIS
 - d. Umbilicus

ANS: B REF: 121

34. A 16-year-old female patient enters the emergency department (ED) with a possible kidney stone. She complains of pain in the right lower pelvis region. Which of the following options should be taken in regard to gonadal shielding?
- a. Do not use it.
 - b. Use it on all projections if correctly placed.
 - c. Use it on the preliminary projection only.
 - d. Ask the patient or her parents for their permission to not shield the gonads.

ANS: A REF: 114

35. A patient comes to radiology with a clinical history of an umbilical hernia. Which one of the following abdomen projections would best demonstrate it?
- a. AP erect abdomen
 - b. Left lateral decubitus
 - c. KUB
 - d. Dorsal decubitus

ANS: D REF: 123

36. Which radiographic landmark is most reliable to evaluate the posteroanterior (PA) projection of the abdomen for rotation?
- a. Xiphoid process
 - b. Symphysis pubis
 - c. Ala of ilium (wings)
 - d. ASIS

ANS: C REF: 120

37. Where is the CR centered for the AP erect projection of the abdomen?
- a. Level of iliac crest
 - b. Xiphoid process
 - c. 2 inches (5 cm) above iliac crest
 - d. 2 inches (5 cm) below iliac crest

ANS: C REF: 122

38. Which of the following kV ranges (digital system) is recommended for a KUB on an adult?

- a. 50 to 60
- b. 70 +/- 5 kV
- c. 80 +/- 5 kV
- d. 110 to 120

ANS: C

REF: 118

39. A radiograph of an AP KUB reveals that the obturator foramina are cut off from the bottom of the image. The kidneys and symphysis pubis are demonstrated. What centering adjustments should the technologist make to improve this image?
- a. Use two 35- × 42-cm (14- × 17-inch) cassettes landscape.
 - b. Center the cassette 2 inches (5 cm) below the iliac crest.
 - c. Open up the collimators to include the ischial tuberosities.
 - d. This radiograph is correctly centered. No centering adjustments are necessary.

ANS: D

REF: 118

40. A 3-year-old patient comes to radiology for an abdominal study. Even with careful instructions and immobilization, the patient is having difficulty holding still. Which of the following should be done to minimize motion on the radiograph?
- a. Increase kV.
 - b. Decrease SID.
 - c. Use a shorter exposure time.
 - d. Ask an older experienced radiographer to hold the patient.

ANS: C

REF: 114

41. Why is the PA projection of the abdomen less desirable for a KUB than the AP projection?
- a. There is an increased gonadal dose with the PA projection.
 - b. The PA projection is less comfortable for the patient.
 - c. Kidneys are farther from the image receptor with PA projection.
 - d. It is not less desirable, but it is the radiographer's choice.

ANS: C

REF: 120

42. A patient is in the intensive care unit after abdominal surgery. The surgeon is concerned about a possible perforated bowel. The patient cannot stand or sit. Which of the following positions will best demonstrate any possible intra-abdominal free air?
- a. Right lateral decubitus
 - b. Dorsal decubitus
 - c. Ventral decubitus
 - d. Left lateral decubitus

ANS: D

REF: 125

43. What CR centering should be used for a dorsal decubitus projection of the abdomen (if the diaphragm is to be included)?
- a. At level of umbilicus
 - b. 2 inches (5 cm) above iliac crest
 - c. At level of iliac crest
 - d. Place bottom of image receptor at level of ASIS.

ANS: B REF: 123

44. Which of the following factors must be followed for an AP erect abdomen projection?
- Collimate lower border to level of ASIS.
 - Use a higher kV technique.
 - Patient needs to be upright a minimum of 5 minutes before imaging.
 - Increase SID to 72 inches (183 cm) to minimize magnification.

ANS: C REF: 122

45. To ensure that the diaphragm is included on the erect abdomen projection, the top of the image receptor should be at the approximate level of the:
- inferior costal margin.
 - jugular notch.
 - xiphoid process.
 - axilla.

ANS: D REF: 122

46. A patient comes to radiology with a clinical history of a possible abdominal aortic aneurysm. Which of the following abdominal projections would best demonstrate this condition?
- Dorsal decubitus
 - Left lateral decubitus
 - Right lateral decubitus
 - AP erect

ANS: A REF: 123

47. Where must the CR be centered for an AP supine projection of the abdomen as part of the acute abdominal series?
- 2 inches (5 cm) above iliac crest
 - Level of iliac crest
 - Level of umbilicus
 - Level of axilla

ANS: B REF: 125

48. Why is the left lateral decubitus preferred over the right lateral decubitus abdomen for an acute abdomen series?
- It is more comfortable for the patient.
 - Any intraperitoneal air will be visualized along the spleen.
 - Any intraperitoneal air will be visualized along the lower liver margin.
 - It allows any gas in the large intestine to move toward the liver.

ANS: C REF: 121

49. Which of the following clinical indications would suggest the need for a dorsal decubitus abdomen position?
- Aneurysms
 - Umbilical hernias
 - Calcification of the aorta
 - All of the above

ANS: D REF: 123

50. Which of the following conditions is NOT considered a clinical indication for an acute abdominal series?
- Kidney stone
 - Obstruction
 - Infection
 - Intra-abdominal mass

ANS: A REF: 125

51. A radiograph of an anteroposterior (AP) abdomen demonstrates elongation (widening) of the left iliac wing and narrowing of the right iliac wing. Which one of the following positioning errors produced this radiographic outcome?
- Rotation to the left (left posterior oblique)
 - Rotation to the right (right posterior oblique)
 - CR off center to the left
 - Left hip was internally rotated more than right hip

ANS: A REF: 118

52. A patient enters the ED with a possible ascites. The patient is ambulatory. Which one of the following projections of the acute abdomen series will best demonstrate this condition?
- AP erect
 - AP supine
 - PA prone
 - PA erect chest

ANS: A REF: 116-117

53. A patient enters the ED with a possible perforated duodenal ulcer. The patient is ambulatory. Which of the following projections will best demonstrate free intraperitoneal air in the abdomen?
- AP supine
 - Right lateral decubitus
 - Dorsal decubitus
 - Erect PA chest

ANS: D REF: 125

54. A dorsal decubitus abdomen is ordered on a patient. The patient is placed on his back on a cart. The CR will enter the left side of the patient with the patient's right side against the image receptor. What type(s) of marker(s) should be used?
- Right and decubitus markers
 - Left and decubitus markers
 - Write "dorsal decubitus" on image after processing.
 - Do not use any right or left markers, only a decubitus.

ANS: A REF: 123

55. A radiograph of a supine KUB on an obese patient reveals that the symphysis pubis is cut off along the bottom of the radiograph. The top of the left kidney is also cut off along the top of the radiograph. What modifications does the technologist need to make for the repeat exposure?
- Center the cassette lower and make the exposure on inspiration.
 - Use two 35- × 43-cm (14- × 17-inch) cassettes landscape, one centered lower and the other one higher.
 - Use two 35- × 43-cm (14- × 17-inch) cassettes portrait, one centered lower and one centered higher.
 - Center the cassette higher and use a second smaller cassette to include the bladder region.

ANS: C REF: 115

56. *Ileus* is the formal term for:
- perforated bowel.
 - bleeding in the abdomen.
 - bowel obstruction.
 - free air in the peritoneal cavity.

ANS: C REF: 117

57. A patient comes to radiology with possible bleeding within the abdomen. The patient is unable to stand or sit for any projections. Which of the following projections would be most effective in demonstrating fluid within the abdomen for this patient?
- AP KUB
 - AP supine chest
 - Right lateral dorsal decubitus
 - Left lateral decubitus

ANS: D REF: 121

58. Which of the following conditions can produce a dynamic bowel obstruction?
- Fibrous adhesions
 - Crohn's disease
 - Intussusception
 - All of the above

ANS: D REF: 116

59. A patient comes to radiology with a clinical history of pneumoperitoneum. The patient is able to stand and lie recumbent. Which one of the following projections will best demonstrate the severity of this condition?
- AP KUB
 - AP erect abdomen
 - Right lateral decubitus
 - Dorsal decubitus

ANS: B REF: 125

60. Which of the following landmarks is often easier to palpate to locate the lower abdomen on the obese patient?

- a. ASIS
- b. Iliac crest
- c. Symphysis pubis
- d. Umbilicus

ANS: A

REF: 115

MATCHING

Identify the following as being either intraperitoneal, retroperitoneal, or infraperitoneal structures.

- a. Intraperitoneal
 - b. Retroperitoneal
 - c. Infraperitoneal
1. Lower rectum
 2. C-loop of duodenum
 3. Major abdominal blood vessels (abdominal aorta and inferior vena cava)
 4. Spleen
 5. Sigmoid colon
 6. Pancreas
 7. Transverse colon
 8. Reproductive organs
 9. Adrenal glands
 10. Jejunum
 11. Urinary bladder
 12. Ascending and descending colon
 13. Liver
 14. Kidneys
 15. Proximal ureters

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- | | |
|------------|----------|
| 1. ANS: C | REF: 111 |
| 2. ANS: B | REF: 111 |
| 3. ANS: B | REF: 111 |
| 4. ANS: A | REF: 111 |
| 5. ANS: A | REF: 111 |
| 6. ANS: B | REF: 111 |
| 7. ANS: A | REF: 111 |
| 8. ANS: C | REF: 111 |
| 9. ANS: B | REF: 111 |
| 10. ANS: A | REF: 111 |
| 11. ANS: C | REF: 111 |
| 12. ANS: B | REF: 111 |
| 13. ANS: A | REF: 111 |
| 14. ANS: B | REF: 111 |
| 15. ANS: B | REF: 111 |

Match the correct pathologic indicator with the definitions or descriptions. (Use each choice only once.)

- a. Volvulus
 - b. Adynamic ileus
 - c. Ascites
 - d. Ulcerative colitis
 - e. Pneumoperitoneum
 - f. Intussusception
 - g. Crohn's disease
16. A twisting of a loop of intestine creating an obstruction
 17. Abnormal accumulation of fluid in the peritoneal cavity
 18. Telescoping of a section of bowel into another loop of bowel
 19. Inflammatory condition of the colon (most frequently involves rectosigmoid region)
 20. Bowel obstruction caused by a lack of intestinal motility
 21. Free air or gas in the peritoneal cavity
 22. Chronic inflammation of the intestinal wall that may result in bowel obstruction

- | | |
|------------|--------------|
| 16. ANS: A | REF: 116-117 |
| 17. ANS: C | REF: 116-117 |
| 18. ANS: F | REF: 116-117 |
| 19. ANS: D | REF: 116-117 |
| 20. ANS: B | REF: 116-117 |
| 21. ANS: E | REF: 116-117 |
| 22. ANS: G | REF: 116-117 |

TRUE/FALSE

1. Motion of the patient's diaphragm can be stopped by providing proper breathing instructions.
ANS: T REF: 106
2. The pancreas is located posterior to the stomach.
ANS: T REF: 108
3. The term *gastro* refers to the intestine.
ANS: F REF: 107
4. Gonadal shielding can often be used with male patients for the AP supine abdomen projection.
ANS: T REF: 114
5. The use of low kV and high mAs is the ideal combination of exposure factors to reduce patient dose.
ANS: F REF: 114
6. The most common type of involuntary motion in the abdomen is peristalsis.
ANS: T REF: 114

7. Gonadal shielding can be used for a KUB abdomen projection on an adolescent female with possible urinary stones.

ANS: F REF: 114

8. The lateral abdomen position will best demonstrate the prevertebral region.

ANS: T REF: 124

9. The Pigg-O-Stat is recommended for erect abdomen projections on young pediatric patients.

ANS: T REF: 125

10. The AP abdomen for the obese patient often requires two separate exposures with the IR placed landscape.

ANS: T REF: 115

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Chapter 04: Upper Limb

Lampignano: Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition

MULTIPLE CHOICE

1. How many carpal bones are found in the wrist?

- a. 14
- b. 8
- c. 5
- d. 7

ANS: B

REF: 128

2. The joint found between the base of the third metacarpal and carpal bone is the:

- a. intercarpal.
- b. interphalangeal.
- c. carpometacarpal.
- d. proximal metacarpophalangeal.

ANS: C

REF: 129

3. Which of the following carpals articulates with the radius?

- a. Trapezium
- b. Scaphoid
- c. Pisiform
- d. Hamate

ANS: B

REF: 130

4. Which of the carpal bones is considered to be the largest?

- a. Hamate
- b. Triquetrum
- c. Trapezium
- d. Capitate

ANS: D

REF: 130

5. Which carpal articulates with both the fourth and fifth metacarpals?

- a. Triquetrum
- b. Capitate
- c. Hamate
- d. Trapezoid

ANS: C

REF: 130

6. Which is the most commonly fractured carpal bone?

- a. Lunate
- b. Trapezium
- c. Scaphoid
- d. Hamate

ANS: C

REF: 130

7. Which carpal bone is **5**?



- a. Trapezium
- b. Trapezoid
- c. Hamate
- d. Scaphoid

ANS: A

REF: 131

8. Which carpal bone is **1**?



- a. Scaphoid
- b. Trapezium
- c. Hamate
- d. Pisiform

ANS: D

REF: 131

9. Which carpal bone is **4**?



- a. Scaphoid
- b. Trapezoid
- c. Hamate
- d. Lunate

ANS: A

REF: 131

10. This projection is performed to rule out:



- a. median nerve impingement.
- b. calcification in carpal sulcus.
- c. carpal tunnel syndrome.
- d. all of the above.

ANS: D

REF: 131

11. This projection is correctly referred to as:



- a. carpal canal, inferosuperior projection.
- b. carpal tunnel, inferosuperior projection.
- c. Gaynor-Hart method.
- d. all of the above.

ANS: D

REF: 131

12. Which carpal bone is the smallest?

- a. Scaphoid
- b. Pisiform
- c. Hamate
- d. Capitate

ANS: B

REF: 130

13. What is the name of the joint found between the proximal and distal phalanges of the first digit?

- a. Proximal interphalangeal
- b. Distal interphalangeal
- c. Metacarpophalangeal
- d. Interphalangeal

ANS: D

REF: 129

14. Which of the following bony structures is found on the distal aspect of the ulna?

- a. Coronoid process

- b. Head
- c. Olecranon process
- d. All of the above

ANS: B REF: 132

15. Which one of the following structures is NOT part of the ulna?

- a. Styloid process
- b. Radial notch
- c. Ulnar notch
- d. Coronoid tubercle

ANS: C REF: 132

16. Which of the following structures is considered to be most proximal?

- a. Head of ulna
- b. Radial styloid process
- c. Olecranon process
- d. Radial tuberosity

ANS: C REF: 132

17. Which of the following structures is considered to be most lateral?

- a. Capitulum
- b. Head of ulna
- c. Trochlea
- d. Coronoid tubercle

ANS: A REF: 132

18. Which of the following structures is considered to be most posterior?

- a. Coronoid process
- b. Radial tuberosity
- c. Trochlea
- d. Olecranon process

ANS: D REF: 132

19. Which of the following structures is considered to be most distal?

- a. Radial head
- b. Styloid processes
- c. Radial tuberosity
- d. Capitulum

ANS: B REF: 132

20. Which two structures primarily form the hinge-like structure and movement of the elbow joint?

- a. Trochlea and olecranon process
- b. Capitulum and trochlea
- c. Coronoid process and coronoid fossa
- d. Coronoid fossa and trochlea

ANS: A

REF: 133

21. What are the names of the two small depressions found on the anterior aspect of the distal humerus?
- Trochlea and capitulum
 - Olecranon and coronoid fossa
 - Radial and coronoid fossa
 - Olecranon and radial fossa

ANS: C

REF: 133

22. Which two structures form the distal radioulnar joint?
- Radial notch and radial head
 - Ulnar notch and head of ulna
 - Radial tuberosity and ulnar notch
 - Coronoid tubercle and radial notch

ANS: B

REF: 132

23. What two bony landmarks are palpated for positioning of the AP elbow?
- Ulnar and radial heads
 - Humeral epicondyles
 - Humeral condyles
 - Trochlea and capitulum

ANS: B

REF: 133

24. The smooth, depressed, center portion of the trochlea used for evaluating rotation on a lateral elbow is termed the trochlear:
- process.
 - fossa.
 - depression.
 - sulcus.

ANS: D

REF: 133

25. The interphalangeal joints have a(n)_____type of joint movement.
- plane
 - saddle
 - ellipsoidal
 - ginglymus

ANS: D

REF: 134-135

26. The radiocarpal (wrist) joint possesses a(n)_____type of joint movement.
- ellipsoidal
 - ginglymus
 - plane
 - pivot

ANS: A

REF: 135

27. The first metacarpophalangeal joint has a(n)_____type of joint movement.

- a. plane
- b. pivot
- c. saddle
- d. ellipsoidal

ANS: D

REF: 134-135

28. A ginglymus joint can also be referred to as a_____joint.

- a. trochoid
- b. saddle
- c. hinge
- d. pivot

ANS: C

REF: 135

29. The first carpometacarpal joint is classified as a_____joint.

- a. saddle
- b. ginglymus
- c. plane
- d. trochoidal

ANS: A

REF: 135

30. An ellipsoidal joint allows movement in_____directions.

- a. two
- b. all
- c. four
- d. six

ANS: C

REF: 135

31. Which wrist ligament is attached to the styloid process of the ulna and continues to the triquetrum and pisiform?

- a. Radial collateral ligament
- b. Dorsal radiocarpal ligament
- c. Palmar radiocarpal ligament
- d. Ulnar collateral ligament

ANS: D

REF: 135

32. The bending or forcing of the hand outward with the hand pronated in a posteroanterior (PA) projection is known as:

- a. radial deviation.
- b. ulnar deviation.
- c. radial abduction.
- d. ulnar extension.

ANS: B

REF: 136

33. The two fat stripes of the wrist demonstrated radiographically are known as the scaphoid fat stripe and the_____fat stripe.

- a. pronator
- b. pisiform

- c. abductor
- d. anterior

ANS: A REF: 137

34. A nonvisible posterior fat pad on a well-exposed, correctly positioned lateral elbow radiograph generally suggests:
- a. negative study for injury.
 - b. fracture of one of the bones of the elbow.
 - c. injury to the synovial joint.
 - d. a congenital defect.

ANS: A REF: 137

35. What is the approximate distance between the tabletop and Bucky tray on most floating tabletop types of tables?
- a. 1/2 to 1 inch (1.3 to 2.5 cm)
 - b. 1 to 2 inches (2.5 to 5.1 cm)
 - c. 2 to 3 inches (5 to 7.6 cm)
 - d. 3 to 4 inches (8 to 10 cm)

ANS: D REF: 138

36. A general positioning rule is to place the long axis of the part_____to the long axis of the image receptor.
- a. perpendicular
 - b. adjacent
 - c. axial
 - d. parallel

ANS: D REF: 138

37. How should the original analog kV range be changed with a fiberglass cast applied for a wrist or forearm radiographic procedure?
- a. No change
 - b. Increase 3 to 4 kV
 - c. Increase 5 to 7 kV
 - d. Increase 8 to 10 kV

ANS: B REF: 138

38. Which of the following sets of exposure factors would be best for an adult hand study using a digital imaging system?
- a. 80 kV, 600 mA, 1/60 seconds, large focal spot
 - b. 64 kV, 200 mA, 1/20 seconds, large focal spot
 - c. 78 kV, 600 mA, 1/60 seconds, large focal spot
 - d. 70 kV, 300 mA, 1/30 seconds, small focal spot

ANS: D REF: 138

39. Grids are generally not required unless the anatomy measures greater than_____cm in thickness.
- a. 8

- b. 10
- c. 14
- d. 5

ANS: B

REF: 139

40. Where is the central ray (CR) placed for a PA projection of the third digit?
- a. At the distal interphalangeal joint
 - b. At the metacarpophalangeal joint
 - c. At the head of the third metacarpal
 - d. At the proximal interphalangeal joint

ANS: D

REF: 142

41. A "skier's thumb" is an injury of the:
- a. scaphoid.
 - b. pronator fat stripe.
 - c. ulnar collateral ligament.
 - d. median nerve

ANS: C

REF: 140

42. Local or generalized infection of bone or bone marrow caused by bacteria introduced by trauma or surgery is a condition termed:
- a. osteomyelitis.
 - b. Paget's disease.
 - c. osteoarthritis.
 - d. cellulitis.

ANS: A

REF: 140

43. The second most common type of primary cancerous bone tumor is:
- a. multiple myeloma.
 - b. chondrosarcoma.
 - c. Ewing's sarcoma.
 - d. osteogenic sarcoma.

ANS: D

REF: 141

44. Which one of the following is the most common primary cancerous bone tumor?
- a. Multiple myeloma
 - b. Osteochondroma
 - c. Osteosarcoma
 - d. Osteocarcinoma

ANS: A

REF: 141

45. From a pronated position, which of the following is required for a PA oblique projection of the fourth digit of the hand?
- a. 45° medial rotation
 - b. 30° to 35° lateral rotation
 - c. 30° to 35° medial rotation
 - d. 45° lateral rotation

ANS: D

REF: 143

46. Why is it recommended that the PA oblique (with medial rotation) projection be performed rather than the PA oblique (with lateral rotation) for the second digit of the hand?
- Minimizes optimal immunomodulating dose (OID).
 - Is more comfortable for the patient.
 - Opens up joints better.
 - Minimizes object image-receptor distance (OID).

ANS: D

REF: 143

47. Where is the CR centered for a PA projection of the hand?
- At the third proximal interphalangeal joint
 - At the third metacarpophalangeal joint
 - At the base of the third metacarpal
 - At the third distal interphalangeal joint

ANS: B

REF: 150

48. Why is it important to keep the phalanges parallel to the IR for a PA oblique projection of the hand?
- Prevents foreshortening of phalanges and obscuring of interphalangeal joints.
 - Prevents foreshortening of radiocarpal joint.
 - Opens up the carpometacarpal joints.
 - Demonstrates the sesamoid bones near the first interphalangeal joint.

ANS: A

REF: 143

49. Which specific anatomy is better visualized with a fan lateral as compared with the other lateral projections of the hand?
- Sesamoid bones
 - Carpals
 - Phalanges
 - Carpometacarpal joints

ANS: C

REF: 152

50. Which projection best demonstrates pathology involving the first carpometacarpal joint and trapezium?
- AP axial (modified Robert's method)
 - PA oblique thumb
 - Norgaard method
 - PA scaphoid, ulnar deviation wrist projection

ANS: A

REF: 148

51. Which of the following projections of the wrist will best demonstrate the wrist joint and intercarpal spaces?
- AP
 - PA
 - Gaynor-Hart
 - 30° PA oblique

ANS: A

REF: 155

52. The CR placement for an AP axial projection (modified Robert's method) of the thumb is at the:
- a. first carpometacarpal joint.
 - b. first proximal interphalangeal joint.
 - c. first distal interphalangeal joint.
 - d. midproximal phalanx of the first digit.

ANS: A

REF: 148

53. What CR angle is required with the modified Robert's method?
- a. 5° proximally (toward the wrist)
 - b. 10° distally (away from the wrist)
 - c. 15° proximally (toward the wrist)
 - d. 20° distally (away from the wrist)

ANS: C

REF: 148

54. How much rotation of the humeral epicondyles is required for the AP medial oblique projection of the elbow?
- a. 30°
 - b. 90°
 - c. 45°
 - d. 20°

ANS: C

REF: 169

55. What type of rotation of the hands is required for the AP oblique-bilateral (Norgaard method) hand projection?
- a. 45° internally
 - b. 30° to 35° externally
 - c. 5° to 10° internally
 - d. None

ANS: A

REF: 154

56. Which special projection of the wrist will open up the interspaces on the ulnar side of the wrist?
- a. Radial deviation
 - b. Ulnar deviation
 - c. Carpal canal
 - d. Carpal bridge

ANS: A

REF: 160

57. How much CR angulation to the long axis of the hand is required for the tangential, inferosuperior projection to demonstrate the carpal sulcus (canal)?
- a. 10° to 15°
 - b. 25° to 30°
 - c. 35° to 45°
 - d. 5° to 10°

ANS: B

REF: 161

58. Which special projection of the wrist is ideal for demonstrating possible calcification in the dorsal aspect of the carpals?
- Carpal bridge
 - Carpal canal
 - Ulnar deviation
 - Lateral wrist

ANS: A

REF: 163

59. Which of the following actions will lead to the proximal radius crossing over the ulna?
- Supination of the hand
 - Placing epicondyles parallel to the image receptor
 - Pronation of the hand
 - External rotation of the elbow

ANS: C

REF: 164

60. What is the purpose of performing the AP partially flexed projections of the elbow?
- To provide a view of the radial head and capitulum
 - To separate the radial head from the ulna
 - To provide an AP perspective if the patient cannot fully extend the elbow
 - To demonstrate any possible elevated fat pads

ANS: C

REF: 167

61. Which routine projection of the elbow best demonstrates the radial head and tuberosity free of superimposition?
- AP
 - Lateral
 - AP oblique with internal rotation
 - AP oblique with external rotation

ANS: D

REF: 169

62. Which routine projection of the elbow best demonstrates the olecranon process in profile?
- AP
 - Lateral
 - Medial rotation oblique
 - Lateral rotation oblique

ANS: B

REF: 172

63. Which basic projection of the elbow best demonstrates the trochlear notch in profile?
- AP
 - Lateral
 - Medial rotation oblique
 - Lateral rotation oblique

ANS: B

REF: 172

64. How should the humeral epicondyles be aligned for a lateral projection of the elbow?
- a. Parallel to image receptor
 - b. Perpendicular to image receptor
 - c. 45° to image receptor
 - d. 30° to image receptor

ANS: B REF: 172

65. A radiograph of the elbow demonstrates the radius directly superimposed over the ulna and the coronoid process in profile. Which projection of the elbow has been performed?
- a. AP
 - b. Lateral
 - c. Lateral (external) rotation oblique
 - d. Medial (internal) rotation oblique

ANS: D REF: 171

66. Which routine projection of the elbow will best demonstrate an elevated or visible posterior fat pad?
- a. True AP with no rotation
 - b. True lateral with 90° flexion
 - c. Lateral rotation oblique
 - d. Coyle method

ANS: B REF: 172

67. With the radial head-lateromedial projections, what is the only difference between the four projections?
- a. The position of the hand and/or wrist
 - b. The CR angulation
 - c. The amount of flexion of the elbow
 - d. The SID used for each projection

ANS: A REF: 174

68. Which of the following best demonstrates the radial head using the trauma lateral Coyle method routine?
- a. Elbow flexed 80°, CR angled 45° away from shoulder
 - b. Elbow flexed 90°, CR angled 30° toward shoulder
 - c. Elbow flexed 90°, CR angled 45° toward shoulder
 - d. Elbow flexed 90°, CR perpendicular to image receptor

ANS: C REF: 173

69. How many projections are required for the AP-acute flexion study of the elbow?
- a. One
 - b. Two
 - c. Three
 - d. Four

ANS: B REF: 167

70. A patient enters the emergency department (ED) with a Smith fracture. Which region of the upper limb must be radiographed to demonstrate this injury?
- a. Trapezium
 - b. Elbow
 - c. Wrist and forearm
 - d. Hand

ANS: C

REF: 140

71. A radiograph of a PA oblique of the hand reveals that the midshaft of the fourth and fifth metacarpals is superimposed. What specific positioning error has been committed?
- a. Excessive rotation of the hand and/or wrist laterally
 - b. Insufficient rotation of the hand and/or wrist laterally
 - c. Incorrect CR angulation
 - d. Fingers of the hand are not parallel to IR

ANS: A

REF: 151

72. A radiograph of a PA projection of the hand reveals that the distal radius and ulna and the carpals were cut off. What should the technologist do to correct this problem?
- a. Accept the radiograph. Carpals and distal radius and ulna are not part of a hand study.
 - b. Make sure the carpals, distal radius, and ulna are included on the lateral projection.
 - c. If the injury to the patient did not involve the carpal region and distal forearm, do not repeat it.
 - d. Repeat the PA projection to include all the carpals and about 1 inch (2.5 cm) of the distal radius and ulna.

ANS: D

REF: 150

73. A radiograph of an AP projection of the elbow reveals that there is complete separation of the proximal radius and ulna. What positioning error has been committed?
- a. Excessive medial rotation
 - b. Partial flexion of the joint
 - c. Excessive lateral rotation
 - d. Incorrect CR location and angle

ANS: C

REF: 166

74. A radiograph of a tangential, inferosuperior projection of the carpal canal reveals that the hamular process is superimposed over the pisiform. Which of the following measures will correct this problem?
- a. Rotate the wrist and hand 10° internally.
 - b. Increase the CR angle.
 - c. Decrease the CR angle.
 - d. Increase the extension of the hand and/or wrist.

ANS: A

REF: 161

75. A radiograph of an AP oblique elbow with medial rotation reveals that the radial head is superimposed over part of the coronoid process. What positioning error has been committed?

- a. Excessive medial rotation
- b. Flexion of the elbow
- c. Excessive lateral rotation
- d. Incorrect CR angulation

ANS: A REF: 169

76. A patient enters the ED with a possible Bennett's fracture. Which of the following routines should be performed to confirm this diagnosis?
- a. Finger
 - b. Wrist
 - c. Forearm
 - d. Thumb

ANS: D REF: 140

77. A patient enters the ED with a possible scaphoid fracture. The patient is unable to assume the ulnar deviation position. Which of the following positions should be performed to confirm the diagnosis?
- a. Gaynor-Hart
 - b. Jones
 - c. Modified Stecher
 - d. Coyle

ANS: C REF: 159

78. A patient with a fractured forearm had the fracture reduced and a fiberglass cast placed on the extremity. The orthopedic surgeon orders a postreduction study. The original (analog) kV was 60 kV. Which one of the following kV factors should be selected for the postreduction study?
- a. 63 kV
 - b. 67 kV
 - c. 70 kV
 - d. 75 kV

ANS: A REF: 138

79. A patient enters the ED in severe pain with a possible dislocation of the elbow. The patient has the elbow flexed more than 90°. Which one of the following routines should be performed to confirm the diagnosis?
- a. Partially flexed AP and limited lateral projections
 - b. Jones method and limited lateral projection
 - c. Coyle method and limited lateral projection
 - d. Lateral elbow only

ANS: A REF: 167

80. A patient enters the ED with an elbow injury. The partially flexed AP and lateral positions reveal a possible fracture of the coronoid process. The patient's elbow is partially flexed and he refuses to extend it farther. Which one of the following positions/projections should be performed to confirm the fracture of the coronoid process?
- a. AP-acute flexion
 - b. Coyle method with 80° flexion, CR angled 45° away from shoulder

- c. Coyle method with 90° flexion, CR angled 45° toward the shoulder
- d. Gaynor-Hart method

ANS: B REF: 173

81. A patient with a history of carpal tunnel syndrome comes to radiology. The physician wants to rule out abnormal calcifications in the carpal sulcus. Which of the following projections would best demonstrate this region?
- a. Coyle method
 - b. Jones method
 - c. Carpal bridge
 - d. Gaynor-Hart method

ANS: D REF: 161

82. The AP oblique-bilateral hands projection (“ball-catcher’s position”) is performed to evaluate for early signs of:
- a. gout.
 - b. osteoporosis.
 - c. rheumatoid arthritis.
 - d. bursitis.

ANS: C REF: 154

83. A radiograph of the PA scaphoid projection reveals extensive superimposition of the scaphoid and adjacent carpals. Which of the following factors can lead to this problem?
- a. Elevation of the hand and wrist
 - b. Insufficient ulnar deviation
 - c. Insufficient CR angle distally
 - d. Slight flexion of the phalanges

ANS: B REF: 158

84. A lateral elbow radiograph demonstrates about half of the radial head superimposed by the coronoid process of the ulna. Which of the following occurred?
- a. The hand was pronated rather than in a true lateral position.
 - b. The hand and wrist were rotated laterally and not in a true lateral position.
 - c. The shoulder was not dropped sufficiently to the tabletop level.
 - d. No positioning errors occurred.

ANS: D REF: 172

85. A patient comes to radiology with a possible tear of the ulnar collateral ligament of the wrist. The patient complains of discomfort near the thumb region. Basic thumb projections do not demonstrate any type of fracture or dislocation. Which one of the following projections can be performed to confirm an injury to the ulnar collateral ligament?
- a. Norgaard method
 - b. Modified Robert’s method
 - c. Gaynor-Hart method
 - d. Folio method

ANS: D REF: 149

86. A patient arrives in radiology with a metal foreign body in the palm of the hand. Which of the following hand routines should be performed on this patient to confirm the location of the foreign body?
- PA and lateral in extension projections
 - PA and lateral in flexion projections
 - PA and fan lateral projections
 - PA and Gaynor-Hart method

ANS: A REF: 153

87. A young child comes to radiology with an elbow injury. The basic elbow projections demonstrate a possible nondisplaced fracture of the coronoid process. Beyond the medial oblique projection, what additional projection(s) can be performed to demonstrate the coronoid process in profile?
- Coyle method with 45° CR angle toward shoulder
 - Radial head lateral projections
 - Coyle method with 45° CR angle away from shoulder
 - Acute flexion projection

ANS: C REF: 173

MATCHING

Select the correct manual exposure adjustment for each disease or condition.

- Increase (+)
 - Decrease (-)
 - No change (0)
- Advanced Paget's disease
 - Bursitis
 - Advanced osteoporosis
 - Bone tumors
 - Osteomyelitis
 - Carpal tunnel syndrome
 - Small joint effusion
 - Advanced rheumatoid arthritis

- ANS: A REF: 140-141
- ANS: C REF: 140-141
- ANS: B REF: 140-141
- ANS: C REF: 140-141
- ANS: C REF: 140-141
- ANS: C REF: 140-141
- ANS: C REF: 140-141
- ANS: B REF: 140-141

Match each fracture description with the corresponding term. (Use each choice only once.)

- Smith fracture
- Barton fracture
- Colles' fracture

- d. Bennett's fracture
 - e. Boxer's fracture
9. Fracture of distal radius with posterior displacement
 10. Transverse fracture through fifth metacarpal neck
 11. Fracture of distal radius with anterior displacement
 12. Fracture and dislocation of posterior lip of distal radius
 13. Fracture of base of first metacarpal
-
9. ANS: C REF: 140-141
 10. ANS: E REF: 140-141
 11. ANS: A REF: 140-141
 12. ANS: B REF: 140-141
 13. ANS: D REF: 140-141

TRUE/FALSE

1. Nuclear medicine is generally more sensitive than radiography for assessing bones of the upper limb for either metastatic bone lesions or stress fractures.

ANS: T REF: 139
2. Carpal tunnel syndrome is more common in middle-aged women than in middle-aged men.

ANS: T REF: 140
3. One of the early signs of rheumatoid arthritis is soft tissue swelling near the ulnar styloid process.

ANS: T REF: 140
4. Rheumatoid arthritis is three times more common in men than women.

ANS: F REF: 140
5. The radiographic criteria for a true lateral finger indicate equal concavity of the anterior and posterior aspects of the phalanges.

ANS: T REF: 144
6. The Folio method is performed to rule out a displaced fracture of the thumb (first metacarpal).

ANS: F REF: 148
7. The Folio method requires a bilateral projection of the thumbs be taken with one single exposure.

ANS: T REF: 149

Chapter 05: Humerus and Shoulder Girdle

Test Bank

MULTIPLE CHOICE

1. Which of the following structures is not part of the proximal humerus?
 - a. Lesser tubercle
 - b. Glenoid process
 - c. Intertubercular groove
 - d. Anatomic neck

ANS: B REF: 174

2. Which term describes the medial end of the clavicle?
 - a. Acromial extremity
 - b. Acromion
 - c. Sternal extremity
 - d. Acromial tuberosity

ANS: C REF: 175

3. The female clavicle is usually shorter and less curved than that of the male.
 - a. True
 - b. False

ANS: A REF: 175

4. The anterior surface of the scapula is referred to as the:
 - a. scapular surface.
 - b. dorsal surface.
 - c. supraspinous and infraspinous fossa.
 - d. costal surface.

ANS: D REF: 176

5. What is the name of the large fossa found within the anterior surface of the scapula?
 - a. Supraspinous fossa
 - b. Infraspinous fossa
 - c. Subscapular fossa
 - d. Glenoid fossa

ANS: C REF: 176

6. What is the name of the insertion point for the deltoid muscle located on the anterolateral surface of the humerus?
 - a. Surgical neck
 - b. Deltoid protuberance
 - c. Deltoid tuberosity
 - d. Intertubercular groove

ANS: C REF: 174

7. All of the joints of the shoulder girdle are diarthrodial.

- a. True
- b. False

ANS: A

REF: 178

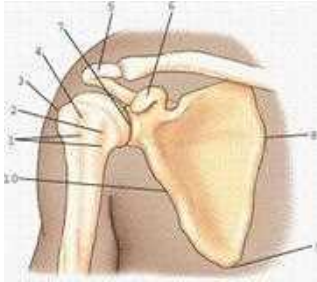
8. Which of the following joints is considered to have a spheroidal type of movement?

- a. Acromioclavicular joints
- b. Sternoclavicular joints
- c. Bicipital joint
- d. Scapulohumeral joint

ANS: D

REF: 178

9. Which view and projection of the proximal humerus is represented in the figure?

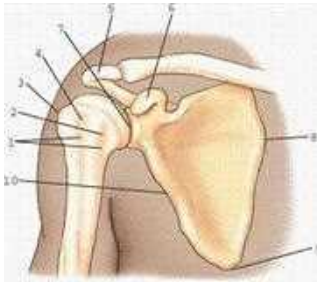


- a. External rotation, anteroposterior (AP) projection
- b. Neutral rotation, AP projection
- c. Internal rotation, AP projection
- d. External rotation, lateral projection

ANS: A

REF: 187

10. Part 5 refers to the:

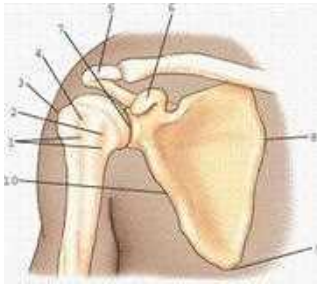


- a. coracoid process.
- b. superior border of scapula.
- c. lateral angle of scapula.
- d. none of the above.

ANS: D

REF: 175 | 176

11. Part 3 refers to the:

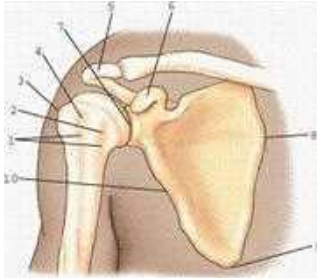


- a. scapulohumeral joint.
- b. glenohumeral joint.
- c. glenoid cavity or fossa.
- d. all of the above.

ANS: D

REF: 175 | 176

12. Part 10 refers to the vertebral border of the scapula.

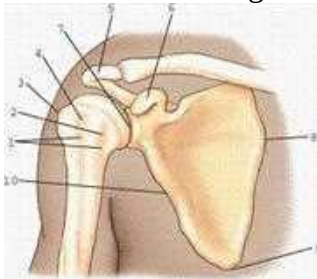


- a. True
- b. False

ANS: B

REF: 175 | 176

13. Part 3 refers to the greater tubercle.



- a. True
- b. False

ANS: A

REF: 175 | 176

14. Which rotation of the humerus will result in a lateral position of the proximal humerus?
- a. Internal rotation (epicondyles perpendicular to image receptor)
 - b. Neutral rotation (epicondyles 45° to the image receptor)
 - c. External rotation (epicondyles parallel to the image receptor)
 - d. None of the above

ANS: A

REF: 179

15. Which AP projection of the shoulder and proximal humerus is created by placing the affected palm of the hand facing inward toward the thigh?
- a. Internal rotation
 - b. Neutral rotation
 - c. External rotation
 - d. AP axial

ANS: B REF: 179

16. The use of a grid during shoulder radiography will result in higher patient dose over nongrid procedures.
- a. True
 - b. False

ANS: A REF: 180

17. Which of the following shoulder positions is considered a trauma projection (can be performed safely for a possible fracture or dislocation)?
- a. AP apical oblique axial (Garth method) projection
 - b. Inferosuperior axial (Clements modification) projection
 - c. AP projection–internal rotation
 - d. None of the above

ANS: A REF: 198

18. What medial central ray (CR) angle is required for the inferosuperior axial shoulder (Lawrence method)?
- a. 5° to 10°
 - b. 40° to 45°
 - c. 25° to 30°
 - d. 10° to 15°

ANS: C REF: 189

19. What additional maneuver must be added to the inferosuperior axial shoulder (Lawrence method) projection to best demonstrate a possible Hill-Sachs defect?
- a. Increase medial CR angulation.
 - b. Angle the CR 10° to 15° downward or posteriorly in addition to the medial angle.
 - c. Perform exaggerated external rotation of the affected upper limb.
 - d. Increase abduction of the affected upper limb.

ANS: C REF: 191

20. Which of the following shoulder projections best demonstrates the glenoid cavity in profile?
- a. Grashey method
 - b. Clements modification
 - c. Garth method
 - d. AP shoulder, neutral rotation

ANS: A REF: 192

21. A radiograph of the inferosuperior axial projection (Lawrence method) demonstrates the acromion process of the shoulder to be located most superiorly (anteriorly).
- a. True
 - b. False

ANS: B REF: 189

22. For a Grashey method projection of the shoulder, the CR is centered to the acromion.
- a. True
 - b. False

ANS: B REF: 192

23. How much posterior CR angulation is required for the supine version of the tangential projection for the intertubercular (bicipital) groove?
- a. 20° to 30°
 - b. 30° to 40°
 - c. 10° to 15°
 - d. No angle is used for this projection.

ANS: C REF: 193

24. Which ionization chamber(s) for the AEC should be used for a tangential projection for an intertubercular groove?
- a. Center chamber
 - b. Both outside chambers
 - c. Left chamber
 - d. Cannot use AEC with this projection

ANS: D REF: 197

25. Which of the following projections can be performed using a breathing technique?
- a. Scapular Y lateral projection
 - b. Inferosuperior axiolateral projection
 - c. AP clavicle
 - d. AP scapula

ANS: D REF: 202

26. How much CR angulation should be used for a scapular Y projection?
- a. No CR angle should be used.
 - b. 10° to 15°
 - c. 20° to 30°
 - d. 35° to 45°

ANS: A REF: 194

27. Where is the CR centered for a transthoracic lateral projection for proximal humerus?
- a. 1 inch (2.5 cm) inferior to the acromion
 - b. Level of the greater tubercle
 - c. Level of surgical neck
 - d. Midaxilla

ANS: C REF: 195

28. The PA transaxillary projection (Hobbs modification) is performed to rule out possible shoulder dislocation.
- a. True
 - b. False

ANS: B REF: 190

29. An AP apical oblique projection for an anteriorly dislocated scapulohumeral joint will project the humerus _____ to the glenoid cavity.
- a. superior
 - b. inferior
 - c. lateral
 - d. medial

ANS: B REF: 198

30. Which projection of the shoulder requires that the patient be rotated 45° to 60° toward the IR from a PA position?
- a. Inferosuperior axiolateral projection
 - b. AP oblique projection
 - c. Lateral scapula projection
 - d. None of the above

ANS: C REF: 203

31. Which of the following modalities best demonstrates shoulder joint pathology such as rotator cuff tears using dynamic evaluation techniques during joint movements?
- a. Ultrasound
 - b. Magnetic resonance imaging (MRI)
 - c. Computed tomography (CT)
 - d. Arthrography

ANS: A REF: 180

32. PA transaxillary (Hobbs modification) requires a 5° to 15° CR cephalic angle.
- a. True
 - b. False

ANS: B REF: 190

33. Which of the following best demonstrates the coracoacromial arch?
- a. Neer method
 - b. West Point method
 - c. Fisk method
 - d. Garth method

ANS: A REF: 197

34. The inferosuperior axial projection (Clements modification) requires a CR angle of _____ toward axilla if a patient cannot fully abduct extremity 90°.

- a. 35°
- b. none
- c. 40° to 45°
- d. 5° to 15°

ANS: D

REF: 191

35. How much CR angulation is required for an asthenic patient for an AP axial projection of the clavicle?
- a. 15°
 - b. 30°
 - c. 45°
 - d. No CR angulation should be used for this projection.

ANS: B

REF: 199

36. Where is the CR centered for the bilateral acromioclavicular (AC) joint projection on a single 14- × 17-inch (35 × 43 cm) image receptor?
- a. At the affected AC joint
 - b. 1 inch (2.5 cm) above jugular notch
 - c. At the level of the thyroid cartilage
 - d. At the sternal angle

ANS: B

REF: 200

37. A radiograph of an AP oblique projection for the glenoid cavity reveals that the anterior and posterior rims of the glenoid process are not superimposed. Which of the following modifications should produce a more acceptable image?
- a. Angle CR 5° to 10° caudad.
 - b. Angle CR 5° to 10° cephalad.
 - c. Increase rotation of the body.
 - d. Abduct the arm slightly.

ANS: C

REF: 189

38. A radiograph of a transthoracic lateral projection reveals that it is difficult to visualize the proximal humerus due to the ribs and lung markings. The following analog exposure factors were used: 75 kV, 30 mAs, 40-inch (102 cm) SID, grid, and suspended respiration. Which of the following changes will improve the visibility of the proximal humerus?
- a. Make the exposure on second inspiration.
 - b. Use a compression band to prevent patient movement.
 - c. Use a 72-inch (183 cm) SID.
 - d. Use an orthostatic (breathing) technique.

ANS: D

REF: 195

39. A radiograph for an AP projection with external rotation of the proximal humerus reveals that the greater tubercle is profiled laterally. What should be changed to improve this image for a repeat exposure?
- a. Rotate epicondyles so they are perpendicular to the image receptor.
 - b. Move the patient obliquely 10° to 15° toward the affected side.

- c. Rotate the arm to place palm of the patient's hand against the thigh.
- d. Positioning is acceptable; do not repeat it.

ANS: D

REF: 183

40. A radiograph of an AP clavicle reveals that the sternal extremity is partially collimated off. What should the technologist do?
- a. Repeat the AP projection and correct collimation.
 - b. Make sure the sternal extremity is included on the AP axial projection.
 - c. Only repeat it if the patient's pain/symptoms involve the sternal extremity.
 - d. Ask the radiologist whether he or she wants the projection repeated.

ANS: A

REF: 199

41. A radiograph of a scapular Y lateral position reveals that the scapula is slightly rotated (the vertebral and axillary borders are not superimposed). The axillary border of the scapula is determined to be more lateral compared with the vertebral border. Which of the following modifications should be made for the repeat exposure?
- a. Decrease rotation of thorax.
 - b. Decrease CR angle.
 - c. Increase rotation of thorax.
 - d. Abduct the arm more and flex it at the elbow.

ANS: A

REF: 202

42. A patient comes to radiology for treatment of an arthritic condition of the right shoulder. The radiologist orders AP internal/external rotation projections and an inferosuperior axiolateral projection of the scapulohumeral joint. However, the patient cannot abduct the arm for this projection. Which other projection will best demonstrate the scapulohumeral joint space?
- a. Posterior oblique (Grashey method)
 - b. Scapular Y lateral
 - c. Transthoracic lateral
 - d. AP projection—neutral rotation

ANS: A

REF: 192

43. A patient comes to the emergency department (ED) with a possible right AC joint separation. Right clavicle and AC joint exams are ordered. The clavicle is taken first, and a small linear fracture of the midshaft of the clavicle is discovered. What should the technologist do in this situation?
- a. Perform the weight-bearing phase as ordered.
 - b. Reduce the amount of weight that would normally be given to the patient and perform the weight-bearing study.
 - c. Consult with the ED physician before continuing with the AC joint study.
 - d. Slowly give the patient more weight to hold until he begins to complain and then complete the AC joint study.

ANS: C

REF: 200

44. A patient enters the ED with a midshaft humeral fracture. The AP projection taken on the cart demonstrates another fracture near the surgical neck of the humerus. The patient is unable to stand or rotate the humerus because of the extent of the trauma. What other projection should be taken for this patient?
- Scapular Y lateral-AP oblique projection
 - Apical oblique projection
 - Horizontal beam transthoracic lateral projection for humerus
 - Rotational lateral projection for humerus

ANS: C

REF: 185 | 186

45. A referring physician suspects that a subacromial spur may be the cause for a patient's arm numbness. She asks the technologist for a projection that would best demonstrate any possible spurs. Which of the following projections would accomplish this objective?
- PA scapular Y lateral with 10° to 15° caudal angle
 - PA scapular Y lateral with 10° to 15° cephalad angle
 - AP oblique shoulder with 45° caudal angle
 - AP shoulder with 10° to 15° caudal angle

ANS: A

REF: 197

46. A patient enters the ED with multiple injuries. The physician is concerned about a dislocation of the left proximal humerus. The patient is unable to stand. Which of the following routines is advisable to best demonstrate this condition?
- AP shoulder and inferosuperior axiolateral projection
 - AP shoulder and 35° to 45° LPO position (Grashey method)
 - AP shoulder and Neer projection
 - AP shoulder and recumbent AP oblique scapular Y projection

ANS: D

REF: 196

47. A patient enters the ED with a possible AC joint separation. The patient is paraplegic; therefore, the study cannot be done erect. Which of the following routines would be performed to diagnose this condition?
- Non-weight-bearing and weight-bearing type of projections performed with the patient recumbent by pulling down on the shoulders
 - Recumbent AP and AP axial projection of the clavicles to include AC joints
 - AP projections of shoulders with external and internal rotation performed recumbent
 - AP and AP apical oblique projection of the shoulder performed recumbent

ANS: A

REF: 200

48. A patient enters the ED with a possible bony defect of the midwing area of the scapula. The patient is able to stand and move the upper limb freely. In addition to the routine AP scapula projection with the arm abducted, which of the following would best demonstrate the involved area?
- Take an apical oblique projection of the shoulder.
 - Take a transthoracic lateral projection of the shoulder region.
 - Have the patient reach across the chest and grasp the opposite shoulder for a lateral scapula projection.

- d. Have the patient drop the affected arm behind him or her and take a lateral scapula projection.

ANS: C REF: 204

49. The recommended SID for AC joints is 72 inches (183 cm).

- a. True
- b. False

ANS: A REF: 180

50. The Hill-Sachs defect is a fracture of the articular surface of the glenoid cavity.

- a. True
- b. False

ANS: B REF: 181

51. The arm should be abducted about 45° for an AP scapula.

- a. True
- b. False

ANS: B REF: 202

52. An orthostatic (breathing) technique can be performed for the AP projection of the scapula.

- a. True
- b. False

ANS: A REF: 202

53. Which one of the following projections/positions should NOT be performed for a possible shoulder dislocation?

- a. AP axial oblique (Garth method)
- b. Transthoracic lateral (Lawrence method)
- c. Inferosuperior axial (Clements modification)
- d. Scapular Y

ANS: C REF: 53

54. A posterior dislocation of the shoulder occurs more frequently than an anterior dislocation.

- a. True
- b. False

ANS: B REF: 196 | 198

55. The Alexander method for AC joints requires a 15° cephalic CR angle.

- a. True
- b. False

ANS: A REF: 200

56. For AC joint weight-bearing studies, patients should not be asked to hold on to the weights with their hands; rather, the weights should be attached to the wrists.

- a. True

b. False

ANS: A

REF: 200

57. Which of the following AP shoulder projections demonstrates the greater tubercle in profile medially?

- a. External rotation
- b. Internal rotation
- c. Neutral rotation
- d. None of the above

ANS: D

REF: 179

58. Which of the following AP shoulder projections demonstrates the lesser tubercle in profile medially?

- a. External rotation
- b. Internal rotation
- c. Neutral rotation
- d. None of the above

ANS: B

REF: 179

59. A patient enters the ED with multiple injuries including a possible fracture of the left proximal humerus. Which positioning rotation should be performed to determine the extent of the humerus injury?

- a. AP neutral shoulder rotation and carefully rotated internally proximal humerus
- b. AP shoulder as is; show radiograph to the ED physician before attempting a rotational lateral projection
- c. AP and horizontal beam transthoracic lateral shoulder projection
- d. AP and apical oblique shoulder without any arm rotation

ANS: C

REF: 184 | 185

60. The AP humerus requires that the humeral epicondyles are_____to the IR.

- a. set at a 45° angle
- b. parallel
- c. perpendicular
- d. slightly oblique

ANS: B

REF: 187

61. A patient enters the ED with a dislocated shoulder. The technologist attempts to position the patient into the transthoracic lateral projection, but the patient is unable to raise the unaffected arm over his head completely. What can the technologist do to compensate for the patient's inability to raise his arm completely?

- a. Perform the Grashey method instead.
- b. Use a breathing technique.
- c. Increase kV to penetrate through both shoulders.
- d. Angle the CR 10° to 15° cephalad.

ANS: D

REF: 195

62. A patient is scheduled for an arthrogram. During the course of the study, the radiologist requests a projection to demonstrate the intertubercular groove. Which one of the following projections would best demonstrate this structure?
- Fisk modification
 - Garth method
 - Grashey method
 - Pearson method

ANS: A REF: 193

63. An inferosuperior axial projection (Clements modification) is performed on a patient with a nontraumatic shoulder injury. The patient cannot fully abduct the upper limb 90°. Which of the following modifications of the position should be performed for this patient?
- Angle CR 30° toward the axilla.
 - Angle CR 5 to 15° toward the axilla.
 - Angle CR 45° toward the elbow AC joint separation.
 - Rotate shoulder slightly anterior to open joint space.

ANS: B REF: 191

64. A radiograph of an AP axial projection of the clavicle demonstrates that the clavicle is within the midaspect of the lung apices. What should the technologist do to correct this error?
- Do nothing; this is an acceptable AP axial clavicle projection.
 - Increase the caudal CR angle during repeat exposure.
 - Increase the cephalic CR angle during repeat exposure.
 - Make the exposure upon complete inspiration.

ANS: C REF: 199

65. What is a possible radiographic sign for impingement syndrome of the shoulder?
- Calcified tendons
 - Fluid-filled joint space
 - Fracture of the glenoid rim
 - Subacromial spurring

ANS: D REF: 181

66. What type of CR angle is required for the superoinferior axial projection (Hobbs modification)?
- CR is perpendicular to IR
 - 5° to 15° toward axilla
 - 25° away from axilla
 - 10° toward shoulder

ANS: A REF: 190

67. Sonography is an effective diagnostic tool in studying the shoulder joint.
- True
 - False

ANS: A REF: 180

68. Where is the CR centered for the posterior oblique position for the glenoid cavity?
- Acromion
 - 2 inches (5 cm) medial and inferior to the superolateral border of shoulder
 - Coracoid process
 - 1 inch (2.5 cm) superior to the coracoid process

ANS: B

REF: 192

69. What is the common term for idiopathic chronic adhesive capsulitis?
- Bankart lesion
 - Tendinitis
 - Bursitis
 - Frozen shoulder

ANS: D

REF: 181

MATCHING

Select the correct method name to match each shoulder projection. (Use each choice only once.)

- Clements modification
 - Neer method
 - Fisk modification
 - Hobbs modification
 - Garth method
 - Grashey method
- Tangential, intertubercular groove projection
 - Tangential, supraspinatus outlet projection
 - AP apical oblique axial projection
 - Inferosuperior axial projection
 - Posterior oblique, glenoid cavity projection
 - PA transaxillary projection

1. ANS: C REF: 193

2. ANS: B REF: 197

3. ANS: E REF: 198

4. ANS: A REF: 191

5. ANS: F REF: 192

6. ANS: D REF: 190

Chapter 06: Lower Limb

Lampignano: Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition

MULTIPLE CHOICE

1. How many tarsal bones are found in the foot?

- a. 7
- b. 14
- c. 5
- d. 26

ANS: A

REF: 212

2. Which metatarsal bone of the foot has a prominent tuberosity most frequently fractured?

- a. First
- b. Third
- c. Fourth
- d. Fifth

ANS: D

REF: 212

3. Which term describes the top or anterior surface of the foot?

- a. Palmar
- b. Dorsum
- c. Volar
- d. Plantar

ANS: B

REF: 223

4. Where would the interphalangeal joint be found in the foot?

- a. Between the phalanges of the second through fifth digits
- b. Between the tarsal bones and phalanges
- c. Between the phalanges of the first digit
- d. Between any of the metatarsals and phalanges

ANS: C

REF: 213

5. Which structure or bone contains the sustentaculum tali?

- a. Calcaneus
- b. Talus
- c. Base of the fifth metatarsal
- d. Tibia

ANS: A

REF: 214

6. How many articular facets make up the subtalar joint?

- a. One
- b. Two
- c. Three
- d. Four

ANS: C

REF: 214

7. What are the two arches of the foot?
- Anterior and longitudinal
 - Longitudinal and transverse
 - Transverse and anterior
 - Instep and cross-step

ANS: B

REF: 215

8. The medial malleolus is part of the:
- talus.
 - calcaneus.
 - fibula.
 - tibia.

ANS: D

REF: 216

9. The ankle joint is a _____ joint with a _____ type of movement.
- fibrous; plane
 - synovial; saddle
 - fibrous; ginglymus
 - synovial; ginglymus

ANS: B

REF: 216

10. Another term for the intercondylar sulcus is the:
- articular facets.
 - patellar surface.
 - intercondylar fossa.
 - intercondylar recess.

ANS: B

REF: 219

11. A tear of the tibial (medial) collateral ligament (MCL) caused by a trauma injury is frequently associated with tears of:
- the anterior cruciate ligament (ACL) and the medial meniscus.
 - the posterior cruciate ligament (PCL) and the lateral meniscus.
 - the fibular lateral collateral ligament (LCL) and the patella ligament.
 - none of the above.

ANS: A

REF: 221

12. Saclike structures found in the knee joint that allow smooth articulation between ligaments and tendons are called:
- bursae.
 - menisci.
 - synovial membranes.
 - synovial bodies.

ANS: A

REF: 221

13. To decrease the angle between the anterior surface of the foot and anterior surface of the lower leg is described as:
- plantar flexion.
 - inversion.
 - dorsiflexion.
 - eversion.

ANS: C REF: 223

14. The patellofemoral joint is a _____ joint with a _____ type of movement.
- synovial; ginglymus
 - fibrous; immovable
 - synovial; saddle
 - synovial; bicondylar

ANS: C REF: 223

15. Which tendon attaches directly to the tibial tuberosity?
- Patellar
 - Quadriceps
 - Soleus
 - Collateral

ANS: A REF: 221

16. The calcaneus articulates with the talus and the:
- cuboid.
 - navicular.
 - medial cuneiform.
 - lateral cuneiform.

ANS: A REF: 215

17. A radiographic appearance of a highly malignant and extensively destructive lesion that usually occurs in long bones and produces a sunburst pattern describes:
- an osteomalacia.
 - an osteogenic sarcoma.
 - an osteoclastoma.
 - Reiter syndrome.

ANS: B REF: 226

18. A radiographic appearance of a well-circumscribed lucency within bones describes:
- gout.
 - Ewing's sarcoma.
 - a bone cyst.
 - Osgood-Schlatter disease.

ANS: C REF: 226-227

19. The best method of evaluating injuries to the menisci and ligaments of the knee joint involves:
- stress views of the knee.
 - anteroposterior (AP), AP oblique, and lateral projections of the knee.

- c. intercondylar fossa projections.
- d. a magnetic resonance imaging procedure.

ANS: D

REF: 226

20. Which of these labeled structures or bones identifies the navicular?



- a. B
- b. C
- c. D
- d. I

ANS: B

REF: 215 | 217

21. Which of these labeled structures or bones identifies the lateral (third) cuneiform?



- a. B
- b. C
- c. D
- d. I

ANS: B

REF: 215 | 217

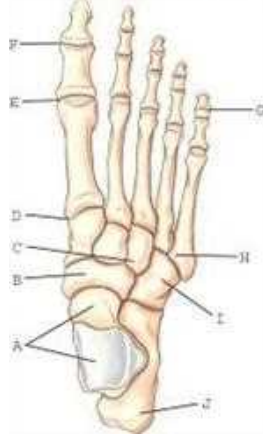
22. Which of these labeled structures or bones identifies the metatarsophalangeal joint?

- a. E
- b. F
- c. G
- d. H

ANS: A

REF: 215 | 217

23. Which of these labeled structures or bones identifies the talus?



- a. A
- b. B
- c. I
- d. J

ANS: A

REF: 215 | 217

24. Which projection and/or position of the foot is represented by this drawing of the foot?

- a. AP projection, no rotation
- b. AP oblique, 15° to 20° medial rotation
- c. AP oblique, 45° lateral rotation
- d. AP oblique, 45° medial rotation

ANS: A

REF: 215 | 217

25. Which one of the labeled structures is the medial condyle of the femur?



- a. A
- b. B
- c. C
- d. D
- e. E

ANS: A

REF: 222

26. Which of the labeled structures is the adductor tubercle?



- a. A
- b. B
- c. C
- d. D

e. E

ANS: C

REF: 222

27. Which of the labeled structures is the lateral condyle of the femur?



- a. A
- b. B
- c. C
- d. D
- e. E

ANS: B

REF: 222

28. This radiograph represents which of the following positions?



- a. Mediolateral projection of the knee, but overextended
- b. Mediolateral projection of the knee, but underrotated toward the IR
- c. Mediolateral projection of the knee, but overrotated toward the IR
- d. Correctly positioned mediolateral projection of the knee, but underexposed

ANS: B

REF: 249

29. The distal tibiofibular joint is classified as a _____ joint.

- a. synovial
- b. fibrous
- c. diarthrodial
- d. synarthrodial

ANS: B

REF: 223

30. Which of the following joints is a modified ellipsoidal or condyloid joint?

- a. Tarsometatarsal
- b. Metatarsophalangeal
- c. Proximal tibiofibular
- d. Intertarsal

ANS: B

REF: 223

31. Extending the ankle joint or pointing the foot and toes downward is called:
- dorsiflexion.
 - inversion.
 - eversion.
 - plantar flexion.

ANS: D

REF: 223

32. How much central ray (CR) angulation (if any) should be used for an AP projection of the toes (without elevation of forefoot)?
- Keep CR perpendicular to IR.
 - 5° toward calcaneus
 - 10° to 15° toward calcaneus
 - 20° to 25° toward calcaneus

ANS: C

REF: 228

33. Which of the following routines should be performed for a study of the second toe?
- AP, AP oblique with lateral rotation, mediolateral projection
 - AP, AP oblique with medial rotation, lateromedial projection
 - AP, AP oblique with lateral rotation, lateromedial projection
 - AP, AP oblique with medial rotation, mediolateral projection

ANS: B

REF: 228-230

34. How much is the foot dorsiflexed with the tangential projection for the sesamoid bones if the CR remains perpendicular to the image receptor?
- 15° to 20° from vertical
 - No flexion of the foot is required.
 - 5° to 7° from vertical
 - 30° to 45° from vertical

ANS: A

REF: 231

35. A mediolateral knee radiograph that is overrotated toward the image receptor can be recognized by which of the following?
- The fibular head will appear more superimposed by the tibia than a true lateral.
 - The fibular head will appear less superimposed by the tibia than a true lateral.
 - The medial condyle of the femur will appear more posterior.
 - Both A and C are correct.

ANS: B

REF: 249

36. To properly visualize the joint spaces with the AP projection of the foot, the CR must be:
- parallel to the longitudinal arch.
 - perpendicular to the metatarsals.
 - perpendicular to the longitudinal arch.
 - parallel to the metatarsals.

ANS: B

REF: 232

37. Which position of the foot will best demonstrate the lateral (third) cuneiform?

- a. AP oblique with medial rotation
- b. AP oblique with lateral rotation
- c. AP projection
- d. Mediolateral projection

ANS: A REF: 233

38. What is one advantage of the lateromedial projection of the foot?

- a. It is more comfortable for the patient.
- b. It better demonstrates the intertarsal joints.
- c. The foot assumes a truer lateral position.
- d. It opens the subtalar joint.

ANS: C REF: 234

39. What CR angulation is required for the AP medial oblique projection of the foot?

- a. CR is perpendicular to the image receptor.
- b. 10° posterior
- c. 15° to 20° posterior
- d. 5° to 7° posterior

ANS: A REF: 233

40. How much CR angulation to the long axis of the foot is required for the plantodorsal (axial) projection of the calcaneus?

- a. 45° to 50°
- b. 15° to 20°
- c. 30° to 35°
- d. 40°

ANS: D REF: 237

41. Where is the CR placed for a mediolateral projection of the calcaneus?

- a. Base of the fifth metatarsal
- b. Trochlear process
- c. Base of the third metatarsal
- d. 1 inch (2.5 cm) inferior to medial malleolus

ANS: D REF: 238

42. Which joint surfaces of the ankle joint are most commonly open with an AP projection of the ankle?

- a. Medial and superior
- b. Lateral and medial
- c. Superior and lateral
- d. Medial, superior, and lateral

ANS: A REF: 239

43. How much rotation from an AP position of the ankle will typically produce an AP mortise projection?

- a. No rotation is necessary.

- b. 45° to 60° lateral
- c. 15° to 20° medial
- d. 25° to 30° medial

ANS: C REF: 240

44. Which of the following projections of the ankle will best demonstrate the open joint space of the lateral aspect of the ankle joint?
- a. AP oblique with 45° rotation
 - b. AP mortise projection
 - c. Lateromedial ankle
 - d. AP projection

ANS: B REF: 240

45. The purpose of the AP stress views of the ankle is to demonstrate:
- a. possible stress fractures.
 - b. possible joint separations or ligament tears.
 - c. loose bodies in ankle joints.
 - d. tears in the joint meniscus.

ANS: B REF: 243

46. To ensure that both joints are included on an AP projection of the tibia and fibula on an adult, the technologist can:
- a. increase the SID to 60 inches (150 cm).
 - b. use a Bucky tray.
 - c. turn the image receptor diagonally to the lower leg.
 - d. use a tabletop technique.

ANS: C REF: 244

47. What CR angulation is recommended for an AP projection of the knee on a patient with an ASIS-to-tabletop measurement of 18 cm?
- a. 3° to 5° caudad
 - b. CR is perpendicular to the IR.
 - c. 3° to 5° cephalad
 - d. 10° to 15° cephalad

ANS: A REF: 246

48. Which projection of the knee will best demonstrate the neck of the fibula without superimposition of the tibia?
- a. AP
 - b. Lateral
 - c. AP oblique with medial rotation
 - d. AP oblique with lateral rotation

ANS: C REF: 247

49. What CR angle should be used for a mediolateral projection of the knee on a short, wide-pelvis patient?
- a. No CR angle is required.

- b. 5° cephalad
- c. 7° to 10° cephalad
- d. 5° to 10° caudad

ANS: C REF: 249

50. What is the major disadvantage of using 45° of flexion for the mediolateral projection of the knee?
- a. Draws the patella into the intercondylar sulcus.
 - b. May cause injury to the anterior cruciate ligament.
 - c. Prevents superimposition of the distal aspect of the femoral condyles.
 - d. Can distort any visible fat pads.

ANS: A REF: 249

51. What type of CR angle is required for the PA axial weight-bearing bilateral knee projection (Rosenberg method)?
- a. 10° caudad
 - b. 5° to 7° cephalad
 - c. 20° to 25° caudad
 - d. None. CR is perpendicular to IR.

ANS: A REF: 251

52. Which special position of the knee requires that the patient be placed supine with 40° flexion of the knee and the CR angled 30° from the long axis of the femur?
- a. Bilateral Merchant method
 - b. PA axial, Camp-Coventry method
 - c. PA axial, Holmblad method
 - d. Tangential, Hughston method

ANS: A REF: 258

53. How much flexion of the knee is recommended for the lateral projection of the patella?
- a. 5° to 10°
 - b. 20° to 30°
 - c. 35° to 40°
 - d. 45° to 50°

ANS: A REF: 257

54. What is the recommended SID for the superoinferior sitting tangential (Hobbs modification) method?
- a. 30 inches (77 cm)
 - b. 40 inches (102 cm)
 - c. 48 to 50 inches (123 to 128 cm)
 - d. 72 inches (183 cm)

ANS: C REF: 261

55. A radiograph of an AP projection of the second toe reveals that the interphalangeal joints are not open. What is the most likely cause for this radiographic outcome?
- a. Rotation of the toes.

- b. Excessive SID was used.
- c. AP projection was made; should have performed the PA projection.
- d. Incorrect or inadequate CR centering or angle.

ANS: D

REF: 228

56. A radiograph of an AP medial oblique projection of the foot, if positioned correctly, should demonstrate:
- a. first through fifth metatarsals free of superimposition.
 - b. third through fifth metatarsals free of superimposition.
 - c. first and second cuneiform joint space is open.
 - d. CR is centered to midshaft of third metatarsal.

ANS: B

REF: 233

57. A radiograph of an AP ankle projection reveals that the lateral joint space is not open (lateral malleolus is partially superimposed by the talus). The superior and medial joint spaces are open. What should the technologist do to correct this problem and improve the image?
- a. Rotate the ankle more laterally.
 - b. Rotate the ankle more medially.
 - c. Nothing; this is an acceptable image.
 - d. Dorsiflex the foot.

ANS: C

REF: 239

58. The profile appearance of the adductor tubercle and excessive superimposition of the fibular head and neck on a mediolateral knee projection indicate:
- a. overrotation of the knee toward the IR.
 - b. underrotation of the knee toward the IR.
 - c. a true lateral knee.
 - d. the CR should be angled 5° to 7° cephalad.

ANS: B

REF: 249

59. A radiograph of a mediolateral projection of the patella reveals that the femoropatellar joint space is not open. The patella is within the intercondylar sulcus. The most likely cause of this is:
- a. excessive extension of the knee.
 - b. excessive angulation of the CR.
 - c. insufficient angulation of the CR.
 - d. excessive flexion of the knee.

ANS: D

REF: 249

60. A radiograph of an AP knee reveals rotation with almost total superimposition of the fibular head and the proximal tibia. What must the technologist do to correct this positioning error on the repeat exposure?
- a. Rotate the knee laterally slightly.
 - b. Rotate the knee medially slightly.
 - c. Angle the CR slightly more cephalad.
 - d. Nothing; this is an acceptable image.

ANS: B

REF: 246

61. A radiograph of a PA axial projection for the intercondylar fossa (Camp-Coventry method) does not demonstrate the fossa well. It is foreshortened. The following positioning factors were used: patient prone, knee flexed 40° to 45° , CR angled to be perpendicular to the femur, 40-inch SID, and no rotation of the lower limb. Based on the factors used, what changes need to be made to produce a more diagnostic image?
- a. Increase SID to at least 48 inches (123 cm).
 - b. CR must be perpendicular to lower leg.
 - c. Rotate lower extremity 10° medially.
 - d. Reduce flexion of the knee to 20° to 30° .

ANS: B

REF: 253

62. A radiograph of an AP mortise projection of the ankle reveals that the lateral malleolus is slightly superimposed over the talus and the lateral joint space is not open. What is most likely cause for this radiographic outcome?
- a. Excessive medial rotation of the foot and ankle
 - b. Insufficient medial rotation of the foot and ankle
 - c. Excessive plantar flexion of the foot and ankle
 - d. Excessive dorsiflexion of the foot and ankle

ANS: B

REF: 240

63. A patient comes to radiology with a clinical history of osteoarthritis of both knees. The referring physician wants a projection to evaluate the damage to the articular facets. Which of the following projections will provide the best image of this region of the knee?
- a. Tangential projection (Hughston method)
 - b. AP axial projection (Béclere method)
 - c. PA axial weight-bearing bilateral knee projection (Rosenberg method)
 - d. Tangential projection (Settegast method)

ANS: C

REF: 251

64. A patient comes to the radiology department for a knee study with special interest in the region of the proximal tibiofibular joint and the lateral condyle of the tibia. Which of the following positioning routines should the technologist obtain?
- a. AP and lateral knee
 - b. AP, lateral, and lateral oblique knee
 - c. AP, lateral, and medial oblique knee
 - d. AP, lateral, and PA axial intercondylar fossa

ANS: C

REF: 246-249

65. A geriatric patient comes to the radiology department for a study of the knee. The patient is unsteady and unsure of himself. Which intercondylar fossa projection would provide the best results without risk of injury to the patient?
- a. Holmblad method
 - b. Hughston method
 - c. Camp-Coventry method
 - d. Rosenberg method

ANS: C

REF: 253

66. A patient comes to radiology for an evaluation of the longitudinal arch of the foot. Which of the following projections would provide the best information about the arch?
- Routine foot series
 - Plantodorsal (axial) projection
 - AP and lateral weight-bearing projections of foot
 - Sesamoid bone series projection

ANS: C

REF: 253-256

67. A patient enters the emergency department (ED) with a possible transverse fracture of the patella. Which of the following routines would safely provide the best images of the patella?
- AP and horizontal beam lateral, no flexion of knee
 - AP and 5° to 10° flexion lateral
 - AP and Merchant method (tangential projection)
 - PA and 45° PA oblique with medial rotation

ANS: A

REF: 249

68. A patient enters the ED with an injury near the base of the first and second metatarsals. The basic foot projections are inconclusive on demonstrating a fracture to the medial cuneiform. Which of the following projections would best demonstrate this bone?
- AP oblique with increased medial rotation
 - AP oblique with lateral rotation
 - AP weight-bearing projection
 - Lateral weight-bearing projection

ANS: B

REF: 233

69. A patient comes to radiology with a history of chondromalacia of the patella. The orthopedic surgeon is concerned about possible loose bodies within the patellofemoral joint space. She wants the best projection to demonstrate this joint space. What projection should be performed?
- Camp-Coventry method
 - Settegast method
 - AP axial projection
 - Merchant method

ANS: D

REF: 258

70. A patient comes to radiology with a history of chondromalacia of the patella. Her physician orders a projection of the patellofemoral joint space. Due to advanced emphysema, the patient cannot lie recumbent for this projection. Which of the following projections would be best for this patient?
- Tangential projection—Settegast method
 - Tangential projection—Merchant method
 - AP axial projection—Béclere method
 - Superoinferior sitting tangential method-Hobbs modification

ANS: D

REF: 261

71. A radiograph of a plantodorsal (axial) projection of the calcaneus reveals foreshortening. The technologist used 60 kV, 6 mAs, 40-inch (102-cm) SID, and a 25° cephalad CR angle from the long axis of the foot. Which of the following modifications will produce a more diagnostic image of the calcaneus?
- Plantarflex the foot.
 - Increase CR angulation.
 - Decrease CR angulation.
 - Increase kV to 70.

ANS: B

REF: 237

72. Which one of the following projections will best demonstrate signs of Osgood-Schlatter disease?
- Plantodorsal (axial) and lateral calcaneus
 - AP, lateral, and oblique ankle
 - AP bilateral weight-bearing knees
 - AP and lateral knee

ANS: D

REF: 227

73. A patient comes to radiology with a clinical history of a Lisfranc joint injury. Which of the following projections would best demonstrate this condition?
- Weight-bearing foot series
 - AP weight-bearing knee projection
 - Tangential projection for patella
 - AP stress views of the ankle

ANS: A

REF: 227

74. For the AP weight-bearing feet projection, the CR should be:
- perpendicular to the image receptor.
 - angled 15° posteriorly.
 - directed horizontal.
 - angled 5° posteriorly.

ANS: B

REF: 235

75. For the AP weight-bearing knee projection on an average patient, the CR should be:
- 10° caudad.
 - 5° to 10° cephalad.
 - perpendicular to the image receptor.
 - perpendicular to the image receptor, but SID should be increased to 60 inches (153 cm).

ANS: C

REF: 250

76. A patient comes to radiology with an infection involving the sesamoid bones of the foot. Beyond the routine foot projections, which one of the following projections can be performed to best demonstrate these structures?
- PA axial Camp-Coventry method
 - AP weight-bearing foot projection
 - Lateral weight-bearing projection

d. Tangential projection

ANS: D REF: 231

77. A patient enters radiology with a possible ligament tear to the lateral aspect of the ankle. Initial ankle radiographs are negative for fracture or dislocation. Because the clinic is in a rural setting, the patient cannot have an MRI performed to evaluate the ligaments of the ankle. Which of the following techniques may provide an assessment of the soft tissue structures of the ankle?
- a. AP weight-bearing projections
 - b. AP mortise projection
 - c. AP stress positions
 - d. Axial plantodorsal projection

ANS: C REF: 243

78. Which of the following imaging modalities and/or procedures will provide the best assessment for osteomyelitis of the foot?
- a. Nuclear medicine
 - b. Ultrasound
 - c. Computed tomography
 - d. Arthrography

ANS: A REF: 226

79. A radiograph of an AP oblique foot with medial rotation demonstrates considerable superimposition of the third through fifth metatarsals. How must the original position be changed to eliminate this problem?
- a. Increase obliquity of the foot.
 - b. Decrease obliquity of the foot.
 - c. Increase CR angle.
 - d. Decrease CR angle.

ANS: B REF: 233

80. The radiographic hallmark of Reiter's syndrome seen in young men is:
- a. asymmetrical narrowing of femoropatellar joint.
 - b. destruction of the patella.
 - c. fluid in the joints of the foot.
 - d. erosion of the Achilles tendon insertion.

ANS: D REF: 227

81. Another term for osteochondroma is:
- a. Ewing's sarcoma.
 - b. exostosis.
 - c. gout.
 - d. Osgood-Schlatter disease.

ANS: B REF: 226

82. Which of the following projections of the patella requires the patient to be placed in a prone position, 50° to 60° flexion of the knee, and a 45° cephalic angle of the CR?

- a. Merchant method
- b. Settegast method
- c. Hughston method
- d. Holmblad method

ANS: C REF: 259

83. Which of the following knee projections requires the use of a special IR holding device?

- a. Bilateral Merchant method
- b. Camp-Coventry method
- c. B  clere method
- d. Hughston method

ANS: A REF: 258

84. How much knee flexion is required for the weight-bearing PA axial projection (Rosenberg method) of the knee?

- a. None. The knee is fully extended.
- b. 30   flexion
- c. 45   flexion
- d. 50   to 60   flexion

ANS: C REF: 251

MATCHING

Match the correct disease or condition with the corresponding pathologic description. (Use each choice only once.)

- a. Chondrosarcoma
 - b. Joint effusion
 - c. Osgood-Schlatter disease
 - d. Reiter's syndrome
 - e. Lisfranc joint injury
 - f. Ewing's sarcoma
 - g. Gout
 - h. Paget's disease
 - i. Bone cyst
 - j. Exostosis
1. An inflammatory condition involving the anterior, proximal tibia
 2. Sprains and/or fractures involving the bases of the first and second metatarsals
 3. Accumulated fluid in the joint cavity
 4. Inherited type of arthritis commonly affecting males; frequently begins at first metatarsophalangeal joint
 5. Benign, neoplastic bone lesion due to overproduction of bone at a joint (usually the knee)
 6. Also known as *osteitis deformans*, a bone disease that disrupts new bone growth, resulting in overproduction of very dense yet soft bone
 7. Common primary bone malignancy in pediatric and young adult patients
 8. Benign, neoplastic bone lesion filled with clear fluid

9. Malignant tumor of the cartilage usually occurring in men older than age 45 in the pelvis and long bones
10. Condition affecting the sacroiliac joints and lower limbs of young men, especially the posteriosuperior margin of calcaneus

- | | |
|------------|--------------|
| 1. ANS: C | REF: 226-227 |
| 2. ANS: E | REF: 226-227 |
| 3. ANS: B | REF: 226-227 |
| 4. ANS: G | REF: 226-227 |
| 5. ANS: J | REF: 226-227 |
| 6. ANS: H | REF: 226-227 |
| 7. ANS: F | REF: 226-227 |
| 8. ANS: I | REF: 226-227 |
| 9. ANS: A | REF: 226-227 |
| 10. ANS: D | REF: 226-227 |

TRUE/FALSE

1. The patella is drawn into the intercondylar sulcus when the knee is overextended.

ANS: F REF: 220

2. Grids are required for studies of the adult ankle.

ANS: F REF: 224

3. When multiple exposures are placed on a single computed radiography image receptor (IR), lead masking should not be placed on the unexposed regions of the imaging plate.

ANS: F REF: 224

4. The adductor tubercle is located on the posterior aspect of the medial femoral condyle.

ANS: T REF: 219

5. A correctly positioned AP 45° medial oblique ankle projection frequently may also demonstrate a fracture of the base of the fifth metatarsal if present.

ANS: T REF: 233

6. The superoinferior, sitting tangential (Hobbs modification) projection for patellofemoral joint space requires a CR angle of 5° to 10° posterior.

ANS: F REF: 261

7. The AP mortise projection of the ankle is commonly taken in surgery during open reductions.

ANS: T REF: 240

8. Follow-up radiographs for a fractured tibia and fibula may include only the joint closest to the site of injury.

ANS: T REF: 244

9. The adductor tubercle is visible on the medial, posterior aspect of the femoral condyle and can be used to determine possible rotation of a lateral knee projection.

ANS: T REF: 249

10. The disadvantage of the superoinferior sitting, tangential (Hobbs modification) method is that it requires acute flexion of the knee.

ANS: T REF: 261

11. A 3° to 5° caudad CR angle should be used for an AP knee projection for patients with an ASIS-to-tabletop measurement of 20 cm.

ANS: F REF: 246

12. The correct CR placement for an AP projection of the knee is midpatella.

ANS: F REF: 246

13. The tangential projection for the sesamoid bones of the foot should be performed with the patient prone rather than supine to minimize magnification of the sesamoid bones, if the patient condition allows it.

ANS: T REF: 231

14. The foot must be force dorsiflexed so that the long axis of the foot is perpendicular to the image receptor for AP and mortise projections of the ankle.

ANS: F REF: 239-240

15. A correctly positioned lateral ankle will demonstrate the lateral malleolus superimposed over the posterior half of the tibia.

ANS: T REF: 242

16. Another term for osteomalacia is rickets.

ANS: T REF: 227

Chapter 07: Femur and Pelvic Girdle

Lampignano: Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition

MULTIPLE CHOICE

1. Which of the following structures is not an aspect of the proximal femur?
 - a. Intertrochanteric crest
 - b. Fovea capitis
 - c. Obturator foramen
 - d. Lesser trochanter

ANS: C REF: 264

2. Which of the following structures is considered to be most inferior or distal?
 - a. Fovea capitis
 - b. Lesser trochanter
 - c. Neck
 - d. Greater trochanter

ANS: B REF: 264

3. Why must the lower limb be rotated 15° to 20° internally for AP pelvis projection (nontrauma)?
 - a. To separate the greater trochanter from the lesser trochanter
 - b. To place the fovea capitis into a profiled position
 - c. To open up the femoroacetabular joint
 - d. To place the femoral neck parallel to the image receptor

ANS: D REF: 271

4. Which bones fuse to form the acetabulum?
 - a. Ischium and pubis
 - b. Ilium and ischium
 - c. Pubis, ilium, and sacrum
 - d. Ischium, pubis, and ilium

ANS: D REF: 265

5. Which of the following bony structures cannot be palpated?
 - a. Ischial spine
 - b. ASIS
 - c. Ischial tuberosity
 - d. Symphysis pubis

ANS: A REF: 266

6. Which bone of the pelvis forms the anterior inferior aspect?
 - a. Ilium
 - b. Ischium
 - c. Pubis

d. Sacrum

ANS: C

REF: 266

7. The lesser sciatic notch is an aspect of the:

- a. ilium.
- b. ischium.
- c. sacrum.
- d. pubis.

ANS: B

REF: 266

8. The sacroiliac joints are classified as _____ joints with _____ mobility.

- a. cartilaginous; amphiarthrodial
- b. synovial; amphiarthrodial
- c. cartilaginous; synarthrodial
- d. fibrous; amphiarthrodial

ANS: B

REF: 270

9. The symphysis pubis provides limited movement during pelvic trauma and during:

- a. walking and running.
- b. flexing and extending.
- c. labor and delivery.
- d. voiding.

ANS: C

REF: 270

10. The two bony landmarks that are palpated using the hip localization method are the:

- a. ischial spine and the symphysis pubis.
- b. symphysis pubis and the greater trochanter.
- c. ASIS and the crest of ilium.
- d. ASIS and the symphysis pubis.

ANS: D

REF: 271

11. Using the hip localization method, the femoral head can be located:

- a. 1 inch (2.5 cm) below the midpoint of the imaginary line between the two bony landmarks.
- b. 1 1/2 inches (4 cm) below the midpoint of the imaginary line between the two bony landmarks.
- c. 2 1/2 inches (6 to 7 cm) below the midpoint of the imaginary line between the two bony landmarks.
- d. at the level of the symphysis pubis.

ANS: B

REF: 271

12. Select the correct gender to correspond with the following pelvic characteristics. More oval or heart-shaped pelvic inlet:

- a. Male
- b. Female

ANS: A

REF: 268

13. Select the correct gender to correspond with the following pelvic characteristics. Wider and shallower general shape of pelvis:

a. Male
b. Female

ANS: B

REF: 268

14. Select the correct gender to correspond with the following pelvic characteristics. An 80° to 85° angle of pubic arch:

a. Male
b. Female

ANS: B

REF: 268

15. Select the correct gender to correspond with the following pelvic characteristics. Round and large pelvic inlet:

a. Male
b. Female

ANS: B

REF: 268

16. Select the correct gender to correspond with the following pelvic characteristics. Narrower, deeper general shape of pelvis:

a. Male
b. Female

ANS: A

REF: 268

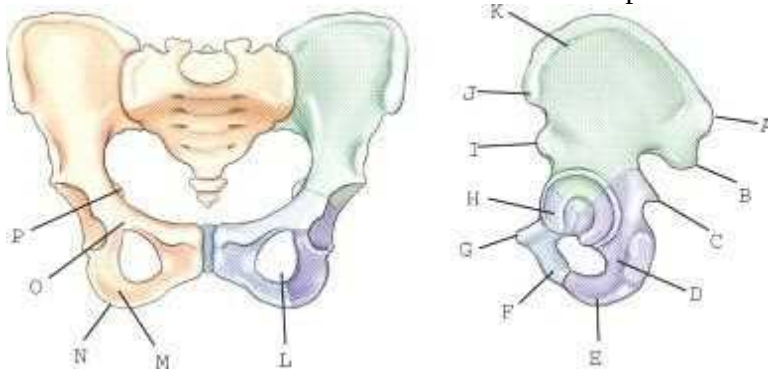
17. Select the correct gender to correspond with the following pelvic characteristics. Ischial spines more protruding into the pelvic cavity:

a. Male
b. Female

ANS: A

REF: 268

18. Which of the labeled structures is the anterior superior iliac spine (ASIS)?



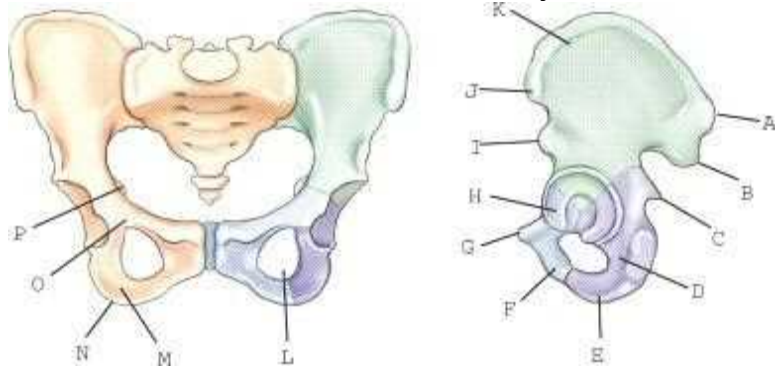
a. A
b. B
c. K
d. J
e. I

- f. F
- g. E
- h. G

ANS: D

REF: 266

19. Which of the labeled structures is the body of the ischium?

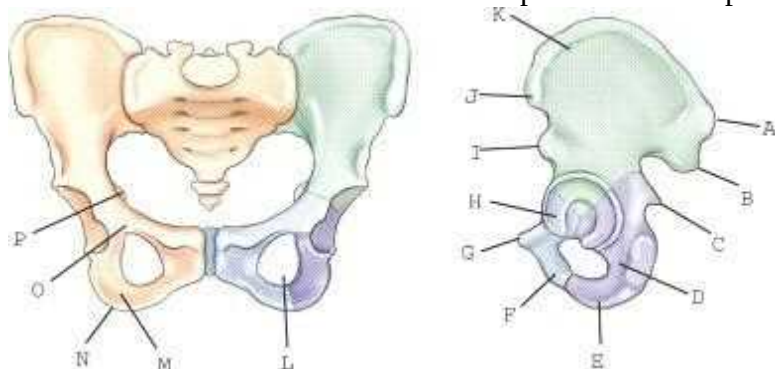


- a. D
- b. E
- c. F
- d. M
- e. O

ANS: A

REF: 266

20. Which of the labeled structures is the superior ramus of pubis?

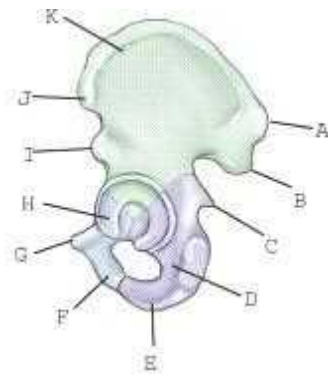
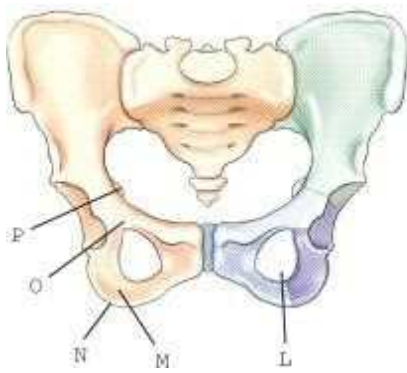


- a. P
- b. N
- c. L
- d. M
- e. O

ANS: E

REF: 266

21. Which of the labeled structures is the ischial spine?

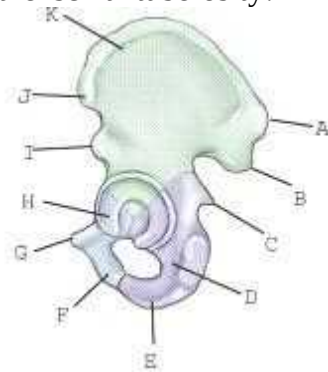
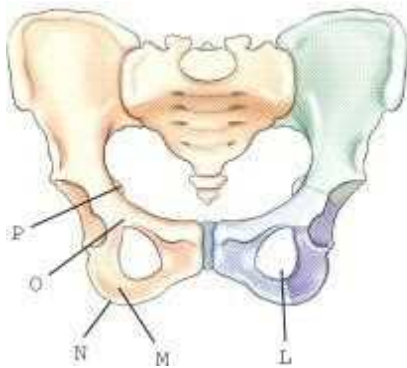


- a. N
- b. M
- c. O
- d. L
- e. P

ANS: E

REF: 266

22. Which of the labeled structures is the ischial tuberosity?

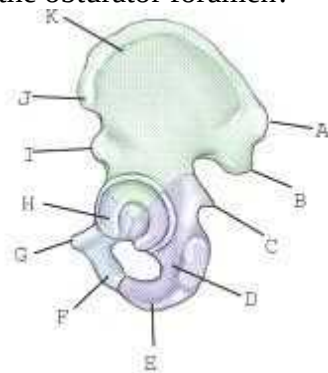
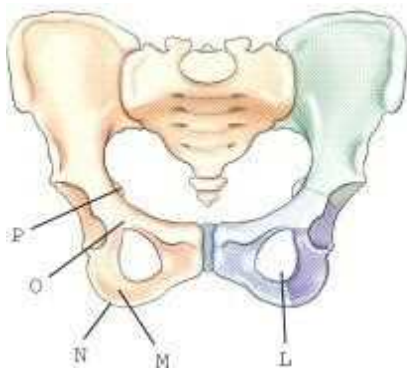


- a. G
- b. F
- c. A
- d. N

ANS: D

REF: 266

23. Which of the labeled structures is the obturator foramen?



- a. H
- b. L
- c. E
- d. O

e. P

ANS: B REF: 266

24. Gonadal shielding of the male patient for the AP pelvis projection requires that the top of the shield is not extended above the level of:
- a. the ASIS.
 - b. the ischial spine.
 - c. the inferior margin of the symphysis pubis.
 - d. none of the above; gonadal shielding cannot be used due to possible covering of pertinent anatomy.

ANS: C REF: 273

25. A common condition of the femur that develops in elderly patients, leading to frequent fractures of the hip (proximal femur), is:
- a. congenital hip dysplasia.
 - b. Legg-Calvé-Perthes disease.
 - c. avascular necrosis.
 - d. developmental dysplasia of the hip.

ANS: C REF: 275

26. Which of the following imaging modalities can be performed on a newborn to assess hip joint stability during movement?
- a. CT
 - b. Sonography
 - c. MRI
 - d. Nuclear medicine

ANS: B REF: 275

27. Which of the following conditions will produce the radiographic sign referred to as “bamboo spine”?
- a. Osteoarthritis
 - b. Chondrosarcoma
 - c. Metastatic carcinoma
 - d. Ankylosing spondylitis

ANS: D REF: 275

28. Which of the following pathologic conditions often occurs in males older than the age of 45 years?
- a. Developmental dysplasia of the hip
 - b. Slipped capital femoral epiphysis
 - c. Chondrosarcoma
 - d. Osteoporosis

ANS: C REF: 275

29. Which of the following pathologic conditions is a common type of aseptic or ischemic necrosis?
- a. Legg-Calvé-Perthes disease

- b. Ankylosing spondylitis
- c. Metastatic carcinoma
- d. Osteoarthritis

ANS: A REF: 275

30. Which of the following conditions will produce shortening of the epiphyses but widening of the epiphyseal plate?
- a. Osteoarthritis
 - b. Legg-Calvé-Perthes disease
 - c. Slipped capital femur
 - d. Chondrosarcoma

ANS: C REF: 275

31. The use of the 80 to 90 kV (analog) technique (as opposed to 70 kV) with a corresponding mAs change for an AP pelvis projection will result in:
- a. increased radiographic contrast.
 - b. improved spatial resolution.
 - c. reduction in gonadal dose.
 - d. none of the above; the difference is not measurable.

ANS: C REF: 273

32. Where is the CR placed for an AP projection of the pelvis?
- a. 1 inch (2.5 cm) above the symphysis pubis
 - b. At the level of the ASIS
 - c. At the level of the iliac crest
 - d. Midway between the ASIS and the symphysis pubis

ANS: D REF: 279

33. What is the amount of abduction of the femurs recommended for an AP bilateral frog-leg (modified Cleaves) projection?
- a. 10° to 15°
 - b. 50° to 60°
 - c. 40° to 45°
 - d. 90°

ANS: C REF: 280

34. Which of the following positions will best demonstrate signs of developmental dysplasia of the hip?
- a. Posterior oblique (Judet method)
 - b. Axiolateral, inferosuperior (Danelius-Miller method)
 - c. Taylor method
 - d. Bilateral frog-leg method

ANS: D REF: 280

35. Which of the following positions will best demonstrate the posterior (ilioischial) column and anterior (iliopubic) column of the pelvis?
- a. Posterior oblique (Judet method)

- b. AP axial (Taylor method)
- c. RPO and LPO projections
- d. Modified axiolateral (Clements-Nakayama method)

ANS: A REF: 283

36. Which one of the following projections will best demonstrate a lateral oblique view of the femoral head and neck for the patient with limited movement in both lower limbs?
- a. Teufel
 - b. Axiolateral (inferosuperior) projection
 - c. AP axial (Taylor)
 - d. Modified axiolateral (Clements-Nakayama)

ANS: D REF: 288

37. What type of CR angle must be used for an AP axial (Taylor method) “outlet” projection for a male patient?
- a. 20° to 35° caudad
 - b. 15° to 20° cephalad
 - c. 20° to 35° cephalad
 - d. 0° (CR perpendicular to the image receptor)

ANS: C REF: 281

38. How much rotation of the body is required for posterior axial oblique projection for acetabulum (Teufel method)?
- a. 45°
 - b. 35° to 40°
 - c. 60° to 70°
 - d. 25° to 30°

ANS: B REF: 284

39. What type of CR angle is required for the posterior axial oblique projection for the acetabulum (Teufel method)?
- a. 12° cephalad
 - b. 10° cephalad
 - c. 20° to 25° caudad
 - d. 15° cephalad

ANS: A REF: 284

40. Which of the following projections would be best for a patient with limited movement of both lower limbs (in addition to the AP pelvis)?
- a. Modified axiolateral (Clements-Nakayama method)
 - b. Axiolateral (inferosuperior)
 - c. Anterior oblique (Teufel method)
 - d. AP axial (Taylor method)

ANS: A REF: 288

41. The proper name of the method used for the unilateral frog-leg projection is the _____ method.

- a. Danelius-Miller
- b. modified Cleaves
- c. Teufel
- d. Taylor

ANS: B

REF: 280

42. What type of CR angle is required for the AP axial, inlet projection?
- a. 30° cephalad
 - b. 10° to 15° cephalad
 - c. 20° to 30° caudad
 - d. 40° caudad

ANS: D

REF: 282

43. A radiograph of an AP pelvis reveals that the lesser trochanters are not visualized. This pelvis projection was performed for nontraumatic reasons. What should the technologist do (if anything) to correct this on the repeat exposure?
- a. Rotate the lower limbs more internally 15° to 20°.
 - b. Do nothing. Accept the radiograph and do not repeat the exposure.
 - c. Ensure that the ASIS is an equal distance from the tabletop.
 - d. Angle the CR 10° to 15° cephalad.

ANS: B

REF: 279

44. A radiograph of an AP pelvis reveals that the right iliac wing is foreshortened as compared with the left side. What specific positioning problem is present on this radiograph?
- a. Left rotation
 - b. Right rotation
 - c. Right tilt
 - d. Incorrect CR centering or angulation

ANS: A

REF: 279

45. A radiograph of an AP pelvis reveals that the left obturator foramen is more open or elongated as compared with the right. What is the specific positioning error present on this radiograph?
- a. Left rotation
 - b. Right rotation
 - c. Left tilt
 - d. Incorrect CR centering or angulation

ANS: B

REF: 279

46. A radiograph of a unilateral frog-leg (modified Cleaves method) projection reveals that the femoral neck is foreshortened and distorted. The radiologist is concerned about pathology involving the neck. What can the technologist do to improve the visibility of the femoral neck without foreshortening during the repeat exposure?
- a. Use a 20° to 25° cephalad CR angle.
 - b. Decrease the abduction of the femur to 20° to 30° from vertical.
 - c. Oblique the patient 35° to 45° toward the affected side with femur abducted to be in contact with tabletop.
 - d. Increase the abduction of the femur to about 60° to 70° from vertical.

ANS: B

REF: 280

47. A radiograph of an axiolateral (inferosuperior) projection of the hip reveals a soft tissue artifact seen across the affected hip. This artifact prevents a clear view of the femoral head and neck. What must the technologist do to eliminate this artifact or its effect during the repeat exposure?
- Increase the kV.
 - Ensure that the CR is centered to the grid to prevent grid cutoff.
 - Increase the elevation and flexion of the patient's unaffected leg.
 - Slightly rotate the patient toward the affected side and angle 5° caudad.

ANS: C

REF: 286

48. A PA axial oblique projection (Teufel method) is performed on a patient. The resultant radiograph demonstrates distortion of the acetabulum. The following positioning factors were used: 40° anterior oblique, 12° cephalad CR angle, and CR centered to the upside hip (acetabulum). What needs to be modified during the repeat exposure?
- Increase CR angle to 15° cephalad.
 - Change CR angle to 12° caudad.
 - Increase rotation of anterior oblique to 45°.
 - Center CR to downside hip (acetabulum).

ANS: D

REF: 284

49. A radiograph of an axiolateral (inferosuperior) projection reveals that there is an excessive amount of grid lines present. A 6:1 linear grid was used. Which of the following points will correct this problem on the repeat exposure?
- Use a screen rather than a grid.
 - Decrease the SID.
 - Keep the image receptor and grid parallel to the femoral neck and perpendicular to the CR.
 - Keep the image receptor and grid perpendicular to the femoral neck.

ANS: C

REF: 286

50. A patient enters the emergency department (ED) having sustained trauma to the pelvis. The patient's main complaint is about her left hip. Which of the following projections should be taken first to rule out fracture or dislocation?
- AP pelvis
 - AP projection of the left hip
 - Axiolateral (inferosuperior) projection of the left hip
 - Lateral frog-leg projection of the left hip

ANS: A

REF: 280 | 794

51. A nontrauma patient comes to radiology with a history of chronic pain of the right hip. The patient is ambulatory but has not had previous radiographs taken of that hip. Which of the following routines would be best suited for this patient?
- AP and axiolateral (inferosuperior) projections of the right hip
 - AP pelvis and axiolateral frog-leg (modified Cleaves) projections of the right hip
 - AP pelvis and modified axiolateral (Clements-Nakayama) projections of the right

- hip
- d. AP pelvis and AP axial (Taylor method) projections of the right hip

ANS: B REF: 279-280

52. A radiograph of an AP axial (Taylor) “outlet” projection reveals that the obturator foramina are not symmetric. What type of positioning error is present on this radiograph?
- a. Tilt of the pelvis
 - b. Off-center CR
 - c. Rotation of the pelvis
 - d. Probable fracture of the pubis or ischium

ANS: C REF: 281

53. During a repeat study of the AP axial (Taylor) outlet projection, both obturator foramina are symmetric but foreshortened. Which of the following positioning modifications must be performed to correct this error?
- a. Increase the cephalic CR angulation.
 - b. Increase the caudad CR angulation.
 - c. Correct for rotation.
 - d. Use a perpendicular CR.

ANS: A REF: 281

54. A patient enters the ED with a possible separation of the symphysis pubis caused by trauma. The AP pelvis projection is inconclusive for determining the extent of the injury. What other projection can be taken to evaluate this region without excessive movement of the patient?
- a. Posterior oblique (Judet) projection
 - b. AP axial “inlet” projection
 - c. Axiolateral (inferosuperior) projection
 - d. AP axial (Taylor) outlet projection

ANS: D REF: 281

55. A patient comes to radiology with a request for a right hip study. He is from an extended care facility and is confused about the cause of the injury. The technologist takes an AP pelvis, and when the lateral frog-leg projection is attempted, the patient complains loudly about the pain in his affected hip. What should the technologist do to complete the study?
- a. Continue to position the patient, but move the affected limb more gently.
 - b. Perform the AP pelvis projection only.
 - c. Perform the axiolateral (inferosuperior) projection.
 - d. Perform the anterior pelvis (Taylor) outlet projection.

ANS: C REF: 286

56. A patient enters the ER with possible bilateral fractured hips. Which of the following routines should be performed?
- a. AP pelvis and axiolateral (inferosuperior) projections for both hips
 - b. AP pelvis and modified axiolateral (Clements-Nakayama method) projections for both hips
 - c. AP pelvis and bilateral frog-leg projections
 - d. AP pelvis and posterior oblique (Judet) projections

ANS: B

REF: 288

57. A patient comes to the ER with a possible pelvic ring fracture. The initial AP pelvis projection is inconclusive. What other projection(s) can be taken to assist with the diagnosis?
- AP axial inlet projection
 - AP, bilateral (modified Cleaves method) frog-leg projection
 - Modified axiolateral projections
 - Posterior axial oblique projections

ANS: A

REF: 282

58. A radiograph of an AP pelvis demonstrates that the right obturator foramen is foreshortened but the left foramen is open. Which one of the following positioning errors is present on this radiograph?
- Right rotation
 - Left rotation
 - Right tilt
 - Excessive CR angle

ANS: A

REF: 279

59. A patient enters the ER with a possible pelvic ring fracture due to an MVA. The initial pelvis projections do not reveal any fracture or dislocation, but the ER physician is concerned about a possible right acetabular fracture. Which of the following projections will best demonstrate the right acetabulum?
- AP axial inlet projection
 - Axiolateral inferosuperior projection (Danelius-Miller method)
 - Modified axiolateral projection (Clements-Nakayama method)
 - Posterior oblique pelvis projection (Judet method)

ANS: D

REF: 283

60. Which of the following lateral hip projections cannot be performed on a trauma patient with a possible hip fracture?
- Modified Cleaves method
 - Clements-Nakayama
 - Danelius-Miller
 - Judet method

ANS: A

REF: 287

61. Which of the following projections requires that the IR be tilted 15° from the vertical plane?
- AP axial inlet projection
 - Axiolateral inferosuperior projection (Danelius-Miller method)
 - Modified axiolateral projection (Clements-Nakayama method)
 - Posterior axial oblique projection (Teufel method)

ANS: C

REF: 288

62. Which of the following imaging modalities will best detect early signs of bone infection of the pelvis?
- Radiography

- b. CT
- c. Nuclear medicine
- d. MRI

ANS: C

REF: 274

63. A study of a prosthetic hip demonstrates that the end of the prosthesis is cut off on the AP projection, but the entire device is demonstrated on the lateral projection. What should the technologist do next?
- a. Repeat both the AP and lateral projections.
 - b. Repeat the AP projection only.
 - c. Ask another technologist for his or her opinion.
 - d. Ask the radiologist if he or she wants the AP projection repeated.

ANS: B

REF: 285

64. How much CR angle, from the horizontal, is required for the modified axiolateral (Clements-Nakayama) projection?
- a. None. The IR must be kept perpendicular to the tabletop.
 - b. 5° to 10°
 - c. 15° to 20°
 - d. 25° to 30°

ANS: C

REF: 288

MATCHING

Match the correct disease or condition with the corresponding pathologic description. (Use each choice only once.)

- a. Metastatic carcinoma
 - b. Ankylosing spondylitis
 - c. Congenital dislocation of hip
 - d. Chondrosarcoma
 - e. Pelvic ring fracture
 - f. Osteoarthritis
 - g. Avulsion fracture
1. Malignancy spread to bone via the circulatory, lymphatic systems, or direct invasion
 2. A disease producing extensive calcification of the longitudinal ligament of the spinal column
 3. A degenerative joint disease
 4. A malignant tumor of the cartilage
 5. Now referred to as “developmental dysplasia of the hip”
 6. A fracture resulting from a severe blow to one side of the pelvis
 7. Fractures that occur in adolescent athletes who experience sudden, forceful, or unbalanced contraction of the tendinous and muscular attachments on the bony pelvis
-
1. ANS: A REF: 275
 2. ANS: B REF: 274
 3. ANS: F REF: 275
 4. ANS: D REF: 275

- 5. ANS: C REF: 275
- 6. ANS: E REF: 275
- 7. ANS: G REF: 274

TRUE/FALSE

- 1. The term pelvic girdle refers to the total pelvis including the sacrum and coccyx.
ANS: F REF: 265
- 2. Gonadal shielding should be used on both males and females of childbearing age for AP hip projections, if correctly placed.
ANS: T REF: 273
- 3. Cephalopelvimetry is still commonly performed in the United States.
ANS: F REF: 267
- 4. The posterior oblique (Judet method) for the acetabulum requires a 10° to 15° rotation of the body.
ANS: F REF: 283
- 5. Only a small part of the lesser trochanter, if any, will be visible on a well-positioned axiolateral (inferosuperior) lateral hip.
ANS: T REF: 286
- 6. The image receptor must be placed parallel to the femoral neck for the axiolateral (inferosuperior) projection of the hip.
ANS: T REF: 286
- 7. Generally, gonadal shielding for adult females cannot be used for an initial AP pelvis for pelvic trauma due to the possibility of covering pertinent anatomy.
ANS: T REF: 273
- 8. Less abduction of femora of only 20° to 30° from vertical provides for the least foreshortening of femoral necks when performing the AP bilateral “frog-leg” projection.
ANS: T REF: 280
- 9. If a patient has excessive external rotation of one foot, a fractured hip may be indicated.
ANS: T REF: 271

Chapter 08: Cervical and Thoracic Spine

Lampignano: Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition

MULTIPLE CHOICE

1. On average, how many separate bones make up the adult vertebral column?
- 33
 - 28
 - 26
 - 31

ANS: C REF: 292

2. The spinal cord tapers off to a point distally at the vertebral level of:
- lower L5.
 - L3-4 intervertebral space.
 - L1-2.
 - L4-5 intervertebral space.

ANS: C REF: 292

3. Which of the following is the first compensatory spinal curvature to develop in the young child?
- Thoracic
 - Cervical
 - Sacral
 - Lumbar

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ANS: B REF: 293

4. Scoliosis is defined as an abnormal or exaggerated_____curvature.
- concave
 - convex
 - lateral
 - “swayback” lumbar

ANS: C REF: 293

5. Kyphosis is defined as a(n):
- normal lumbar curvature.
 - normal convex sacral curvature.
 - normal compensatory curve of the thoracic spine.
 - abnormal thoracic curvature with increased convexity.

ANS: D REF: 293

6. The bony structures connected directly to the vertebral body are the:
- pedicles.
 - articular processes.
 - laminae.

d. transverse processes.

ANS: A REF: 294

7. The most posterior aspect of a typical vertebra is the:
- pedicle.
 - spinous process.
 - lamina.
 - body.

ANS: B REF: 294

8. The joints between articular processes of vertebra are termed _____ joints.
- zygapophyseal
 - fibrous
 - intervertebral
 - synarthrodial

ANS: A REF: 294-296

9. Which aspect of the intervertebral disk is composed of semigelatinous material?
- Nucleus pulposus
 - Annulus fibrosus
 - Conus medullaris
 - Cauda equina

ANS: A REF: 295

10. Which of the following statements is true?
- All adult vertebrae are separated by intervertebral disks.
 - All thoracic vertebrae have at least one facet for rib articulation.
 - The intervertebral disks are tightly bound to the vertebral bodies to prevent movement within the vertebral column.
 - All of the above are true statements.

ANS: B REF: 298

11. Which of the following statements is true for a typical adult vertebra?
- The transverse processes extend laterally from the junction of the pedicles and laminae.
 - The transverse processes are present only on thoracic vertebrae containing rib connections.
 - The spinous process extends posteriorly from the body of the vertebra.
 - All of the above are true statements.

ANS: A REF: 294

12. Which of the following features makes the cervical vertebra unique as compared with other vertebrae of the spine?
- Transverse foramina and double (bifid) tips on spinous processes
 - Overlapping vertebral bodies
 - Presence of zygapophyseal joints
 - All of the above

ANS: D REF: 296

13. Where is the articular pillar located on a cervical vertebra?
- Between the superior and inferior articular processes
 - Between the pedicle and the body
 - Between the spinous process and the lamina
 - Nowhere

ANS: A REF: 296

14. Which of the following best defines or describes the vertebral body of C1?
- The smallest of all vertebral bodies
 - A column of bone supported by an intervertebral disk
 - A large bony mass
 - There is no vertebral body at C1.

ANS: D REF: 297

15. Which of the following thoracic vertebra(e) possess(es) no facets for costotransverse joints?
- T9-10
 - T11-12
 - T1
 - None of the above

ANS: B REF: 298

16. The zygapophyseal joints for the typical cervical vertebra lie at an angle of _____ in relation to the midsagittal plane. **NURSINGTB.COM**
- 45°
 - 60°
 - 70° to 75°
 - 90°

ANS: D REF: 299

17. The most prominent aspect of the thyroid cartilage corresponds to the vertebral level of:
- C5.
 - C1-2.
 - C6-7.
 - C7-T1.

ANS: A REF: 304

18. The zygapophyseal joints for the thoracic spine lie at an angle of _____ in relation to the midsagittal plane.
- 45°
 - 60°
 - 70° to 75°
 - 90°

ANS: C REF: 299

19. T2-3 intervertebral disk space is found:
- at the level of the jugular notch.
 - at the level of the sternal angle.
 - at the level of the xiphoid process.
 - 2 inches (5 cm) below the jugular notch.

ANS: A REF: 304

20. The gonion corresponds to the vertebral level of:
- C1.
 - C4-5.
 - C3.
 - C7.

ANS: C REF: 304

21. The xiphoid process corresponds to the vertebral level of:
- T8.
 - T9-10.
 - T7.
 - T12.

ANS: B REF: 304

22. Along with increasing the source image receptor distance (SID), what other factor(s) will improve spatial resolution for lateral and oblique projections of the cervical spine?
- Increasing object image receptor distance (OID)
 - Using a small focal spot
 - Using higher kV, lower mAs
 - Using a breathing technique

ANS: B REF: 305

23. Which of the following pathologic conditions is defined as “a condition of the spine characterized by rigidity of a vertebral joint”?
- Spondylitis
 - Ankylosing spondylitis
 - Spondylosis
 - Scheuermann disease

ANS: C REF: 308

24. Which of the following clinical conditions will require a decrease in **analog** manual technical factors?
- Advanced osteoporosis
 - Severe scoliosis
 - Moderate lordosis
 - Scheuermann disease

ANS: A REF: 308

25. Which factor is most important to open up the intervertebral joint spaces for a lateral thoracic spine projection?

- a. Use sufficiently high kV.
- b. Collimate the spine region to reduce scatter.
- c. Keep the vertebral column parallel to the tabletop.
- d. Angle the central ray (CR) 5° to 10° caudad.

ANS: C REF: 321

26. Which position or projection of the cervical spine will best demonstrate the zygapophyseal joint spaces between C1 and C2?
- a. Anteroposterior (AP) axial
 - b. Lateral
 - c. 45° posterior or anterior oblique
 - d. AP open mouth

ANS: D REF: 296-297

27. Along with the upper incisors, what other bony landmark must be aligned for the AP open-mouth projection?
- a. Base of skull
 - b. Tip of mandible
 - c. Inferior margin of lower incisors
 - d. Thyroid cartilage

ANS: A REF: 310

28. What type of CR angulation is required for the AP axial projection for the cervical spine?
- a. None. CR is perpendicular to the image receptor.
 - b. 5° to 10° cephalad.
 - c. 15° to 20° cephalad.
 - d. 15° to 20° caudad.

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ANS: C REF: 311

29. Why are the anterior oblique projections (right anterior oblique [RAO]/left anterior oblique [LAO]) preferred over the posterior oblique projections of the cervical spine?
- a. To make the patient more comfortable
 - b. To reduce the thyroid dose
 - c. To prevent overlap of the mandible over the spine
 - d. To place the zygapophyseal joints closer to the image receptor

ANS: B REF: 312

30. Which of the following positions will demonstrate the left intervertebral foramina of the cervical spine?
- a. RAO
 - b. Left posterior oblique (LPO)
 - c. Lateral
 - d. LAO

ANS: D REF: 313

31. Which of the following projections will best demonstrate the C4-5 zygapophyseal joints of the cervical spine?

- a. AP axial
- b. Posterior oblique
- c. Lateral
- d. Anterior oblique

ANS: C REF: 296

32. Which of the following is NOT a correct evaluation criterion for the AP axial C-spine projection?
- a. C3-T2 vertebral bodies should be visualized.
 - b. Spinous processes are seen to be equal distances from the vertebral body lateral borders.
 - c. CR is at the lower margin of the thyroid cartilage.
 - d. All of the above are correct criteria.

ANS: D REF: 319

33. Which of the following factors does not apply to a lateral projection of the cervical spine?
- a. Use a 72-inch (183-cm) SID.
 - b. Suspend respiration upon full inspiration prior to exposure.
 - c. Perform horizontal beam lateral projection if trauma is suspected.
 - d. Center CR to thyroid cartilage.

ANS: B REF: 313

34. The chin is extended for a lateral projection of the cervical spine to:
- a. open up the C1-2 joint space.
 - b. demonstrate the articular pillars.
 - c. open up the intervertebral joint space.
 - d. prevent superimposition of the mandible upon the spine.

ANS: D REF: 313

35. The AP axial-vertebral arch projection may be performed to better demonstrate the:
- a. C1 and C1-2 atlantoaxial joint spaces.
 - b. vertebral arch (articular pillars) of C4-7.
 - c. open intervertebral disk spaces of C3-T1.
 - d. dens within the foramen magnum.

ANS: B REF: 319

36. What type of CR angle is recommended when performing the AP axial C-spine projection erect?
- a. 15° cephalad
 - b. 20° cephalad
 - c. 15° caudad
 - d. 25° cephalad

ANS: B REF: 311

37. What type of CR angle is required for posterior oblique (left posterior oblique [LPO]/right posterior oblique [RPO]) positions of the cervical spine?
- a. 15° cephalad

- b. 15° caudad
- c. 5° to 10° cephalad
- d. None. The CR is perpendicular to the image receptor (IR).

ANS: A REF: 312

38. Which of the following factors will enhance the visibility of the vertebral bodies during a lateral projection of the thoracic spine?
- a. Use a high kV.
 - b. Increase SID.
 - c. Use an orthostatic (breathing) technique.
 - d. Flex the spine.

ANS: C REF: 321

39. Which of the following positions will best demonstrate the left zygapophyseal joints of the thoracic spine?
- a. LPO
 - b. RPO
 - c. RAO
 - d. Lateral

ANS: B REF: 322

40. How much rotation of the body is required for an LAO projection of the thoracic spine (from the plane of the table)?
- a. 20°
 - b. 45°
 - c. 50° to 60°
 - d. 70°

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ANS: D REF: 322

41. Which of the following projections will project the dens within the shadow of the foramen magnum?
- a. AP open mouth
 - b. AP projection (Fuchs method)
 - c. Twining method
 - d. None of the above

ANS: B REF: 317

42. A radiograph of an AP open-mouth projection of the cervical spine reveals that the zygapophyseal joints are not symmetric. No fracture or subluxation is present. Which one of the following positioning errors most likely led to this radiographic outcome?
- a. Excessive CR angulation
 - b. Insufficient CR angulation
 - c. Rotation of the spine
 - d. Excessive flexion of the head

ANS: C REF: 310

43. A radiograph of an AP axial projection of the cervical spine reveals that the intervertebral joints are not open. The following analog factors were used for this projection: 5° cephalad angle, 40-inch (100-cm) SID, grid, slight extension of the skull, and the CR centered to the thyroid cartilage. Which of the following modifications should be made during the repeat exposure?
- Keep the CR perpendicular to the image receptor.
 - Increase the SID to 72 inches (183 cm).
 - Center the CR to the gonion.
 - Increase the CR angulation.

ANS: D REF: 319

44. A radiograph of an AP thoracic spine projection reveals that the upper thoracic spine is overexposed. The lower vertebrae have acceptable density and contrast. Which one of the following modifications will improve the visibility of the upper thoracic spine?
- Place the upper spine under the cathode side of the tube.
 - Use a compensating (wedge) filter.
 - Increase the kV to decrease the contrast of the upper spine.
 - Use a breathing technique.

ANS: B REF: 320

45. A radiograph of a lateral thoracic spine reveals that there is excessive density along the posterior aspect of the spine. Even with good collimation, the scatter radiation reaching the image receptor obscures the spinous processes. What can the technologist do to improve the visibility of the posterior elements of the spine?
- Use higher-speed screens and film.
 - Increase the kV, lower the mAs.
 - Use a higher-ratio grid.
 - Place a lead mat on the tabletop just posterior to the patient.

ANS: D REF: 321

46. A radiograph of an AP open-mouth projection reveals that the base of the skull is superimposed over the dens. What positioning error led to this radiographic outcome?
- Excessive flexion of the skull
 - Excessive extension of the skull
 - Excessive CR angulation
 - Rotation of the skull

ANS: B REF: 310

47. A radiograph of a lateral projection (nontrauma) of the cervical spine reveals that the ramus of the mandible is superimposed over the spine. What could the technologist have done to prevent this?
- Elevate the chin to place the acanthiomeatal line (AML) parallel with the floor.
 - Rotate the skull 20° to 30° toward the IR.
 - Angle the CR 3° to 5° caudad.
 - Have the patient hold 5 to 10 lb in each hand.

ANS: A REF: 313

48. A radiograph of an RAO of the cervical spine reveals that the lower intervertebral foramina are not open. The upper vertebral foramina are well visualized. Which positioning error most likely lead to this radiographic outcome?
- Excessive CR angulation
 - Insufficient CR angulation
 - Insufficient rotation of the upper body
 - Incorrect CR placement

ANS: C

REF: 312

49. A patient comes to the radiology department for a cervical spine routine. The study is ordered for nontraumatic reasons. The AP open-mouth projection reveals that the base of the skull and upper incisors are superimposed, but they are obscuring the upper portion of the dens. On the repeat exposure, what should the technologist do to demonstrate the upper portion of the dens?
- Increase the flexion of the skull.
 - Increase the extension of the skull.
 - Perform the Fuchs or Judd method.
 - Perform the AP chewing projection.

ANS: C

REF: 310

50. A patient enters the emergency department (ED) because of a motor vehicle accident (MVA). The patient is on a backboard and wearing a cervical collar. The technologist is concerned about the artifacts that the collar will project on the spine during the horizontal beam lateral projection. What should the technologist do in this situation?
- Leave the collar on during the exposure.
 - Remove the cervical collar but be careful not to move the patient's head.
 - Ask the patient to remove the collar herself (for liability reasons).
 - Ask a nurse to remove the collar and to hold the patient's head while the technologist is initiating the exposure.

ANS: A

REF: 310

51. A lateral projection of the thoracic spine reveals that the upper aspect, which is a primary area of interest on this patient, is obscured by the patient's broad shoulders. Which of the following options will best demonstrate this region of the spine?
- Use a compensating (wedge) filter and repeat the exposure with increased kV.
 - Angle the CR 10° to 15° cephalad.
 - Perform the projection with the patient erect and holding weights in hand during exposure.
 - Perform a cervicothoracic (swimmer's) lateral position.

ANS: D

REF: 315

52. A patient enters the ED with a cervical spine injury as a result of a fall. The initial horizontal beam lateral projection reveals no subluxation or fracture. The ED physician is concerned about a whiplash injury. Which of the following routines would be most helpful in diagnosing this type of injury?
- Patient in the swimmer's lateral position
 - Oblique projections of the cervical spine

- c. Patient in hyperflexion and hyperextension lateral positions
- d. AP Ottonello method

ANS: C REF: 316

53. A patient comes to radiology for a thoracic spine routine. The patient has a history of arthritis of the spine. The radiologist requests that additional projections be taken to demonstrate the zygapophyseal joints. What position(s) and/or projection(s) would be ideal to demonstrate these structures?
- a. Pillar view projection of interest region
 - b. Swimmer's lateral projection
 - c. Spot AP and lateral projections of interest region
 - d. 70° oblique projections

ANS: D REF: 322

54. For an average-size adult, which of the following would receive the highest skin dose?
- a. AP "wagging jaw" cervical spine, 3-second exposure time
 - b. AP thoracic spine
 - c. Lateral cervical spine at 72-inch (183-cm) SID
 - d. Lateral thoracic spine

ANS: D REF: 321

55. What is the recommended kV range for thoracic spine projections when using digital systems?
- a. 70 to 80 kV
 - b. 60 to 70 kV
 - c. 75 to 85 kV
 - d. 110 to 120 kV

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ANS: C REF: 305 | 312

56. This radiographic image represents which of the following projections and/or positions?



- a. AP Fuchs method
- b. AP pillar projection
- c. AP axial C-spine projection
- d. AP open-mouth projection

ANS: D REF: 310

57. A critique of the image demonstrates which repeatable error?



- a. Excessive flexion of the skull
- b. Excessive extension of the skull
- c. Mouth not open far enough
- d. None of the above are repeatable errors.

ANS: D

REF: 310

58. The structure labeled **A**, which should be well demonstrated on this projection, is the:



- a. pedicle.
- b. lamina.
- c. odontoid process.
- d. inferior articular process.

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ANS: C

REF: 310

59. A digital image taken of a lateral thoracic spine projection demonstrates poor visibility of the spine. The image was taken on a full 14- × 17-inch (35- × 43-cm) IR. The following factors were used during the exposure: 80 kV, 80 mAs, 40-inch (102-cm) SID, and collimation to the size of the IR. Which one of the following modifications will result in a more diagnostic image?
- a. Decrease kV.
 - b. Decrease mAs.
 - c. Collimate to spine.
 - d. Increase SID.

ANS: C

REF: 321

60. A patient comes to radiology for a follow-up study of the cervical spine. The patient had spinal fusion between C5 and C6 performed 6 months earlier. His physician wants to assess the cervical spine for anteroposterior mobility. Which of the following projections would provide this assessment?
- a. Cervicothoracic projection
 - b. AP axial-vertebral arch projection
 - c. Judd or Fuchs projection

d. Hyperflexion and hyperextension projections

ANS: D REF: 316

61. Which of the following will best demonstrate a compression fracture of the thoracic spine?
- AP projection
 - Lateral projection
 - Posterior oblique positions
 - Anterior oblique positions

ANS: B REF: 321

62. Which imaging modality will best demonstrate herniated nucleus pulposus in the cervical spine?
- Computed tomography (CT)
 - Hyperflexion and hyperextension lateral projections
 - Magnetic resonance imaging (MRI)
 - Nuclear medicine

ANS: C REF: 307

63. A patient enters the ED due to an MVA. He is on a backboard and in a cervical collar. The initial lateral cervical spine projection demonstrates C1–6. The patient has broad and thick shoulders. Because the hospital is in a rural setting, no CT scanner is available. Which of the following modifications would best demonstrate the lower cervical spine safely?
- Repeat the exposure and increase kV.
 - Repeat the exposure but ask the patient to stand up and do the lateral projection erect.
 - Repeat the exposure but have a student pull down on the arms during the exposure.
 - Perform the horizontal beam cervicothoracic (swimmer's) lateral position.

ANS: D REF: 315

64. A patient comes to radiology for a follow-up study for a clay shoveler's fracture. Which of the following projections will best demonstrate the extent of this fracture?
- AP cervical spine
 - Lateral thoracic spine
 - Lateral cervical spine
 - AP axial-vertebral arch

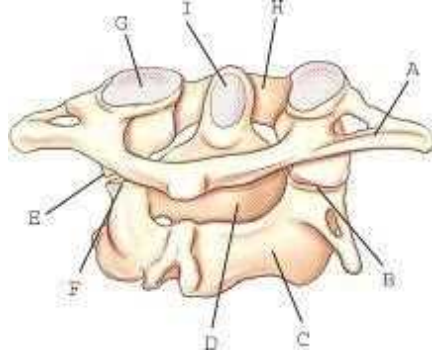
ANS: C REF: 307

COMPLETION

1. The structure anterior arch of the atlas is labeled_____.



2. Stress from a severe whiplash type of injury may cause a fracture of the structure labeled _____.

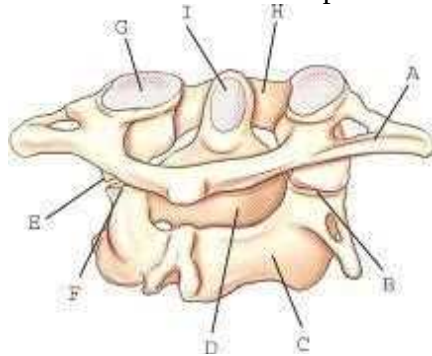


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ANS: I

REF: 297

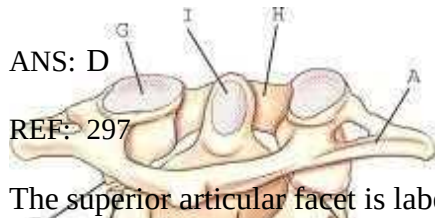
3. The structure transverse process is labeled_____.



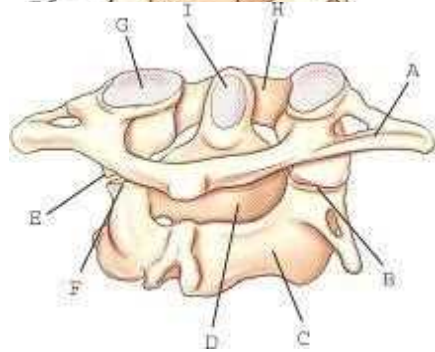
ANS: A

REF: 297

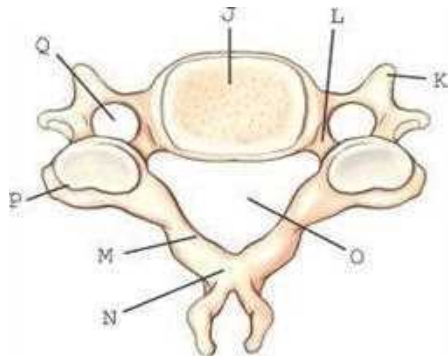
4. The body of C2 is labeled _____.



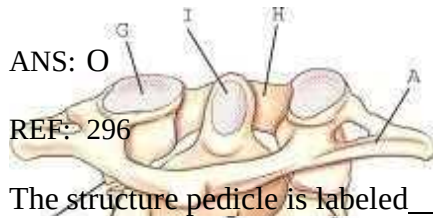
5. The superior articular facet is labeled _____.



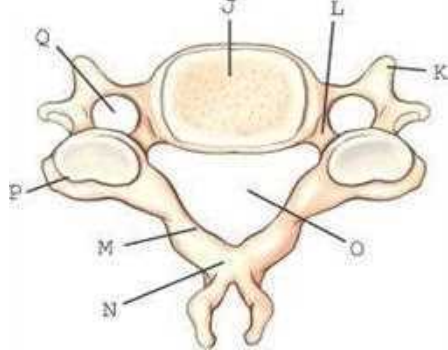
6. The structure transverse foramen is labeled _____.



7. The part vertebral foramen is labeled_____.

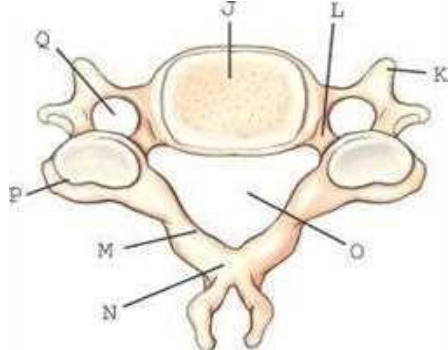


8. The structure pedicle is labeled_____.



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9. The structure lamina is labeled_____.



MATCHING

Match the vertebra with the corresponding terms and/or structures. (You may use an answer more than once.)

- a. C7
- b. C2
- c. C1
- d. C4
- e. T1
- f. T7

1. Dens
2. Vertebra prominens
3. Axis
4. Anterior arch
5. Typical cervical vertebra
6. Lateral masses

- | | |
|-----------|----------|
| 1. ANS: B | REF: 297 |
| 2. ANS: A | REF: 296 |
| 3. ANS: B | REF: 296 |
| 4. ANS: C | REF: 297 |
| 5. ANS: D | REF: 296 |
| 6. ANS: C | REF: 297 |

TRUE/FALSE

1. The PA projection (Judd method) is intended to demonstrate the atlantoaxial joints between C1 and C2.

ANS: F REF: 317 NURSINGTB.COM

2. The posterior cervical oblique projections demonstrate the intervertebral foramina and pedicles on the side closest to the image receptor.

ANS: F REF: 312

3. An RPO position of the cervical spine requires a 45° oblique of the body with a 15° caudad CR angle.

ANS: F REF: 322

4. Another term for a breathing technique during exposure is the orthostatic technique.

ANS: T REF: 305

5. The anterior oblique thoracic spine demonstrates the upside zygapophyseal joints.

ANS: F REF: 322

Chapter 09: Lumbar Spine, Sacrum, and Coccyx

Lampignano: Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition

MULTIPLE CHOICE

1. The intervertebral foramina of the lumbar spine are located at an angle of _____ in relation to the midsagittal plane.
- 45°
 - 30° to 35°
 - 70° to 75°
 - 90°

ANS: D

REF: 326

2. The small section of bone found between the superior and inferior articular processes of the lumbar spine is termed:
- pillar.
 - transverse processes.
 - articular facets.
 - pars interarticularis.

ANS: D

REF: 326

3. The zygapophyseal joints of the upper lumbar vertebrae are _____ in relationship to the midsagittal plane.
- 30°
 - 50°
 - 45°
 - 90°

ANS: B

REF: 326

4. The anterior projecting bony process of the sacrum that forms part of the inlet of the true pelvis is the:
- promontory of the sacrum.
 - body of S1.
 - apex of coccyx.
 - sacral foramina.

ANS: A

REF: 327

5. Another term for the sacral horns is the:
- base of the sacrum.
 - promontory of the sacrum.
 - cornu of the sacrum.
 - median sacral crest.

ANS: C

REF: 327

6. Which specific aspect of the sacrum articulates with the ilium to form the sacroiliac joint?

- a. Promontory
- b. Cornu
- c. Auricular surface
- d. Inferior articular processes

ANS: C REF: 327

7. Which one of the following structures of the sacrum is considered to be the most posterior?
- a. Median sacral crest
 - b. Promontory
 - c. Superior articular processes
 - d. Spinous processes

ANS: A REF: 327

8. What is the term for the superior aspect of the coccyx?
- a. Base
 - b. Apex
 - c. Superior margin
 - d. Sacrococcygeal junction

ANS: A REF: 328

9. What is the joint classification of the zygapophyseal joints?
- a. Cartilaginous/amphiarthrodial
 - b. Synovial/diarthrodial
 - c. Fibrous/synarthrodial
 - d. Symphyses/amphiarthrodial

ANS: B REF: 330

10. The intervertebral joints in the lumbar spine are classified as:
- a. synovial/diarthrodial.
 - b. fibrous/synarthrodial.
 - c. cartilaginous/amphiarthrodial.
 - d. fibrous/amphiarthrodial.

ANS: C REF: 330

11. What type of joint movement occurs with the zygapophyseal joints?
- a. Ginglymus
 - b. Plane
 - c. Ellipsoidal
 - d. Pivot

ANS: B REF: 330

12. Which of the following topographic landmarks corresponds with the L4-5 vertebral level?
- a. Xiphoid process
 - b. Lower costal margin
 - c. Anterior superior iliac spine (ASIS)
 - d. Iliac crest

ANS: D

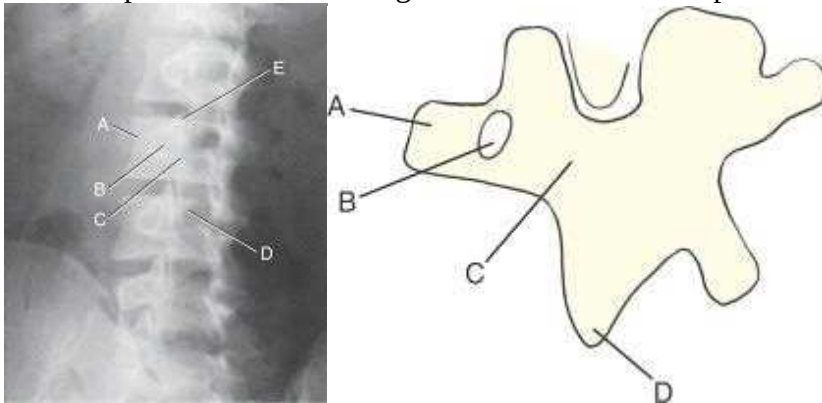
REF: 332

13. Which of the following structures is located at the level of the ASIS?
- a. S1-2 (sacral segments)
 - b. Tip of coccyx
 - c. L5-S1 joint space
 - d. L4-5 joint space

ANS: A

REF: 332

14. Which aspect of the Scottie dog is the inferior articular process?

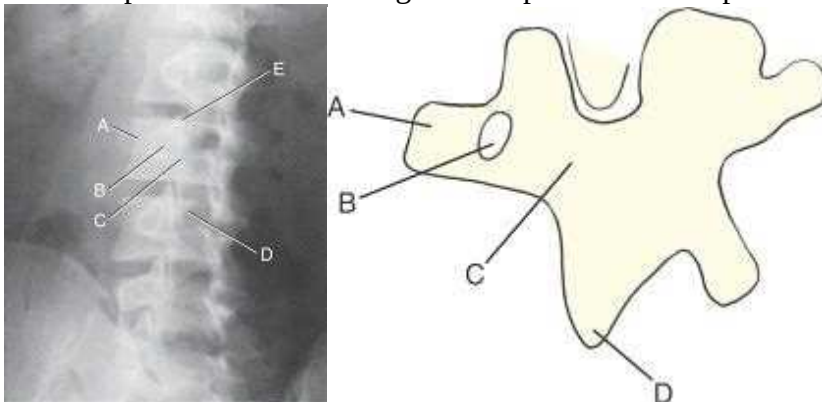


- a. A
- b. B
- c. C
- d. D

ANS: D

REF: 330

15. Which aspect of the Scottie dog is the superior articular process?

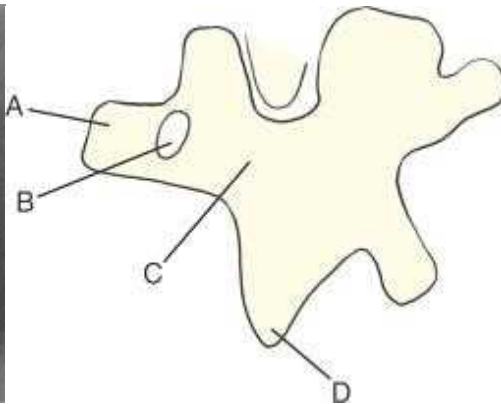
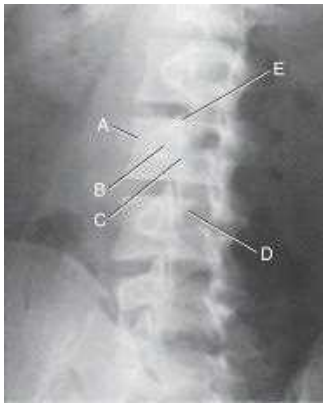


- a. A
- b. B
- c. C
- d. D
- e. E

ANS: E

REF: 330

16. Which aspect of the Scottie dog is the transverse process?

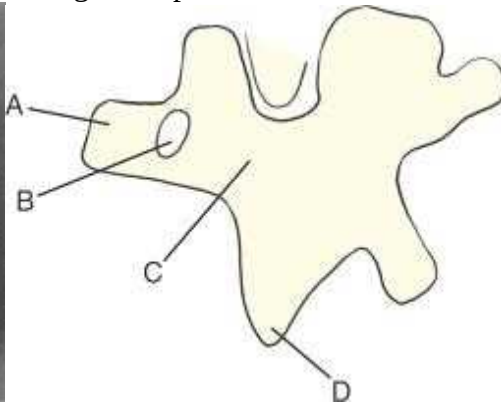
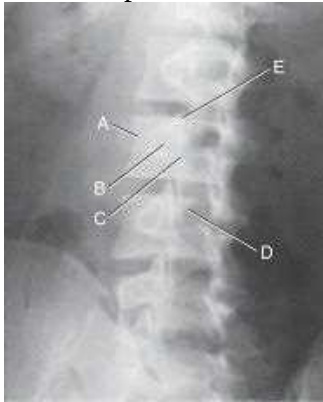


- a. A
- b. B
- c. C
- d. D

ANS: A

REF: 330

17. Which aspect of the Scottie dog is the pedicle?



- a. A
- b. B
- c. C
- d. D

ANS: B

REF: 330

18. The average degree of rotation required to demonstrate the L3-4 zygapophyseal joints is:

- a. 50°.
- b. 30°.
- c. 20° to 25°.
- d. 45°.

ANS: D

REF: 329

19. Why should the hips and knees be flexed for an anteroposterior (AP) projection of the lumbar spine?

- a. For patient comfort
- b. To reduce the lumbar curvature
- c. To demonstrate any possible spondylolisthesis
- d. Both A and B

ANS: D

REF: 333

20. Which of the following should be done to reduce scatter radiation from reaching the image receptor for the lateral lumbar, sacrum, and coccyx projections?
- Use a lower kV.
 - Place a lead mat on the tabletop behind the patient's lower back and pelvis.
 - Increase the source image receptor distance (SID) to 44 inches (113 cm).
 - Use a smaller image receptor.

ANS: B

REF: 334

21. Where is the central ray (CR) centered for an AP projection of the lumbar spine with a 14- × 17-inch (35- × 43-cm) IR?
- At the iliac crest
 - At the ASIS
 - 1 to 1.5 inches (2.5 to 3 cm) above the iliac crest
 - At the lower costal margin

ANS: A

REF: 337

22. An average of _____ segment(s) make up the adult coccyx.
- one
 - four
 - five
 - three

ANS: B

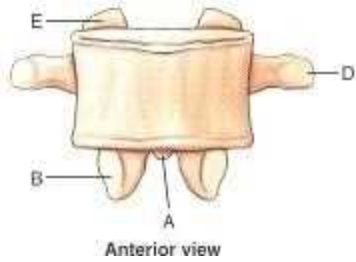
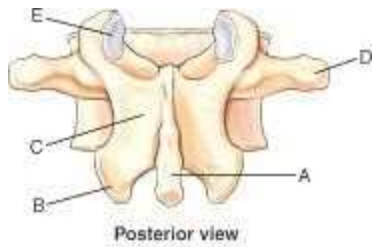
REF: 328

23. Which of the following statements is NOT true about the lateral L5-S1 projection?
- If the waist is not supported, the CR must be angled 5° to 8° caudad.
 - A lead mat should be placed on the tabletop behind the patient, and there should be close collimation to improve image quality.
 - A 14- × 17-inch (35- × 43-cm) IR is required.
 - The CR is centered 1.5 inches (3 to 4 cm) inferior to the iliac crest and 2 inches (5 cm) posterior to the ASIS.

ANS: C

REF: 340

24. Which labeled structure in the figure is the superior articular process?

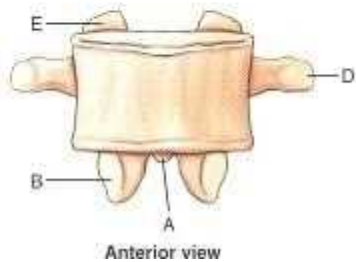
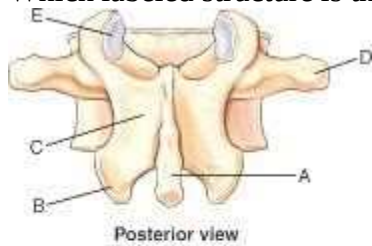


- a. A
- b. B
- c. C
- d. D
- e. E

ANS: E

REF: 326

25. Which labeled structure is the pars interarticularis?

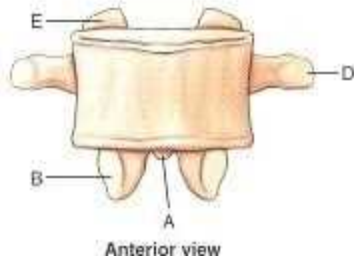
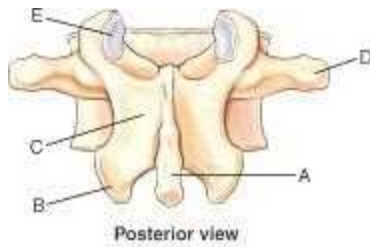


- a. A
- b. B
- c. C
- d. D
- e. E

ANS: C

REF: 326

26. Which labeled structure is the inferior articular process?

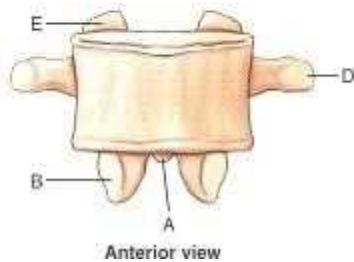
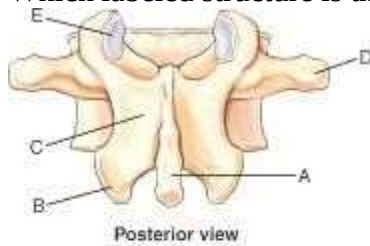


- a. A
- b. B
- c. C
- d. D
- e. E

ANS: B

REF: 326

27. Which labeled structure is the spinous process?



- a. A
- b. B
- c. C
- d. D
- e. E

ANS: A

REF: 326

28. What CR angulation should be used for an AP axial projection of the L5-S1 joint space on a male patient?

- a. 20° cephalad
- b. 30° cephalad

- c. 35° caudad
- d. 40° to 45° cephalad

ANS: B REF: 341

29. A key advantage of a posteroanterior (PA) projection taken during a pediatric scoliosis study as compared with the AP projection is that it reduces:
- a. breast dose by 90%.
 - b. female ovarian dose by 25% to 30%.
 - c. breast dose by 15% to 20%.
 - d. breast and thyroid dose by 150%.

ANS: A REF: 342

30. Where is the CR centered for an AP axial projection of the sacrum?
- a. At the level of the ASIS
 - b. At the level of the symphysis pubis
 - c. 1 to 1 1/2 inches (3 to 4 cm) below the iliac crest
 - d. 2 inches (5 cm) above the symphysis pubis

ANS: D REF: 347

31. What type of CR angulation is required for an AP axial projection of the coccyx?
- a. 10° caudad
 - b. 15° cephalad
 - c. 10° cephalad
 - d. Perpendicular to the cassette

ANS: A REF: 348

32. The radiographic appearance on an oblique lumbar spine in which the neck of the Scottie dog appears broken suggests the presence of:
- a. spondylolisthesis.
 - b. spina bifida.
 - c. a compression fracture.
 - d. spondylolysis.

ANS: D REF: 335

33. A destructive type of lesion with irregular margins and increased density is an indication of possible:
- a. osteoblastic type of metastases.
 - b. osteolytic type of metastases.
 - c. spondylolisthesis.
 - d. spondylolysis.

ANS: A REF: 335

34. A fracture through the vertebral body and posterior elements caused by lap seat belts during an auto accident involving sudden deceleration is a _____ fracture.
- a. compression
 - b. Jefferson
 - c. teardrop burst

d. Chance

ANS: D REF: 335

35. Which of the following is a condition of unknown cause in which calcification of bony ridges between vertebrae occurs, creating a lack of mobility with a “bamboo” appearance?
- a. Scheuermann disease
 - b. Ankylosing spondylitis
 - c. Spondylolisthesis
 - d. Osteoblastic type of metastases

ANS: B REF: 335

36. An anterior wedging of vertebrae with a loss of body height but rarely causing neurologic symptoms is called:
- a. a teardrop burst fracture.
 - b. a Chance fracture.
 - c. a compression fracture.
 - d. spondylolysis.

ANS: C REF: 335

37. Sciatic type of pain resulting from a “slipped disk” indicates:
- a. spondylolisthesis.
 - b. herniated nucleus pulposus.
 - c. ankylosing spondylitis.
 - d. spina bifida.

ANS: B REF: 335

38. An abnormal lateral curvature of the spine is a congenital condition termed:
- a. spina bifida.
 - b. spondylolisthesis.
 - c. lordosis.
 - d. scoliosis.

ANS: D REF: 335

39. What CR angle should be used for a lateral sacrum/coccyx projection?
- a. 15° cephalad
 - b. 30° cephalad
 - c. None. CR is perpendicular to the image receptor.
 - d. 10° cephalad

ANS: C REF: 349

40. A radiograph of a left posterior oblique (LPO) projection of the lumbar spine reveals that the downside pedicle is projected too far posterior on the vertebral body. What specific positioning error is present on this radiograph?
- a. Excessive rotation of the spine
 - b. Insufficient rotation of the spine
 - c. Tilt of the spine
 - d. Incorrect CR placement

ANS: A

REF: 338

41. A radiograph of a lateral projection of the lumbar spine reveals that the mid- to lower-intervertebral joint spaces are not open. The patient's waist was supported and the CR was perpendicular to the IR. Which of the following modifications will help open these joint spaces during the repeat exposure?
- Increase the SID for less divergence of the x-ray beam.
 - Decrease waist support and/or angle the CR 5° to 8° cephalad.
 - Have the patient hold her breath on a deeper inspiration to expand the thorax and straighten the spine.
 - Increase waist support and/or angle the CR 5° to 8° caudad.

ANS: D

REF: 339

42. A radiograph of an AP axial sacrum reveals that it is foreshortened and the sacral foramina are not clearly seen. The patient was in an AP supine position, and the technologist angled the CR 5° to 7° cephalad. What specific positioning error is present on this radiograph?
- Excessive CR angulation
 - Rotation of the sacrum
 - Insufficient CR angulation
 - Wrong direction of the CR angle

ANS: C

REF: 347

43. A radiograph of an AP axial coccyx reveals that the symphysis pubis is superimposed over the distal end of the coccyx. Which of the following modifications will correct this problem during the repeat exposure?
- Decrease the CR angulation.
 - Increase the CR angulation.
 - Slightly oblique the patient.
 - Ask the patient to empty her bladder.

ANS: B

REF: 348

44. A radiograph of an AP axial L5-S1 projection reveals that the joint space is not open. The following factors were used on this female patient: 80 kV, 40-inch (102-cm) SID, grid, 35° caudad angle, and CR centered to the ASIS. Which of the following factors needs to be modified to produce a more diagnostic image?
- Increase the CR angulation.
 - Decrease the CR angulation.
 - Change the direction of the CR angulation.
 - Center the CR higher to place it parallel to the joint space.

ANS: C

REF: 341

45. A radiograph of an AP projection of the lumbar spine on an average-size patient reveals that the psoas major muscles and transverse processes are not visible. The following **analog** factors were used for this projection: automatic exposure control (AEC) with center ionization chamber, 95 kV, 40-inch (102-cm) SID, grid, and 14- × 17-inch (35- × 43-cm) image receptor. Which of the following modifications will be most effective in demonstrating these structures?

- a. Decrease the kV.
- b. Activate all three ionization chambers.
- c. Decrease the mAs.
- d. Increase the kV.

ANS: A REF: 337

46. A patient comes to radiology for a study of the lumbar spine. The initial radiographs demonstrate potential pathology involving the L5-S1 zygapophyseal joint. Which of the following positions and/or projections would best demonstrate this joint space?
- a. Lateral L5-S1 position
 - b. Right and left 30° oblique projections
 - c. Right and left 50° oblique projections
 - d. Closely collimated and lateral position of L5-S1 region

ANS: B REF: 338

47. A patient comes to radiology for a study of the lumbar spine. He has a clinical history of spondylolisthesis of L5. Which of the following projections will best demonstrate the severity of this condition?
- a. 30° oblique projections
 - b. 50° oblique projections
 - c. Lateral L5-S1 projection
 - d. AP axial L5-S1 projection

ANS: C REF: 340

48. A patient comes to radiology for a follow-up study of the lumbar spine. The patient had a spinal fusion performed at the L3-4 level 4 months earlier. Which of the following would best demonstrate the degree of movement at the fusion site?
- a. Lateral hyperextension and hyperflexion projections
 - b. Ferguson method
 - c. AP and lateral erect projections
 - d. Right and left 45° oblique projections

ANS: A REF: 346

49. A young female patient comes to radiology for a scoliosis study. The patient has had this series performed frequently. How much will the breast dose be decreased if a PA rather than an AP projection is taken?
- a. 15%
 - b. 90%
 - c. 35%
 - d. It will not make a significant difference with good collimation.

ANS: B REF: 342

50. A patient comes in with a possible compression fracture of L3. Which one of the following positioning routines would best demonstrate the body of L3 and the intervertebral joint spaces above and below it?
- a. Collimated R and L posterior oblique and AP projections
 - b. Collimated PA and lateral projections

- c. Erect AP and lateral projections
- d. Collimated LPO and RPO positions

ANS: B REF: 329

51. A geriatric patient comes to radiology for a lumbar spine series. She has severe kyphosis of the thoracolumbar spine. Which one of the following modifications should be applied to this patient?
- a. Perform all positions erect.
 - b. Perform all positions recumbent; include flexion and extension projections.
 - c. Include the entire spine for all projections regardless of what was ordered by the physician.
 - d. Use high (90 kV) for all projections.

ANS: A REF: 334

52. A female patient is brought to the emergency department (ED) because of a motor vehicle accident (MVA). Her chief complaint is pain in the lower lumbar region. The ED physician orders a lumbar series. Upon questioning, the technologist learns that the patient is pregnant. The ED physician is made aware of the pregnancy but still wants the lumbar spine series performed. What can the technologist do to minimize dose to the fetus and mother?
- a. Use higher kV than normal; reduce mAs accordingly.
 - b. Use smallest IR possible.
 - c. Collimate as much as feasible.
 - d. All of the above should be done.

ANS: D REF: 333

53. Which of the following fractures is due to a hyperflexion force injury?
- a. Compression
 - b. Burst
 - c. Chance
 - d. Metastatic

ANS: C REF: 335

54. For a lateral L5-S1 projection, the CR must be parallel to the:
- a. midsagittal plane.
 - b. midcoronal plane.
 - c. interiliac line.
 - d. transverse plane.

ANS: C REF: 340

55. How much obliquity of the body is required for posterior oblique (LPO/RPO) positions for the sacroiliac joints?
- a. 45°
 - b. 10° to 15°
 - c. 60° to 70°
 - d. 25° to 30°

ANS: D REF: 352

56. A radiograph of the left sacroiliac joint demonstrates it open and clearly seen. Which of the following positions was performed?
- LPO
 - RPO
 - RAO
 - AP

ANS: B

REF: 352

57. Radiographs of oblique projections of the SI joints do not clearly demonstrate the inferior/distal aspect of the joints. What can the technologist do to better demonstrate this region?
- Increase rotation of the pelvis.
 - Initiate exposure upon expiration.
 - Angle the CR 15° to 20° cephalad.
 - Perform positions erect.

ANS: C

REF: 352

58. Where is the CR centered for posterior oblique projections of the SI joints?
- 1 inch (2.5 cm) medial to upside ASIS
 - 2 inches (5 cm) medial to upside ASIS
 - Centered at upside ASIS
 - 1 inch (2.5 cm) medial and inferior to upside ASIS

ANS: A

REF: 352

TRUE/FALSE

1. The long axis of the sacrum is generally angled more posteriorly in males than females.

ANS: F

REF: 328

2. A female is more likely to suffer a fracture of the coccyx due to a backward, sitting type of fall than a male.

ANS: T

REF: 328

3. The Scottie dog sign is demonstrated with oblique projections of the thoracic and lumbar spine.

ANS: F

REF: 330

4. The anterior oblique (RAO and LAO) positions of the lumbar spine will demonstrate the zygapophyseal joints closest to the image receptor.

ANS: F

REF: 330

5. If the waist is supported properly, an average-size patient does not require any CR angulation for the lateral lumbar spine projection.

ANS: T

REF: 339

6. If the patient has scoliosis, the convexity of the spine should be down toward the image receptor for the lateral spine projection.

ANS: T REF: 339

7. Gonadal shielding must always be used on adult female patients for the lumbar spine series.

ANS: F REF: 333

8. Magnetic resonance imaging (MRI) is superior to computed tomography (CT) for evaluation of spinal cord and intervertebral disks.

ANS: T REF: 335

9. Bone densitometry produces very little skin dose to the patient.

ANS: T REF: 335

10. Conventional radiography does not detect bone loss from conditions such as osteoporosis until bone mass has been reduced at least 30%.

ANS: T REF: 335

11. The AP and lateral projections for a pediatric scoliosis study should include the entire lumbar and thoracic spine.

ANS: T REF: 342

12. The second projection for the Ferguson method of the scoliosis series requires that the concave side of the curve be built up 3 to 4 inches (8 to 10 cm) by placing blocks beneath the patient's foot.

ANS: F REF: 344

13. The use of digital radiography is not recommended for studies of the sacrum and coccyx.

ANS: F REF: 334

14. The "nose" of the Scottie dog represents the spinous process of a lumbar vertebra.

ANS: F REF: 330

15. The pelvis must remain stationary for the AP right and left bending projections of the scoliosis series.

ANS: T REF: 345

16. Lateral projections of the sacrum and coccyx must be performed as two separate exposures.

ANS: F REF: 340

17. The LPO position for sacroiliac joints will best demonstrate the right joint.

ANS: T

REF: 352

Chapter 10: Bony Thorax-Sternum and Ribs

Test Bank

MULTIPLE CHOICE

1. The suprasternal, manubrial, or jugular notch all correspond to the level of:
 - a. T2-3.
 - b. T1.
 - c. T4-5.
 - d. C7.

ANS: A

REF: 354

2. The xiphoid process corresponds to the vertebral level of:
 - a. T7.
 - b. T9-10.
 - c. T4-5.
 - d. L1-2.

ANS: B

REF: 354

3. What is the primary term for the superior margin of the sternum?
 - a. Sternal notch
 - b. Manubrial notch
 - c. Suprasternal notch
 - d. Jugular notch

ANS: D

REF: 354

4. At approximately what age does the xiphoid process become totally ossified?
 - a. 12 years old
 - b. 21 years old
 - c. 40 years old
 - d. The xiphoid process never becomes ossified.

ANS: C

REF: 354

5. Which of the following structures connects the anterior aspect of the ribs to the sternum?
 - a. Costocartilage
 - b. Sternal tendons
 - c. Costovertebral joints
 - d. Costotransverse joints

ANS: A

REF: 355

6. The tubercle portion of a typical rib connects the anterior end of the rib to the sternum.
 - a. True
 - b. False

ANS: B

REF: 355

7. The only bony connection between the shoulder girdle and the bony thorax is the acromioclavicular joint.
- a. True
 - b. False

ANS: B

REF: 354

8. The sternal angle is a palpable landmark at the level of:
- a. T4-5.
 - b. T2-3.
 - c. T7.
 - d. T9-10.

ANS: A

REF: 354

9. Which pair of ribs attaches to the sternum at the level of the sternal angle?
- a. First
 - b. Second
 - c. Third
 - d. Fourth and fifth

ANS: B

REF: 355

10. In the erect adult bony thorax, the posterior portion of a typical rib is _____ higher or more superior to the anterior portion.
- a. 1 to 2 inches (2.5 to 5 cm)
 - b. 3 to 5 inches (7.5 to 13 cm)
 - c. 6 to 8 inches (15 to 20 cm)
 - d. 10 to 12 inches (25 to 30 cm)

ANS: B

REF: 355

11. Which of the following ribs is considered to be a false rib?
- a. Seventh
 - b. First
 - c. Ninth
 - d. None of the above

ANS: C

REF: 355

12. Which of the following statements is true about floating ribs?
- a. They do not possess a head.
 - b. They do not possess a costovertebral joint.
 - c. They do not possess costocartilage.
 - d. They are ribs 10 through 12.

ANS: C

REF: 355

13. The widest aspect of the thorax generally occurs at the level of:
- a. the eleventh and twelfth ribs.
 - b. T7.
 - c. the sternoclavicular joints.
 - d. the eighth or ninth ribs.

ANS: D

REF: 356

14. What is the joint classification and type of movement for the sternoclavicular joints?
- Cartilaginous with diarthrodial (ginglymus) movement
 - Synovial with diarthrodial (gliding) movement
 - Synovial with amphiarthrodial, limited movement
 - Cartilaginous with synarthrodial or no movement

ANS: B

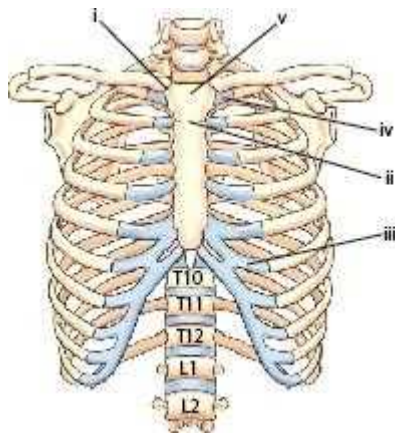
REF: 356

15. What is the joint classification and type of movement for the costotransverse joint?
- Cartilaginous with diarthrodial (ginglymus) movement
 - Synovial with diarthrodial (plane) movement
 - Synovial with amphiarthrodial, limited movement
 - Cartilaginous with synarthrodial or no movement

ANS: B

REF: 356

16. What is the name of the part labeled **i** in this figure?



- Facet for the first rib
- Body
- Sternoclavicular joint
- Sternal angle

ANS: C

REF: 354

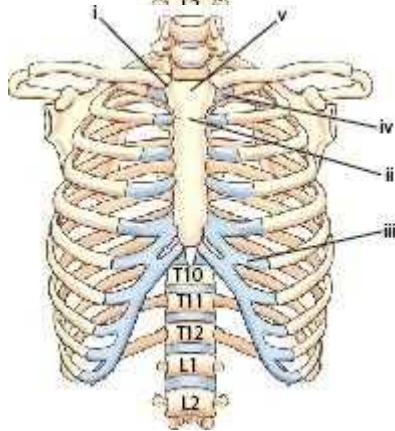
17. What is the name of the part labeled **ii**?

- a. Xiphoid process
- b. Body
- c. Sternoclavicular joint
- d. Sternal angle

ANS: D

REF: 354

18. The structure labeled **iii** is costocartilage:

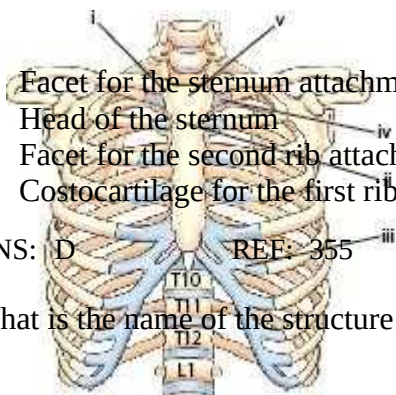


- a. of the 10th rib.
- b. portion of the first false rib.
- c. of the last true rib.
- d. of the sixth rib.

ANS: D

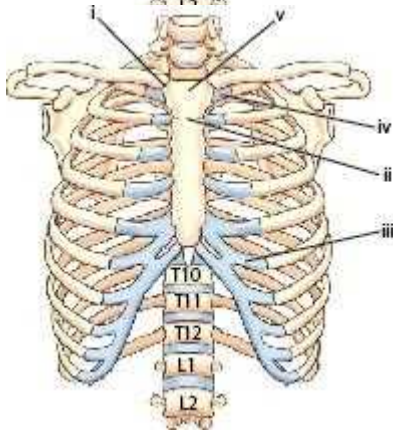
REF: 355

19. What is the name of the part labeled **iv**?

- 
- a. Facet for the sternum attachment
 - b. Head of the sternum
 - c. Facet for the second rib attachment
 - d. Costocartilage for the first rib attachment

ANS: D REF: 355

20. What is the name of the structure labeled v?



- a. Head
- b. Body
- c. Manubrium
- d. Xiphoid process

ANS: C REF: 354

21. Which aspect of the rib articulates with the thoracic vertebral body?

- a. Neck
- b. Tubercles
- c. Head
- d. Facets

ANS: C REF: 355

22. Which ribs are considered to be true ribs?
- a. First and second ribs
 - b. First through seventh ribs
 - c. First through ninth ribs
 - d. 11th and 12th ribs

ANS: B REF: 355

23. The degree of rotation for the right anterior oblique (RAO) projection of the sternum is dependent on the size of the thoracic cavity.
- a. True
 - b. False

ANS: A REF: 357

24. The left anterior oblique (LAO) position of the sternum provides the best frontal image of the sternum with a minimal amount of distortion.
- a. True
 - b. False

ANS: B REF: 359

25. Which of the following techniques is most effective in preventing lung markings from obscuring the sternum on an oblique projection?
- a. Use a high kV.
 - b. Oblique as much as needed to not superimpose the sternum over the hilum region.
 - c. Decrease the source image receptor distance (SID) to magnify the sternum.
 - d. Use an orthostatic (breathing) technique.

ANS: D REF: 357

26. Why is the RAO sternum preferred to the LAO position?
- a. The RAO produces less magnification of the sternum.
 - b. The RAO projects the sternum over the shadow of the heart.
 - c. The RAO reduces dose to the thyroid gland.
 - d. The RAO projects the sternum away from the hilum and heart.

ANS: B REF: 357 | 362

27. Which of the following statements is true about radiography of ribs located above the diaphragm?
- a. Suspend breathing upon inspiration.
 - b. Perform the study with the patient recumbent.
 - c. Use an analog kV range of 85 to 95.
 - d. Always include an anteroposterior (AP) projection as part of the routine.

ANS: A REF: 358

28. Which of the following positions will best demonstrate the axillary portion of the left ribs?
- a. AP
 - b. Posteroanterior (PA)

- c. Left posterior oblique (LPO)
- d. LAO

ANS: C REF: 359

29. Which of the following positions will best demonstrate the axillary portion of the right ribs?
- a. AP
 - b. PA
 - c. LAO
 - d. RAO

ANS: C REF: 359

30. A right or left marker may be taped over the area of interest to indicate the location of the trauma to the ribs.
- a. True
 - b. False

ANS: B REF: 359

31. A recommended practice is to decrease the SID to less than 40 inches (102 cm) for the oblique sternum projection to increase the magnification and resultant unsharpness of overlying ribs.
- a. True
 - b. False

ANS: B REF: 362

32. Which of the following conditions may occur with trauma to the ribs?
- a. Airway obstruction of the trachea
 - b. Pneumonia
 - c. Hemothorax
 - d. Pulmonary embolus

ANS: C REF: 359

33. What is the recommended degree of obliquity for an RAO projection of the sternum for an asthenic type of patient?
- a. 20°
 - b. 15°
 - c. 30°
 - d. 10°

ANS: A REF: 362

34. Which position can replace the RAO of the sternum if the patient cannot lie prone?
- a. LAO
 - b. Left lateral decubitus
 - c. LPO
 - d. RPO

ANS: C REF: 362

35. What is the recommended SID for the lateral sternum position?
- a. 40 inches (102 cm)
 - b. 44 inches (113 cm)
 - c. 46 inches (117 cm)
 - d. 60 to 72 inches (152 to 183 cm)

ANS: D REF: 363

36. Where is the CR centered for a PA projection of the sternoclavicular joints?
- a. At the level of the vertebra prominens (T1)
 - b. At the level of the sternal angle (T4-5)
 - c. Three inches (7 cm) distal to vertebra prominens (T2-3)
 - d. At the level of the thyroid cartilage (T9)

ANS: C REF: 364

37. How much rotation and which oblique position are required to best demonstrate the left sternoclavicular joints?
- a. 10° to 15° LAO
 - b. 35° to 45° LAO
 - c. 10° to 15° RAO
 - d. 5° to 10° RAO

ANS: A REF: 365

38. Which two projections must be taken for an injury to the right anterior upper ribs?
- a. PA and LAO
 - b. PA and RAO
 - c. AP and RAO
 - d. AP and LPO

ANS: A REF: 359

39. Which two projections must be taken for an injury to the left posterior lower ribs?
- a. AP and LPO
 - b. AP and RAO
 - c. PA and LPO
 - d. PA and RAO

ANS: A REF: 359

40. Which analog kV range is recommended for an AP study of the ribs found below the diaphragm?
- a. 85 to 90 kV
 - b. 60 to 65 kV
 - c. 65 to 75 kV
 - d. 70 to 80 kV

ANS: D REF: 358

41. Which disease or condition may be associated with postoperative complications of open heart surgery?
- a. Spondylitis
 - b. Osteoblastic metastases
 - c. Osteomyelitis
 - d. Flail chest

ANS: C REF: 360

42. Fracture of adjacent ribs in two or more places with associated pulmonary injury is known as a(n)_____rib fracture.
- a. compound
 - b. flail chest
 - c. acute
 - d. compression

ANS: B REF: 360

43. The radiographic appearance of the erosion of bony rib margins is a possible indication of:
- a. osteomyelitis.
 - b. osteoblastic metastases.
 - c. spondylolysis.
 - d. osteolytic metastases.

ANS: A REF: 360

44. Which of the following conditions, if severe, requires a decrease adjustment of manual exposure factors?
- a. Osteoblastic metastases
 - b. Osteomyelitis
 - c. Flail chest
 - d. None of the above

ANS: D REF: 360

45. Both nuclear medicine and MRI (magnetic resonance imaging) studies can be performed to evaluate metastatic rib lesions before conventional rib radiographic examination.
- a. True
 - b. False

ANS: B REF: 360

46. A congenital defect characterized by anterior protrusion of the lower sternum and xiphoid process is termed:
- a. pectus excavatum.
 - b. flail chest.
 - c. pectus carinatum.
 - d. sternal protrusion.

ANS: C REF: 360

47. Multiple myeloma is seen often in the flat bones of the bony thorax.
- a. True

b. False

ANS: A

REF: 360

48. Which condition of the sternum is often termed “funnel chest?”

- a. Pectus excavatum
- b. Flail chest
- c. Pectus eruptus
- d. Pectus deforminens

ANS: A

REF: 360

49. Both bony and soft tissue anatomy may be evaluated by CT for pathology involving the sternum or the sternoclavicular joints.

- a. True
- b. False

ANS: A

REF: 360

50. The condition, flail chest, is most commonly caused by:

- a. pneumothorax.
- b. emphysema.
- c. blunt trauma.
- d. congenital heart defect.

ANS: C

REF: 360

51. A radiograph of an RAO sternum reveals that it is partially superimposed over the spine. What must be done to eliminate this problem during the repeat exposure?

- a. Perform an LPO projection instead of an RAO.
- b. Angle CR 5° to 10° laterally to the sternum.
- c. Increase rotation of the body.
- d. Increase kV.

ANS: C

REF: 362

52. A radiograph of a lateral projection of the sternum reveals that the patient's ribs are superimposed over the sternum. What needs to be done to correct this problem during the repeat exposure?

- a. Increase the SID.
- b. Angle the CR 5° anterior.
- c. Ensure that the patient is not rotated.
- d. Increase the kV.

ANS: C

REF: 363

53. A radiograph of an RAO projection of the sternum demonstrates excessive lung markings obscuring the sternum. A 1-second exposure time and an orthostatic (breathing) technique were used. Which of the following will produce a more diagnostic image of the sternum?

- a. Ensure that the patient is not breathing during the exposure.
- b. Increase the exposure time; decrease the mA.
- c. Decrease the kV; increase the mA or time.

d. Initiate exposure on deeper inspiration.

ANS: B

REF: 362

54. A PA radiograph of the sternoclavicular (SC) joints demonstrates unequal distance from the SC joints to the midline of the spine. The left SC joint is farther from the sternum than the right. What specific positioning error is present on this radiograph?
- a. Slight right rotation (right side toward the image receptor)
 - b. Slight left rotation (left side toward the image receptor)
 - c. Tilt of the upper thorax
 - d. Excessive angulation of the CR

ANS: A

REF: 364

55. A young female patient from the emergency department (ED) is brought to radiology for rib examination. She is able to sit up or stand for the procedure. She indicates that the region of pain is to the right anterior-to-mid axillary region. Which rib projections should be performed to minimize the effective dose to this patient?
- a. PA and RPO
 - b. AP and RPO
 - c. PA and RAO
 - d. PA and LAO

ANS: D

REF: 359

56. A patient enters the ED with an injury to the left anterior lower ribs. Which of the following projections should be taken to demonstrate the involved area?
- a. AP and LAO
 - b. PA and RAO
 - c. AP and LPO
 - d. PA and LAO

ANS: B

REF: 369

57. An ambulatory patient enters the ED with a possible injury to the right upper posterior ribs. Which of the following routines should be taken to demonstrate the involved area?
- a. Erect PA and LPO
 - b. Erect AP and RPO
 - c. Recumbent AP and RPO
 - d. Erect PA and LAO

ANS: B

REF: 368-369

58. A patient enters the ED with blunt trauma to the sternum. The patient is in great pain and cannot lie prone on the table or stand erect. Which of the following routines would be best for the sternum examination in this situation?
- a. RPO and lateral recumbent projections
 - b. AP and horizontal beam lateral projections
 - c. LPO and horizontal beam lateral projections
 - d. LPO and lateral recumbent projections

ANS: C

REF: 359 | 362

59. A patient enters the ED with trauma to the bony thorax. The initial radiographs reveal that there are fractured ribs and a possible pneumothorax of the left thorax. The physician orders a chest study to confirm the pneumothorax; however, the patient cannot stand. Which of the following positions would best demonstrate the pneumothorax?
- a. Left lateral decubitus
 - b. Right lateral decubitus
 - c. Ventral decubitus
 - d. Dorsal decubitus

ANS: B REF: 359

60. Initial PA projections of the SC joints indicate a possible defect involving the left SC joint. The vertebral column is preventing a clear view of it. Which of the following projections will demonstrate the right SC joint without superimposition over the spine?
- a. Horizontal beam lateral
 - b. LAO
 - c. RAO
 - d. Erect lateral projection

ANS: C REF: 365

61. The use of 125 kV is recommended for AP and PA projections of the ribs to reduce skin dose.
- a. True
 - b. False

ANS: B REF: 366-377

62. What is the minimum number of ribs that must be demonstrated for a unilateral rib study above the diaphragm?
- a. Ribs 1 through 6
 - b. Ribs 1 through 8
 - c. Ribs 1 through 10
 - d. All ribs must be demonstrated.

ANS: C REF: 368

63. A lateral projection of the sternum requires that respiration be suspended on expiration.
- a. True
 - b. False

ANS: B REF: 363

64. A radiograph of an RAO projection of the ribs demonstrates the left axillary ribs are foreshortened, whereas the right side is elongated. Which of the following is the most likely reason for this radiographic outcome?
- a. The patient requires more rotation to the right.
 - b. An LAO was performed rather than the RAO position.
 - c. The technologist should have performed a PA projection to demonstrate the left axillary ribs, not an RAO.
 - d. CR angulation was incorrect.

ANS: B

REF: 369-370

65. A patient with metastatic disease in the ribs comes to radiology following a nuclear medicine scan. The radiologist orders a right, upper posterior rib study performed. Which of the following positioning factors should be followed for this specific study?
- a. Perform positions erect if the patient's condition permits.
 - b. Exposure on full expiration.
 - c. Include the RPO position as part of the positioning routine.
 - d. Both A and C are correct.

ANS: D

REF: 358 | 369-370

66. Which of the following positioning considerations does NOT apply for a study of the lower ribs?
- a. Perform positions recumbent.
 - b. Use a digital kV range between 65 and 70 kV.
 - c. Exposure on full expiration.
 - d. Both A and B are incorrect.

ANS: B

REF: 358

Chapter 11: Cranium, Facial Bones, and Paranasal Sinuses

Lampignano: Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition

MULTIPLE CHOICE

1. Which of the following bones is part of the floor of the cranium?
- Temporal
 - Occipital
 - Frontal
 - Parietal

ANS: A REF: 377

2. How many bones make up the facial bone region?
- 6
 - 8
 - 12
 - 14

ANS: D REF: 377

3. Which bony landmark represents the highest level of the facial bone mass?
- Nasion
 - Acanthion
 - Orbital plates
 - Supraorbital notch

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ANS: C REF: 378

4. The widest portion of the cranium is found at the level of the:
- parietal tubercles.
 - right and left pterion.
 - squamous portion of the temporal bone.
 - external acoustic meatus (EAM).

ANS: A REF: 379

5. What is the name of the joint found between the lateral condylar processes of the skull and the atlas of C1?
- Zygapophyseal joint
 - Intervertebral joint
 - Atlanto-occipital joint
 - Cervico-occipital joint

ANS: C REF: 379

6. Which cranial bone articulates with the other seven cranial bones?
- Parietal
 - Ethmoid
 - Sphenoid

d. None of the above

ANS: C REF: 381

7. The slight depression above each eyebrow is termed the:
- glabella.
 - supraorbital foramina.
 - supraorbital groove.
 - frontal tuberosity.

ANS: C REF: 378

8. Which of the following cranial bones does not articulate with the parietal bone?
- Frontal
 - Sphenoid
 - Occipital
 - All of the above articulate with the parietal bone.

ANS: D REF: 379

9. The left mastoid fontanel becomes the _____ in an adult.
- left asterion
 - left pterion
 - left bregma
 - squamosal suture

ANS: A REF: 383

10. There are a total of _____ fontanelles in an infant.
- four
 - two
 - six
 - eight

ANS: C REF: 383

11. The frontal bone articulates with _____ cranial bones.
- four
 - six
 - two
 - five

ANS: A REF: 378

12. Which of the following landmarks corresponds with the level of the petrous ridge?
- EAM
 - Top of ear attachment (TEA)
 - Squamosal suture
 - Inion

ANS: B REF: 380

13. The pituitary gland (hypophysis cerebri) is associated with and protected by the _____ bone.

- a. temporal
- b. ethmoid
- c. palatine
- d. sphenoid

ANS: D REF: 381

14. Which cranial bone contains the foramen ovale?
- a. Sphenoid
 - b. Occipital
 - c. Ethmoid
 - d. Temporal

ANS: A REF: 381

15. Which cranial bone contains the cribriform plate?
- a. Sphenoid
 - b. Occipital
 - c. Temporal
 - d. Ethmoid

ANS: D REF: 382

16. Which of the following sutures separates the parietal from the occipital bone?
- a. Squamosal
 - b. Sagittal
 - c. Coronal
 - d. Lambdoidal

ANS: D REF: 383

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17. Which of the following terms describes the anterior fontanel found in the adult skull?
- a. Bregma
 - b. Pterion
 - c. Asterion
 - d. Lambda

ANS: A REF: 383

18. Which of the following terms describes the small irregular bones occasionally found in the sutures?
- a. Asterion
 - b. Wormian
 - c. Sesamoid
 - d. Squamosal

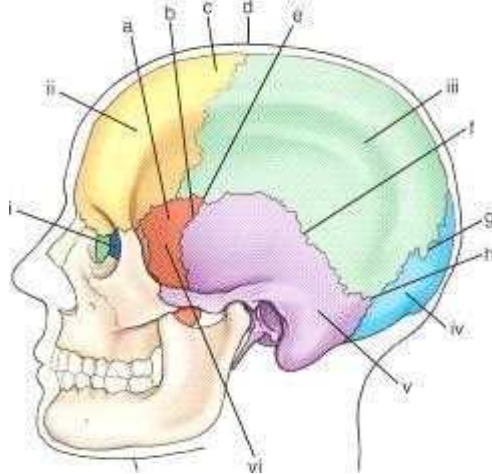
ANS: B REF: 383

19. The ethmoid notch is part of which cranial bone?
- a. Temporal
 - b. Ethmoid
 - c. Sphenoid
 - d. Frontal

ANS: D

REF: 378

20. Which cranial bone is labeled **vi** in this figure?



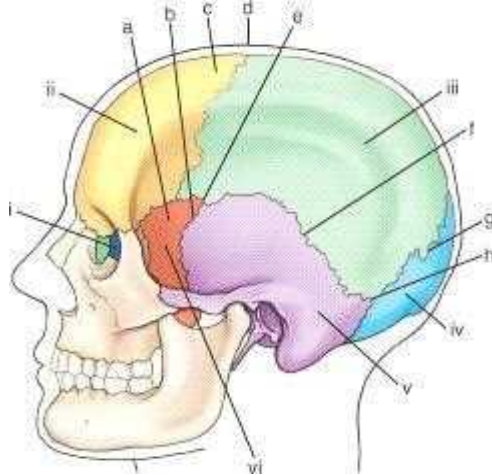
(Anatomic structures are labeled **i** through **vi** and sutures **a** through **h**.)

- a. Temporal
- b. Occipital
- c. Greater wing of sphenoid
- d. Parietal

ANS: C

REF: 377-380

21. Which bony structure is labeled **v**?



N^GT^B.C^OM

(Anatomic structures are labeled **i** through **vi** and sutures **a** through **h**.)

- a. EAM
- b. Mastoid process
- c. Styloid process
- d. Zygomatic process

ANS: B

REF: 377-380

22. The cranial bone labeled **i** is the:

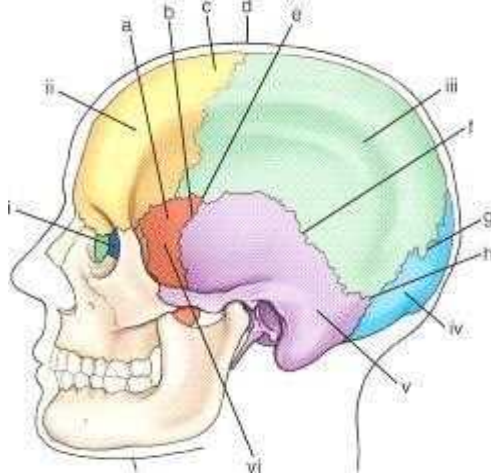
(Anatomic structures are labeled **i** through **vi** and sutures **a** through **h**.)

- a. sphenoid.
- b. lacrimal.
- c. ethmoid.
- d. palatine.

ANS: C

REF: 377-380

23. Which cranial suture is labeled **g**?



N^GT^B.C^OM

(Anatomic structures are labeled **i** through **vi** and sutures **a** through **h**.)

- a. Coronal
- b. Squamosal
- c. Lambdoidal
- d. Sagittal

ANS: C

REF: 377-380

24. The sutural point or area labeled **e** is the:

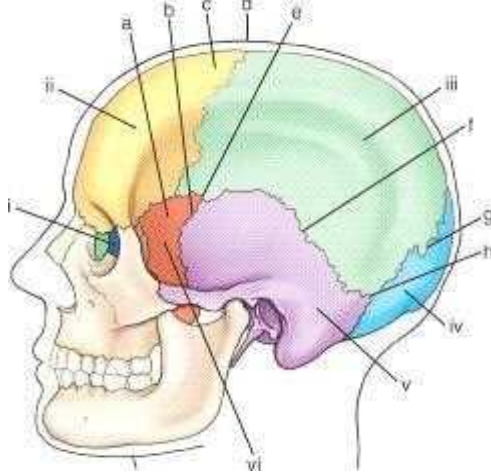
(Anatomic structures are labeled **i** through **vi** and sutures **a** through **h**.)

- a. lambda.
- b. asterion.
- c. bregma.
- d. pterion.

ANS: D

REF: 383

25. The sutural point or area labeled **d** is the:



N^GT^B.C^OM

(Anatomic structures are labeled **i** through **vi** and sutures **a** through **h**.)

- a. bregma.
- b. lambda.
- c. asterion.
- d. pterion.

ANS: A

REF: 383

26. The suture labeled **f** is the:

(Anatomic structures are labeled **i** through **vi** and sutures **a** through **h**.)

- a. asterion.
- b. lambdoidal.
- c. coronal.
- d. squamosal.

ANS: D

REF: 383

27. Which of the fontanelles is the last to close at about 18 months of age?

- a. Sphenoid
- b. Mastoid
- c. Anterior
- d. Posterior

ANS: C

REF: 383

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28. An average-shaped skull with a 47° angle between the petrous pyramids and the midsagittal plane is classified as:

- a. mesocephalic.
- b. brachycephalic.
- c. dolichocephalic.
- d. morphocephalic.

ANS: A

REF: 405

29. An axiolateral oblique projection (modified Law method) for the temporomandibular joints on a brachycephalic type of skull would require _____ rotation as compared with an average-shaped skull.

- a. more
- b. less
- c. the same
- d. Rotation depends on the patient's age.

ANS: B

REF: 405

30. Which term describes the small flap of cartilage covering the opening to the ear?

- a. Tragus
- b. Pinna
- c. Acanthion

d. EAM

ANS: A REF: 385

31. What is the difference, in degrees, between the infraorbitomeatal and orbitomeatal lines?
- 10°
 - 15° to 22°
 - 7° to 8°
 - 20° to 25°

ANS: C REF: 407

32. Which one of the following technical considerations is most critical for demonstrating air and/or fluid levels within the cranium?
- Low kV range
 - Detail image receptor (IR)
 - Short exposure time
 - Erect or horizontal x-ray beam positioning

ANS: D REF: 408

33. A radiograph of an anteroposterior (AP) axial projection of the cranium reveals that the dorsum sellae is projected below the foramen magnum, but the posterior arch of C1 is visible within the foramen. Which of the following positioning errors led to this radiographic outcome?
- Excessive central ray (CR) angulation
 - Insufficient CR angulation
 - Insufficient flexion of the head and neck
 - Tilt of the skull

ANS: A REF: 413

34. Which one of the following positioning errors most often results in a repeat exposure of a cranial position?
- Incorrect rotation and tilt
 - Incorrect central ray placement
 - Slight flexion
 - Slight extension

ANS: A REF: 409

35. A radiograph of a posteroanterior (PA) axial projection (Caldwell method) of the cranium reveals that the petrous ridges are located at the level of the lower one-third of the orbits. The technologist performed this projection with the CR angled 15° caudad to the orbitomeatal line (OML). How must positioning be altered if a repeat exposure is performed?
- Increase the extension of the skull.
 - Increase the flexion of the skull.
 - Increase the CR angulation.

ANS: D REF: 415

- d. None of the above; positioning was correct.

ANS: D

REF: 415

36. A radiograph of a submentovertex projection of the cranium reveals that the mandibular mentum are projected into the ethmoid sinuses. What must be altered during the repeat exposure to produce a more diagnostic radiograph?
- Increase the extension of the skull.
 - Increase the flexion of the skull.
 - Decrease the CR angulation.
 - None of the above; it is an acceptable image.

ANS: A

REF: 417

37. A radiograph of a lateral projection of the cranium reveals that the orbital roofs (plates) are not superimposed—one is slightly superior to the other. Which of the following positioning errors led to this radiographic outcome?
- Rotation
 - Tilt
 - Excessive flexion
 - Excessive extension

ANS: B

REF: 414

38. A radiograph of a lateral cranium reveals that the mentum of the mandible was cut off from the bottom of the radiograph. A 24 × 30-cm (10 × 12-inch) IR was used, and it was placed landscape. What must be altered if a repeat exposure is performed?
- Center the CR at the EAM.
 - Increase SID to reduce magnification.
 - Place the 24 × 30-cm (10 × 12-inch) IR lengthwise.
 - None of the above; all of the critical structures were demonstrated.

ANS: D

REF: 414

39. A patient comes to radiology for a routine study of the cranium. He is unable to flex his head and neck sufficiently to place the OML perpendicular to the IR for the AP axial projection. What should the technologist do to compensate for this problem without creating excessive magnification of the occipital bone?
- Use the inferior OML and increase the CR angulation by 7°.
 - Perform the Haas method.
 - Perform a submentovertex projection in place of the AP axial projection.
 - Use the AML and increase the CR angulation by 10°.

ANS: A

REF: 413

40. A patient enters the emergency department (ED) with a possible basilar skull fracture. Which of the following skull projections would best demonstrate any blood present in the sphenoid sinus?
- AP with a 15° cephalic angle
 - Haas method
 - Submentovertex
 - Horizontal beam lateral projection

ANS: D

REF: 414

41. A patient comes to radiology with a history of a possible erosion of the superior orbital fissures. Which of the following projections would best demonstrate this structure?
- PA axial with a 15° caudad angle to OML
 - Submentovertical
 - PA axial with a 25° to 30° caudad angle to OML
 - AP axial with a 37° caudad angle to OML

ANS: C

REF: 415

42. A patient comes to radiology with a possible bone cyst within the squamous portion of the frontal bone. Which of the following projections would best demonstrate this region with a minimal amount of distortion of the frontal bone?
- AP axial with a 30° caudad angle to OML
 - PA axial with a 30° caudad angle to OML
 - PA axial with a 15° caudad angle to OML
 - PA with no CR angulation to OML

ANS: D

REF: 416

43. A PA axial projection with a 25° caudad angle of the cranium reveals that the petrous ridges are at the level of the superior orbital margins. Which of the following modifications are required to correct this error?
- Decrease CR angle.
 - Increase extension of cranium.
 - Increase flexion of cranium.
 - No corrections are required; this is an acceptable position.

ANS: B

REF: 415

44. Which one of the following cranial projections will best demonstrate a possible basilar fracture?
- PA axial (Caldwell method)
 - Lateral recumbent
 - Horizontal beam lateral
 - AP axial (Towne method)

ANS: C

REF: 414

45. Which positioning line should be perpendicular to the plane of the IR for the AP axial (Towne) projection with a 37° caudad CR angle?
- OML
 - IOML
 - AML
 - LML

ANS: B

REF: 413

46. Which division of the temporal bone contains the organs of hearing and equilibrium?
- Petrous
 - Mastoid
 - Squamous
 - Antrum

ANS: A REF: 385

47. Which one of the following structures is part of the middle ear?
- Tragus
 - Cochlea
 - Tympanic cavity
 - Eustachian tube

ANS: C REF: 385

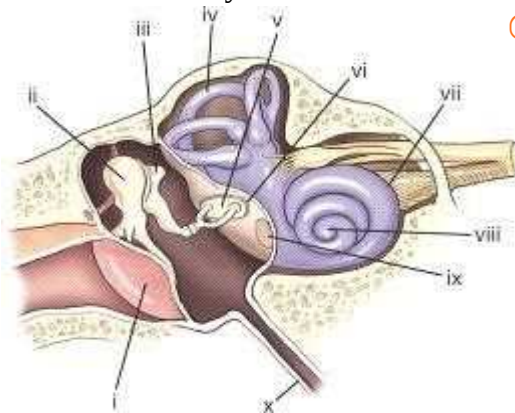
48. To which aspect of the ear does the eustachian tube attach?
- External ear
 - Middle ear
 - Inner ear
 - Cochlea

ANS: B REF: 386

49. The aditus is defined as a(n):
- large chamber containing the mastoid air cells.
 - thin plate of bone separating the mastoid air cells from the brain.
 - passageway for the auditory nerve.
 - opening between the epitympanic recess and the mastoid air cells.

ANS: D REF: 386

50. The incus auditory ossicle is labeled:

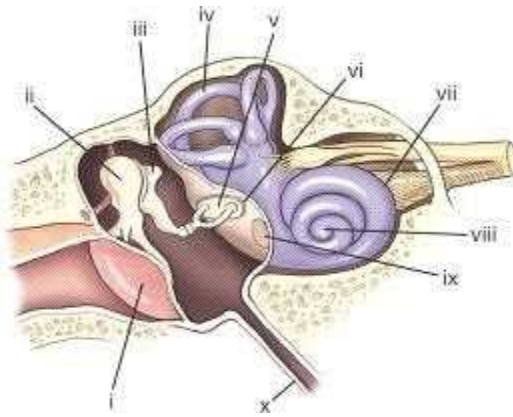


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- iii.
- i.
- iv.
- ii.
- vii.

ANS: A REF: 387

51. The oval window is labeled:

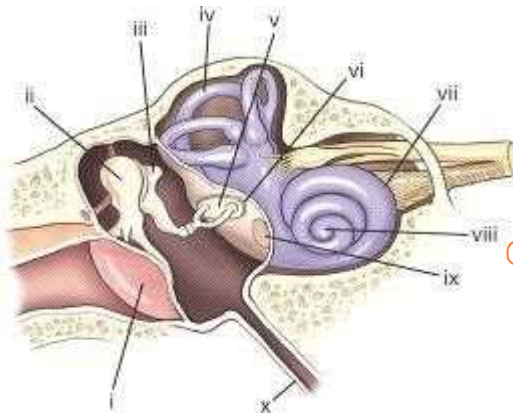


- a. vi.
- b. ix.
- c. vii.
- d. i.
- e. v.

ANS: A

REF: 387

52. The cochlea is labeled:



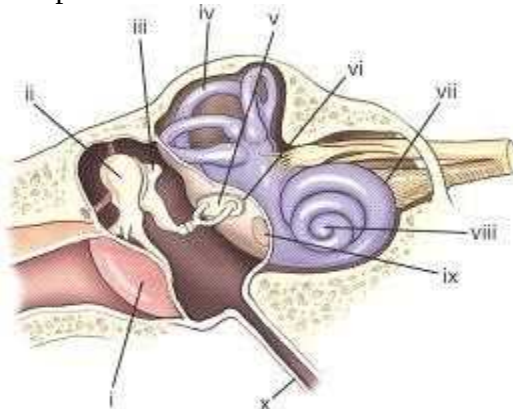
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- a. v.
- b. vii.
- c. viii.
- d. ix.

ANS: C

REF: 387

53. The part labeled **ii** is the:

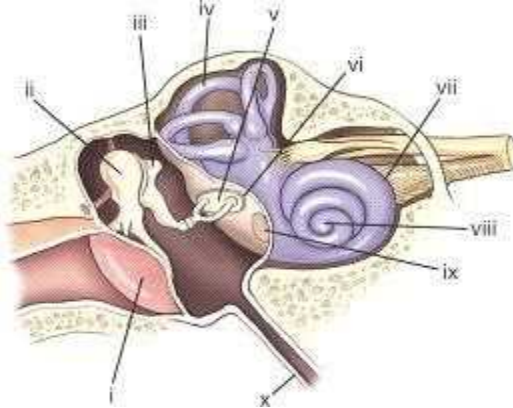


- a. stapes.
- b. incus.
- c. malleus.
- d. cochlea.

ANS: C

REF: 387

54. The part labeled **i** is the:

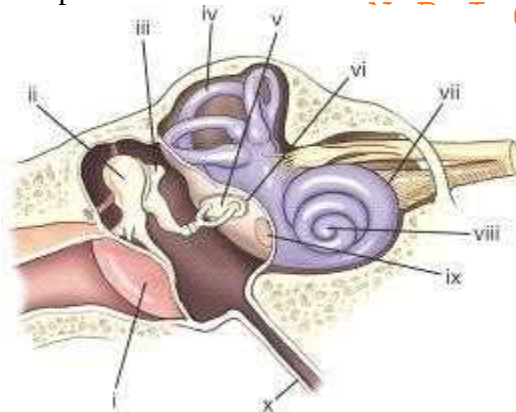


- a. external acoustic meatus.
- b. tegmen tympani.
- c. auditory tube.
- d. tympanic membrane.

ANS: D

REF: 387

55. The part labeled **x** is the:



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- a. eustachian tube.
- b. internal auditory canal.
- c. tympanic tube.
- d. internal auditory meatus.

ANS: A

REF: 387

56. The mastoid air cells communicate with the:

- a. inner ear.
- b. middle ear.
- c. external ear.
- d. base of the brain.

ANS: B REF: 386

57. Which of the following structures of the inner ear is responsible for hearing?
- Vestibule
 - Semicircular canals
 - Cochlea
 - Round window

ANS: C REF: 387

58. Where is the CR centered for a lateral projection of the cranium?
- EAM
 - Three-fourths inch (2 cm) anterior and three-fourths inch (2 cm) superior
 - Two inches (5 cm) superior to EAM
 - Midway between EAM and nasion

ANS: C REF: 414

59. Which cranial bone possesses the sella turcica?
- Temporal
 - Sphenoid
 - Ethmoid
 - Occipital

ANS: B REF: 381

60. Which cranial bone possesses the superior nasal conchae?
- Ethmoid
 - Sphenoid
 - Frontal
 - Temporal

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ANS: A REF: 382

61. Which cranial bone possesses the zygomatic process?
- Frontal
 - Sphenoid
 - Temporal
 - Ethmoid

ANS: C REF: 380

62. Which of the following modalities best demonstrates early signs of Paget's disease of the skull?
- CT
 - Nuclear medicine
 - MRI
 - Sonography

ANS: B REF: 402

63. A patient comes to radiology with a clinical history of an acoustic neuroma. Which of the following imaging modalities will provide the best assessment for this tumor?

- a. Radiography
- b. Ultrasound
- c. Nuclear medicine
- d. MRI

ANS: D REF: 402-403

64. A patient comes to radiology with acute mastoiditis. Which one of the following imaging modalities will best demonstrate possible bony destruction within the mastoid region?
- a. CT
 - b. Nuclear medicine
 - c. Ultrasound
 - d. PET

ANS: A REF: 402

65. A patient comes in with a clinical history of a possible pituitary adenoma. Because this is a rural hospital, CT and MRI are not available. Which radiographic projection or position would best demonstrate signs of bony erosion of the sella turcica because of the tumor?
- a. AP axial (Towne method)
 - b. PA axial (Caldwell method)
 - c. Lateral position
 - d. Both A and C

ANS: C REF: 403

66. What is the largest immovable bone of the face?
- a. Vomer
 - b. Mandible
 - c. Maxilla
 - d. Zygomatic

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ANS: C REF: 389

67. Which facial bone forms the majority of the hard palate?
- a. Mandible
 - b. Palatine
 - c. Maxilla
 - d. Zygomatic

ANS: C REF: 390

68. Which three cranial bones articulate directly with the zygomatic bone?
- a. Frontal, ethmoid, temporal
 - b. Frontal, sphenoid, temporal
 - c. Sphenoid, frontal, occipital
 - d. Ethmoid, parietal, frontal

ANS: B REF: 391

69. Which of the following terms describes the junction of the two nasal bones?
- a. Nasion
 - b. Acanthion

- c. Glabella
- d. Supraorbital groove

ANS: A REF: 391

70. Which of the following structures are described as scroll-like projections found in the nasal cavity?
- a. Perpendicular plate
 - b. Pterygoid processes
 - c. Septal cartilage
 - d. Conchae

ANS: D REF: 392

71. Which two bones form the bony nasal septum?
- a. Superior and inferior nasal conchae
 - b. Ethmoid and vomer
 - c. Vomer and maxilla
 - d. Sphenoid and ethmoid

ANS: B REF: 392

72. The upper and lower teeth are embedded in the:
- a. symphysis menti.
 - b. condyloid processes.
 - c. palatine processes.
 - d. alveolar processes.

ANS: D REF: 393

73. The point of union between both halves of the mandible is termed:
- a. gonion.
 - b. ramus.
 - c. symphysis menti.
 - d. mental foramina.

ANS: C REF: 393

74. What primary type of joint movement occurs with the temporomandibular joint?
- a. Plane
 - b. Gomphosis
 - c. Spheroidal
 - d. Bicondylar

ANS: D REF: 394

75. What is the classification of the joint found between the teeth and maxilla?
- a. Synovial
 - b. Fibrous
 - c. Cartilaginous
 - d. Synarthrodial

ANS: B REF: 394

76. The posterior aspect of the orbit is termed the:

- a. apex.
- b. base.
- c. sphenoid strut.
- d. crown.

ANS: A

REF: 398

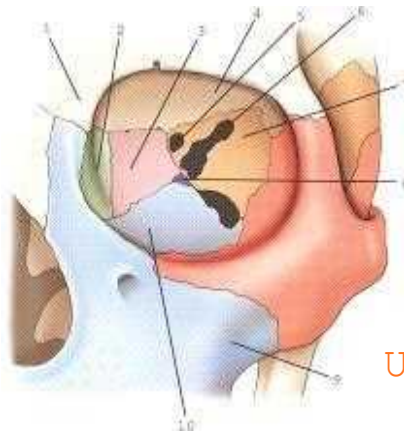
77. How many facial bones help make up the bony orbit?

- a. Three
- b. Four
- c. Five
- d. Seven

ANS: B

REF: 398

78. The bone labeled 2 is the:



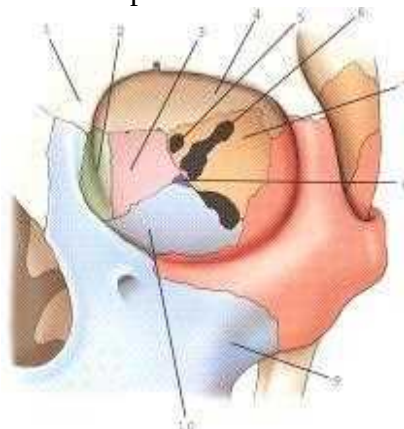
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- a. lacrimal.
- b. maxilla.
- c. ethmoid.
- d. palatine.

ANS: A

REF: 398-399

79. Part 10 is part of which bone?



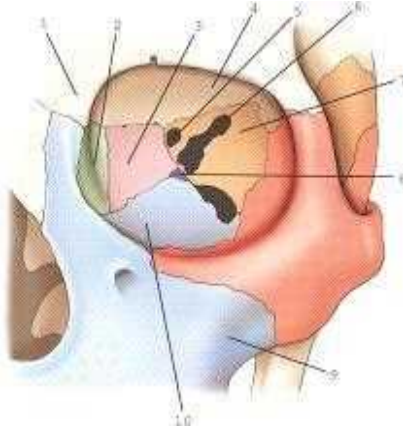
- a. Maxilla
- b. Sphenoid

- c. Zygomatic
- d. Ethmoid

ANS: A

REF: 398-399

80. Part 7 is part of which bone?

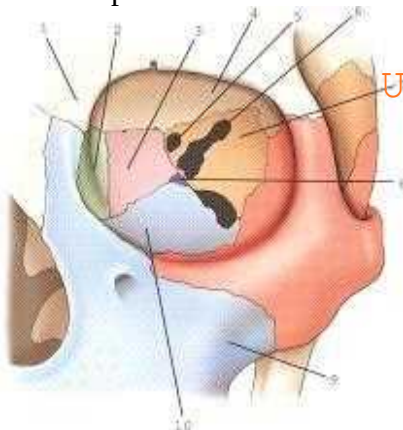


- a. Ethmoid
- b. Lacrimal
- c. Zygomatic
- d. Sphenoid

ANS: D

REF: 398-399

81. Part 3 is part of which bone?

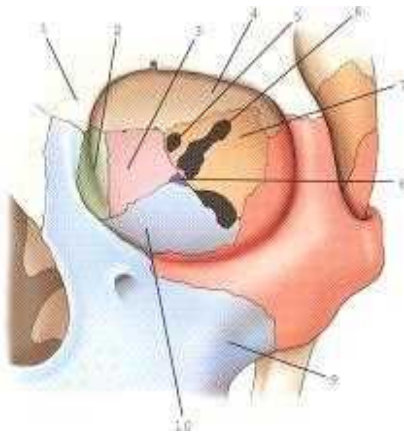


- a. Palatine
- b. Sphenoid
- c. Lacrimal
- d. Ethmoid

ANS: D

REF: 398-399

82. Part 6 is which of the following?

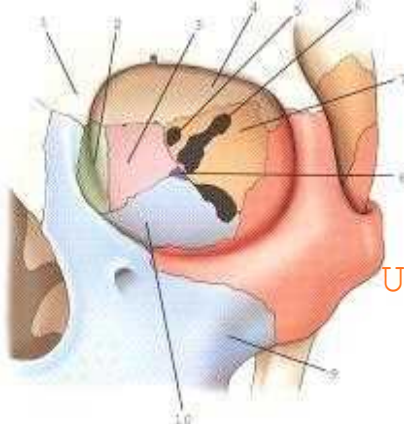


- a. Inferior orbital fissure
- b. Optic foramina
- c. Superior orbital fissure
- d. Lacrimal duct

ANS: C

REF: 398-399

83. Part **9** is part of which bone?

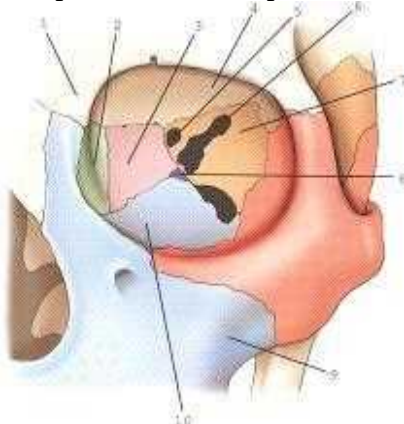


- a. Zygomatic
- b. Maxilla
- c. Sphenoid
- d. Ethmoid

ANS: B

REF: 398-399

84. The part labeled **8** is part of which bone?



- a. Palatine
- b. Sphenoid
- c. Ethmoid
- d. Zygomatic

ANS: A REF: 398-399

85. What is the only paranasal sinus not contained within a cranial bone?
- a. Maxillary
 - b. Sphenoid
 - c. Ethmoid
 - d. Frontal

ANS: A REF: 395

86. The term *antrum of Highmore* is an older term for the:
- a. frontal sinuses.
 - b. ethmoid sinuses.
 - c. maxillary sinuses.
 - d. nasal cavity.

ANS: C REF: 395

87. Which sinus often produces an air/fluid level indicating a basilar skull fracture?
- a. Ethmoid
 - b. Maxillary
 - c. Sphenoid
 - d. Frontal

ANS: C REF: 396

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88. Where are the ethmoid sinuses located within the ethmoid bone?
- a. Perpendicular plate
 - b. Pterygoid processes
 - c. Cribriform plate
 - d. Lateral masses

ANS: D REF: 396

89. The ____ passageway drains the maxillary sinus into the middle nasal conchae.
- a. ethmoid bulla
 - b. infundibulum
 - c. uncinate process
 - d. inferior nasal concha

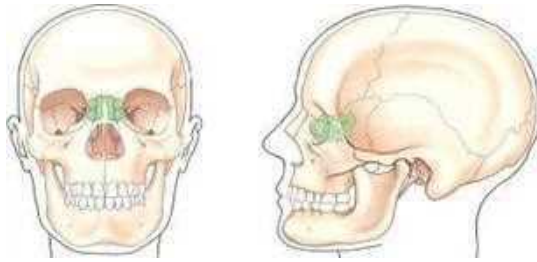
ANS: B REF: 396

90. The ____ sinuses develop last and are not fully developed until the teenage years.
- a. ethmoid
 - b. sphenoid
 - c. nasal
 - d. maxillary

ANS: A

REF: 395

91. Which group of sinuses is shaded (screened) in the frontal and lateral views of the illustration below?



- a. Maxillary
- b. Sphenoid
- c. Ethmoid
- d. Frontal

ANS: C

REF: 395

92. Which bone is involved with a tripod fracture?

- a. Maxilla
- b. Ethmoid
- c. Temporal
- d. Zygomatic

ANS: D

REF: 404

93. A fracture involving the facial bones where a blow to one side causes a fracture to the opposite side is termed a _____ fracture.

- a. tripod
- b. blow-out
- c. Le Fort
- d. contrecoup

ANS: D

REF: 404

94. Which of the following imaging modalities is utilized to determine the degree of skeletal metastases especially in the cranium?

- a. CT
- b. MRI
- c. Nuclear medicine
- d. Radiography

ANS: C

REF: 412

95. Where is the CR centered for a lateral projection of the facial bones?

- a. Outer canthus
- b. Acanthion
- c. Midway between the glabella and the EAM

ANS: D

REF: 419

- d. Zygoma, midway between the EAM and the outer canthus

ANS: D

REF: 419

96. What is the angle between the OML and the plane of the IR for the parietoacanthial (Waters) projection?
- a. 40°
 - b. 37°
 - c. 42°
 - d. 15° to 20°

ANS: B

REF: 420

97. Where does the CR exit for a modified parietoacanthial (modified Waters) projection of the facial bones?
- a. Nasion
 - b. Glabella
 - c. Acanthion
 - d. Midorbits

ANS: C

REF: 422

98. Which of the following technical factors do NOT apply to lateral nasal bone projections?
- a. The technologist should not use automatic exposure control (AEC).
 - b. The technologist should use a small focal spot.
 - c. The technologist should use low to medium kV.
 - d. All of the above apply.

ANS: D

REF: 423

99. Which positioning line is placed perpendicular to the plane of the IR with a true lateral nasal bone projection?

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- a. OML
- b. AML
- c. Interpupillary
- d. Midsagittal

ANS: C

REF: 423

100. Which of the following projections will best demonstrate deviation of the bony nasal septum?
- a. Parietoacanthial
 - b. Lateral nasal bone
 - c. AP axial projection
 - d. Lateral facial bone

ANS: A

REF: 420

101. The CR must be placed parallel to the _____ positioning line for the superoinferior tangential (axial) projection of nasal bones.
- a. glabellomeatal
 - b. mentomeatal
 - c. lips-meatal
 - d. glabelloalveolar

ANS: D

REF: 424

102. How much skull tilt and rotation are required for the oblique inferosuperior (tangential) projection for zygomatic arches?
- 10°
 - 15°
 - 25°
 - None

ANS: B

REF: 426

103. What can the technologist do if the patient cannot extend the head and neck adequately for the routine submentovertical projection of the zygomatic arches?
- Perform the Haas method.
 - Use a short SID to magnify the arches.
 - Angle the CR to place it perpendicular to the IOML.
 - Rotate the skull 15° away from the affected side.

ANS: C

REF: 425

104. Which positioning line is parallel to the IR for the oblique inferosuperior (tangential) projection of the zygomatic arches?
- Midsagittal plane
 - Infraorbitomeatal
 - Orbitomeatal
 - Glabelloalveolar

ANS: B

REF: 426

105. Which of the following points is NOT true about the oblique inferosuperior (tangential) projection of the zygomatic arches?
- It requires both rotation and tilt of the skull.
 - A small focal spot should be used.
 - The AEC should not be used.
 - A grid must be used.

ANS: D

REF: 426

106. How much difference is there between the OML and IOML positioning lines?
- 7° to 8°
 - 8° to 9°
 - 10° to 11°
 - 5° to 6°

ANS: A

REF: 407

107. Which projection best demonstrates the floor of the orbits with minimal distortion?
- Parietoacanthial (Waters)
 - Modified parietoacanthial (modified Waters)
 - PA axial (Caldwell)
 - Lateral facial bones

ANS: B

REF: 422

108. Which positioning line must be used with a 30° caudad angle for an AP axial projection of zygomatic arches?
- IOML
 - AML
 - OML
 - GAL

ANS: C

REF: 427

109. What is the angle between the midsagittal plane and the IR for a parieto-orbital oblique projection of the optic foramen?
- 45°
 - 12°
 - 30°
 - 53°

ANS: D

REF: 428

110. Which positioning line is placed perpendicular to the IR for the parieto-orbital oblique projection of the optic foramina?
- OML
 - AML
 - MML
 - IOML

ANS: B

REF: 429

111. What is the maximum CR angulation used for the axiolateral/axiolateral oblique projection of the mandible?
- 10° to 15°
 - 25°
 - 30°
 - 45°

ANS: B

REF: 429

112. How much skull rotation (from a lateral position) is required to place the ramus parallel to the IR for the axiolateral/axiolateral oblique projection of the mandible?
- None. The skull should be kept in a lateral position.
 - 30°
 - 45°
 - 53°

ANS: A

REF: 429

113. Why is the chin extended for an axiolateral/axiolateral oblique projection of the mandible?
- To open up the TMJ
 - To profile the condylar process
 - To prevent superimposition upon the cervical spine
 - To better visualize the mentum

ANS: C

REF: 429

114. Where does the CR exit for the optional PA axial projection of the mandible?
- Junction of the lips
 - Nasion
 - Mentum
 - Acanthion

ANS: D REF: 430

115. Which positioning line is perpendicular to the IR for a PA projection of the mandible?
- OML
 - AML
 - IOML
 - GAL

ANS: A REF: 430

116. Which aspect of the mandible is best demonstrated with an AP axial projection?
- Body
 - Mentum
 - Ramus
 - Condylod process

ANS: D REF: 431

117. Where is the CR centered for an AP axial (Towne method) projection for the mandible?
- At the nasion
 - 2 inches (5 cm) superior to glabella
 - 1 inch (2.5 cm) superior to glabella
 - At the mentum

ANS: C REF: 431

118. Which of the following projections will best demonstrate the entire mandible with one exposure?
- AP axial
 - Submentovertical
 - Axiolateral oblique
 - Tomography

ANS: B REF: 432

119. What CR angle is required for the AP axial projection for the temporomandibular joints (TMJs) with the IOML perpendicular to the image receptor?
- 30°
 - 37°
 - 25°
 - 42°

ANS: D REF: 434

120. The axiolateral oblique projection (modified Law method) for TMJs requires a _____ rotation of the skull and a _____ caudad angle of the CR.
- 15°; 15°

- b. 10°; 15°
- c. 5°; 0°
- d. 0°; 25° to 30°

ANS: A REF: 435

121. What is the position of the skull for an axiolateral projection (Schuller method) of the TMJ?
- a. Midsagittal plane at a 53° angle to the image receptor
 - b. Skull rotated 15° toward the IR from the lateral position
 - c. True lateral position
 - d. OML is at a 37° angle to the image receptor

ANS: C REF: 436

122. What CR angle is required for the axiolateral (Schuller method) projection of the TMJs?
- a. None. The CR should be perpendicular to the film.
 - b. 25° to 30° caudad
 - c. 15° caudad
 - d. 20° to 25° cephalad

ANS: B REF: 436

123. Where should the optic foramen be located with a well-positioned parieto-orbital oblique projection of the optic foramina?
- a. Inner, lower quadrant of orbit
 - b. Center of orbit
 - c. Lower, outer quadrant of orbit
 - d. Inner, upper quadrant of orbit

ANS: C REF: 428

124. Along with the use of erect positions, what other technical factor is important to demonstrate air/fluid levels in paranasal sinuses?
- a. Use of high kV
 - b. Horizontal x-ray beam
 - c. Use of IR without a grid
 - d. Large focal spot

ANS: B REF: 408

125. Where is the CR centered for a lateral projection of the sinuses?
- a. Upside EAM (side away from image receptor)
 - b. At the level of the nasion
 - c. Midway between the acanthion and the EAM
 - d. Midway between the outer canthus and the EAM

ANS: D REF: 437

126. Which sinuses are best demonstrated with the PA projection?
- a. Maxillary and sphenoid
 - b. Frontal and ethmoid
 - c. Sphenoid and ethmoid
 - d. Frontal and maxillary

ANS: B REF: 438

127. Which sinuses are best demonstrated with a parietoacanthial projection?

- a. Maxillary
- b. Frontal and maxillary
- c. Frontal, maxillary, and ethmoid
- d. Sphenoid and maxillary

ANS: A REF: 439

128. Which plane or perspective is most often produced for a CT scan of the sinuses?

- a. Sagittal
- b. Transverse
- c. Coronal
- d. Axial oblique

ANS: C REF: 411

129. Which sinus is projected through the oral cavity with a parietoacanthial transoral projection?

- a. Ethmoid
- b. Maxillary
- c. Sphenoid
- d. Frontal

ANS: C REF: 441

130. A radiograph of a lateral projection of the facial bones reveals that the mandibular rami are not superimposed. What specific positioning error is present on this radiograph?

- a. Tilt
- b. Excessive flexion
- c. Excessive extension
- d. Rotation

ANS: D REF: 419

131. The recommended digital systems kV range for the superoinferior tangential (axial) projection of the nasal bones is:

- a. 40 to 50.
- b. 50 to 60.
- c. 70 to 80.
- d. 75 to 85.

ANS: C REF: 424

132. How much skull rotation, from a lateral position, is recommended to best demonstrate the body of the mandible for an axiolateral/axiolateral oblique projection?

- a. None. Keep skull in true lateral position.
- b. 10 to 15° toward the IR
- c. 30° toward the IR
- d. 45° toward the IR

ANS: C REF: 429

133. A radiograph of a parietoacanthial (Waters method) projection reveals that the petrous ridges are superimposed over the lower 30% of the maxillary sinuses. What specific positioning error (if any) led to this radiographic finding?
- a. Insufficient extension of skull and neck
 - b. Excessive extension of skull and neck
 - c. Excessive CR angulation
 - d. No error exists; accept the initial radiograph.

ANS: A REF: 422

134. A radiograph of a PA Caldwell (15° caudad) projection for cranium reveals that the petrous ridges are projected into the lower one-third of the orbits. Which of the following modifications should be made during the repeat exposure to produce a more diagnostic image?
- a. Increase the extension of the head and neck.
 - b. Decrease the extension of the head and neck.
 - c. Nothing; accept the initial radiograph.
 - d. Angle the CR 10° caudad.

ANS: C REF: 415

135. A radiograph of a parieto-orbital oblique projection for the optic foramen reveals that the optic foramen is projected into the maxillary sinus. Which of the following modifications is necessary to produce a more diagnostic image?
- a. Decrease the extension of the head and neck.
 - b. Increase the extension of the head and neck.
 - c. Increase the CR angulation.
 - d. Decrease the CR angulation.

ANS: A REF: 428

136. A radiograph of an axiolateral oblique projection of the mandible reveals that the mandibular body is greatly foreshortened. Which of the following modifications is necessary to produce a more diagnostic image?
- a. Increase the rotation of skull toward the image receptor.
 - b. Decrease the rotation of skull toward the image receptor.
 - c. Decrease the CR angulation.
 - d. Increase the CR angulation.

ANS: A REF: 429

137. A patient enters the ED with facial bone injuries. The physician is concerned about a possible blow-out fracture of the left orbit. Which one of the following projections would best diagnose this injury?
- a. Parietoacanthial (Waters method) projection
 - b. Submentovertical projection
 - c. Superoinferior (tangential) projection
 - d. Modified parietoacanthial (modified Waters) projection

ANS: D REF: 422

138. A patient enters the ED with a possible nasal bone fracture. The physician is concerned about a possible bony nasal septum deviation and fractured nasal bones. Which of the following routines would best diagnose these injuries?
- Fifteen-degree PA Caldwell and lateral facial bone projections
 - Parietoacanthial, lateral nasal bone, and superoinferior (axial) projections
 - Modified parietoacanthial and lateral nasal bone projections
 - Modified parietoacanthial, submentovertex, and oblique-axial projections

ANS: B

REF: 420 | 423-424

139. A patient enters the ED with a possible fracture of the right zygomatic arch. Which of the following routines would best diagnose a possible fracture of this structure?
- Submentovertical, parietoacanthial, and bilateral tangential superoinferior projections
 - Parietoacanthial, parieto-orbital, and lateral facial bone projections
 - Modified parietoacanthial, 15° PA Caldwell, and lateral facial bone projections
 - Submentovertical, oblique inferosuperior (tangential), and AP axial (Towne method) projections

ANS: D

REF: 425-427

140. A patient enters the ED with a possible fracture of the proximal ramus of the mandible. Which of the following routines would best diagnose this fracture?
- Parietoacanthial projection, axiolateral oblique projection with a 30° skull rotation toward IR, and lateral facial bone projection
 - PA mandible projection, axiolateral oblique projection with a 45° skull rotation toward IR, and 35° AP axial projection
 - PA axial mandible projection, axiolateral projection with no skull rotation, and a 35° AP axial projection
 - PA mandible projection, axiolateral oblique projection with a 45° skull rotation toward IR, and submentovertex projection

ANS: C

REF: 429-431

141. A radiograph of a PA projection of the sinuses reveals that the petrous ridges are projected over the ethmoid sinuses. Which of the following modifications will eliminate this superimposition while not compromising diagnostic quality of the study?
- Increase extension of the head and neck slightly.
 - Angle the CR 5° to 10° caudad.
 - Increase flexion of the head and neck slightly.
 - Have the patient open his mouth.

ANS: A

REF: 438

142. A radiograph of a parietoacanthial (Waters) projection for sinuses reveals that the petrous pyramids are projected over the maxillary sinuses. What positioning error is present on this radiograph?
- Excessive flexion of head and neck
 - Excessive extension of head and neck
 - Excessive CR angulation
 - Rotation of the head

ANS: A REF: 439

143. A radiograph of a submentovertical projection reveals that the mandible is superimposed over the ethmoid and sphenoid sinuses. Which of the following modifications will eliminate this problem?
- Perform the projection with the patient supine.
 - Perform the axiolateral oblique instead of the submentovertical projection.
 - Increase the flexion of the head and neck.
 - Increase the extension of the head and neck.

ANS: D REF: 440

144. A radiograph of a parietoacanthial transoral (open-mouth Waters) projection reveals that the mouth is open but the sphenoid sinus is superimposed over the maxilla and upper teeth. What positioning error led to this radiographic outcome?
- Insufficient flexion of the head and neck
 - Excessive CR angulation
 - Insufficient CR angulation
 - Insufficient extension of the head and neck

ANS: D REF: 441

145. A patient comes to radiology for a sinus series on a cart (gurney). She is unable to stand or sit erect for any of the projections. Which of the following projections will best detect any air/fluid levels present in the maxillary sinuses?
- PA
 - Parietoacanthial
 - Parietoacanthial transoral NURSINGTB.COM
 - Horizontal beam lateral

ANS: D REF: 408

146. A patient comes to radiology for a sinus series. She cannot fully extend her head and neck for the submentovertical projection. What else can the technologist do to produce a diagnostic submentovertical projection?
- Angle the CR to place it perpendicular to the OML.
 - Angle the CR to place it perpendicular to IOML.
 - Perform the projection with the patient recumbent.
 - Place sandbags on the forehead to extend the skull.

ANS: B REF: 440

147. The pathway of communication between the frontal, maxillary, and ethmoid sinuses that provides drainage between them is termed:
- paranasal meatus.
 - osteomeatal complex.
 - labyrinths.
 - lateral chambers.

ANS: B REF: 395

148. The most common radiographic sign for secondary osteomyelitis of the paranasal sinuses is:

- a. polyps.
- b. mucosal thickening.
- c. deviation of the bony nasal septum.
- d. erosion of the bony margins.

ANS: D REF: 404

149. A pediatric patient enters radiology for a paranasal sinus series. Because of her age, the child is unable to hold still for the projections even with the use of immobilization devices. The decision is to hold the child during each exposure. Which of the following individuals should be asked to hold the child?
- a. Technologist
 - b. Referring physician
 - c. Guardian
 - d. Student

ANS: C REF: 411

150. Which of the following structures passes through the superior orbital fissure?
- a. Optic nerve
 - b. Olfactory nerve
 - c. Cranial nerves III to VI
 - d. Maxillary branch of the fifth cranial nerve

ANS: C REF: 399

MATCHING

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Select the imaging modality that would best demonstrate the following pathologies.

- a. Nuclear medicine
 - b. MRI
 - c. CT
 - d. Ultrasound
 - e. Conventional radiography
1. Paget's disease
 2. Craniosynostosis (premature suture closing in neonate skull)
 3. Hydrocephalus (in neonate)
 4. Early detection of metastases
 5. Recent bleeding within the brain
 6. Intracranial hemorrhage in premature infants
 7. Most sensitive modality for detecting differences between normal and abnormal brain tissues

- | | |
|-----------|--------------|
| 1. ANS: E | REF: 402-403 |
| 2. ANS: D | REF: 402-403 |
| 3. ANS: D | REF: 402-403 |
| 4. ANS: A | REF: 402-403 |
| 5. ANS: C | REF: 402-403 |
| 6. ANS: D | REF: 402-403 |
| 7. ANS: B | REF: 412 |

Match each of the following radiographic appearances with the corresponding pathologic indication. (Use each selection only once.)

- a. Multiple myeloma
 - b. Paget's disease
 - c. Metastases
 - d. Pituitary adenoma
8. Distinctive lesions with moth-eaten appearance, a combination of increased density and destructive irregular border lesions
 9. Enlarged sella turcica
 10. Radiolucent areas within the bony cranium
 11. Destructive stage of bony areas demonstrated by areas of radiolucency followed by reparative stages of sclerotic (radiodense) regions resulting in a "cotton-wool" appearance
-
8. ANS: C REF: 402-403
 9. ANS: D REF: 402-403
 10. ANS: A REF: 402-403
 11. ANS: B REF: 402-403

Match each radiographic appearance with the corresponding pathologic indication. (Use each selection only once.)

- a. Otosclerosis
 - b. Acoustic neuroma
 - c. Cholesteatoma
 - d. Mastoiditis
12. Bone destruction most commonly involving middle ear
 13. Increased densities replace mastoid air cells
 14. Bone destruction with widened internal auditory canal
 15. Excessive bone formation generally involving both the middle and inner ear
-
12. ANS: C REF: 404
 13. ANS: D REF: 404
 14. ANS: B REF: 404
 15. ANS: A REF: 404

TRUE/FALSE

1. Lesions of decreased density are termed osteoblastic lesions.

ANS: F REF: 402
2. Both CT (computed tomography) and MRI (magnetic resonance imaging) can provide reconstructed images in three planes: axial, sagittal, and coronal.

ANS: T REF: 411-412
3. The PA axial projection (Haas method) for the cranium requires a CR angle of 25° caudad.

ANS: F REF: 418

4. The submentovertical projection requires that the infraorbital meatal line (IOML) is placed parallel to the image receptor.

ANS: T REF: 417

5. The osseous labyrinth includes the cochlea, the vestibule, and the semicircular canals.

ANS: T REF: 387

6. The sensory apparatus of both equilibrium and hearing are contained in the internal ear.

ANS: T REF: 387

7. The vestibule is located in the middle ear.

ANS: F REF: 387

8. All of the sinuses intercommunicate with each other and with the nasal cavity.

ANS: T REF: 395

9. Infections involving the upper teeth may involve the frontal sinuses.

ANS: F REF: 395

10. The lateral projection of the facial bones is typically a unilateral projection.

ANS: T REF: 419 NURSINGTB.COM

11. For a lateral facial bone projection, the chin should be adjusted so the IOML is perpendicular to the front edge of the IR.

ANS: T REF: 419

12. The modified parietoacanthial (modified Waters) projection requires more extension of the head and neck as compared with the parietoacanthial (Waters) projection.

ANS: F REF: 422

13. The 15° PA axial (Caldwell) projection for facial bones produces an unobstructed view of the maxilla.

ANS: F REF: 421

14. The lateral projection for the nasal bones is generally a unilateral projection. (Both right and left lateral projections are usually not required.)

ANS: F REF: 423

15. The proper name for the parieto-orbital oblique projection is the Schuller method.

ANS: F

REF: 429

16. Optic foramen studies are routinely taken as bilateral projections.

ANS: T

REF: 429

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Chapter 12: Biliary Tract and Upper Gastrointestinal System

Test Bank

MULTIPLE CHOICE

1. The liver is located primarily in the _____ of the abdomen.
- a. LLQ
 - b. RLQ
 - c. RUQ
 - d. LUQ

ANS: C

REF: 446

2. The liver is divided into _____ major and minor lobes.
- a. three
 - b. four
 - c. two
 - d. six

ANS: B

REF: 446

3. The liver secretes approximately _____ mL of bile per day.
- a. 100 to 250
 - b. 500 to 700
 - c. 800 to 1000
 - d. 1200 to 1500

ANS: C

REF: 446

4. The liver performs more than 100 different functions.
- a. True
 - b. False

ANS: A

REF: 446

5. The main function of bile is to:
- a. break down cholesterol.
 - b. emulsify fats.
 - c. begin the digestion of proteins.
 - d. begin the digestion of complex sugars.

ANS: B

REF: 446

6. Which aspect of the gallbladder is located most posterior within the abdomen?
- a. Fundus
 - b. Body
 - c. Neck
 - d. Apex

ANS: C

REF: 447

7. The average adult gallbladder is _____ cm long and _____ cm wide.

- a. 7 to 10; 3
- b. 4 to 6; 2
- c. 12 to 15; 5 to 6
- d. 2 to 3; 1

ANS: A REF: 447

8. What is the primary purpose of the membranous folds located within the cystic duct?
- a. Produces cholecystokinin
 - b. Prevents gallstones from entering the gallbladder
 - c. Provides blood supply to the gallbladder
 - d. Prevents distention or collapse of the cystic duct

ANS: D REF: 447

9. Where is bile formed?
- a. Gallbladder
 - b. Duodenal mucosa
 - c. Liver
 - d. Pancreas

ANS: C REF: 447

10. Which of the following functions are performed by the gallbladder?
- a. Storage of bile
 - b. Concentration of bile
 - c. Contraction and release of bile
 - d. All of the above

ANS: D REF: 447

11. What is a primary function of cholecystokinin?
- a. Serves as an enzyme to break down certain food nutrients
 - b. Stimulates the production of bile
 - c. Stimulates the gallbladder to contract
 - d. Inhibits the formation of gallstones

ANS: C REF: 447

12. Where is cholecystokinin produced?
- a. Duodenal mucosa
 - b. Liver
 - c. Gallbladder
 - d. Pancreas

ANS: A REF: 447

13. What is an older term for the pancreatic duct?
- a. Duct of Wirsung
 - b. Hepatopancreatic duct
 - c. Duct of Langerhans
 - d. Ampulla of Vater

ANS: A

REF: 447

14. In 80% of all individuals, the common bile duct and the pancreatic duct unite before entering the duodenum.
- a. True
 - b. False

ANS: B

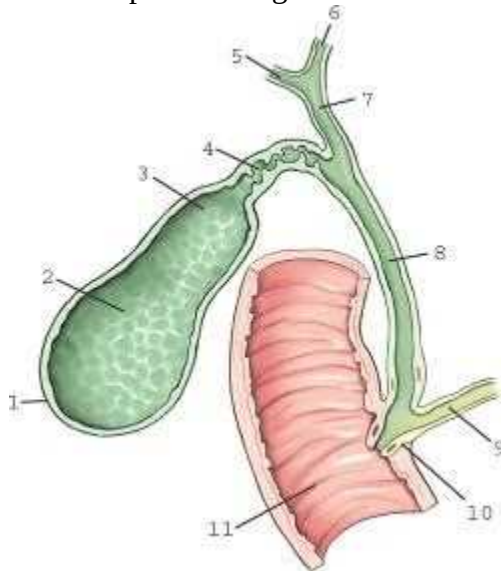
REF: 447

15. What is an older term for the hepatopancreatic sphincter?
- a. Duodenal papilla
 - b. Sphincter of Vater
 - c. Duodenal sphincter
 - d. Sphincter of Oddi

ANS: D

REF: 447

16. Which aspect of the gallbladder is labeled 1?

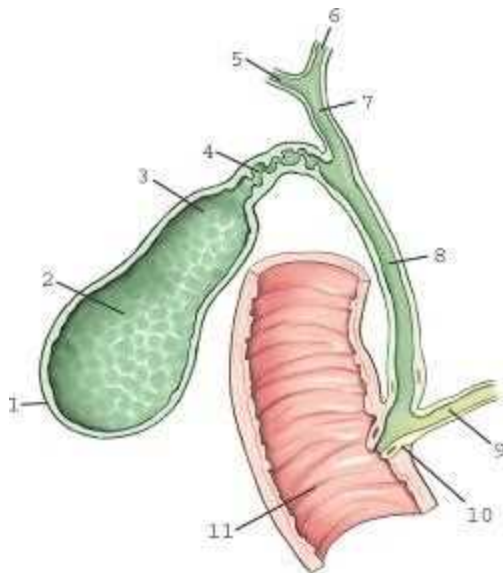


- a. Neck
- b. Fundus
- c. Body
- d. Apex

ANS: B

REF: 447

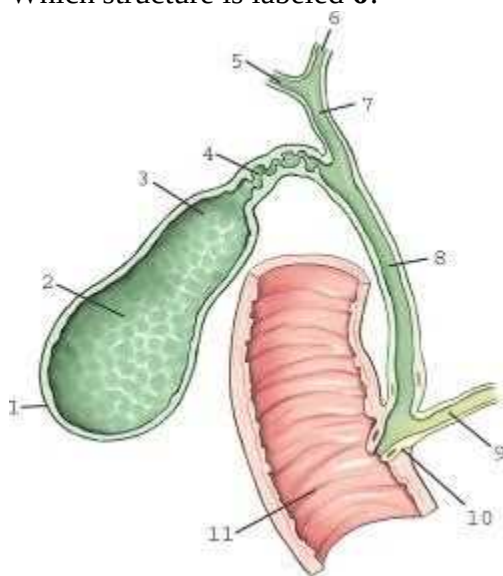
17. Which biliary structure is labeled 4?



- a. Cystic duct
- b. Common bile duct
- c. Common hepatic duct
- d. Right hepatic duct

ANS: A REF: 447

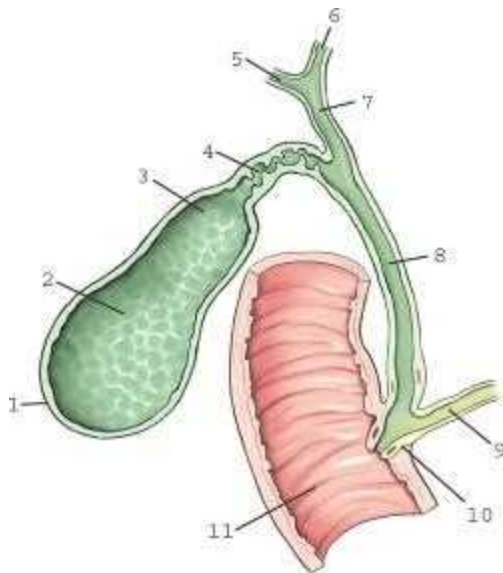
18. Which structure is labeled **6**?



- a. Cystic duct
- b. Pancreatic duct
- c. Right hepatic duct
- d. Left hepatic duct

ANS: D REF: 447

19. Which structure is labeled **9**?

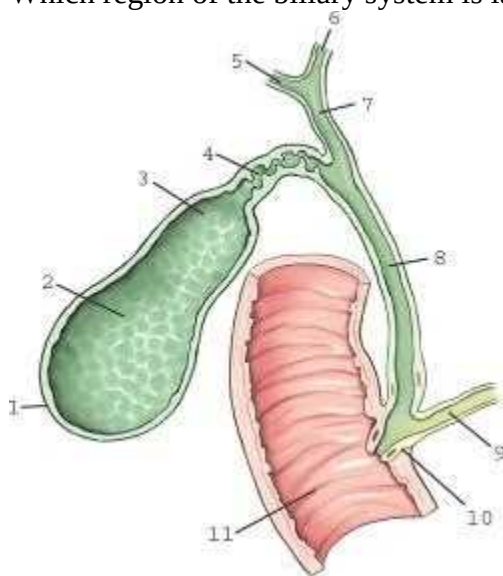


- a. Pancreatic duct
- b. Common bile duct
- c. Cystic duct
- d. Common hepatic duct

ANS: A

REF: 447

20. Which region of the biliary system is labeled **10**?



- a. Duct of Vater
- b. Hepatopancreatic ampulla
- c. Duct of Wirsung
- d. Hepatopancreatic sphincter

ANS: B

REF: 447

21. "Chole-" is a prefix for terms pertaining to the:

- a. gallbladder.
- b. ducts.
- c. bile.

d. liver.

ANS: C

REF: 448

22. Radiographic examination of the biliary ducts only is termed:

- a. cholecystography.
- b. cholangiography.
- c. cholelithiasis.
- d. cholecystocholangiography.

ANS: B

REF: 449

23. Which of the following structures is not considered to be an accessory organ of digestion?

- a. Liver
- b. Pancreas
- c. Salivary glands
- d. Kidneys

ANS: D

REF: 450

24. Saliva contains certain enzymes to begin the digestion of:

- a. starch.
- b. minerals.
- c. proteins.
- d. lipids.

ANS: A

REF: 451

25. The act of swallowing is termed:

- a. mastication.
- b. digestion.
- c. deglutition.
- d. aphasia.

ANS: C

REF: 451

26. Which of the following structures is not one of the salivary glands?

- a. Parotid
- b. Sublingual
- c. Submandibular
- d. All of the above are salivary glands.

ANS: D

REF: 451

27. The esophagus is located_____to the larynx.

- a. anterior
- b. posterior
- c. inferior
- d. proximal

ANS: B

REF: 451

28. The aortic arch and the _____ create a normal indentation seen along the lateral border of the esophagus.
- a. pulmonary artery
 - b. left primary bronchus
 - c. pulmonary veins
 - d. superior vena cava

ANS: B REF: 452

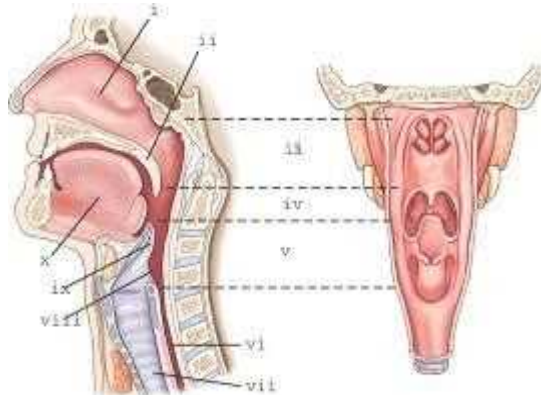
29. Which two forces or processes propel food down the esophagus?
- a. Peristalsis and gravity
 - b. Peristalsis and rhythmic segmentation
 - c. Gravity and deglutition
 - d. Deglutition and mastication

ANS: A REF: 453

30. The opening between the stomach and esophagus is termed the:
- a. cardiac antrum.
 - b. cardiac notch.
 - c. esophagogastric junction.
 - d. esophagocardiac junction.

ANS: C REF: 453

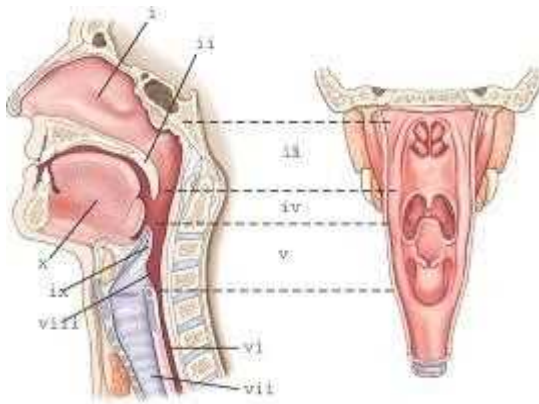
31. Part **ii** refers to the:



- a. soft palate.
- b. tonsils.
- c. hard palate.
- d. epiglottis.

ANS: A REF: 451

32. Part **iv** refers to the:

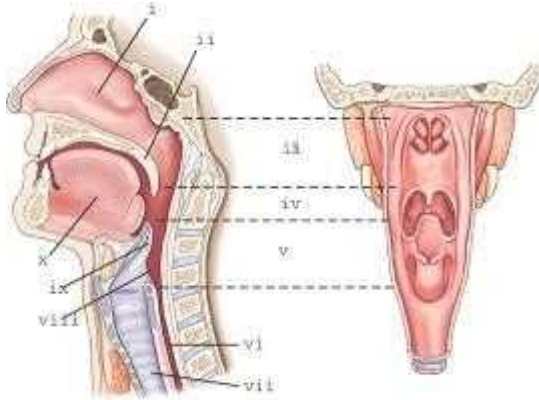


- a. laryngopharynx.
- b. nasopharynx.
- c. oropharynx.
- d. posterior oral cavity.

ANS: C

REF: 451

33. Part **ix** refers to the:

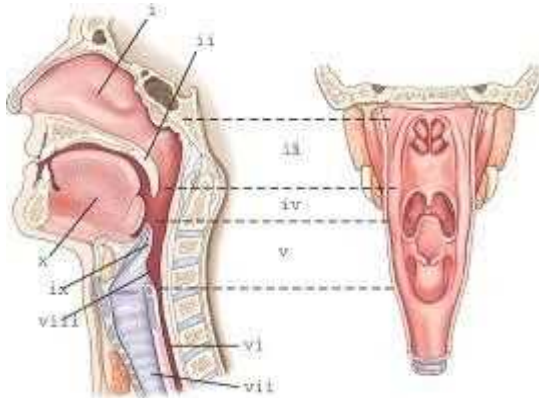


- a. soft palate.
- b. tonsils.
- c. uvula.
- d. epiglottis.

ANS: D

REF: 451

34. Part **iii** refers to the:



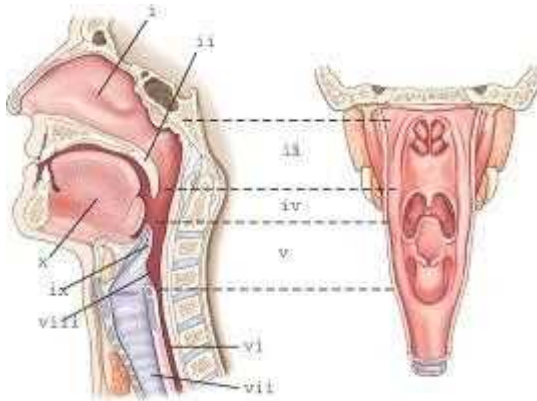
- a. nasopharynx.

- b. laryngopharynx.
- c. oropharynx.
- d. nasal cavity.

ANS: A

REF: 451

35. Part **vii** refers to the:

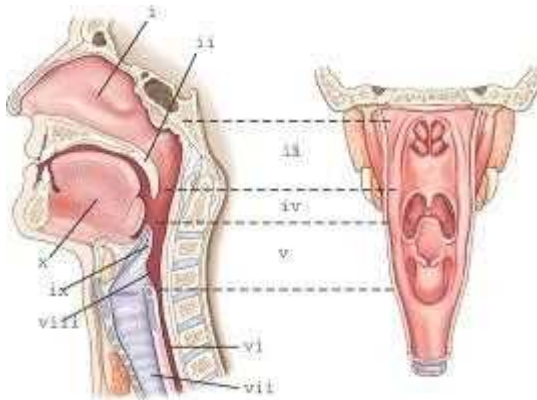


- a. esophagus.
- b. trachea.
- c. spinal cord.
- d. larynx.

ANS: B

REF: 451

36. Part **i** refers to the:



- a. nasal sinus.
- b. maxillary sinus.
- c. nasal cavity.
- d. upper oral cavity.

ANS: C

REF: 451

37. Part **v** refers to the:

- a. Body and pylorus
- b. Fundus
- c. Cardiac
- d. Fundus and body

ANS: A

REF: 455

43. Which aspect of the stomach is attached to the duodenum?

- a. Fundus
- b. Body
- c. Pylorus
- d. Cardiac

ANS: C

REF: 456

44. Which specific part of the pancreas is adjacent to the C-loop of the duodenum?

- a. Tail
- b. Body
- c. Head
- d. Neck

ANS: C

REF: 456

45. Which division of the duodenum contains the duodenal bulb or cap?

- a. First (superior)
- b. Third (horizontal)
- c. Second (descending)
- d. Fourth (ascending)

ANS: A

REF: 456

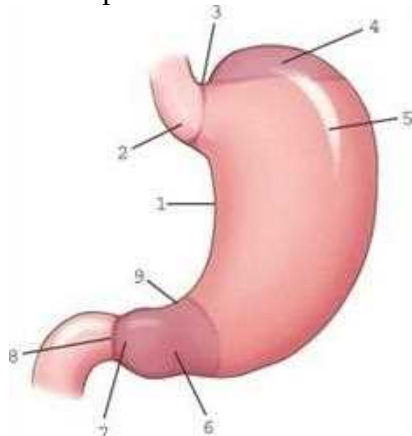
46. What structure indicates the junction between the duodenum and jejunum?

- a. Duodenal cap
- b. Suspensory muscle of the duodenum
- c. Valvulae conniventes
- d. C-loop of the duodenum

ANS: B

REF: 456

47. Which part of the stomach is labeled **6**?

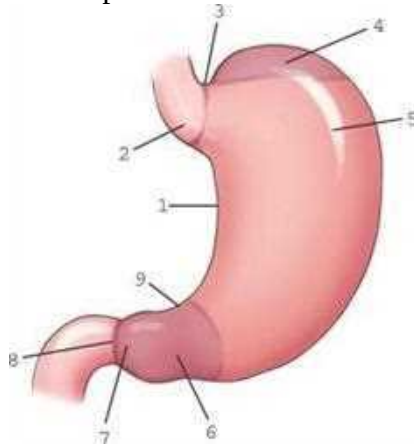


- a. Body
- b. Pyloric portion
- c. Pyloric antrum
- d. Pyloric canal

ANS: C

REF: 454

48. Which part of the stomach is labeled **2**?

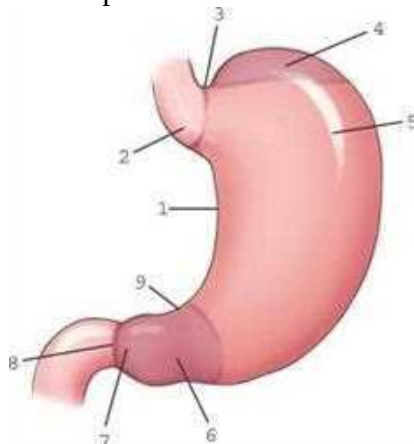


- a. Esophagogastric junction
- b. Incisura angularis
- c. Incisura cardiaca
- d. Cardiac antrum

ANS: D

REF: 454

49. Which part of the stomach is labeled **9**?

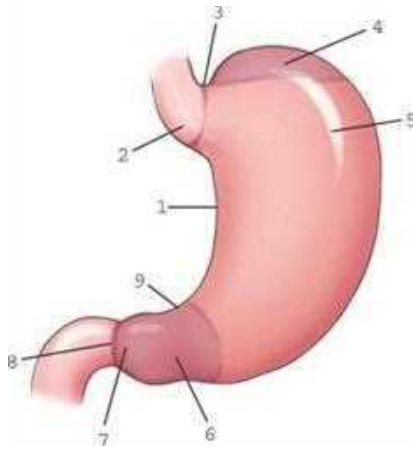


- a. Cardiac notch
- b. Angular notch
- c. Pyloric orifice
- d. Incisura cardiaca

ANS: B

REF: 454

50. Which part of the stomach is labeled **3**?



- a. Angular notch
- b. Cardiac notch
- c. Incisura angularis
- d. Esophagogastric junction

ANS: B REF: 454

51. Once food enters the stomach and is mixed with gastric secretions, it is termed:
- a. bile.
 - b. lipids.
 - c. chyme.
 - d. biologic catalysts.

ANS: C REF: 457

52. Which of the following substances are not digested chemically?
- a. Minerals
 - b. Carbohydrates
 - c. Proteins
 - d. Lipids

ANS: A REF: 457

53. Enzymes that aid in chemical digestion are classified as:
- a. lipids.
 - b. biologic catalysts.
 - c. digestive acids.
 - d. amino acids.

ANS: B REF: 457

54. Lipids (fats) are broken down to fatty acids and glycerol as they are digested and absorbed by the:
- a. stomach and small bowel.
 - b. stomach only.
 - c. small bowel only.
 - d. None of the above (are not digested).

ANS: C REF: 457

55. Which aspect of the gastrointestinal (GI) tract is primarily responsible for the absorption of digestive end products along with water, vitamins, and minerals?
- a. Stomach
 - b. Small intestine
 - c. Large intestine
 - d. Pancreas

ANS: B REF: 457

56. A high and transverse stomach would be found in a(n)_____patient.
- a. hyposthenic
 - b. asthenic
 - c. sthenic
 - d. hypersthenic

ANS: D REF: 458

57. A stomach with the duodenal bulb at the level of L1-2 would be found in a(n)_____patient.
- a. hyposthenic
 - b. asthenic
 - c. sthenic
 - d. hypersthenic

ANS: C REF: 458

58. What is the classification of barium sulfate as a contrast media?
- a. Radiopaque
 - b. Radiolucent
 - c. Isodense
 - d. Negative contrast media

ANS: A REF: 461

59. What type of solution is formed when barium is mixed with water?
- a. Water-soluble solution
 - b. Isotonic solution
 - c. Hypotonic solution
 - d. Colloidal suspension

ANS: D REF: 461

60. Sodium bicarbonate is often used as a negative contrast medium during an upper GI series.
- a. True
 - b. False

ANS: B REF: 461

61. Swallowed air can be used as a negative contrast medium during an upper GI series.
- a. True
 - b. False

ANS: A REF: 461

62. Which of the following statements is true about barium sulfate?
- a. It should be discarded if not used within an hour after mixing.
 - b. The patient may become ill if it is not prepared with sterile water.
 - c. It rarely produces an allergic reaction.
 - d. It is soluble in water.

ANS: C REF: 461

63. Which of the following clinical indications would mandate the use of an oral, water-soluble contrast agent?
- a. Patient with esophageal reflux
 - b. Patient with a bezoar
 - c. Patient with a possible perforated bowel
 - d. Patient with a possible peptic ulcer

ANS: C REF: 462

64. What type of contrast media is ideal for demonstrating a diverticulum within the stomach?
- a. Double-contrast barium/negative contrast agent
 - b. Single-contrast barium sulfate
 - c. Water soluble
 - d. Radiolucent

ANS: A REF: 471

65. Which of the following patient care concerns would prevent the use of an oral, water-soluble contrast medium?
- a. The patient has a possible ulcer.
 - b. The patient is sensitive to iodine.
 - c. The patient has esophageal reflux.
 - d. The patient has dysphasia.

ANS: B REF: 462

66. Digital fluoroscopy does not require the use of an image intensifier.
- a. True
 - b. False

ANS: B REF: 463

67. No cassettes are required for imaging with a digital fluoroscopy unit.
- a. True
 - b. False

ANS: A REF: 463

68. Digital fluoroscopy has distinct advantages but produces a slightly higher patient dose as compared with conventional fluoroscopy.
- a. True
 - b. False

ANS: B REF: 463

69. With digital fluoroscopy edge enhancement, brightness and contrast can be manipulated both during the procedure and also at a later time.
- a. True
 - b. False

ANS: A REF: 464

70. Which of the following is not one of the cardinal principles of radiation protection?
- a. Time
 - b. Distance
 - c. Intensity
 - d. Shielding

ANS: C REF: 465

71. Which one of the following cardinal principles of radiation protection is most effective in reducing the dose to the technologist during fluoroscopy?
- a. Time
 - b. Distance
 - c. Intensity
 - d. Shielding

ANS: B REF: 465

72. Which of the following devices reduces scatter exposure during fluoroscopy from the fluoroscopy tube?
- a. Compression paddle
 - b. Bucky tray
 - c. Bucky slot cover
 - d. Lead gloves

ANS: C REF: 465

73. Protective aprons worn during fluoroscopy must possess at least _____mm lead equivalency.
- a. 0.25
 - b. 0.5
 - c. 0.75
 - d. 1

ANS: B REF: 465

74. Which of the following conditions involves dilated veins in the distal aspect of the esophagus, which in some cases can lead to internal bleeding?
- a. Esophageal varices
 - b. Esophageal reflux
 - c. Esophageal hypertension
 - d. Esophageal thrombosis

ANS: A REF: 467

75. A large outpouching of the proximal esophagus above the upper esophageal sphincter is termed:
- a. Barrett esophagus.

- b. esophageal varices.
- c. esophageal reflux.
- d. Zenker diverticulum.

ANS: D REF: 468

76. Achalasia is generally defined as:
- a. difficulty in swallowing.
 - b. a common malignancy of the esophagus.
 - c. motor disorder of the esophagus.
 - d. large outpouching of the esophagus.

ANS: C REF: 466

77. Which of the following definitions would describe a bezoar?
- a. Inflammation of the gastric lining
 - b. Outpouching of the stomach wall
 - c. Mass of undigested material
 - d. Stomach neoplasm

ANS: C REF: 471

78. Duodenal ulcers are rarely malignant.
- a. True
 - b. False

ANS: A REF: 473

79. Only 5% of all ulcers lead to bowel perforation.
- a. True
 - b. False

ANS: A REF: 473

80. Research suggests that peptic ulcers may be caused by:
- a. smoking.
 - b. bacteria.
 - c. alcohol.
 - d. antibiotics.

ANS: B REF: 473

81. Gastritis is defined as inflammation of the:
- a. pancreas
 - b. large intestine
 - c. small intestine
 - d. stomach

ANS: D REF: 472

82. Which of the following conditions is an example of GERD?
- a. Esophageal varices
 - b. Gastric carcinoma

- c. Esophageal reflux
- d. Bezoar

ANS: C REF: 467

83. What is the most common radiographic procedure performed to diagnose GERD?

- a. Endoscopy
- b. Esophagogram
- c. Upper GI series
- d. CT

ANS: A REF: 467

84. Hypertrophic pyloric stenosis (HPS) is the most common form of intestinal obstruction found in infants.

- a. True
- b. False

ANS: A REF: 472

85. Which of the imaging modalities or procedures is most effective and preferred in diagnosing HPS?

- a. Nuclear medicine
- b. CT
- c. Upper GI series
- d. Ultrasound

ANS: D REF: 472

86. What is a potential risk associated with the use of water-soluble contrast agents, especially for geriatric patients?

- a. Bowel obstruction
- b. Cardiac arrest
- c. Dehydration
- d. Shock

ANS: C REF: 475

87. When using computed radiography (CR), inadequate kV or mAs will produce a_____image.

- a. dark
- b. light
- c. blurry
- d. mottled

ANS: D REF: 476

88. Which of the following technical factors will best enhance a digital image taken during an upper GI series?

- a. Collimation
- b. Low kV techniques
- c. Long SID
- d. Use of compensation (wedge) filter

ANS: A

REF: 476

89. Patient preparation for an esophagram includes NPO_____ before the procedure.
- a. 4 to 6 hours
 - b. 30 minutes to 1 hour
 - c. 4 to 6 hours and no gum chewing or smoking
 - d. None of the above; patient preparation is not needed as long as an upper GI series is not scheduled to follow.

ANS: D

REF: 469

90. Most esophagograms begin with the patient:
- a. recumbent-supine.
 - b. erect.
 - c. recumbent-prone.
 - d. in a left lateral decubitus position.

ANS: B

REF: 469

91. Why would a patient undergo Valsalva maneuver during an esophagram?
- a. To demonstrate possible esophageal varices
 - b. To demonstrate possible esophageal reflux
 - c. To demonstrate possible esophagitis
 - d. To demonstrate a possible bezoar

ANS: B

REF: 470

92. Which of the following procedures will not demonstrate possible esophageal reflux?
- a. Toe-touch maneuver
 - b. Water test
 - c. Reverse Trendelenburg method
 - d. Compression technique

ANS: C

REF: 470

93. Which of the following positions is not normally considered to be part of the esophagram basic routine?
- a. Posteroanterior (PA)
 - b. Left lateral
 - c. Right anterior oblique (RAO)
 - d. Anteroposterior (AP)

ANS: D

REF: 477

94. Patient preparation for an adult upper GI series includes:
- a. nothing; no patient preparation is required.
 - b. NPO 4 hours before the procedure.
 - c. NPO 8 hours before the procedure.
 - d. NPO 24 hours before the procedure.

ANS: C

REF: 474

95. Which of the following kV ranges should be used for an upper GI series using barium sulfate (single contrast study)?
- a. 80 to 90 kV
 - b. 90 to 100 kV
 - c. 100 to 125 kV
 - d. 125 to 140 kV

ANS: C REF: 476

96. Which of the following imaging modalities is an alternative to an esophagogram for detecting esophageal varices?
- a. Sonography
 - b. CT
 - c. Nuclear medicine
 - d. MRI

ANS: A REF: 477

97. Which of the following imaging modalities is ideal for demonstrating signs of Barrett esophagus?
- a. Nuclear medicine
 - b. MRI
 - c. Sonography
 - d. CT

ANS: A REF: 477

98. How much barium is typically given to a 3- to 10-year-old child during an upper GI series?
- a. 4 to 6 ounces
 - b. 14 to 16 ounces
 - c. 6 to 12 ounces
 - d. 1 cup

ANS: C REF: 475

99. Gastric emptying studies are performed using:
- a. intraesophageal sonography.
 - b. radionuclides.
 - c. MRI.
 - d. CT.

ANS: B REF: 477

100. CR centering for an esophagogram should be to the vertebral level of:
- a. the sternal angle.
 - b. T3 or T4.
 - c. T5 or T6.
 - d. T7.

ANS: C REF: 478

101. How much obliquity is required for the RAO position for the esophagus?

- a. 10° to 15°
- b. 20° to 30°
- c. 35° to 40°
- d. 45° to 60°

ANS: C

REF: 478

102. The RAO position of the esophagus is preferred over the left anterior oblique (LAO) because it:
- a. is a more comfortable position for the patient.
 - b. increases the visibility of the esophagus between the vertebrae and heart.
 - c. reduces thyroid exposure to the patient.
 - d. is easier for the patient to hold the cup of barium in his or her left hand.

ANS: B

REF: 478

103. What type of breathing instructions should be given to the patient during an esophagogram using a thin barium mixture?
- a. Suspended respiration while continuing to swallow
 - b. Suspended inspiration after the last swallow
 - c. Shallow breathing and continued swallowing during exposure
 - d. Exposure immediately after last bolus is swallowed (patient will not be breathing immediately after swallow)

ANS: C

REF: 478

104. Other than the esophagogram, what other imaging modality is performed to diagnose Barrett's esophagus?
- a. Computed tomography
 - b. Nuclear medicine
 - c. Magnetic resonance
 - d. Sonography

ANS: B

REF: 468

105. Which of the following upper GI projections and/or positions will best fill the body and pylorus with barium?
- a. AP
 - b. Right lateral
 - c. Left posterior oblique (LPO)
 - d. PA

ANS: D

REF: 483

106. Which of the following upper GI projections and/or positions will best demonstrate the pylorus and duodenal bulb in profile during a double-contrast study?
- a. AP
 - b. LAO
 - c. PA
 - d. LPO

ANS: D

REF: 485

107. At what level should the CR and image receptor be centered for the RAO or PA upper GI projection and/or position on a sthenic-body type of patient?
- a. Lower costal margin
 - b. L2
 - c. L3-4
 - d. Iliac crest

ANS: B REF: 482-483

108. A radiograph taken during an upper GI series demonstrates poor visibility of the gastric mucosa. The following factors were used: 80 kV, 30 mAs, 1/40-second exposure time, and high-speed image receptors. Barium sulfate was used during the procedure. Which of the following factors needs to be modified during the repeat exposure?
- a. Use of detail-speed screens (adjust mAs accordingly)
 - b. Shortened exposure time (increase mAs accordingly)
 - c. Use of a water-soluble contrast medium
 - d. Increased kV (decrease mAs as needed)

ANS: D REF: 482

109. A radiograph taken during an esophagogram using thin barium mixture demonstrates that there is very little contrast media in the esophagus. Which of the following points will improve filling of the esophagus? (The exposure was made on inspiration after the last swallow.)
- a. Have the patient drink during the exposure.
 - b. Have the patient perform the Valsalva maneuver during the exposure.
 - c. Have the patient perform the Müller maneuver during the exposure.
 - d. Shorten the exposure time.

ANS: A REF: 478

110. A PA radiograph taken on a hypersthenic patient during an upper GI series reveals that the pylorus and duodenal bulb are superimposed. Which of the following modifications will best eliminate the superimposition between these structures?
- a. Roll the patient into a slight RAO position.
 - b. Angle the CR 35° to 45° cephalad.
 - c. Place a rolled towel or a filled compression paddle under the patient's abdomen before exposure.
 - d. Increase the kV.

ANS: B REF: 483

111. A patient comes to radiology for an upper GI series. Her clinical history indicates that there may be a tumor posterior to the stomach. Which one of the following projections and/or positions will best demonstrate this condition?
- a. RAO
 - b. PA
 - c. Right lateral
 - d. LPO

ANS: C REF: 484

112. A pediatric patient enters the emergency department (ED) with a small, plastic object stuck in her esophagus. PA and lateral chest radiographs fail to demonstrate the foreign body. Which of the following procedures would be most effective in demonstrating the location of the object?
- Upper GI series
 - Esophagogram with the water test
 - Esophagogram using very thick barium
 - Esophagogram using shredded cotton soaked in barium

ANS: D REF: 467

113. A patient comes to radiology with a history of a gastric ulcer. Which of the following procedures would be most diagnostic to demonstrate this lesion?
- Double-contrast upper GI series
 - Single-contrast barium sulfate upper GI series
 - Oral, water-soluble upper GI series
 - Carbon dioxide upper GI series

ANS: A REF: 471,473

114. A patient comes to radiology for an esophagogram. The radiologist is concerned about the upper portion of the esophagus, near the level of T1, which did not visualize well on the previous routine projection-position esophagogram. Which of the following special projections and/or positions would be most helpful in demonstrating this region?
- Soft tissue lateral
 - LAO
 - Swimmer's lateral position
 - AP with 25° to 30° cephalad CR angle

ANS: C REF: 479

115. One radiograph of an upper GI series needs repeating. The technologist is unsure which projection and/or position is seen on this radiograph. The fundus is filled with barium, and the pylorus and duodenal bulb are profiled and air filled. The patient was recumbent for all projections. Which projection and/or position needs to be repeated?
- PA
 - LPO
 - RAO
 - Right lateral

ANS: B REF: 485

116. A patient comes to radiology for an upper GI series. The patient has a clinical history of hiatal hernia. Which of the following positions may be helpful in demonstrating this condition?
- AP Trendelenburg position
 - Left lateral decubitus, AP projection
 - Dorsal decubitus, lateral projection
 - LAO with compression technique

ANS: A REF: 486

117. A PA projection taken during an upper GI series performed on an infant reveals that the body and pylorus of the stomach are superimposed. What modification needs to be made during the repeat exposure to separate these two regions?
- Perform the AP projection instead.
 - Angle the CR 20° to 25° cephalad.
 - Angle the CR 30° to 45° cephalad.
 - Use the AP Trendelenburg position.

ANS: B

REF: 483

118. During an upper GI series, the “halo” sign appears in the duodenum. Which of the following conditions will produce this radiographic sign?
- Ulcer
 - Bezoar
 - Diverticulum
 - Tumor

ANS: A

REF: 473

119. A patient comes to radiology with a clinical history of HPS. Which of the following imaging modalities will best demonstrate this condition?
- CT
 - Nuclear medicine
 - Ultrasound
 - Upper GI series

ANS: C

REF: 473

MATCHING

Match each radiographic appearance or description with the corresponding disease or condition. (Use each selection only once.)

- Ulcers
 - Hiatal hernia
 - Achalasia (cardiospasm)
 - Zenker diverticulum
 - Schatzki ring
 - Gastritis
 - Esophageal varices
 - Gastric carcinoma
- Presence indicates a possible sliding hiatal hernia
 - Punctate collection of barium surrounded by a “halo” appearance during upper GI series
 - Narrowing and wormlike appearance of distal esophagus
 - Irregular filling defect within the stomach
 - Gastric bubble seen above the diaphragm
 - Dilated distal esophagus due to reduced peristalsis
 - Enlarged recess in the distal esophagus
 - Speckled appearance of the gastric mucosa and absence of rugae

- | | |
|-----------|----------------|
| 1. ANS: E | REF: 473 |
| 2. ANS: A | REF: 473 |
| 3. ANS: G | REF: 467 |
| 4. ANS: H | REF: 471 473 |
| 5. ANS: B | REF: 473 |
| 6. ANS: C | REF: 466 |
| 7. ANS: D | REF: 468 |
| 8. ANS: F | REF: 472 |

Chapter 13: Lower GI System

Lampignano: Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition

MULTIPLE CHOICE

1. Which part of the small intestine has a feathery appearance when filled with barium?
 - a. Ileum
 - b. Jejunum
 - c. Cecum
 - d. Duodenum

ANS: B

REF: 489

2. Which part of the small intestine has the largest diameter?
 - a. Duodenum
 - b. Ileum
 - c. Jejunum
 - d. Cecum

ANS: A

REF: 489

3. Which part of the small intestine is the shortest?
 - a. Duodenum
 - b. Ileum
 - c. Jejunum
 - d. Pylorus

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ANS: A

REF: 489

4. Which part of the small intestine makes up three-fifths of its entirety?
 - a. Duodenum
 - b. Jejunum
 - c. Ileum
 - d. Ilium

ANS: C

REF: 489

5. Which aspect of the large intestine is located highest, or most superior, in the abdomen?
 - a. Right colic flexure
 - b. Left colic flexure
 - c. Transverse colon
 - d. Ascending colon

ANS: B

REF: 490

6. Which of the following structures is not considered part of the colon?
 - a. Transverse colon
 - b. Right and left colic flexures
 - c. Rectum
 - d. All of the above are part of the colon.

ANS: C REF: 490

7. Which part of the large intestine is located between the rectum and the descending colon?
- Left colic flexure
 - Right colic flexure
 - Sigmoid colon
 - Cecum

ANS: C REF: 490

8. Which part of the large intestine has the widest diameter?
- Descending colon
 - Transverse colon
 - Cecum
 - Ascending colon

ANS: C REF: 490

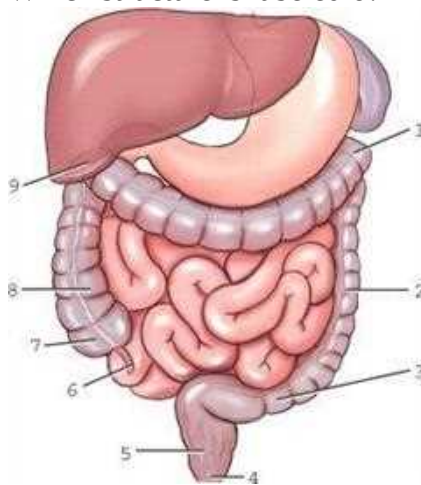
9. Which part of the colon has the greatest amount of potential movement?
- Descending colon
 - Transverse colon
 - Sigmoid colon
 - Ascending colon

ANS: B REF: 490

10. What is the term for the three bands of muscle that pull the large intestine into pouches?
- Haustra
 - Valvulae conniventes
 - Suspensory ligaments
 - Taenia coli

ANS: D REF: 491

11. Which structure is labeled 6?



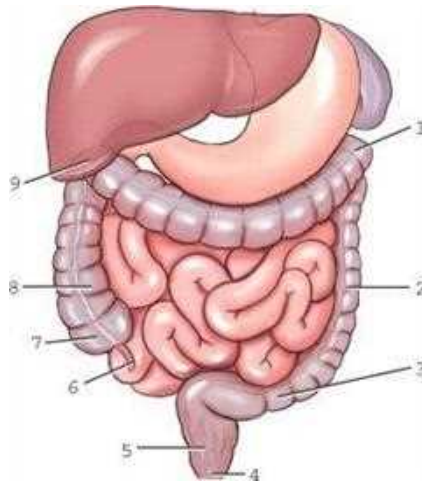
- Cecum
- Sigmoid colon
- Vermiform appendix

d. Iliac colon

ANS: C

REF: 490

12. Which structure is labeled 1?

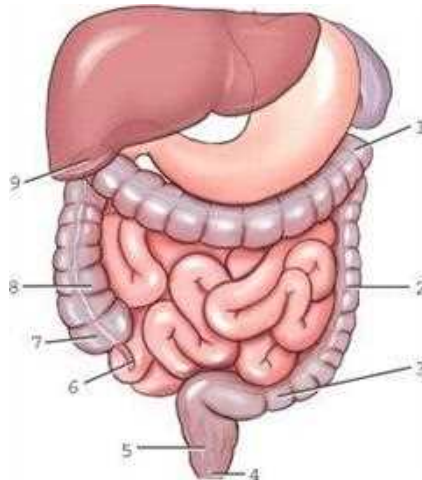


- a. Ascending colon
- b. Left colic flexure
- c. Right colic flexure
- d. Sigmoid colon

ANS: B

REF: 490

13. Which structure is labeled 7?



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- a. Descending colon
- b. Sigmoid colon
- c. Cecum
- d. Rectum

ANS: C

REF: 490

14. Which sections of the large intestine will most likely be filled with air with the patient in the prone position during a double-contrast barium enema (BE)?

- a. Ascending colon, descending colon, and rectum
- b. Transverse and sigmoid colon
- c. Rectum only

d. Right and left colic flexure and sigmoid colon

ANS: B REF: 491

15. Which part of the gastrointestinal (GI) tract synthesizes and absorbs vitamins B and K?
- Ileum
 - Duodenum
 - Jejunum
 - Large intestine

ANS: D REF: 493

16. Which of the following conditions may lead to an adynamic ileus?
- Small bowel tumor
 - Scar tissue within the jejunum
 - Peritonitis
 - Stricture of ileum due to an inguinal hernia

ANS: C REF: 495

17. Which of the following conditions may produce the “cobblestone” or “string” sign?
- Whipple disease
 - Regional enteritis (Crohn’s disease)
 - Giardiasis
 - Ileus

ANS: B REF: 494

18. Which of the following procedures is considered as a functional study?
- Barium enema (BE)
 - Enteroclysis
 - Air-contrast BE
 - Small bowel series

ANS: D REF: 494

19. When are small bowel series deemed to be complete?
- Two hours after the ingestion of barium
 - Once the contrast media passes the ileocecal valve
 - Once the contrast media reaches the rectum
 - Once the contrast media passes the duodenojejunal flexure

ANS: B REF: 497

20. The term describing a double-contrast small bowel procedure is:
- two-stage small bowel procedure.
 - diagnostic intubation.
 - enteroclysis.
 - none of the above.

ANS: C REF: 498

21. The patient must be NPO a minimum of _____ hours before the small bowel series.

- a. 4
- b. 6
- c. 8
- d. 24

ANS: C REF: 499

22. The tip of the catheter is advanced to the_____during an enteroclysis.
- a. duodenojejunal junction (ligament of Treitz)
 - b. C-loop of the duodenum
 - c. pyloric sphincter
 - d. ileocecal sphincter

ANS: A REF: 498

23. A twisting of the intestine on its own mesentery is termed:
- a. intussusception.
 - b. volvulus.
 - c. diverticulosis.
 - d. enteritis.

ANS: B REF: 501

24. A telescoping, or invagination, of one part of the intestine into another is termed:
- a. diverticulosis.
 - b. volvulus.
 - c. intussusception.
 - d. colitis.

ANS: C REF: 501

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25. The “stovepipe” radiographic sign is often seen with:
- a. volvulus.
 - b. intussusception.
 - c. neoplasm.
 - d. chronic ulcerative colitis.

ANS: D REF: 500

26. The “tapered,” or “corkscrew,” radiographic sign is often seen with:
- a. diverticulosis.
 - b. neoplasm.
 - c. volvulus.
 - d. intussusception.

ANS: C REF: 501

27. Which radiographic sign is frequently seen with adenocarcinoma of the large intestine?
- a. “Sail” sign
 - b. Diverticula
 - c. “Napkin ring” or “apple core” sign
 - d. Thickened mucosa

ANS: C REF: 501

28. Which of the following is classified as an irritant laxative?
- a. Magnesium citrate
 - b. Magnesium sulfate
 - c. Castor oil
 - d. None of the above

ANS: C REF: 502

29. Which of the following conditions would contraindicate the use of a cathartic before a barium enema?
- a. Colitis
 - b. Diverticulosis
 - c. Obstruction
 - d. Diverticulitis

ANS: C REF: 502

30. At what stage of respiration should the enema tip be inserted into the rectum?
- a. During deep breaths
 - b. During shallow breaths
 - c. Suspended inspiration
 - d. Suspended expiration

ANS: D REF: 505

31. In what position is the patient placed for the enema tip insertion?
- a. Sims'
 - b. Lithotomy
 - c. Modified lithotomy
 - d. Prone

ANS: A REF: 505

32. During the initial enema tip insertion, the tip is aimed:
- a. toward the coccyx.
 - b. toward the umbilicus.
 - c. directly posterior.
 - d. directly superior.

ANS: B REF: 505

33. Which of the following pathologic conditions is best demonstrated with evacuative proctography?
- a. Intussusception
 - b. Volvulus
 - c. Rectal prolapse
 - d. Diverticulosis

ANS: C REF: 508

34. Which specific aspect of the large intestine must be demonstrated during evacuative proctography?
- a. Sigmoid colon
 - b. Haustra
 - c. Anorectal angle
 - d. Rectal ligament

ANS: C REF: 509

35. The ideal kV range for a double-contrast barium enema is:
- a. 70 to 80.
 - b. 90 to 100.
 - c. 100 to 125.
 - d. 130 to 140.

ANS: B REF: 515

36. Which imaging modality can demonstrate abscesses in the retroperitoneum?
- a. MRI
 - b. Nuclear medicine
 - c. Sonography
 - d. Conventional radiography

ANS: A REF: 512

37. Which one of the following imaging modalities and/or procedures is very effective in detecting the Meckel diverticulum?
- a. CT
 - b. Double-contrast barium enema
 - c. Sonography
 - d. Nuclear medicine

ANS: D REF: 512

38. Which of the following statements is NOT true in regard to a pediatric small bowel series?
- a. The transit time for barium through the small intestine is longer than that of an adult.
 - b. Barium sulfate is the contrast medium of choice.
 - c. The small bowel series should be scheduled early in the morning.
 - d. A gonadal shield often cannot be used during the later stages of the study.

ANS: A REF: 511

39. What type of enema tip is recommended for a barium enema on an infant?
- a. Rectal retention
 - b. Plastic disposable
 - c. 10 Fr, flexible silicone catheter
 - d. Foley catheter

ANS: C REF: 511

40. Central ray and image receptor centering for a 1-hour small bowel radiograph should be:
- a. 2 inches (5 cm) above level of the iliac crest.

- b. at the level of the iliac crest.
- c. 1 inch (2.5 cm) below the level of the iliac crest.
- d. at the level of the ASIS.

ANS: B REF: 513

41. Which projection and/or position is most commonly performed during an evacuative proctogram?
- a. Anteroposterior (AP) erect
 - b. Lateral
 - c. Right posterior oblique (RPO) and left posterior oblique (LPO)
 - d. AP axial

ANS: B REF: 509

42. Why is the posteroanterior (PA) rather than the AP projection recommended for a small bowel series?
- a. Less gonadal dose for female patients
 - b. More comfortable for patient
 - c. Places small intestine closer to image receptor (IR)
 - d. Better separation of loops of small intestine

ANS: D REF: 497

43. Which of the following positions best demonstrates the left colic flexure?
- a. LPO
 - b. Left lateral decubitus
 - c. Left lateral
 - d. Left anterior oblique (LAO)

ANS: D REF: 517

44. During a double-contrast barium enema (BE) procedure, the radiologist suspects a polyp in the descending colon. Which position would best demonstrate this?
- a. Supine for AP projection
 - b. 45° erect PA projection
 - c. Right lateral decubitus
 - d. Left lateral decubitus

ANS: C REF: 520

45. A radiograph of an AP barium enema (BE) projection reveals poor visualization of the sigmoid due to excessive superimposition of the sigmoid colon and rectum. How can this area be better visualized on the repeat exposure?
- a. Angle the central ray (CR) 30° to 40° cephalad with AP projection.
 - b. Increase kV.
 - c. Take a PA projection with the patient in the left lateral decubitus position.
 - d. Take a PA projection with a 30° to 40° cephalad CR angle.

ANS: A REF: 523

46. A patient comes to radiology for a barium enema (BE). He has a possible fistula extending from the rectum to the urinary bladder. Which one of the following projections and/or positions would best demonstrate the fistula?
- a. Lateral rectum position
 - b. AP erect projection
 - c. LPO axial projection
 - d. LPO and RPO positions

ANS: A REF: 519

47. A patient comes to radiology with possible diverticulosis. Which of the following studies is most diagnostic for detecting this condition?
- a. Single-contrast barium enema
 - b. Double-contrast barium enema
 - c. Evacuative proctogram
 - d. Small bowel series

ANS: B REF: 502

48. A patient comes to radiology for a double-contrast barium enema. The patient cannot lie on her side during the study. Which of the following projections could replace the lateral rectum projection?
- a. AP axial
 - b. LPO axial projection
 - c. Ventral decubitus
 - d. Dorsal decubitus

ANS: C REF: 519

49. During a single-contrast barium enema, the radiologist detects a possible defect within the right colic flexure. Which of the following projections and/or positions best demonstrates this region of the colon?
- a. RPO
 - b. LAO
 - c. AP axial
 - d. LPO

ANS: D REF: 518

50. A patient comes to radiology with a history of rectocele. Which of the following procedures best demonstrates this condition?
- a. Single-contrast barium enema
 - b. Evacuative proctogram
 - c. Double-contrast barium enema
 - d. Enteroclysis

ANS: B REF: 508

51. An infant is brought to the ED with a possible intussusception. Which of the following procedures may actually correct this condition?
- a. Small bowel enema
 - b. Small bowel series

- c. Defecography
- d. Barium or air enema

ANS: D REF: 501

52. Which of the following barium enema projections and/or positions provides the greatest amount of gonadal dosage to both male and female patients?
- a. AP/PA
 - b. Lateral rectum
 - c. Left lateral decubitus
 - d. Left posterior oblique

ANS: B REF: 519

53. What is another term for the AP axial projection taken during a barium enema procedure?
- a. Sims' position
 - b. Butterfly position
 - c. Chassard-Lapine position
 - d. Smith position

ANS: B REF: 523

54. How much CR angulation is required for the AP axial projection taken during a barium enema examination?
- a. 10° to 15°
 - b. 20° to 25°
 - c. 30° to 40°
 - d. 45°

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ANS: C REF: 523

55. While attempting to insert an enema tip into the rectum, the technologist experiences resistance. What should be the next step taken by the technologist?
- a. Retry the insertion using more lubrication.
 - b. Ask the patient to try to insert it himself.
 - c. Have the radiologist insert it using fluoroscopic guidance.
 - d. Cancel the procedure.

ANS: C REF: 503

56. Why is it important for the technologist to review the patient's chart and inform the radiologist before beginning the barium enema examination if a biopsy was performed as part of a prior sigmoidoscopy or colonoscopy procedure?
- a. A sigmoidoscopy or colonoscopy would make the BE examination unnecessary.
 - b. The biopsy of the colon may weaken that portion of the colon, which could lead to a perforation during the BE examination.
 - c. The radiologist would want to confer with the referring physician to see whether the biopsy revealed a malignancy.
 - d. None of the above; the radiologist does not need to know this information before the BE examination.

ANS: B REF: 500

57. During barium enema fluoroscopy, the radiologist detects a possible defect in the right colic flexure. He asks the technologist to produce a radiograph that will best demonstrate this region of the large intestine. Which one of the following positions will accomplish this goal?
- LAO
 - AP axial projection
 - AP recumbent
 - LPO

ANS: D

REF: 518

58. Why is oral contrast media sometimes given during computed tomography colonography?
- To determine if a fistula is present
 - To mark or “tag” possible fecal matter
 - To demonstrate possible diverticula
 - To prevent spasm of the large intestine

ANS: B

REF: 512

59. The average time to scan the large intestine during a computed tomography colonography is:
- 1 hour.
 - 20 minutes.
 - 30 minutes.
 - 10 minutes.

ANS: D

REF: 512

MATCHING

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Match each of the definitions or descriptions with the corresponding pathologic indication for the small bowel series. (Use each option only once.)

- Ileus
 - Neoplasm
 - Meckel diverticulum
 - Malabsorption syndrome (sprue)
 - Enteritis
 - Regional enteritis (Crohn's disease)
 - Giardiasis
 - Adynamic or paralytic ileus
- Inflammation of the intestine
 - Chronic inflammatory disease of the GI tract
 - Patient with lactose or sucrose sensitivities
 - New growth observed in intestine as filling defects
 - Obstruction of the small intestine
 - Are often found 50 to 100 cm proximal to the ileocecal valve
 - Common parasitic infection of the small intestine
 - Obstruction of the small intestine due to the cessation of peristalsis

1. ANS: E

REF: 494

2. ANS: F

REF: 494

- | | |
|-----------|----------|
| 3. ANS: D | REF: 496 |
| 4. ANS: B | REF: 496 |
| 5. ANS: A | REF: 495 |
| 6. ANS: C | REF: 496 |
| 7. ANS: G | REF: 495 |
| 8. ANS: H | REF: 495 |

TRUE/FALSE

1. The ascending colon and upper rectum are intraperitoneal structures.
ANS: F REF: 491
2. The circular staircase, or herringbone pattern, is a common radiographic sign for a mechanical ileus.
ANS: T REF: 495
3. Meckel diverticulum is best diagnosed with a radionuclide (nuclear medicine) scan.
ANS: T REF: 496
4. The enteroclysis procedure is indicated for patients with regional enteritis.
ANS: T REF: 498
5. For an average adult, the amount of barium ingested is one 16-oz cup for a small-bowel-only series.
ANS: T REF: 498
6. Ultrasound, with graded compression, can be used in diagnosing acute appendicitis.
ANS: T REF: 500
7. CT may be performed to diagnose acute appendicitis.
ANS: T REF: 500
8. Synthetic latex enema tips are safe to use for latex-sensitive patients.
ANS: T REF: 503
9. Rectal retention enema tips should be fully inflated by the technologist before beginning a barium enema.
ANS: F REF: 503
10. Evacuative proctography is most commonly performed on geriatric patients.
ANS: F REF: 511

11. During a colostomy barium enema, a double-contrast retention enema tip is used.
ANS: F REF: 510
12. The opening leading into the intestine for the patient with a colostomy is termed the stoma.
ANS: T REF: 509
13. The height of the enema bag should not exceed 36 inches (92 cm) above the radiographic table at the beginning of the study.
ANS: F REF: 510
14. Overhead, radiographic projections are often not taken when using digital fluoroscopy.
ANS: T REF: 511
15. A single-stage, double-contrast barium enema involves instilling both the negative and positive contrast media at the same time.
ANS: T REF: 506
16. Computed tomography colonography (CTC) is considered as an effective alternative to endoscopic colonoscopy.
ANS: T REF: 511

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Chapter 14: Urinary System and Venipuncture

Lampignano: Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition

MULTIPLE CHOICE

1. Which abdominal muscles run on each side of, and medial and posterior to, the kidneys?
 - a. Rectus abdominis
 - b. External obliques
 - c. Right and left psoas major
 - d. Erector spinae

ANS: C REF: 527

2. The average adult kidney measures _____ in length.
 - a. 2 to 3 inches (5 to 7 cm)
 - b. 4 to 5 inches (10 to 12 cm)
 - c. 6 to 8 inches (15 to 20 cm)
 - d. 8 to 10 inches (20 to 25 cm)

ANS: B REF: 527

3. What structure enables the kidneys to be visualized on plain abdominal radiographs?
 - a. Adipose capsule
 - b. Renal pyramids
 - c. Major and minor calyces
 - d. High volume of blood within the kidney

ANS: A REF: 527

4. Which of the following functions is not performed by the urinary system?
 - a. Removing nitrogenous wastes
 - b. Regulating water levels in tissues
 - c. Regulating the acid-base and electrolyte balance
 - d. Producing and releasing adrenaline

ANS: D REF: 528

5. The term describing the total functioning portions of the kidney is the:
 - a. renal collecting system.
 - b. nephron.
 - c. glomerular capsule.
 - d. renal parenchyma.

ANS: D REF: 529

6. Urine will travel from the major calyces to the:
 - a. renal pelvis.
 - b. ureter.
 - c. minor calyces.
 - d. renal pyramids.

ANS: A REF: 529

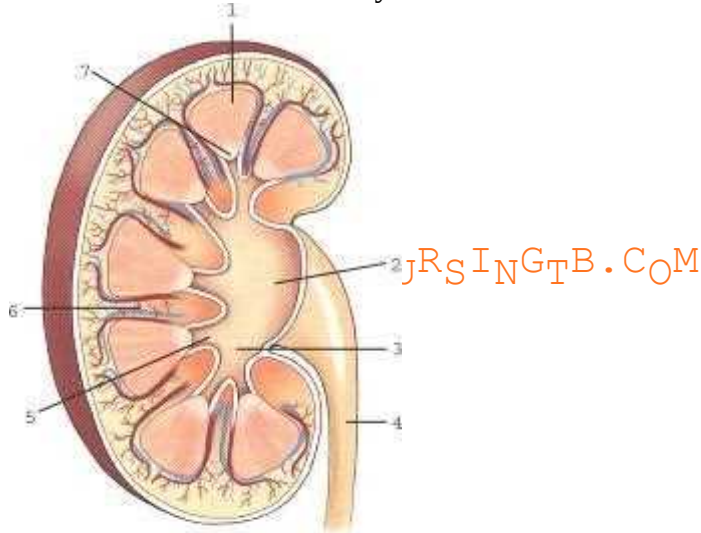
7. The glomeruli, glomerular capsule, and proximal and distal convoluted tubules are located in the _____ of the kidney.
- medulla
 - cortex
 - collecting system
 - fibrous capsule

ANS: B REF: 529

8. The structural and functional unit of the kidney is:
- Bowman capsule.
 - the calyx.
 - the nephron.
 - the glomerulus.

ANS: C REF: 529

9. Which structure of the kidney is labeled 3?



- Minor calyx
- Major calyx
- Renal pelvis
- Renal pyramid

ANS: B REF: 529

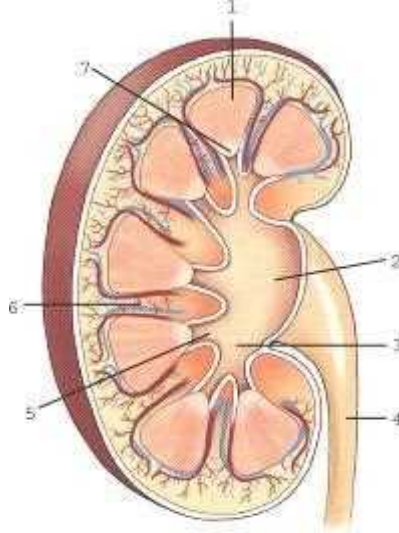
10. Which structure and/or region of the kidney is labeled 1?

- a. Minor calyx
- b. Major calyx
- c. Renal sinus
- d. Medulla

ANS: D

REF: 529

11. Which structure is labeled **2**?



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- a. Renal pelvis
- b. Ureterovesical junction
- c. Ureteropelvic junction
- d. Pelvic brim

ANS: A

REF: 529

12. What is the structure labeled **6**?

- a. Renal pelvis
- b. Uterovesical junction
- c. Renal sinuses
- d. Trigone

ANS: C REF: 529

13. One of the three constricted points along each ureter is the pelvic brim. The location of this constricted point is:
- a. where the bladder meets the symphysis pubis.
 - b. at the level of the ischial spines.
 - c. where the iliac blood vessels cross over the ureters.
 - d. where the distal ureters connect to the bladder.

ANS: C REF: 530

14. What is the total capacity of the average adult bladder?
- a. 350 to 500 mL
 - b. 100 to 250 mL
 - c. 500 to 750 mL
 - d. 1000 to 1200 mL

ANS: A REF: 530

15. Which term describes the act of voiding under voluntary control?
- a. Urination
 - b. Urinary release
 - c. Incontinence
 - d. Anuria

ANS: A REF: 530

16. The numerous mucosal folds located within the urinary bladder are termed:
- a. trigone.
 - b. mucosa.
 - c. rugae.
 - d. vesical mucosa.

ANS: C REF: 530

17. Which of the following compounds is a common cation (+) found in ionic contrast media?
- Diatrizoate
 - Iodine
 - Meglumine
 - Benzoic acid

ANS: C REF: 538

18. Which component of an ionic contrast media increases its solubility?
- Cation
 - Anion
 - Benzoic acid
 - Iodine

ANS: A REF: 538

19. Which of the following is true with nonionic-type contrast media?
- Low osmolality
 - The inability to dissociate into two separate ions
 - Less chance of reaction
 - All of the above

ANS: D REF: 538

20. Which of the following occurs in many patients and is defined as an expected outcome to the introduction of iodinated contrast media?
- Moderate itching and sneezing
 - Metallic taste in mouth and a temporary hot flash
 - Mild condition of urticaria (hives)
 - All of the above

ANS: B REF: 539

21. The American College of Radiology recommends that metformin (a drug used for diabetes mellitus) be withheld for _____ hour(s) following a contrast media procedure.
- 1
 - 8
 - 24
 - 48

ANS: D REF: 539

22. The normal creatinine level (diagnostic indication of kidney function) for an adult is _____ mg/dL.
- 0.1 to 0.5
 - 0.6 to 1.5
 - 3 to 4.5
 - 6 to 7.5

ANS: B REF: 539

23. Normal BUN (blood urea nitrogen) levels in adults should not exceed _____mg per 100 mL.
- 1.5
 - 5
 - 10
 - 25

ANS: D REF: 539

24. What is the primary purpose of the premedication procedure before an iodinated contrast media study?
- Reduces anxiety
 - Permits greater contrast enhancement of kidneys during an intravenous urography (IVU)
 - Reduces the severity of a possible contrast media reaction
 - Decreases blood pressure

ANS: C REF: 540

25. Which one of the following drugs is often given before an IVU to reduce the risk of a contrast media reaction?
- Diazepam
 - Benadryl and prednisone
 - Fluoxetine
 - Verapamil

ANS: B REF: 540

26. Which of the following symptoms is classified as "mild" during a systematic contrast media reaction?
- Itching
 - Hypotension
 - Extravasation
 - Angioedema

ANS: A REF: 541

27. If a patient experiences tachycardia (>100 heartbeats/min) following a systemic contrast media injection, he or she is experiencing a _____reaction.
- mild
 - moderate
 - severe
 - vasovagal

ANS: B REF: 541

28. If a patient experiences laryngeal swelling following a contrast media injection, he or she is experiencing a _____level reaction.
- mild
 - moderate
 - severe
 - local

ANS: C REF: 541

29. The drug Lasix is classified as a:
- a. contrast agent.
 - b. cathartic.
 - c. diuretic.
 - d. salicylate.

ANS: C REF: 540

30. A brief loss of consciousness caused by reduced cerebral blood flow is termed:
- a. syncope.
 - b. brachycardia.
 - c. hypotension.
 - d. angioedema.

ANS: A REF: 542

31. A region or area of subcutaneous swelling caused by allergic reaction to foods or drugs is termed:
- a. oliguria.
 - b. micturition.
 - c. syncope.
 - d. angioedema.

ANS: D REF: 542

32. Which of the following symptoms is considered a severe reaction to contrast media and is a life-threatening condition requiring life-saving measures?
- a. Tachycardia (rapid heartbeat)
 - b. Excessive urticaria (hives)
 - c. Extravasation at the injection site
 - d. Cardiac arrhythmias

ANS: D REF: 541

33. Which of the following conditions is considered to be higher risk (a contraindication) for a contrast media reaction?
- a. Hematuria
 - b. Congestive heart failure
 - c. Urinary tract infection
 - d. Renal calculi

ANS: B REF: 542

34. What is the correct course of action for the technologist when, during an injection of contrast media, a patient experiences a side effect of mild hot flashes and some metallic taste in his mouth?
- a. Call for a physician to complete the injection.
 - b. Stop the injection of contrast media immediately.
 - c. Stop the injection but continue the normal imaging sequence.
 - d. Reassure the patient and continue the injection and imaging sequence, while

carefully observing the patient for a possible more severe reaction to follow.

ANS: D REF: 541

35. Which term describes the leakage of contrast media from a vein into the surrounding tissues of the arm?
- Extravasation
 - Filtration
 - Exudation
 - Micturition

ANS: A REF: 540

36. Which level of contrast media reaction has occurred when the patient develops moderate urticaria?
- Normal side effect
 - Mild reaction
 - Moderate reaction
 - Severe reaction

ANS: C REF: 541

37. Which of the following is considered as a contraindication for an IVU procedure?
- Hypertension
 - Anuria
 - Hematuria
 - All of the above

ANS: B REF: 542 NURSINGTB.COM

38. Which of the following conditions is considered a moderate-level contrast media reaction requiring treatment?
- Nausea and vomiting
 - Syncope
 - Tachycardia
 - None of the above

ANS: C REF: 541

39. What is the recommended treatment protocol for extravasation?
- Give the patient diphenhydramine (Benadryl).
 - Elevate the limb and apply cold compress over injection site.
 - Increase IV fluids.
 - Give the patient Lasix immediately.

ANS: B REF: 537

40. The rapid introduction of contrast agents into the vascular system is termed:
- rapid-fire injection.
 - rapid-drip infusion.
 - bolus injection.
 - IV infusion.

ANS: C REF: 533

41. In preparation for a venipuncture, a tourniquet should be applied _____ above or proximal to the site of injection.
- 1 to 2 inches (2.5 to 5 cm)
 - 3 to 4 inches (7.5 to 10 cm)
 - 6 to 7 inches (15 to 18 cm)
 - 8 to 10 inches (20 to 25 cm)

ANS: B REF: 535

42. The most common size needle used for bolus injection of contrast agents for adult patients is _____ gauge.
- 23 to 25
 - 14 to 16
 - 18 to 22
 - 28

ANS: C REF: 534

43. Which of the following veins is not normally used during venipuncture?
- Median cubital
 - Axillary
 - Cephalic
 - Basilic

ANS: B REF: 534

44. Patchy blunting of the calyces is a radiographic sign of:
- polycystic kidney disease.
 - renal hypertension.
 - chronic pyelonephritis.
 - ectopic kidney.

ANS: C REF: 546

45. Ureteric compression is contraindicated for patients with a history of:
- hematuria.
 - abdominal mass.
 - hypertension.
 - flank pain.

ANS: B REF: 547

46. How is contrast media normally introduced during a retrograde cystogram?
- Intravenously
 - With an injection through the urethra with a large syringe and catheter
 - Gravity flow through a catheter
 - Either B or C

ANS: C REF: 550

47. What is the recommended position for a male retrograde urethrogram?

- a. 30° right posterior oblique (RPO)
- b. 45° RPO
- c. Lateral
- d. 2° left anterior oblique (LAO)

ANS: A REF: 551

48. With automatic exposure control (AEC), which ionization chamber(s) should be activated for an AP projection taken during an IVU?
- a. Left and right upper chambers
 - b. Center chamber
 - c. Left chamber
 - d. Center and right upper chamber

ANS: A REF: 554

49. Which one of the following veins is NOT selected for venipuncture during an IVU?
- a. Basilic
 - b. Cephalic
 - c. Axillary
 - d. Median cubital

ANS: C REF: 534

50. Where is the central ray (CR) centered for a nephrotomogram of the kidneys?
- a. At the xiphoid process
 - b. At the iliac crest
 - c. Midway between the iliac crest and the xiphoid process
 - d. Midway between the ASIS and the iliac crest

ANS: C REF: 555

51. A nephrogram taken during an IVU demonstrates that the renal parenchyma is poorly visualized but the calyces are contrast enhanced. What is the most likely reason for this radiographic outcome?
- a. The kV may have been too high.
 - b. The contrast media was diluted.
 - c. The patient has hypertension.
 - d. The exposure was not taken soon enough following the injection.

ANS: D REF: 549 | 555

52. A radiograph of a left posterior oblique (LPO) position taken during an IVU reveals that the right kidney is foreshortened and superimposed over the spine. What must the technologist do to correct this error during the repeat exposure?
- a. Decrease rotation.
 - b. Increase rotation.
 - c. Increase CR angulation.
 - d. Place the patient in the RPO position to better demonstrate the right kidney.

ANS: A REF: 556

53. A radiograph of an AP projection taken during a retrograde cystogram reveals that the floor of the bladder is superimposed over the symphysis pubis. What error led to this radiographic finding?
- a. Excessive CR angulation
 - b. Rotation of the pelvis
 - c. Insufficient CR angulation
 - d. Excessive filling of the bladder with contrast media

ANS: C

REF: 559

54. A patient comes to radiology for an IVU. During the procedure, the radiologist suspects nephroptosis. Which of the following positions best demonstrates this condition?
- a. Erect
 - b. Prone
 - c. Supine with ureteric compression
 - d. RPO and LPO

ANS: A

REF: 557

55. A patient comes to radiology for an IVU. The clinical history states that the patient may have an enlarged prostate gland (benign prostatic hyperplasia). Which of the following positions best demonstrates this condition?
- a. AP erect, prevoiding and voiding
 - b. PA prone, CR perpendicular
 - c. AP supine with a 15° CR caudad angle
 - d. 30° RPO

ANS: A

REF: 557

56. A patient comes to radiology, after surgery of the abdomen, for an IVU with an order for ureteric compression to enhance pelvicalyceal filling. What should the technologist do?
- a. Use mild ureteric compression only.
 - b. Place the patient into a Trendelenburg position instead of compression.
 - c. Perform all projections erect.
 - d. Raise the Foley bag above the tabletop to keep the contrast media in the kidneys longer.

ANS: B

REF: 548

57. A patient comes to radiology for an IVU. He has a clinical history of renal hypertension. How should the IVU procedure be altered for this patient?
- a. Keep ureteric compression inflated for all projections.
 - b. Give the patient a diuretic agent before the procedure.
 - c. Provide images every 30 minutes after the injection.
 - d. Shorten the time between exposures.

ANS: D

REF: 545

58. A patient comes to radiology with a history of vesicourethral reflux. The patient states that she is highly sensitive to iodinated contrast media. Which of the following alternative procedures could be performed to demonstrate this condition?
- a. Radionuclide scan

- b. Sonography
- c. CT
- d. MRI (magnetic resonance imaging)

ANS: A REF: 553

59. A male patient comes to radiology for a voiding cystourethrogram. Which of the following projections and/or positions would be performed for this procedure?
- a. 30° RPO
 - b. Erect lateral
 - c. Recumbent lateral
 - d. Erect PA

ANS: A REF: 551

60. A patient, during an injection of contrast media, complains about pain at the injection site. The radiographer notices a moderate degree of swelling beneath the skin. The radiographer stops the injection and suspects that the needle has slipped out of the vein. What should the radiographer do after removing the needle to alleviate the patient's discomfort?
- a. Give the patient diphenhydramine (Benadryl).
 - b. Elevate the limb and place a cold compress over the injection site.
 - c. Place ice over the injection site.
 - d. Flex and extend the elbow to increase absorption of contrast media into the soft tissues.

ANS: B REF: 540

61. A patient comes to radiology for an IVU. His laboratory report indicates a creatinine level of 0.7 mg/dL. What should be the technologist's next step?
- a. Proceed with the study.
 - b. Notify the radiologist of an elevated creatinine level.
 - c. Notify the referring physician of an elevated creatinine level.
 - d. Escort the patient to the emergency department (ED) right away.

ANS: A REF: 539

62. A patient with a possible ureteric stone comes from the emergency department (ED) for an IVU. She has a blood urea nitrogen (BUN) level of 50. Which of the following imaging modalities is recommended for this patient?
- a. IVU using ionic contrast media
 - b. Sonography
 - c. CT
 - d. MRI

ANS: C REF: 552

63. During an IVU, the patient develops severe urticaria. What should be the next action taken by the technologist?
- a. Call a code emergency.
 - b. Comfort the patient; this is a common side effect.
 - c. Give the patient diphenhydramine (Benadryl).
 - d. Get medical assistance.

ANS: D

REF: 541

64. A patient experiences a hot flash after the injection of an iodinated contrast media. What should be the next action taken by the technologist?
- Call a code emergency.
 - Comfort the patient; this is a common side effect.
 - Give the patient diphenhydramine (Benadryl).
 - Get medical assistance.

ANS: B

REF: 539

MATCHING

Select the correct pathologic term for each definition. (Use each selection only once.)

- Anuria
 - Oliguria or hypouresis
 - Polyuria
 - Hematuria
 - Renal agenesis
 - Micturition
- Absence of a functioning kidney
 - Excretion of diminished amounts of urine
 - Act of voiding
 - Complete cessation of urinary secretion
 - Passage of a large volume of urine
 - Blood in the urine

- ANS: E REF: 542
- ANS: B REF: 542
- ANS: F REF: 542
- ANS: A REF: 542
- ANS: C REF: 542
- ANS: D REF: 542

Select the correct pathologic indication for each statement or description. (Select each choice only once.)

- Horseshoe kidney
 - Ectopic kidney
 - Vesicocolonic fistula
 - Staghorn kidney stone
 - Urinary incontinence
 - BPH (benign prostatic hyperplasia)
- Artificial opening between the urinary bladder and aspects of the large intestine
 - Normal kidney that fails to ascend into the abdomen but remains in the pelvis
 - Age-associated enlargement of the prostate gland
 - Large stone that grows and completely fills the renal pelvis
 - Fusion of the kidneys during development of the fetus

12. Constant or frequent involuntary passage of urine

- | | |
|------------|----------|
| 7. ANS: C | REF: 545 |
| 8. ANS: B | REF: 543 |
| 9. ANS: F | REF: 543 |
| 10. ANS: D | REF: 544 |
| 11. ANS: A | REF: 543 |
| 12. ANS: E | REF: 542 |

TRUE/FALSE

1. The suprarenal glands are part of the endocrine system.

ANS: F REF: 526

2. The left kidney is generally slightly lower, or more inferior, than the right.

ANS: F REF: 526

3. Ionic contrast agents use a parent compound of a carboxyl group (benzoic acid).

ANS: T REF: 538

4. Nonionic contrast agents create a hypertonic condition in the blood plasma as compared with ionic contrast agents.

ANS: F REF: 538

5. Nonionic contrast agents may increase the severity of side effects as compared with ionic contrast agents.

ANS: F REF: 538

6. Nonionic contrast agents contain no positively charged cations.

ANS: T REF: 538

7. A vasovagal contrast media reaction can be a life-threatening condition.

ANS: T REF: 542

8. A medical emergency must be declared if the patient experiences a moderate contrast media reaction.

ANS: T REF: 542

9. Extravasation is classified as a local reaction.

ANS: T REF: 540

10. Phlebitis is considered to be a systemic contrast media reaction.

ANS: F REF: 541

11. Venipuncture procedures may be performed by a technologist only if a physician is present in the room or is in an adjoining room.

ANS: F REF: 533

12. Patients (or legal guardian) must sign an informed consent form before a venipuncture procedure.

ANS: T REF: 534

13. The bevel of the needle must be facing downward during the actual puncture into a vein.

ANS: F REF: 535

14. If available, the technologist should use a central line catheter to introduce contrast agents into the patient.

ANS: F REF: 534

15. Over-the-needle catheters are often used for drip infusion studies.

ANS: T REF: 533

16. The technologist should leave a butterfly needle in the vein for the first part of the IVU following injection.

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ANS: T REF: 536

17. CT (computed tomography) of the kidney for renal calculi does not require the use of intravenous contrast media.

ANS: T REF: 552

18. Ultrasound is an effective imaging modality in demonstrating cystitis.

ANS: F REF: 546

19. If an IVU is performed on a female, a menstrual history must be obtained.

ANS: T REF: 547

20. Generally, female patients cannot be shielded during an IVU (except for nephrotomography).

ANS: T REF: 555

21. It is recommended to inject contrast media through a shunt when one is present in the patient.

ANS: F REF: 555

22. If both procedures are ordered on the same day, a barium enema must be performed before an IVU.

ANS: F REF: 547

23. All reactions, regardless to their severity, must be documented.

ANS: T REF: 540

24. A true allergic reaction is also called an anaphylactic reaction.

ANS: T REF: 541

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Chapter 15: Trauma, Mobile, and Surgical Radiography

Test Bank

MULTIPLE CHOICE

1. Which of the following imaging modalities is often used to diagnose pulmonary emboli?
 - a. Ultrasound
 - b. MRI (magnetic resonance imaging)
 - c. Nuclear medicine
 - d. None of the above

ANS: C REF: 572

2. Which imaging modality is often used to diagnose an ectopic pregnancy?
 - a. Ultrasound
 - b. Nuclear medicine
 - c. MRI
 - d. CT (computed tomography)

ANS: A REF: 572

3. Which of the following terms best describes a partial dislocation of a joint?
 - a. Subluxation
 - b. Luxation
 - c. Apposition
 - d. Angulation

ANS: A REF: 572

4. A bruise type of injury with a possible avulsion fracture is termed a(n):
 - a. subluxation.
 - b. apposition.
 - c. contusion.
 - d. luxation.

ANS: C REF: 572

5. Which term describes a misalignment of a distal fracture fragment that is angled toward the midline?
 - a. Anatomic apposition
 - b. Varus deformity
 - c. Valgus deformity
 - d. Distraction

ANS: B REF: 573

6. Which type of fracture is defined as being crushed at the site of impact, producing two or more fragments?
 - a. Comminuted
 - b. Compound
 - c. Complete

d. Torus

ANS: A REF: 574

7. Which of the following fractures is described as an incomplete fracture with the cortex broken on one side of the bone?
- a. Bayonet
 - b. Torus
 - c. Avulsion
 - d. Greenstick

ANS: D REF: 573

8. Which of the following is not a fracture but a subluxation?
- a. Hutchinson's
 - b. Nursemaids' elbow
 - c. Monteggia's
 - d. None of the above

ANS: B REF: 572

9. Which of the following fractures is often called a *reverse Colles'* with anterior displacement of the distal radius?
- a. Pott's
 - b. Trimalleolar
 - c. Tripod
 - d. Smith's

ANS: D REF: 574

10. Which of the following fractures involves the distal fifth metacarpal?
- a. Boxer's
 - b. Barton's
 - c. Pott's
 - d. Smith's

ANS: A REF: 574

11. Which of the following fractures usually involves the spine?
- a. Depressed
 - b. Comminuted
 - c. Stellate
 - d. Compression

ANS: D REF: 575

12. Which type of procedure would be performed in surgery to realign a fracture?
- a. Open reduction
 - b. Closed reduction
 - c. Internal fixation
 - d. Compound reduction

ANS: A REF: 576

13. Generally, only one joint needs to be included for follow-up studies of a long bone fracture.
- a. True
 - b. False

ANS: A REF: 571

14. A fracture in which the bone is broken into three pieces, with the middle fragment fractured at both ends, is termed _____ fracture.
- a. segmental
 - b. butterfly
 - c. splintered
 - d. impacted

ANS: A REF: 574

15. A fracture that occurs through the pedicles of the axis (C2), with or without displacement of C2 or C3, is termed _____ fracture.
- a. odontoid
 - b. clay shoveler's
 - c. Jefferson
 - d. hangman's

ANS: D REF: 574

16. Which fracture is also called a "march fracture"?
- a. Pott
 - b. Stress
 - c. Trimalleolar
 - d. Burst

ANS: B REF: 575

17. A fragment of bone that is separated or pulled away by the attached tendon or ligament is termed a(n) _____ fracture.
- a. avulsion
 - b. chip
 - c. depressed
 - d. epiphyseal

ANS: A REF: 575

18. With high-level fluoroscopy (HLF), the maximum exposure rate cannot exceed 20 R/min.
- a. True
 - b. False

ANS: A REF: 568

19. Because of radiation exposure to the head and neck region, the C-arm should not be placed in the posteroanterior (PA) projection tube alignment.
- a. True
 - b. False

ANS: B

REF: 568-569

20. _____ is used to create an x-ray beam that activates at timed increments to reduce exposure during C-arm fluoroscopy.
- Pulse mode
 - Road-mapping
 - Magnification mode
 - Boost digital spot

ANS: A

REF: 567

21. A self-propelled, battery-driven mobile x-ray unit will generally go up a maximum incline of:
- 2°.
 - 7°.
 - 10°.
 - 15°.

ANS: B

REF: 565

22. What is the minimum distance a technologist should stand away from the x-ray tube during an exposure when using a mobile x-ray unit?
- 1 foot
 - 3 feet
 - 6 feet
 - 10 feet

ANS: C

REF: 568

23. Which one of the three cardinal rules of radiation protection is the most effective means of reducing exposure during mobile and surgical procedures?
- Time
 - Shielding
 - Distance
 - None of the above; all are equally effective.

ANS: C

REF: 568

24. Which of the C-arm orientations in general results in the greatest exposure to the operator's head region if the distance from the patient is unchanged (patient is supine)?
- Anteroposterior (AP) projection (x-ray tube above anatomy)
 - PA projection (x-ray tube below anatomy)
 - PA, 30° tilt away from operator
 - No significant difference

ANS: A

REF: 568

25. A radiographer receives 400 mR/hr standing 1 foot from a C-arm fluoroscopy unit. What is the exposure rate if the radiographer moves to a distance of 3 feet?
- 100 to 150 mR/hr
 - 75 to 100 mR/hr
 - 25 to 50 mR/hr

d. Less than 10 mR/hr

ANS: C REF: 568

26. Where should the operator (or surgeon) stand when using a C-arm fluoroscopy unit in a horizontal central ray (CR) position?
- a. Intensifier end of the C-arm
 - b. X-ray tube end of the C-arm
 - c. Midway between the x-ray tube and the intensifier
 - d. Must stand back at least 6 feet from the patient

ANS: A REF: 568

27. A 30° tilt of the C-arm x-ray tube from the vertical position will increase radiation exposure to the face and neck region of the operator standing next to the C-arm by approximately a factor of:
- a. 2.
 - b. 3.
 - c. 4.
 - d. 6.

ANS: C REF: 568

28. How should the CR be aligned for an AP projection of the chest?
- a. Perpendicular to the long axis of the sternum
 - b. Perpendicular to the plane of the image receptor (IR)
 - c. Perpendicular to the midcoronal plane
 - d. Parallel to the midsagittal plane

ANS: A REF: 577

29. A patient enters the emergency department (ED) with a possible pneumothorax of the right lung. The patient is unable to stand or sit erect. Which specific position should be performed to diagnose this condition?
- a. Left lateral decubitus
 - b. Right lateral decubitus
 - c. Ventral decubitus
 - d. AP supine

ANS: A REF: 580

30. A patient enters the ED with a possible fractured sternum. The patient is supine and unable to lie prone. Which of the following routines best demonstrates the sternum?
- a. Right posterior oblique (RPO) and lateral recumbent
 - b. AP and horizontal beam lateral
 - c. AP and LPO
 - d. LPO and horizontal beam lateral

ANS: D REF: 571 | 578

31. How much rotation is required for an AP oblique projection of the sternum on a hypersthenic patient?

- a. 20
- b. 25
- c. 30
- d. 15

ANS: D

REF: 578

32. What type of “holding breath” instructions should be given for an AP projection (patient supine) of the ribs located above the diaphragm?
- a. Expose upon inspiration.
 - b. Expose upon expiration.
 - c. Suspend respiration and expose.
 - d. Perform a breathing technique.

ANS: A

REF: 579

33. A patient enters the ED with severe trauma to the abdomen. The ED physician is concerned about bleeding in the abdomen with associated possible free intra-abdominal air. The patient is unable to stand or sit erect. Which position best demonstrates the condition?
- a. AP supine
 - b. Dorsal decubitus
 - c. Ventral decubitus
 - d. Lateral decubitus

ANS: D

REF: 577

34. Which of the following positions or projections best demonstrates free intra-abdominal air on the patient who cannot stand or sit erect?
- a. Right lateral decubitus
 - b. AP supine
 - c. Left lateral decubitus
 - d. Dorsal decubitus

ANS: C

REF: 580

35. A patient comes to the ED with a possible abdominal aortic aneurysm. Which of the following projections of the abdomen best demonstrates it?
- a. Erect abdomen
 - b. Dorsal decubitus
 - c. Right lateral decubitus
 - d. AP kidneys, ureter, bladder (KUB)—supine

ANS: B

REF: 580

36. What is the primary disadvantage of performing a PA thumb over an AP projection?
- a. May not demonstrate the entire thumb
 - b. Is more difficult to position
 - c. Results in an increase in object image receptor distance (OID)
 - d. Requires the use of a higher kV and greater exposure to patient

ANS: C

REF: 581

37. Postreduction projections of the upper and lower limbs generally require only the joint nearest to the fracture site.
- True
 - False

ANS: A

REF: 582

38. A patient enters the ED with a fractured forearm. The physician reduces the fracture and places a fiberglass cast on the forearm. The initial analog technique was 55 kV and 5 mAs. Which of the following technical factors is best for the postreduction study?
- 59 kV; 5 mAs
 - 62 kV; 5 mAs
 - 67 kV; 5 mAs
 - 72 kV; 5 mAs

ANS: A

REF: 582

39. How should the CR be aligned for a trauma PA projection of the elbow?
- Perpendicular to the interepicondylar plane
 - Parallel to the interepicondylar plane
 - Perpendicular to the palmar surface of the hand
 - None of the above; projection should be taken AP, not PA.

ANS: A

REF: 583

40. A patient enters the ED with a possible shoulder dislocation. Because of his multiple injuries, the patient is unable to stand or sit erect. Which of the following routines best demonstrates the dislocation?
- AP external and internal rotation projections
 - AP and transaxillary projections
 - AP and horizontal beam transthoracic lateral projections
 - AP and AP axial projections

ANS: C

REF: 585

41. A patient enters the ED with a possible fractured scapula. Because of her multiple injuries, the patient is on a backboard. Which of the following techniques is most helpful in providing a lateral view of the scapula if the patient is unable to rotate the affected shoulder adequately?
- Perform a horizontal beam lateral.
 - Angle the CR parallel to the scapular spine.
 - Angle the CR lateromedial and parallel to the scapular body.
 - Angle the CR mediolateral and perpendicular to the scapular body.

ANS: C

REF: 585

42. How much rotation of the body is generally required for an AP oblique, lateral scapular Y projection?
- 10° to 15° from AP projection
 - 25° to 30° from AP projection
 - 35° to 40° from AP projection
 - 45° to 60° from AP projection

ANS: B

REF: 585

43. What CR angulation should be used for an AP axial projection of the clavicle on an asthenic patient?
- a. 10° cephalad
 - b. 15° caudal
 - c. 20° cephalad
 - d. 40° cephalad

ANS: C

REF: 585

44. An ankle series would best demonstrate a Pott fracture.
- a. True
 - b. False

ANS: A

REF: 575 | 587

45. A patient's lower leg is in traction in the hospital bed. The orthopedic surgeon orders an AP mortise projection of the ankle. Because of the traction, the lower leg cannot be rotated. The leg is in a straight "foot up" position. What can the radiographer do to achieve this AP mortise projection?
- a. Perform a horizontal beam lateral projection.
 - b. Perform a CR 15° to 20° lateromedial angle AP projection.
 - c. Perform a CR 15° to 2° mediolateral angle AP projection.
 - d. Loosen the traction device and oblique the ankle.

ANS: B

REF: 587

46. A patient enters the ED on a backboard with multiple injuries, including an injury to the knee region with a possible stellate fracture noted on the examination requisition. Which of the following routines best demonstrates this injury safely?
- a. AP and 30° flexed lateral knee projections
 - b. AP and 30° flexed lateral knee projections to include the proximal tibia-fibula
 - c. AP medial oblique and 30° flexed lateral knee projections
 - d. AP and horizontal beam lateral projections of the knee and patella without knee flexion

ANS: D

REF: 588

47. Which of the following projections best produces an unobstructed view of the fibular head and neck without rotation of the lower leg (with patient in supine position)?
- a. AP knee projection
 - b. Horizontal beam lateral projection
 - c. AP projection with a CR 45° mediolateral angle
 - d. AP projection with a CR 45° lateromedial angle

ANS: D

REF: 588

48. How is the CR aligned for an axiolateral, inferosuperior (Danelius-Miller) projection?
- a. Parallel to femoral neck
 - b. Perpendicular to femoral neck

- c. AP 30° and axial and horizontal beam lateral skull
- d. AP acanthioparietal and horizontal beam lateral facial bone projection

ANS: B REF: 597

61. A patient enters the ED with a radial head fracture and dislocation. The ED physician orders an elbow series. The elbow is flexed near 90° and is unable to extend it farther. Which of the following positioning routines would work best for this patient?
- a. AP, lateral, and AP oblique-medial rotation positions
 - b. AP partial flexion, lateral, and trauma axiolateral (Coyle method) projections
 - c. AP acute flexion, AP oblique-lateral rotation, and lateral positions
 - d. Axiolateral projections, AP acute flexion, and lateral positions

ANS: B REF: 582

62. Which of the following is not an essential attribute for the surgical radiographer?
- a. Confidence
 - b. Mastery of positioning and technical concepts
 - c. Problem-solving skills
 - d. Mastery of essential nursing skills

ANS: D REF: 599

63. A health professional who prepares the operating room (OR) by supplying it with the appropriate supplies and instruments is a:
- a. certified surgical technologist (CST).
 - b. circulator.
 - c. scrub.
 - d. surgical assistant.

ANS: A REF: 600

64. An individual who prepares the sterile field and scrubs and gowns the members of the surgical team is a:
- a. certified surgical technologist (CST).
 - b. circulator.
 - c. scrub.
 - d. surgical assistant.

ANS: C REF: 600

65. What should a technologist do if the sterile environment is violated during a surgical procedure?
- a. Note the violation on the examination requisition.
 - b. Inform the radiology supervisor.
 - c. Notify a member of the surgical team once the procedure has been completed.
 - d. Notify a member of the surgical team immediately.

ANS: D REF: 601

66. Which one of the following devices is best during a C-arm hip pinning procedure to protect the sterile environment?

- c. AP 30° and axial and horizontal beam lateral skull
- d. AP acanthioparietal and horizontal beam lateral facial bone projection

ANS: B REF: 597

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 - b. AP partial flexion, lateral, and trauma axiolateral (Coyle method) projections
 - c. AP acute flexion, AP oblique-lateral rotation, and lateral positions
 - d. Axiolateral projections, AP acute flexion, and lateral positions

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 - d. Notify a member of the surgical team immediately.

ANS: D REF: 601

66. Which one of the following devices is best during a C-arm hip pinning procedure to protect the sterile environment?

- a. Sterile towel over image intensifier
- b. Sterile towel over x-ray tube
- c. Shower curtain
- d. Wiping down the entire C-arm with an antiseptic solution

ANS: C REF: 602

67. Asepsis is defined as a(n):
- a. clean environment.
 - b. absence of infectious organisms.
 - c. sterile dressings and covers.
 - d. proper handwashing.

ANS: B REF: 601

68. OR tables are considered sterile only at the level of the tabletop.
- a. True
 - b. False

ANS: A REF: 601

69. The entire sterile gown, worn by the surgeon, is considered sterile.
- a. True
 - b. False

ANS: B REF: 601

70. Only sterile items are allowed within the sterile field.
- a. True
 - b. False

ANS: A REF: 601

71. Shoe covers are not required in the presurgical or recovery areas.
- a. True
 - b. False

ANS: B REF: 604

72. An aerosol cleaner should be used in cleaning the C-arm in surgery before a procedure.
- a. True
 - b. False

ANS: B REF: 604

73. Which one of the following methods will best reduce patient dosage during a fluoroscopic procedure in surgery?
- a. Increase mA.
 - b. Use intermittent fluoro.
 - c. Decrease kV.
 - d. Place x-ray tube above patient.

ANS: B REF: 605

74. "Boost" exposures used during C-arm procedures are intended to:
- decrease patient dose.
 - provide a road map effect.
 - increase brightness of image.
 - decrease the technologist's dose.

ANS: C REF: 605

75. The primary clinical indication for an operative cholangiogram is:
- biliary calculi.
 - jaundice.
 - pancreatitis.
 - hepatitis.

ANS: A REF: 606

76. When performing conventional imaging during an operative cholangiogram, the IR is placed in a special metal tray called a:
- Smith tray.
 - Meyer's tray.
 - cholangiogram tray.
 - "pizza pan."

ANS: D REF: 606

77. Typically, how much contrast media is injected by the surgeon during an operative cholangiogram?
- 1 to 2 mL
 - 6 to 8 mL
 - 10 to 12 mL
 - 15 to 20 mL

ANS: B REF: 606

78. Which of the following modifications must be made if the OR table is tilted while imaging during an operative cholangiogram using analog imaging?
- Increase kV.
 - Decrease kV.
 - Turn grid crosswise.
 - Increase SID.

ANS: C REF: 607

79. Which one of the following structures is not typically visualized during an operative cholangiogram?
- Hepatic ducts
 - Cystic duct
 - Common bile duct
 - Stensen duct

ANS: D REF: 607

80. Which of the following is NOT an advantage of laparoscopic cholecystectomy?

- a. It can be performed as an outpatient procedure.
- b. The procedure is performed without anesthetic in radiology.
- c. It is a less invasive procedure.
- d. The patient can return home following procedure.

ANS: B REF: 607

81. Retrograde urography is classified as a nonfunctioning study of the urinary system.

- a. True
- b. False

ANS: A REF: 608

82. A laparoscope is used during the retrograde urogram.

- a. True
- b. False

ANS: B REF: 608

83. The urologist will withdraw the urethral catheter before imaging during a retrograde pyelogram.

- a. True
- b. False

ANS: B REF: 608

84. The retrograde pyelogram is intended to demonstrate the collecting structures of the kidney only.

- a. True
- b. False

ANS: A REF: 608

85. The abbreviation ORIF refers to:

- a. orthopedic reduction internal fixation.
- b. open reduction internal fracture.
- c. orthopedic rodding internal fixation.
- d. open reduction internal fixation.

ANS: D REF: 609

86. Which of the following procedures is a nonsurgical procedure?

- a. Closed reduction
- b. Open reduction
- c. Internal fixation
- d. Intramedullary fixation

ANS: A REF: 609

87. Which one of the following devices is classified as an external fixator?

- a. Intramedullary nail
- b. Interbody fusion cages
- c. Ilizarov device

d. Compression screw

ANS: C REF: 609

88. Which device is commonly used during a hip pinning to reduce a fracture of the proximal femur?

- a. Ilizarov device
- b. Intramedullary nail
- c. Cannulated screw assembly
- d. Kirschner wire

ANS: C REF: 610

89. What type of orthopedic fixator is commonly used to reduce midhumeral fractures?

- a. Compression screw assembly
- b. Intramedullary rod
- c. Kirschner wire
- d. Interbody fusion cage

ANS: B REF: 613

90. Arthroplasty is a formal term describing a(n):

- a. internal reduction of a long bone fracture.
- b. removal of damaged meniscus in the knee.
- c. débridement of loose bodies in a joint.
- d. total hip replacement.

ANS: D REF: 612

91. What is the newer type of prosthetic device being used for total hip replacements?

- a. Austin-Moore
- b. Thompson
- c. Ilizarov device
- d. Modular bipolar endoprosthesis

ANS: D REF: 612

92. A surgical procedure to remove a small portion of the bone that is impinging the nerve root is termed:

- a. spinal fusion.
- b. vertebroplasty.
- c. laminectomy.
- d. discectomy.

ANS: C REF: 614

93. Which of the following devices is an alternative to traditional spinal fusion procedures?

- a. Harrington rods
- b. Interbody fusion cage
- c. Ilizarov device
- d. Cortical screw

ANS: B REF: 614

94. Which one of the following procedures uses a high-powered stereoscopic microscope to provide illumination and magnification of the impinged nerve and surrounding structures?
- a. Laminectomy
 - b. Microdiscectomy
 - c. Arthroplasty
 - d. Scoliosis corrective procedure

ANS: B REF: 615

95. Which procedure may require the use of Luque or Harrington rods?
- a. Arthroplasty
 - b. Internal reduction of long bone
 - c. Scoliosis corrective procedure
 - d. Microdiscectomy

ANS: C REF: 616

96. Which procedure introduces orthopedic cement directly into the weakened vertebrae?
- a. Vertebroplasty
 - b. Microdiscectomy
 - c. Spinal fusion
 - d. Scoliosis corrective surgery

ANS: A REF: 616

97. An orthopedic wire that tightens around a fracture site to reduce shortening of a limb is a _____ wire.
- a. Kirschner
 - b. cancellous
 - c. cortical
 - d. cerclage

ANS: D REF: 618

98. Electrohydraulic shock wave used to break apart calcifications in the urinary system is the definition for:
- a. ORIF.
 - b. HTO.
 - c. ESWL.
 - d. EHS.

ANS: C REF: 618

99. Soaking of moisture through a sterile or nonsterile drape, cover, or protective barrier permitting bacteria to reach sterile areas is generally termed:
- a. sterile violation.
 - b. strike-through.
 - c. transmission.
 - d. aseptic leakage.

ANS: B REF: 618

100. In orthopedic terms, CR refers to:

- a. cast removal.
- b. callus reduction.
- c. closed reduction.
- d. cast reduction.

ANS: C

REF: 618

101. An internal pacemaker implantation can be performed under local anesthetic.

- a. True
- b. False

ANS: A

REF: 617

MATCHING

Match each of the following fractures with its alternative name or term. (Use each choice only once.)

- a. Smith fracture
 - b. Closed fracture
 - c. Hickory-stick fracture
 - d. Mallet fracture
 - e. Chauffeur's fracture
 - f. March fracture
 - g. Tripod fracture
-
- 1. Baseball fracture
 - 2. Hutchinson's fracture
 - 3. Reverse Colles' fracture
 - 4. Simple fracture
 - 5. Blow-out fracture
 - 6. Greenstick fracture
 - 7. Stress or fatigue fracture

- | | |
|-----------|----------|
| 1. ANS: D | REF: 574 |
| 2. ANS: E | REF: 574 |
| 3. ANS: A | REF: 574 |
| 4. ANS: B | REF: 573 |
| 5. ANS: G | REF: 575 |
| 6. ANS: C | REF: 573 |
| 7. ANS: F | REF: 575 |

Chapter 16: Pediatric Radiography

Lampignano: Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition

MULTIPLE CHOICE

1. Which of the following terms is commonly applied in describing child abuse?
- Battered child syndrome (BCS)
 - Pediatric intentional trauma (PIT)
 - Nonaccidental trauma (NAT)
 - Suspected child abuse (SCA)

ANS: C REF: 620

2. Which of the following factors should be the first consideration in controlling motion for the pediatric patient?
- Parent holding child
 - Sandbags and tape
 - High kV techniques
 - Short exposure time

ANS: D REF: 621

3. Which of the following immobilization devices is recommended for an erect abdomen projection on an 18-month-old patient?
- Pigg-O-Stat
 - Tam-em Board
 - Plexiglas hold-down paddle
 - Parent/guardian holding

ANS: A REF: 617

4. The neonate is defined as a child:
- between 1 and 3 months of age.
 - newly born.
 - between a newborn and 28 days of age.
 - between a newborn and 3 years of age.

ANS: B REF: 622

5. Classic metaphyseal lesion (CML) is a fracture involving the:
- entire long bone.
 - metaphysis.
 - epiphysis.
 - diaphysis.

ANS: B REF: 620

6. Which term describes the primary center for ossification of long bones?
- Epiphysis
 - Diaphysis

- c. Epiphyseal plate
- d. Metaphysis

ANS: B REF: 619

7. Which term describes the space between the primary and secondary growth centers?
- a. Epiphysis
 - b. Diaphysis
 - c. Epiphyseal plate
 - d. Metaphysis

ANS: C REF: 619

8. Another term for the CML injury is:
- a. flail fracture.
 - b. osteogenesis imperfecta.
 - c. compression fracture.
 - d. corner fracture.

ANS: D REF: 620

9. Which of the following pathologies is best demonstrated with a radiographic chest procedure?
- a. Cystic fibrosis
 - b. Wilms' tumor
 - c. Celiac disease
 - d. Crohn's disease

ANS: A REF: 623

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10. The central ray (CR) should be directed to the level of _____ for a lateral 2-year-old chest patient.
- a. the mammillary line
 - b. 2 inches (5 cm) above the umbilicus
 - c. 1 inch (2.5 cm) above the xiphoid tip
 - d. 2 inches (5 cm) above the jugular notch

ANS: A REF: 629

11. Which modality is commonly used for evaluating congenital hip dislocation in newborns?
- a. Magnetic resonance imaging (MRI)
 - b. Computed tomography (CT)
 - c. Nuclear medicine
 - d. Sonography

ANS: D REF: 622

12. Which modality is commonly used for evaluating vesicoureteral reflux in infants?
- a. MRI
 - b. CT
 - c. Nuclear medicine
 - d. Sonography

ANS: C REF: 626

13. Which modality is commonly used for evaluating and staging of tumors in young children without providing a high patient dose?
- MRI
 - CT
 - Nuclear medicine
 - Sonography

ANS: A REF: 622

14. Which modality is commonly used to produce three-dimensional images of vascular lesions without introducing contrast media?
- MRI
 - Helical CT
 - Nuclear medicine
 - Sonography

ANS: B REF: 622

15. Which modality is commonly used for clinical evaluation for attention-deficit hyperactivity disorder (ADHD) in young children?
- Functional MRI
 - Nuclear medicine
 - Sonography
 - None of the above

ANS: A REF: 622

16. Which modality is commonly used for diagnosing pyloric stenosis in infants or young children without providing a high patient dose?
- MRI
 - CT
 - Sonography
 - None of the above

ANS: C REF: 622

17. Which of the following digital system kV ranges is recommended for a lateral projection of the pediatric chest?
- 60 to 65
 - 70 to 75
 - 75 to 80
 - 100 to 115

ANS: C REF: 629

18. Which of the following pathologic indications requires a significant decrease (up to 50%) of manual exposure factors?
- Osteomalacia (rickets)
 - Osteogenesis imperfecta
 - Talipes equinus
 - Osteochondrosis

ANS: B REF: 625

19. A type I Salter-Harris fracture involves the:
- metaphysis.
 - diaphysis.
 - epiphyseal plate.
 - hyaline cartilage.

ANS: C REF: 624

20. What are the basic projections and/or positions for a radiographic study of the hips on a pediatric patient (nontraumatic injury)?
- Anteroposterior (AP) projection only
 - AP and horizontal beam inferosuperior lateral projections
 - AP and bilateral frog-leg projections
 - AP and Clements-Nakayama projections

ANS: C REF: 633

21. Which positioning line is perpendicular to the image receptor (IR) for an AP projection of the pediatric skull?
- Orbitomeatal line (OML)
 - Inferior OML
 - Mentomeatal line (MML)
 - Acanthiomeatal line (AML)

ANS: A REF: 637

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22. Which of the following radiographic structures are evaluated to best determine tilt on a lateral pediatric skull projection?
- Top of ear attachments (TEAs)
 - Orbital floors
 - External acoustic/auditory meatus (EAMs)
 - Orbital plates or roofs

ANS: D REF: 638

23. What is the recommended nothing by mouth (NPO) fasting period for a 1-month-old infant before an upper gastrointestinal series?
- None
 - 3 hours
 - 4 hours
 - 6 hours

ANS: B REF: 639

24. Double-contrast barium enemas are most commonly performed on young pediatric patients when _____ suspected.
- Hirschsprung disease is
 - intussusception is
 - intestinal bleeding is
 - polyps are

ANS: D REF: 639

25. Where is the CR centered for a kidneys, ureter, and bladder (KUB) projection performed on an infant?
- At the level of the iliac crest
 - 1 inch (2.5 cm) above the umbilicus
 - Midway between the mammary line and the umbilicus
 - 1 inch (2.5 cm) below the iliac crest

ANS: B REF: 640

26. A bowel obstruction caused by an accumulation of fluid in the bowel of a full-term fetus is termed:
- necrotizing enterocolitis.
 - meconium ileus.
 - intussusception.
 - appendicitis.

ANS: B REF: 626

27. Which projection and/or position of the abdomen is recommended for demonstrating the prevertebral region of the abdomen?
- AP supine
 - AP erect
 - Dorsal decubitus
 - Left lateral decubitus

ANS: C REF: 642

28. How much barium is given to an infant (<1 year) during an upper gastrointestinal series?
- 15 ml
 - 30 to 75 ml
 - 80 to 100 ml
 - 100 to 150 ml

ANS: B REF: 643

29. What is the average transit time for the barium to reach the ileocecal valve during a pediatric small bowel study?
- 30 minutes
 - 1 hour
 - 2 hours
 - 3 hours

ANS: B REF: 644

30. Images are taken at _____ intervals for a small bowel series on a pediatric patient.
- 10- to 15-minute
 - 20- to 30-minute
 - 30- to 40-minute
 - 1-hour

ANS: B REF: 644

31. What is the maximum height the enema bag should be above the tabletop at the beginning of a barium enema procedure?
- 1 foot (30 cm)
 - 2 feet (61 cm)
 - 3 feet (92 cm)
 - 6 inches (15 cm)

ANS: B REF: 646

32. What type of contrast media is most effective in reducing an intussusception?
- Barium
 - Iodinated, water soluble
 - Helium
 - Air

ANS: D REF: 645

33. Which of the following terms describes a condition in which the urethra opens up on the underside of the penis?
- Urethral shortening
 - Vesicoureteral reflux
 - Urethral valve defect
 - Hypospadias

ANS: D REF: 626

34. Which of the following digital kV ranges is recommended for a pediatric voiding cystourethrogram (VCUG) for neonates through age 18 years?
- 50 to 60
 - 65 to 75
 - 70 to 80
 - 80 to 90

ANS: C REF: 647

35. What size and type of catheter is recommended for a VCUG on a young pediatric patient?
- 8 Fr feeding tube
 - Small feeding tube, inflatable balloon-retaining catheter
 - 10 Fr flexible silicon catheter
 - Catheter not used, injected directly with a 20-mL syringe and fistula tip

ANS: A REF: 647

36. What is a common clinical indication for a pediatric VCUG?
- Vesicoureteral reflux
 - Urinary bladder calculi
 - Renal calculi
 - Anuria

ANS: A REF: 626

37. A 2-year-old child comes to radiology for a cervical spine series. The child is unable to hold still for the projections even with immobilization. Which of the following individuals should be asked to hold the child if present?
- Radiography student wearing protective apron
 - Older technologist wearing protective apron
 - Father wearing protective apron
 - Nurse wearing protective apron

ANS: C

REF: 617

38. A 1-year-old child comes to radiology for an erect abdomen. Which one of the following immobilization devices or techniques should be used during the exposure?
- Tam-em Board
 - Pigg-O-Stat
 - Compression bands
 - Stockinette

ANS: B

REF: 617

MATCHING

Match the correct pathologic indication of the pediatric chest to the following definitions. (Use each choice only once.)

- Atelectasis
- Cretinism (a thyroid gland disorder)
- Croup
- Hyaline membrane disease
- Cystic fibrosis
- Bronchiectasis

- Neonate hypothyroidism with slowed bone growth or possible dwarfism
- An emergency type of condition in newborns in which the alveoli and capillaries of the lungs are injured or infected, creating leakage of fluid into the alveoli; demonstrated radiographically by granular pattern of increased densities
- A condition of irreversible widening (dilation of the bronchi); frequently begins in early childhood (may require a slight increase in exposure factors)
- A condition of labored breathing and harsh dry cough caused by viral infection (most common in children ages 1 to 3 years)
- A condition of partial or complete collapse of a lung caused by an obstruction of the bronchus
- An inherited disease with progressive heavy mucus blocking the bronchi; demonstrated by increased radiodensities in specific lung regions

- ANS: B REF: 623
- ANS: D REF: 623
- ANS: F REF: 623
- ANS: C REF: 623
- ANS: A REF: 623
- ANS: E REF: 623

Match the correct pathologic indication of the pediatric skeletal system and abdomen to the definition. (Use each choice only once.)

- a. Köhler bone disease
 - b. Spina bifida occulta
 - c. Necrotizing enterocolitis
 - d. Hirschsprung disease
 - e. Osgood-Schlatter disease
 - f. Atresia (or clausura)
7. A mild form of a defect of the posterior arch of L5-S1 vertebrae
 8. An inflammation at the tibial tuberosity most common in 5- to 10-year-old boys
 9. A congenital condition in which there is an absence of an opening to an organ that requires surgical intervention
 10. An inflammation of the navicular bone of the foot; lasts up to 2 years; most common in 3- to 5-year-old boys
 11. An inflammation of the inner lining of the intestine that may lead to tissue death; most common in newborns
 12. A congenital condition of the large intestine in which nerves controlling rhythmic contractions are missing

- | | |
|------------|----------|
| 7. ANS: B | REF: 624 |
| 8. ANS: E | REF: 624 |
| 9. ANS: F | REF: 626 |
| 10. ANS: A | REF: 624 |
| 11. ANS: C | REF: 626 |
| 12. ANS: D | REF: 626 |

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TRUE/FALSE

1. A technologist's attitude is one of the more important factors in making a pediatric procedure a success.

ANS: T REF: 616
2. Fear and combative resistance from a young child are common initial responses to a radiographic procedure.

ANS: T REF: 616
3. The technologist is the one who should decide whether a parent remains in the radiographic room during a procedure.

ANS: T REF: 616
4. It is the responsibility of the technologist to determine if child abuse has occurred and then report it to law enforcement.

ANS: F REF: 620
5. The Pigg-O-Stat can be employed for pediatric skull procedures.

6. The adhesive surface of the tape should be applied directly to the skin of infants to help prevent movement of the body part during the exposure.

ANS: F REF: 623

7. Psychologic maltreatment is one of the six categories of child abuse.

ANS: T REF: 620

8. The mummifying technique is highly effective for immobilization of the lower limbs of children.

ANS: F REF: 618

9. Female caregivers of childbearing age should never be allowed to stay in the room to assist with the procedure.

ANS: F REF: 621

10. The ImageGently.org campaign is designed to use minimal immobilization techniques and measures when imaging a young child.

ANS: F REF: 621

11. Regions of extensive bone growth, such as the elbow and wrist, should be radiographed separately on older children rather than combined on a single projection of the entire limb.

ANS: T REF: 631

12. Gonadal shielding should not be used for any studies of the pelvis for bilateral hip evaluation.

ANS: F REF: 635

13. Children should not drink any fluid (including water and fruit juice) for 4 hours prior to intravenous urography (IVU).

ANS: F REF: 639

14. The lateral skull projection of an 8-year-old child requires approximately the same size IR as that used with an adult.

ANS: T REF: 638

15. It is difficult to distinguish the small bowel from the large on a pediatric abdominal radiograph.

ANS: T REF: 639

16. Latex enema tips should be used for pediatric barium enemas.

17. An inflatable balloon retention catheter should never be used for pediatric barium enemas.
ANS: T REF: 645
18. A radionuclide VCUG may be performed rather than a fluoroscopic VCUG.
ANS: T REF: 648
19. CT scans of pediatric patients should always use the highest resolution possible.
ANS: F REF: 622
20. Helical CT scan pitch ratio can be increased to reduce patient dose.
ANS: T REF: 622
21. A pediatric patient should not have solid food 8 hours before an IVU.
ANS: F REF: 639
22. Renal CT scans have largely replaced intravenous urography studies for pediatric patients.
ANS: T REF: 622

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Chapter 17. Angiography and Interventional Procedures

Test Bank

MULTIPLE CHOICE

Which specific artery provides blood to the pelvic organs, including the bladder, rectum, reproductive organs, and pelvic muscles?

- A) Superior mesenteric artery
- B) Inferior mesenteric artery
- C) Internal iliac artery
- D) External iliac artery

- C) Internal iliac artery

Which element of blood promotes blood clotting?

- A) Plasma
- B) Leukocytes
- C) Platelets
- D) Erythrocytes

- C) Platelets

Which of the following is NOT a function of the cardiovascular system?

- A) Producing red blood cells
- B) Transporting oxygen, nutrients, and hormones
- C) Removing waste products
- D) Maintaining body temperature

- A) Producing red blood cells

Which vessel carries blood from the lungs to the left atrium of the heart?

- A) Pulmonary vein
- B) Pulmonary artery
- C) Coronary vein
- D) Azygos vein

A) Pulmonary vein

Which heart valve is located between the left atrium and the left ventricle?

A) Pulmonary valve

B) Mitral valve

C) Aortic valve

D) Tricuspid valve

B) Mitral valve

Which two vessels deliver blood to the heart muscle?

A) Right and left pulmonary arteries

B) Right and left pulmonary veins C) Right and left coronary arteries D) Right and left cardiac arteries

C) Right and left coronary arteries

Which of the following vessel(s) do NOT supply blood to the brain?

A) Right common carotid artery

B) Left common carotid artery

C) Vertebral arteries

D) Subclavian arteries

D) Subclavian arteries

Which of the following vessels is NOT a major branch of the aortic arch?

A) Right common carotid artery

B) Left common carotid artery

C) Brachiocephalic artery

D) Left subclavian artery

A) Right common carotid artery

The right common carotid artery bifurcates into the external and internal carotid arteries at the level of:

A) C1-2.

B) C4.

C) C6-7.

D) T2-3.

B) C4.

The S-shaped portion of the internal carotid artery is termed the:

A) sigmoid portion.

B) carotid sinus.

C) carotid bifurcation.

D) carotid siphon.

D) carotid siphon.

Which vessel in the brain supplies blood primarily to the anterior portion of the brain?

A) Basilar artery

B) External carotid artery

C) Internal carotid artery

D) Vertebral arteries

C) Internal carotid artery

Which vessel is formed when the vertebral arteries join together at the base of the skull?

A) Basilar artery

B) Middle cerebral artery

C) Anterior cerebral artery

D) Middle meningeal artery

A) Basilar artery

Which of the following vessels is not part of the arterial circle (circle of Willis)?

A) Middle cerebral artery

B) Internal carotid artery

C) Posterior communicating artery D) Anterior cerebral artery

A) Middle cerebral artery

Eventually, the external jugular vein connects with the _____ to form the brachiocephalic vein.

- A) external jugular vein
- B) subclavian vein
- C) superior vena cava
- D) vertebral vein

B) subclavian vein

Which veins drain blood from the meninges of the brain?

- A) Internal jugular veins
- B) Vertebral veins
- C) Brachiocephalic veins
- D) External jugular veins

A) Internal jugular veins

Which veins drain blood from the scalp and facial region?

- A) Internal jugular veins
- B) Vertebral veins
- C) Brachiocephalic veins
- D) External jugular veins

D) External jugular veins

Which dural venous sinus is located within the inner aspect of the longitudinal fissure of the brain?

- A) Sigmoid sinus
- B) Straight sinus
- C) Transverse sinus
- D) Superior sagittal sinus

A) Sigmoid sinus

Where do the openings for the coronary arteries originate?

- A) Ascending aorta
- B) Aortic arch

- C) Aortic bulb (root)
- D) Left ventricle of the heart

C) Aortic bulb (root)

Which term describes a variation of the aorta in which the descending aorta is arched to the right?

- A) Hyperarched aorta
- B) Inverse aorta
- C) Pseudocoarctation
- D) Situs inversus

B) Inverse aorta

Which vein drains and receives blood from the intercostal, bronchial, esophageal, and phrenic veins?

- A) Pulmonary vein
- B) Inferior vena cava
- C) Azygos vein
- D) Superior vena cava

C) Azygos vein

Which of the branches of the abdominal aorta is considered the most superior?

- A) Superior mesenteric artery
- B) Inferior mesenteric artery
- C) Celiac artery
- D) Renal arteries

C) Celiac artery

Which of the following provides blood to the majority of the small intestine and portions of the large intestine?

- A) Celiac axis
- B) Superior mesenteric artery

- C) Inferior mesenteric artery
- D) Common iliac arteries
- B) Superior mesenteric artery

The hepatic portal vein carries blood from the abdominal digestive track to the:

- A) inferior vena cava.
- B) spleen.
- C) kidneys.
- D) liver.
- D) liver.

Which two vessels unite to form the hepatic portal vein?

- A) Hepatic and superior mesenteric veins
- B) Superior mesenteric and splenic veins
- C) Splenic and renal veins
- D) Hepatic and splenic veins
- B) Superior mesenteric and splenic veins

On the right side of the body, the subclavian artery is a branch of the:

- A) brachiocephalic artery.
- B) right common carotid artery.
- C) right vertebral artery.
- D) aortic arch.
- A) brachiocephalic artery.

Which vein is most commonly used to draw blood from the arm? A) Cephalic

- B) Basilic
- C) Median cubital
- D) Brachial
- C) Median cubital

Which of the following arteries is NOT found in the lower limb?

- A) Popliteal
- B) Deep femoral
- C) Dorsalis pedis
- D) Deep palmar
- D) Deep palmar

Which is the longest vein in the body?

- A) Great (long) saphenous vein
- B) Inferior vena cava
- C) Femoral vein
- D) Popliteal vein
- A) Great (long) saphenous vein

Which of the following functions is NOT performed by the lymphatic system?

- A) Synthesizing certain amino acids
- B) Transferring fats from intestine to the blood
- C) Filtering the lymph
- D) Returning proteins and other substances to the blood
- A) Synthesizing certain amino acids

What is the largest lymph vessel in the body?

- A) Thoracic duct
- B) Inguinal duct
- C) Axillary duct
- D) Intestinal duct
- A) Thoracic duct

Lymphography is considered an obsolete radiographic procedure.

True

How long should solid food be withheld prior to angiography?

- A) 1 hour
- B) 4 hours
- C) 8 hours
- D) 12 hours

C) 8 hours

Which of the following vessels is NOT a typical puncture site for catheterization during angiography?

- A) Brachial artery
- B) External iliac artery
- C) Femoral artery
- D) Axillary artery

B) External iliac artery

Which vessel is the preferred site for arterial puncture for most angiography?

- A) Femoral artery
- B) Brachial artery
- C) Subclavian artery
- D) External iliac artery

A) Femoral artery

The contrast medium of choice for angiography is:

- A) ionic iodinated.
- B) tri-iodinated.
- C) nonionic water-soluble iodinated.
- D) oil-based iodinated.

C) nonionic water-soluble iodinated.

Which of the following is NOT a contraindication for angiography? A) Impaired renal function

B) Taking anticoagulant medication

- C) Unstable cardiopulmonary status
- D) None of the above; all are contraindications.
- D) None of the above; all are contraindications.

What is the name of the technique commonly used to introduce a catheter into a vessel?

- A) Direct stick
- B) Over the needle
- C) Myer
- D) Seldinger
- D) Seldinger

What is the purpose of a heating device on an electromechanical injector?

- A) To sterilize the contrast media
- B) To expand the diameter of the catheter
- C) To remove any possible air bubbles by heating the contrast media
- D) To reduce the viscosity of the contrast media by keeping it near body temperature
- D) To reduce the viscosity of the contrast media by keeping it near body temperature

Injection flow rate in angiography is NOT affected by:

- A) viscosity of contrast media.
- B) length and diameter of catheter.
- C) injection pressure.
- D) body temperature.
- D) body temperature.

Which of the following conditions contraindicates the use of a femoral approach during cerebral angiography?

- A) Arterial aneurysm
- B) Obese patient
- C) Lack of pulsation in the femoral artery
- D) Arteriovenous malformations
- C) Lack of pulsation in the femoral artery

Which imaging modality has largely replaced venograms with no radiation exposure to the patient?

- A) Angiography
- B) CT
- C) Color duplex
- D) Nuclear medicine
- C) Color duplex

Which position is most useful in preventing superimposition of the aortic arch and its branches with other structures during thoracic aortography?

- A) AP
- B) Lateral
- C) 45° LAO
- D) 60° LPO
- C) 45° LAO

How long can a peripherally inserted central catheter (PICC) line remain in the patient safely (if properly maintained)?

- A) 1 week
- B) 30 days
- C) 6 months
- D) 18 months
- C) 6 months

Three-dimensional rotational angiography is highly recommended for:

- A) arteriovenous malformations.
- B) lymph node pathology.
- C) cardiomyopathy.
- D) pulmonary embolus.
- A) arteriovenous malformations.

An example of a nonvascular interventional procedure is:

- A) nephrostomy.
- B) thrombolysis.
- C) stent placement.
- D) embolization of a vessel.

A) nephrostomy

The most common clinical indication for a percutaneous biliary drainage is:

- A) infusion therapy.
- B) palliative procedure for unresectable malignant disease.
- C) biliary stone removal.
- D) repair duct that is leaking bile.

B) palliative procedure for unresectable malignant disease.

To avoid puncturing other organs during percutaneous gastrostomy, the stomach is filled with _____ during the procedure.

- A) water-soluble contrast media
- B) nitrogen
- C) air
- D) barium sulfate

C) air

Which vessel is punctured during a TIPS procedure to access the hepatic portal system?

- A) Femoral artery
- B) Femoral vein
- C) Inferior vena cava
- D) Right jugular vein

D) Right jugular vein

What type of chemical agent is given to control vascular spasm? A) Thrombolytic

B) Vasoconstrictor

- C) Vasodilator
- D) Chemotherapeutic
- C) Vasodilator

Uterine artery embolization is commonly performed to:

- A) treat ovarian cancer.
- B) treat infertility issues.
- C) control life-threatening postpartum bleeding.
- D) treat a rectouterine fistulae.
- C) control life-threatening postpartum bleeding.

Which of the following imaging modalities is recommended for biopsy of small and deep lesions within the abdomen?

- A) Doppler ultrasound
- B) MRI
- C) DSA
- D) CT
- D) CT

How is neoplastic tissue destroyed during radiofrequency ablation? A) Freezing the tissue

- B) Heating the tissue
- C) Applying magnetic energy to the tissue
- D) Cutting off blood supply to the tissue
- B) Heating the tissue

What other contrast media can be given during angiography if the patient is highly allergic to iodinated contrast media?

- A) Air
- B) Nitrogen
- C) CO₂
- D) Helium
- C) CO₂

Chapter 18. Computed Tomography

Test Bank

MULTIPLE CHOICE

A 64-slice CT scanner can require up to _____ images per second

- a. 64
 - b. 160
 - c. 525
 - d. 1048
- b. 160

At what level does the solid spinal cord terminate?

- a. L1
 - b. L2
 - c. L3
 - d. L4
- a. L1

The central midline portion of the brain connecting to the midbrain, pons, and medulla to the spinal cord is called the:

Brainstem

A collection of blood accumulating under the dura mater caused by trauma is termed:

- a. subdural hematoma.
 - b. subarachnoid hemorrhage.
 - c. glioma.
 - d. subdural abscess.
- a. Subdural hematoma

Common pathologic indications for a CT study of the spine include all of the following except:

- a. Infection
- b. Spinal stenosis
- c. Spinal cord deformity
- d. Fracture of the vertebrae
- c. Spinal cord deformity

Consists of tracts of myelinated axons of nerve cells

White matter

Contrast media does not often pass what barrier?

Blood-brain barrier

CT can detect tissue density differences as low as:

- a. 1 %
- b. 5%
- c. 10%
- d. 20%

- a. 1 %

A CT hystography requires the use of _____ as a contrast medium

- a. Barium sulfate
- b. Iodinated rectal contrast
- c. Air
- d. All of the above

- c. Air

CT scan of the neck for a possible tumor of the nasopharynx requires slice thickness no greater than?

- a. 2-3 mm
- b. 5 mm
- c. 7-10 mm
- d. 1 cm

- a. 2-3 mm

Define the processes that conduct impulses toward the neuron cell body

Dendrite

Define the process that leads away from the cell body

Axon

The dendrite and cell bodies make up what?

Gray matter of the brain and spinal cord

The depth of the voxels is determined by:

- a. Slice thickness
- b. Speed of computer
- c Actual scan time
- b. Size of pixel

- a. Slice thickness

The diamond-shaped fourth ventricle connects inferiorly with a wide portion of the subarachnoid space called the:

- a. Interventricular foramen
 - b. Lateral recesses
 - c. Cisterna cerebellomedullaris
 - d. Cisterna pontis
- c. Cisterna cerebellomedullaris

The distal tapered ending of the spinal cord is called what?

Conus medullaris

During CT fluoroscopy, partially reconstructed images are obtained and displayed at a rate of

- a. 1-3 images per second
- b. 6-8 images per second
- c. 8-12 images per second
- d. 20-25 images per second
- c. 8-12 images per second

How long is the catheter left in place following a percutaneous abscess drainage (PAD) procedure?

- a. 1 hour
- b. 6 hours
- c. 12 hours
- d. 24 to 48 hours
- d. 24 to 48 hours

How much oral contrast media is instilled for a CT enteroclysis?

- a. Up to 100 mL
- b. Up to 500 mL
- c. Up to 1000 mL
- d. Up to 2000 ml
- d. Up to 2000 mL

How must the intravenous contrast media be administered during a multislice CT scan?

- a. Hand, bolus injection
- b. Electromechanical injector

- c. Slow drip infusion
- d. Fast drip infusion
- b. Electromechanical injector

In general, fat has a CT number of:

- a. 0
- b. +25
- c. +150
- d. -100
- d. -100

The inner "tender" layer of the skull is called what

- a. Arachnoid mater
- b. Pia mater
- c. Dura mater
- b. Pia mater

In the skull, what is the wider space filled with cerebrospinal fluid?

- a. Subarachnoid space
- b. Subdural space
- c. Epidural space
- a. Subarachnoid space

Is primarily dendrites and cell bodies

Gray matter

The large myelinated axons make up what?

White matter

A method by which images acquired in the axial plane may be reconstructed in the coronal or sagittal plane

Multiplanar reconstruction

A midline structure gland

Pineal gland

The more centrally located brain tissue is _____ matter

White / Gray

White

A neuron with several dendrites and a single axon that conduct impulses from the spinal cord to the muscle tissue

Multipolar motoneuron

One of the most common applications for CT fluoroscopy

- a. CT myelography
- b. GI motility studies
- c. virtual colonoscopy
- d. biopsies
- d. biopsies

Outer "hard" / "tough" layer of the skull is the

- a. Arachnoid mater
- b. Pia mater
- c. Dura mater
- c. Dura mater

The parts of the cells that receive the electrical impulse and conduct them toward the cell body are called what?

Dendrites

Pitch is defined as a ratio between table speed and

- a. Number of tube rotations
- b. Size of total tissue acquisition
- c. Slice thickness
- d. Tissue attenuation

c. Slice thickness

Pixels represent varying degrees of:

- a. Resolution
- b. Contrast
- c. Attenuation
- d. Scatter radiation

c. Attenuation

A scanogram or tomogram is another term for:

- a. CT scan of the head
- b. Scout
- c. Warm up procedure for scanner
- d. Calibration procedure for scanner

b. Scout view

The space in the brain that is narrow and contains a thin layer of fluid is called what?

- a. Subarachnoid space
- b. Subdural space
- c. Epidural space

b. Subdural space

Specialized capillary beds found in the ventricles that produce CSF are termed:

- a. Arachnoid plexus
- b. Cerebral pontis
- c. Cistern filters
- d. Choroid plexus
- d. Choroid plexus

The specialized cells of the nervous system that conduct electrical impulses are called what?

Neurons

The spider like avascular membrane of the skull is the

- a. Arachnoid mater
- b. Pia mater
- c. Dura mater
- a. Arachnoid mater

The tapered end where the spinal cord terminates is called what?

Conus medularis

A technique used to view vessels demonstrated in CTA defines:

- a. Maximum intensity projection (MIP)
- b. Multi-planar reconstruction (MPR)
- c. Volume scanning
- d. Linear attenuation coefficient
- a. Maximum intensity projection (MIP)

T / F

A 2:1 pitch ratio is an example of under sampling.

True

T/F

Air may be injected into the joint for a CT scan of synovial joints

True

T / F

An intravenous injection of iodinated contrast media is often given during a CT arteroclysis study

True

T / F

A wide window width will produce a low-contrast image.

True

T / F

CT angiography (CTA) does not require the use of intravenous contrast media to demonstrate vascular structures.

False

T / F

CT angiography does not require of iodinated contrast media

False

T / F

CT exceeds the contrast resolution seen on a conventional radiograph

True

T / F

CT percutaneous biopsies have an equal accuracy rate compared with surgical biopsies

True

T/F

Different CT scans can be combined and reformatted to create a 3-D image

False

T / F

Iodinated contrast media are able to pass through the blood-brain barrier in the normal individual

False

T / F

Iodinated contrast media are often required to visualize neoplasms during a head CT scan

True

T / F

Patient dose is higher for a CT scan of the head as compared with a routine skull series

True

T / F

Special filters can be used during CT fluoroscopy to reduce patient skin dose during biopsies

True

T / F

Submillimeter slice thickness are possible with multislice CT scanners

True

T / F

The higher the pitch ratio during a volume CT scan, the greater the patient dose

False - the lower the pitch ratio

T / F

The patient / table is stationary during CT fluoroscopy

True

T / F

Traditional coronary angiography remains the gold standard for evaluation of the coronary arteries over cardiac CT

True

T / F

Window level (WL) in CT controls the displayed image contrast.

False - window level controls brightness

The thin, outer cerebral cortex is _____ matter

White / Gray

Gray

This gland is located just inferior to the division of the forebrain

Pituitary gland

A typical slice thickness for a spine CT

- a. 3 mm
- b. 7 mm
- c. 10 mm
- d. 15 mm

a. 3 mm

What are the three structures of the brainstem?

1. Midbrain
2. Pons
3. Medulla

What controls the gray level of an image (the contrast)?

Window width

What is commonly injected following the administration of intravenous contrast media during a multi-slice scan?

- a. Saline
- b. Heparin
- c. Lasix
- d. Sterile water

a. Saline

What is the chief disadvantage of CT holography over conventional endoscopy?

- a. Cost
 - b. Cannot biopsy or remove polyps
 - c. Bowel prep required
 - d. Time-consuming procedure
- b. Cannot biopsy or remove polyps

What is the CT number for air?

- a. +2000
 - b. +600
 - c. -1000
 - d. -500
- c. -1000

What is the CT number for blood?

- a. - 40
- b. +20
- c. +30
- d. -20

+20

What is the device that transmits electrical energy and allows continuous rotation of the X-ray tube for volumetric acquisition?

Slip rings

What is the name of technology that uses the optical mAs per slice to minimize the patient dose during a CT scan?

- a. Modulation transfer function
- b. Scan-dose calibration
- c. Detector calibration
- d Dose modulation
- b. Dose modulation

What is the name of the 3-D element that provides height, width, and depth to the display matrix of the digital image?

- a. Pixel
- b. Voxel
- c. Image volume
- d. Isotropic data set
- d. Isotropic data set

What is the name of the arched mass of transverse fibers (white matter) that connects the two cerebral hemispheres?

- a. Falx cerebri
- b. Anterior central gyrus
- c. Central sulcus
- d. Corpus callosum
- D. Corpus callosum

What is the name of the large groove that separates the cerebral hemispheres?

- a. Anterior central gyrus

- b. Longitudinal fissure
- c. Central sulcus
- d. Posterior central gyrus

B. Longitudinal fissure

What is the name of the pathway for CSF between the third and fourth ventricles?

- a. Lateral aperture
- b. Medial aperture
- c. Interventricular foramina
- d. Cerebral aqueduct

d. Cerebral aqueduct

What is used to minimize exposure to the hands of the radiologist during a CT fluoroscopic biopsy?

- a. Lead gloves
- b. Low kV
- c. Special filters
- d. Special needle holders

d. Special needle holders

What substance serves as a baseline for CT numbers?

What is its number?

Water, 0

What type of neuron conducts electric impulses toward the cell body?

- a. Nerve cell
- b. Dendrite
- c. Multipolar neuron
- d. Axon

b. Dendrite

What type of shields can be used to minimize dose to radiosensitive organs (eyes, pelvis, thyroid)?

a. lead

b. bismuth

c. plastic acrylic

d. copper

b. bismuth

Which aspect of the brain controls important body activities related to homeostasis?

a. Pons

b. Cerebellum

c. Thalamus

d. Hypothalamus

d. Hypthalamus

Which aspect of the brain coordinates important motor functions such as coordination, posture and balance?

a. Pons

b. Cerebellum

c. Midbrain

d. Hypothalamus

b. Cerebellum

Which aspect of the brain serves as an interpretation center for certain sensory impulses?

a. Midbrain

b. Pituitary gland

- c. Thalamus
- d. Hypthalamus

c. Thalamus

Which generation of CT scanner allows continuous volume type of scanning?

- a. First-generation
- b. Second-generation
- c. Third-generation
- d. Fourth-generation
- d. Fourth-generation

Which generation of CT scanner uses a pencil-thin x-ray beam and a single detector?

- a. First-generation
- b. Second-generation
- c. Third-generation
- d. Fourth-generation
- a. First-generation

Which of the following measures will reduce dose during a pediatric CT study?

- a. Decrease kV
- b. Decrease slice thickness
- c. Increase slice thickness
- d. 0.5:1 pitch ratio
- c. Increase slice thickness

Which of the following parameters cannot be varied by appropriate manipulation at the operator console?

- a. kV

- b. Scan time
- c. Pitch ratio
- d. Vertical adjustment of table height
- e. Thickness of slice
- d. Vertical adjustment of table height

Which of the following pathologic indications does not apply to head CT?

- a. Brain neoplasm
- b. Brain atrophy
- c. Multiple sclerosis
- d. Trauma
- e. All of the above apply
- c. Multiple sclerosis

Which of the following pitch ratios represents "under sampling"?

- a. 1:1
- b. 2:1
- c. 0.5:1
- d. 0.7:1
- b. 2:1

Which of the following substances will not pass through the blood-brain barrier

- a. Proteins
- b. Glucose
- c. Oxygen
- d. Select ion found in the blood
- a. Proteins

Which of the following ventricles are located in the upper aspect of the cerebral hemispheres?

- a. lateral ventricle
- b. fourth ventricle
- c. third ventricle
- d. cisterna magna

a. lateral ventricle

Which part of the CT system houses the X-ray tube, detector array, and collimator?

Gantry

Which structure of the brain controls a wide range of body functions, including growth and reproductive functions?

- a. Pineal gland
 - b. Pituitary gland
 - c. Thalamus
 - d. Hypothalamus
- b. Pituitary gland

Window level controls what?

- a. Image brightness
- b. Image contrast
- c. Total number of slices
- d. Slice thickness

a. Image brightness

With multi detector CT systems, actual thickness of a tomographic slice is determined by:

- a. Size of detector row
- b. Pre-patient collimator

- c. Effective focal spot
- d. Post-patient collimator
- a. Size of detector row

Chapter 19: Special Radiographic Procedures

Lampignano: Bontrager's Textbook of Radiographic Positioning and Related Anatomy, 10th Edition

MULTIPLE CHOICE

1. Which of the following is generally true for knee arthrography?
 - a. A common nontrauma clinical indication is a Baker's cyst.
 - b. A minimum of 20 mL of positive contrast media is introduced into joint.
 - c. During fluoroscopy, views are taken of each meniscus with the knee rotated 30° between exposures.
 - d. The amount of aspirated joint (synovial) fluid should equal the amount of injected contrast media.

ANS: A REF: 713

2. What imaging modality is most frequently used to study the soft tissue structures of the temporomandibular joint?
 - a. Computed tomography (CT)
 - b. Magnetic resonance imaging (MRI)
 - c. Conventional radiography
 - d. Ultrasound

ANS: B REF: 712

3. Which of the following instruments is not required during a knee arthrogram?
 - a. Sterile gauze
 - b. 10-mL syringe
 - c. 20-gauge needle
 - d. Arthroscope

ANS: D REF: 713

4. During an arthrogram, why is the knee flexed following injection of contrast media before imaging?
 - a. To reduce the viscosity of the contrast media
 - b. To force the contrast media outside of the joint if there is a tear
 - c. To coat the soft tissue structures with contrast media
 - d. None of the above; the knee should not be flexed during an arthrogram after injection of contrast media.

ANS: C REF: 713

5. A common fluoroscopy routine for knee arthrography is:
 - a. nine views of each meniscus rotated 20° between exposures.
 - b. nine views total of each knee rotated 20° between exposures.
 - c. six views each of lateral and medial menisci rotated 20° between exposures.
 - d. horizontal beam projections, six exposures per knee.

ANS: A REF: 714

6. Which of the following is not an indication for knee arthrography?
- Injury or tears to rotator cuff
 - Evaluate for Baker's cyst
 - Injury or tears to collateral or cruciate ligaments
 - Injury or tears to menisci

ANS: A REF: 713

7. What size needle is used to introduce the contrast media during a shoulder arthrogram?
- 2 inches, 16 gauge
 - 1 1/2 inches, 18 gauge
 - 2 inches, 25 gauge
 - 2 3/4- to 3 1/2-inch spinal needle

ANS: D REF: 715

8. Which of the following projections would NOT be commonly performed during a shoulder arthrogram?
- Anteroposterior external/internal rotation projections
 - Scapular Y projection
 - Glenoid fossa projection
 - Transaxillary projection

ANS: B REF: 715

9. What is the most common clinical indication for a postoperative (T-tube) cholangiogram?
- Jaundice
 - Pancreatitis
 - Chronic cholecystitis
 - Residual calculi

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ANS: D REF: 716

10. The patient must be NPO _____ hours (minimum) before a postoperative (T-tube) cholangiogram.
- 4
 - 6
 - 8
 - 12

ANS: C REF: 716

11. The majority of ERCP procedures are performed by a:
- radiologist.
 - radiologic technologist.
 - gastroenterologist.
 - surgeon.

ANS: C REF: 717

12. Which of the following conditions is often a contraindication for an ERCP?
- Pseudocyst
 - Biliary stenosis

- c. Hepatitis
- d. Cirrhosis

ANS: A REF: 717

13. Which of the four divisions of the uterus is the largest?
- a. Fundus
 - b. Corpus (body)
 - c. Isthmus
 - d. Cervix

ANS: B REF: 718

14. The uterine (fallopian) tubes are approximately _____ cm in length.
- a. 3 to 4
 - b. 6 to 8
 - c. 10 to 12
 - d. 15 to 18

ANS: C REF: 718

15. Which of the four segments of the uterine tube communicates with the uterine cavity?
- a. Interstitial
 - b. Isthmus
 - c. Ampulla
 - d. Infundibulum

ANS: A REF: 718

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16. The fingerlike extensions termed fimbriae connect to which part of the uterine tube?
- a. Interstitial
 - b. Isthmus
 - c. Ampulla
 - d. Infundibulum

ANS: D REF: 718

17. Which part of the uterine tube opens into the peritoneal cavity?
- a. Isthmus
 - b. Interstitial
 - c. Infundibulum
 - d. None of the above

ANS: C REF: 718

18. The purpose of the hysterosalpingography is to demonstrate the:
- a. interior of the cervix, uterus, uterine tubes, and ovaries.
 - b. interior of the uterus for neoplasms or other abnormalities.
 - c. uterine cavity and the patency of the uterine tubes.
 - d. degree of openness of the cornu between the uterus and uterine tubes.

ANS: C REF: 718

19. Which of the following is a contraindication to hysterosalpingography?
- Pregnancy
 - Active uterine bleeding
 - Pelvic inflammatory disease
 - All of the above

ANS: D REF: 719

20. The preferred contrast medium for hysterosalpingography is:
- positive, ionic, oil based.
 - positive, nonionic, water soluble.
 - negative carbon dioxide gas.
 - thin barium sulfate.

ANS: B REF: 719

21. Imaging for a hysterosalpingography includes centering of the CR and image receptor (IR) to:
- 4 inches (10 cm) superior to the symphysis pubis.
 - the symphysis pubis.
 - the level of the ASIS.
 - 2 inches (5 cm) superior to the symphysis pubis.

ANS: D REF: 720

22. Which of the following is NOT a valid radiographic criterion for hysterosalpingography?
- Cannula or balloon catheter should be seen within the cervix.
 - Ovaries should be opacified and well demonstrated.
 - Contrast medium should be seen within the peritoneum.
 - The pelvic ring should be centered within the collimation field.

ANS: B REF: 720

23. Where is the contrast media instilled during a myelogram?
- Subarachnoid space
 - Epidural space
 - Subdural space
 - Spinal cord

ANS: A REF: 722

24. What is the most common clinical indication for a myelogram?
- Benign tumors
 - Malignant tumors
 - Herniated nucleus pulposus
 - Increased intracranial pressure

ANS: C REF: 721

25. Myelography is often contraindicated if a lumbar puncture has been performed within the previous:
- 2 weeks.
 - 3 weeks.
 - 30 days.

d. 6 months.

ANS: A REF: 721

26. Which of the following is a contraindication for myelography?

- a. Arachnoiditis
- b. Blood in the CSF
- c. Increased intracranial pressure
- d. All of the above

ANS: D REF: 721

27. What is the most common injection site for a myelogram?

- a. C1-2
- b. T12
- c. L4-5
- d. L3-4

ANS: D REF: 722

28. During a myelogram performed with the patient prone, why is a positioning block (bolster) placed under the abdomen for the lumbar puncture?

- a. To force the contrast media toward the head
- b. For patient comfort
- c. To widen the interspinous spaces
- d. To prevent reflux of contrast media back into the syringe

ANS: C REF: 722

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29. Other than prone, what additional position is recommended for a cisternal puncture?

- a. Erect-seated
- b. Left lateral decubitus
- c. Right lateral decubitus
- d. Trendelenburg

ANS: A REF: 722

30. How is the water-soluble contrast media eliminated following a myelogram?

- a. Withdrawn through a needle/syringe
- b. Remains in the spinal canal
- c. Excreted by the kidneys
- d. Excreted by the lungs

ANS: C REF: 721

31. What is an average dosage of contrast media given during a myelogram?

- a. 1 to 2 mL
- b. 3 to 4 mL
- c. 9 to 15 mL
- d. 20 to 24 mL

ANS: C REF: 722

32. What is the most common type of contrast media given during a myelogram?

- a. Iodinated, oil based
- b. Room air
- c. Carbon dioxide
- d. Nonionic, water soluble

ANS: D REF: 721

33. The suggested positioning routine for lumbar myelography is:

- a. patient prone: semierect horizontal beam lateral, left and right lateral decubitus (AP and PA), and PA projection.
- b. patient on side: right lateral decubitus (AP) and left lateral decubitus (PA).
- c. patient prone: semierect horizontal beam lateral.
- d. patient supine: semierect AP and horizontal beam lateral.

ANS: C REF: 724

34. Why is the supine AP projection rarely taken during a thoracic spine myelogram?

- a. Patient discomfort at puncture site
- b. Contrast media may leak from puncture site
- c. Contrast media tend to pool near the midthoracic region
- d. Excessive radiation exposure to anterior chest structures

ANS: C REF: 724

35. Which of the following is a suggested conventional positioning routine for cervical myelography following fluoroscopy and spot imaging?

- a. Patient prone: PA lateral, swimmer's lateral, and one lateral decubitus-horizontal beam
- b. Patient on side: right lateral decubitus (AP) and left lateral decubitus (PA)
- c. Patient prone: PA horizontal beam and swimmer's lateral of C6 or C7
- d. Patient prone: horizontal beam lateral (centered to C4-5) and swimmer's horizontal beam lateral (centered to C7)

ANS: D REF: 723

36. The literal definition of orthoroentgenography is:

- a. long bone measurement.
- b. straight or right angle to radiography.
- c. joint radiography.
- d. extremity study.

ANS: B REF: 725

37. The chief disadvantage of CT scanograms as compared with orthoroentgenography is:

- a. distortion of joints due to penumbra.
- b. artifacts from special ruler placed in gantry.
- c. CT involves high cost and specialized equipment.
- d. CT produces a poor image of bones.

ANS: C REF: 728

38. A limb-shortening surgical procedure is termed:

- a. epiphysiodesis.
- b. limbectomy.
- c. epiphysioectomy.
- d. diaphysiodeses.

ANS: A REF: 725

39. What is the name of the special ruler used in orthoroentgenography?
- a. Long bone ruler
 - b. Shepard-Logan ruler
 - c. Bell-Thompson ruler
 - d. Myer-Smith ruler

ANS: C REF: 726

40. Which of the following factors is most critical when performing orthoroentgenography?
- a. The patient should not move between exposures.
 - b. Short exposure time techniques must be used.
 - c. A long source IR distance (SID) must be used for less beam divergence.
 - d. Both right and left limbs must be examined at the same time for length comparisons.

ANS: A REF: 726

41. Which one of the following is not a factor that directly controls or influences the amount of tomographic blurring?
- a. Size of anatomy
 - b. Tomographic angle
 - c. Object-IR distance
 - d. Exposure angle

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ANS: A REF: 729

42. The pivot point between the x-ray tube and IR in a tomographic system is termed:
- a. amplitude.
 - b. fulcrum.
 - c. tube trajectory.
 - d. objective plane.

ANS: B REF: 729

43. The total distance the x-ray tube travels is termed:
- a. tomographic angle.
 - b. fulcrum.
 - c. objective plane.
 - d. fulcrum level.

ANS: A REF: 729

44. Objects within the body that are farther from the objective plane have:
- a. greater movement.
 - b. increased blurring.
 - c. less blurring.

- d. both A and B.

ANS: D REF: 730

45. Which of the following procedures is the most common application of conventional tomography?
- Intravenous urography
 - Long bone studies
 - Sternum studies
 - Vertebral column studies

ANS: A REF: 729

46. Objects within the objective plane will appear:
- blurred.
 - sharper and in relative focus.
 - as radiolucent densities.
 - as streaks.

ANS: B REF: 730

47. Which of the following exposure angles will produce the thinnest sectional thickness?
- 10°
 - 20°
 - 30°
 - 40°

ANS: D REF: 730

48. Objects within the body above and below the focal plane appear blurred because:
- they are not placed parallel to the direction of tube travel.
 - their images move from one part of the IR to another as the tube and IR move through their travel during the exposure.
 - they are situated too close to the focal plane.
 - the body part is too large for sufficient penetration of x-rays.

ANS: B REF: 730

49. Another term for tomography is:
- computed tomography.
 - orthoroentgenography.
 - body section radiography.
 - orthostatic radiography.

ANS: C REF: 729

MATCHING

Match each of the following tomographic terms with its correct definition. (Use each term only once.)

- Object plane
- Exposure angle

- c. Tomogram
- d. Blur
- e. Fulcrum
- f. Tomographic angle

1. Distortion of objects outside the object plane
2. The total distance the x-ray tube travels
3. Radiograph produced by a tomographic unit
4. The plane where the target anatomy is clear
5. The pivot point between tube and IR
6. The factor that determines slice thickness

- | | |
|-----------|----------|
| 1. ANS: D | REF: 729 |
| 2. ANS: F | REF: 729 |
| 3. ANS: C | REF: 729 |
| 4. ANS: A | REF: 729 |
| 5. ANS: E | REF: 729 |
| 6. ANS: B | REF: 729 |

TRUE/FALSE

1. Intercondylar fossa projections are often required during a conventional knee arthrogram.

ANS: F REF: 714

2. CT and MRI arthrography has significantly reduced the number of radiographic arthrograms performed.

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ANS: T REF: 715

3. The technologist must follow standard precautions when handling bile.

ANS: T REF: 716

4. An endoscopic retrograde cholangiopancreatography (ERCP) can either be a diagnostic or a therapeutic procedure.

ANS: T REF: 717

5. The patient must remain NPO (nothing by mouth) a minimum of 8 hours following an ERCP.

ANS: F REF: 717

6. Arachnoiditis is a clinical indication for a myelogram procedure.

ANS: F REF: 721

7. Most disk pathology of the spine occurs in the cervical and lumbar regions.

ANS: T REF: 722

8. Long bone measurement of the lower limb requires that the entire lower limb be included on a single radiograph.

ANS: F REF: 726

9. Gonadal shielding cannot be used for long bone measurement of the lower limb for males or females.

ANS: F REF: 726

10. The wrist should be placed into the pronated PA position for a long bone study of the upper limb.

ANS: F REF: 727

11. Lower limb orthoroentgenograms should be performed nongrid.

ANS: F REF: 726

12. Linear tomography is primarily used for studies of the temporal bones.

ANS: F REF: 729

13. The primary factor affecting the sectional thickness, as controlled by the operator, is exposure angle.

ANS: T REF: 730

14. More blurring occurs with a shorter exposure angle.

ANS: F REF: 730

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Chapter 20: Diagnostic and Therapeutic Modalities

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MULTIPLE CHOICE

1. The American Cancer Society estimates one in_____women will develop invasive breast cancer.
- two.
 - four.
 - six.
 - eight.

ANS: D REF: 746

2. The risk of breast cancer occurring in men is about_____of that for women.
- 1% to 2%
 - 5% to 6%
 - 10% to 11%
 - None of the above; breast cancer does not occur in men.

ANS: A REF: 746

3. The U.S. Mammography Quality Standards Act (MQSA) of October 1994 requires that:
- all mammograms be performed with film-screen systems with less than a 2% repeat rate.
 - patient skin dose be reduced to less than 200 mrad per projection as monitored by the Department of Health and Human Services (DHHS).
 - all sites (except VA facilities) meet quality standards and be certified by the DHHS.
 - all women older than age 40 have a screening mammogram.

ANS: C REF: 746

4. The pigmented area surrounding the nipple is termed the:
- tail of the breast.
 - areola.
 - lobules.
 - prolongation.

ANS: B REF: 747

5. What is another term for the tail of the breast?
- Caudal portion
 - Areola
 - Axillary prolongation
 - Axilla

ANS: C REF: 747

6. The junction between the inferior aspect of the breast and anterior chest wall is termed the:

- a. inframammary fold.
- b. pectoralis major.
- c. retromammary space.
- d. inferior margin.

ANS: A REF: 747

7. In which quadrant of the left breast would the 7 o'clock position be located?
- a. UOQ
 - b. UIQ
 - c. LIQ
 - d. LOQ

ANS: C REF: 748

8. The 2 o'clock position in the left breast corresponds to the _____ o'clock position in the right breast.
- a. 2
 - b. 8
 - c. 10
 - d. 5

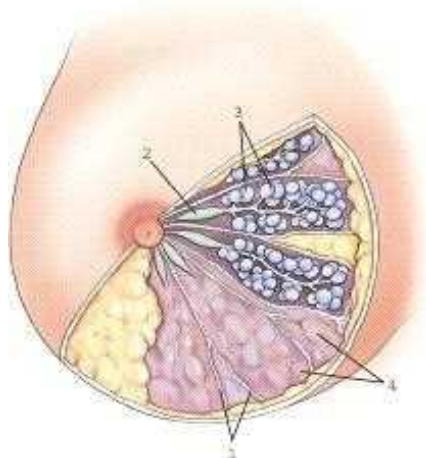
ANS: C REF: 748

9. The glandular tissue of the breast is divided into 15 to 20:
- a. lobes.
 - b. sections.
 - c. partitions.
 - d. ducts.

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ANS: A REF: 748

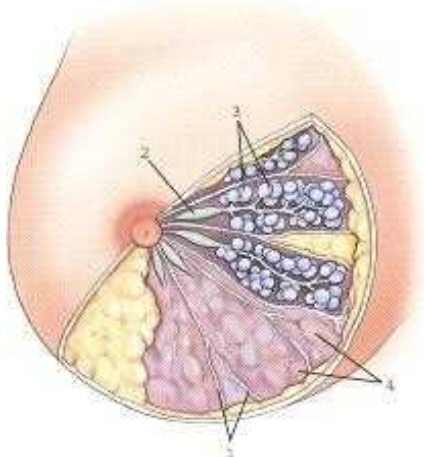
10. Which of the following structures is labeled 1?



- a. Alveoli
- b. Blood vessels
- c. Cooper's ligament
- d. Ducts

ANS: C REF: 748

11. Which of the following structures is labeled 2?

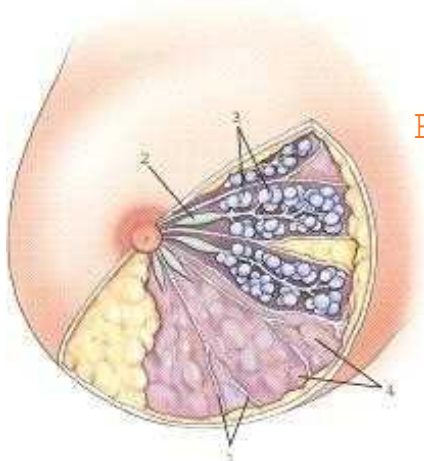


- a. Lobes
- b. Ampulla
- c. Alveoli
- d. Ducts

ANS: B

REF: 748

12. The structures labeled 3 refer to:



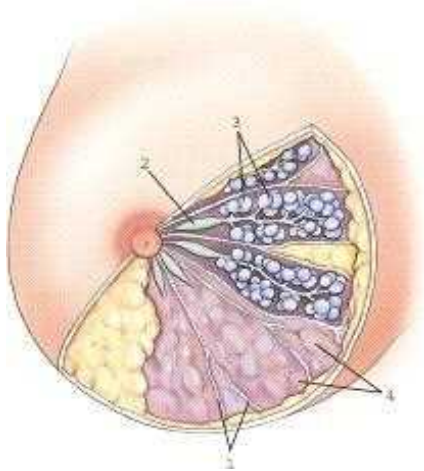
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- a. glands.
- b. ampulla.
- c. alveoli.
- d. lobes.

ANS: C

REF: 748

13. The structures labeled 4 are:



- a. lobules.
- b. alveoli.
- c. glands.
- d. ampulla.

ANS: A

REF: 748

14. Blood vessels, connective tissue, and other small structures seen on a mammogram are termed:

- a. alveoli.
- b. ampulla.
- c. lobules.
- d. trabeculae.

ANS: D

REF: 748

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15. Which of the following breast tissues is least dense?

- a. Glandular
- b. Adipose
- c. Fibrous
- d. Connective

ANS: B

REF: 749

16. What is the breast classification of a 45-year-old woman with three or more pregnancies?

- a. Fibroglandular
- b. Fibro-fatty
- c. Fatty
- d. Fibroconnective

ANS: B

REF: 749

17. The average male breast is classified as being:

- a. fibroglandular.
- b. fibro-fatty.
- c. fatty.
- d. muscle.

ANS: C

REF: 749

18. What is the breast classification of a 35-year-old woman without children?
- Fibroglandular
 - Fibro-fatty
 - Fatty
 - Fibroconnective

ANS: A REF: 749

19. The portion of the breast near the nipple is termed the:
- apex.
 - base.
 - inframammary fold.
 - alveolar portion.

ANS: A REF: 751

20. Using the anode-heel effect, the cathode of the x-ray tube should be placed over the:
- apex.
 - base.
 - midportion.
 - nipple.

ANS: B REF: 751

21. What is the magnification factor with a source object distance (SOD) of 40 inches (100 cm) and a source image receptor distance (SID) of 60 inches (150 cm)?
- 2°
 - 2.5°
 - 2.2°
 - 1.5°

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ANS: D REF: 752

22. What is the American College of Radiology standard for maximum repeat exposures taken during mammography?
- Less than 5%
 - Less than 3%
 - Less than 10%
 - Less than 15%

ANS: A REF: 752

23. What is the primary reason for high patient doses delivered during screening mammography?
- Use of high kV
 - Increased use of digital imaging systems
 - Large number of projections taken
 - Use of low kV

ANS: D REF: 752-753

24. Which of the following imaging modalities can best distinguish between a solid mass and a cyst in the breast?

- a. Film-screen mammography
- b. Magnetic resonance imaging (MRI)
- c. Sonography
- d. Digital mammography

ANS: C REF: 754

25. Which imaging modality is most ideal for a breast with an implant?
- a. Analog mammography
 - b. MRI
 - c. Sonography
 - d. CT

ANS: B REF: 756

26. What type of contrast media is employed for a contrast mammogram?
- a. Carbon dioxide
 - b. Microbubbles
 - c. Iodinated
 - d. Nitrogen

ANS: C REF: 754

27. Computer-aided detection (CAD) is reported to improve cancer detection rates by:
- a. 2%.
 - b. 4%.
 - c. 5% to 15%.
 - d. 50%.

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ANS: C REF: 754

28. Computer-aided detection uses a computerized detection_____to analyze various suspicious breast lesions.
- a. signal
 - b. reader
 - c. laser
 - d. algorithm

ANS: D REF: 754

29. Magnification studies of the breast and breast specimens should use a focal spot size of:
- a. 0.1 mm.
 - b. 0.1 cm.
 - c. 0.3 mm.
 - d. 0.5 mm.

ANS: A REF: 752

30. Positron emission tomography (PET) detects breast cancer by measuring the increased metabolism of_____by cancerous cells.
- a. carbon
 - b. phosphates
 - c. oxygen

d. sugar

ANS: D

REF: 755

31. What type of radionuclide tracer is most commonly used with PET studies of the breast?
- Sulfur colloid
 - ^{18}F -FDG
 - Technetium-99m-sestamibi
 - None of the above

ANS: B

REF: 755

32. Which one of the following imaging modalities is best for detecting silicone leakage from an intracapsular rupture of a breast implant?
- Nuclear medicine
 - PET
 - MRI
 - Ultrasound

ANS: C

REF: 755-756

33. What is the chief disadvantage of using MRI as a breast screening tool?
- High patient dose
 - High false-positive rate
 - Patient discomfort
 - Poor tissue resolution

ANS: B

REF: 757

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34. Which of the following definitions would apply to the ACR abbreviation SIO?
- Slight inferior oblique
 - Superolateral-inferomedial oblique
 - Sagittal image oblique
 - Superoinferior oblique

ANS: B

REF: 758

35. What is the energy source used with digital breast tomosynthesis (DBT)?
- Radionuclide
 - Pulsed magnetic field
 - Conventional mammography x-ray tube
 - Ultrabright light

ANS: C

REF: 757

36. Where should the image receptor be placed for the craniocaudal projection?
- At the level of the axilla
 - At the level of the sternal angle
 - At the level of the xiphoid process
 - At the level of the inframammary fold

ANS: D

REF: 759

37. MGD is an abbreviation for:
- modulation gradient distance.
 - mammographic glandular dose.
 - mean glandular dose.
 - microglandular dose.

ANS: C REF: 752

38. Which soft tissue structure must be in profile for the craniocaudal and mediolateral oblique projections?
- Pectoral muscle
 - Tail of the breast
 - Nipple
 - Glandular tissue

ANS: C REF: 760

39. What kV range should be used for analog (film-screen) mammography?
- 23 to 28
 - 30 to 35
 - 50 to 65
 - 20 to 22

ANS: A REF: 759

40. Which patient position is preferred for most mammogram projections?
- Supine
 - Prone
 - Standing
 - Decubitus

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ANS: C REF: 759

41. Where should the marker and patient identification be in regard to the anatomy?
- Near apex
 - Near base
 - Upper right aspect of image
 - Near axilla

ANS: D REF: 759

42. What is most generally the type of shielding used during mammography?
- Breast shielding
 - Thyroid shielding
 - Apron shielding
 - No shielding

ANS: C REF: 759

43. How is the breast positioned for the mediolateral oblique projection?
- Drawn anterior and medial away from the chest wall
 - Drawn posterior and lateral away from the chest wall
 - Drawn inferior and medial toward the chest wall

- d. Drawn anterior and lateral away from the chest wall

ANS: A REF: 761

44. How much central ray (CR) angulation is required for the mediolateral oblique projection of an average-sized breast?
- a. 45°
 - b. 60°
 - c. 70°
 - d. 90°

ANS: A REF: 761

45. The most common projections performed as *routine projections* throughout the United States and Canada are:
- a. bilateral CC, MLO, and ML.
 - b. bilateral CC and MLO.
 - c. unilateral CC, MLO, and XCCL.
 - d. unilateral CC, MLO, XCCL, and ML.

ANS: B REF: 796

46. Which of the following projections best demonstrates the axillary tissue of the breast and a portion of the pectoral muscle?
- a. Craniocaudal
 - b. Mediolateral oblique
 - c. Exaggerated craniocaudal
 - d. Mediolateral

ANS: C REF: 763

47. Which projection best demonstrates inflammation or pathology in the deep lateral aspect of the breast?
- a. Lateromedial oblique
 - b. Craniocaudal
 - c. Exaggerated craniocaudal
 - d. Mediolateral oblique

ANS: D REF: 761

48. Which of the following is most effective in demonstrating a breast with an implant?
- a. Mayer method
 - b. ACR technique
 - c. Eklund method
 - d. Sonography

ANS: C REF: 764

49. What projection should be performed if a deep lesion in the axillary tissue is not seen on the exaggerated craniocaudal projection?
- a. MLO—mediolateral oblique
 - b. CC—craniocaudal
 - c. MLO—mediolateral oblique

d. AT—axial tail

ANS: D REF: 763

50. What is the most referenced dose unit in mammographic imaging?

- a. Mean skin dose
- b. Mean glandular dose
- c. Mean dose equivalent
- d. Mean exposure dose

ANS: B REF: 752

51. Why can AEC not be used for mammography of a breast with an implant?

- a. The image will be overexposed.
- b. The image will be underexposed.
- c. AEC provides greater patient dose as compared with manual techniques.
- d. This statement is false; AEC should be used for all studies including implants.

ANS: A REF: 764

52. How should a breast implant be moved for a craniocaudal projection?

- a. It is displaced anteriorly toward the apex.
- b. It is displaced posteriorly toward the chest wall.
- c. It is displaced laterally.
- d. No attempt should be made to move the implant because of the danger of rupture.

ANS: B REF: 764

53. What CR angle (in relationship to the vertical) is required for the mediolateral (true lateral) projection?

- a. 90°
- b. 45°
- c. 60°
- d. 70°

ANS: A REF: 762

54. How is the head of the patient positioned for the laterally exaggerated craniocaudal projection?

- a. Turned away from the side being examined
- b. Turned toward the side being examined
- c. Tilted toward the IR
- d. Tilted away from the IR

ANS: A REF: 763

55. The most common type of breast cancer is:

- a. lobular carcinoma.
- b. fibroadenoma.
- c. infiltrating ductal carcinoma.
- d. intraductal papilloma.

ANS: C REF: 757

56. A small growth inside the duct of the breast near the nipple is termed:
- intraductal papilloma.
 - Paget's disease.
 - gynecomastia.
 - fibroadenoma.

ANS: A REF: 758

57. Noninvasive cancers (DCIS and LCIS) comprise approximately _____ of all breast cancer diagnoses.
- 10%
 - 15% to 20%
 - 25% to 30%
 - 60% to 70%

ANS: B REF: 757

58. A loss of _____ of trabecular bone is necessary before it can be visualized on conventional radiographs.
- 30% to 50%
 - 10% to 20%
 - 2% to 5%
 - 60% to 70%

ANS: A REF: 766

59. Which of the following is NOT a possible risk factor for osteoporosis?
- Estrogen deficiency
 - Alcohol abuse
 - Excessive body weight
 - Sedentary lifestyle

ANS: C REF: 766-767

60. Which of the following is NOT a contraindication for a bone densitometry procedure?
- Bone mass that is too low
 - Pregnancy
 - Recent vertebral augmentation
 - Childbearing age

ANS: D REF: 768

61. Which of the following is NOT a technique or method of bone densitometry being performed today?
- Quantitative ultrasound
 - Single-energy photon absorptiometry (SPA)
 - Quantitative computed tomography (QCT)
 - Dual-energy x-ray absorptiometry

ANS: B REF: 768

62. The standard(s) being used with dual-energy x-ray absorptiometry to compare the patient's bone density measurements is/are:
- A-score.
 - Z-score.
 - T-score.
 - both B and C.

ANS: D REF: 769

63. Which of the following techniques or methods provides bone mineral density (BMD) measurements for both trabecular and cortical bones?
- Quantitative ultrasound
 - Quantitative computed tomography
 - Dual-energy x-ray absorptiometry
 - All of the above

ANS: B REF: 769

64. Which technique or method is most common for measuring bone density using a peripheral site such as the os calcis?
- Dual-energy x-ray absorptiometry
 - Single-energy x-ray absorptiometry
 - Quantitative ultrasound
 - All of the above

ANS: C REF: 769

65. Which is the method of choice for evaluating trabecular bone?
- Quantitative computed tomography
 - Dual-energy x-ray absorptiometry
 - Quantitative ultrasound
 - Dual-energy photon absorptiometry

ANS: A REF: 769

66. A patient with a spine T-score of between -1 and -2.5 is classified according to the World Health Organization as:
- normal.
 - osteopenic.
 - osteoporotic.
 - severely osteoporotic.

ANS: B REF: 767

67. A patient with a spine T-score of less than or equal to -2.5 (but no fractures) is classified according to the World Health Organization as:
- normal.
 - osteopenic.
 - osteoporotic.
 - severely osteoporotic.

ANS: C REF: 767

68. Bone cells that are responsible for bone resorption are:

- a. osteoclasts.
- b. osteoblasts.
- c. osteons.
- d. osteocytes.

ANS: A

REF: 766

69. A patient's T-score given in a bone density report:

- a. compares the patient's BMD with that of a young, healthy person of the same gender.
- b. compares the patient's BMD with that of an age-matched normal population.
- c. compares the patient's BMD with that of an age- and sex-matched normal population.
- d. is the same for all measurement sites.

ANS: A

REF: 769

70. A patient's Z-score given in a bone density report:

- a. compares the patient's BMD with that of the normal population.
- b. compares the patient's BMD with that of an age-matched normal population.
- c. compares the patient's BMD with that of an average individual of the same sex and age.
- d. is the same for all measurement sites.

ANS: C

REF: 769

71. Which other region of the body can be scanned if the patient has spine or hip artifacts (i.e., advanced arthritis)?

- a. Cervical spine
- b. Mandible
- c. Foot
- d. Forearm

ANS: D

REF: 770

72. Which region of the spine is scanned during a DXA procedure?

- a. C7-T-5
- b. Sacroiliac joints
- c. T-12 to the iliac crest
- d. T1 to T-12

ANS: C

REF: 770

73. Estrogen replacement therapy is given primarily to:

- a. stimulate new bone growth.
- b. reduce bone loss.
- c. promote healing of stress fractures of the hip.
- d. increase blood flow to bone.

ANS: B

REF: 768

74. Alendronate (Fosamax) is an example of a(n):
- bisphosphonate.
 - selective estrogen receptor modulator (SERM).
 - parathyroid hormone.
 - estrogen.

ANS: A REF: 767

75. Reproducibility as applied for DXA systems is also termed:
- quality assessment.
 - system reliability.
 - accuracy.
 - precision.

ANS: D REF: 771

76. A group of radioactive drugs used in the diagnosis and treatment of disease is the definition for:
- radiopharmaceutical.
 - gamma emitters.
 - radionuclide.
 - photon-emissive materials.

ANS: A REF: 733

77. Radiopharmaceuticals are introduced into the body:
- via inhalation.
 - via ingestion.
 - intravenously.
 - by all of the above.

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ANS: D REF: 733

78. One of the most common radioactive materials used in nuclear medicine procedures is:
- xenon.
 - iodine 131.
 - thallium.
 - technetium 99m.

ANS: D REF: 733

79. Often, the gamma camera in nuclear medicine systems is coupled with_____to provide both an anatomic and functional study of the body.
- functional MRI
 - sonography
 - CT
 - SPECT

ANS: C REF: 733

80. Technetium 99m has a physical half-life of approximately:
- 15 to 20 minutes.
 - 120 to 150 minutes.

- c. 6 hours.
- d. 12 hours.

ANS: C REF: 733

81. Which of the following radiopharmaceuticals is used for thyroid uptake studies?
- a. Sodium iodide (^{123}I)
 - b. Technetium 99-m
 - c. Xenon 133
 - d. Thallium

ANS: A REF: 734

82. A hyperthyroid with a higher uptake of radiopharmaceutical may indicate:
- a. Graves' disease.
 - b. iodine-dependent thyroid.
 - c. multiple thyroid nodule.
 - d. thyroiditis.

ANS: A REF: 734

83. Which member of the nuclear medicine health team administers the radionuclide to the patient?
- a. Nuclear medicine technologist
 - b. Nuclear medicine physician
 - c. Health physicist
 - d. Radiation safety officer (RSO)

ANS: A REF: 735

84. Which member of the nuclear medicine health team is responsible for calibration and maintenance of imaging equipment?
- a. Nuclear medicine technologist
 - b. Nuclear medicine physician
 - c. Health physicist
 - d. Radiation safety officer (RSO)

ANS: C REF: 735

85. Which member of the nuclear medicine health team performs statistical analysis of examination data?
- a. Nuclear medicine technologist
 - b. Nuclear medicine physician
 - c. Health physicist
 - d. Radiation safety officer (RSO)

ANS: A REF: 735

86. Ionizing radiation with characteristics of an electron but emitted from the nucleus of a radioactive atom is identified as a(n):
- a. alpha particle.
 - b. beta particle.
 - c. gamma ray.

d. positron.

ANS: B REF: 735

87. The spontaneous transmutation of a radionuclide resulting in a decrease of the number of radioactive events in a sample is the definition for:
- a. biologic half-life.
 - b. disintegration.
 - c. decay.
 - d. equilibrium.

ANS: C REF: 735

88. The type of atom whose nucleus disintegrates spontaneously is a(n):
- a. radionuclide.
 - b. radioisotope.
 - c. parent.
 - d. isotope.

ANS: A REF: 735

89. PET is an acronym for positron:
- a. emission tomography.
 - b. emission technique.
 - c. energy tomography.
 - d. energy targeting.

ANS: A REF: 736

90. What is the product of a positron and electron combining and then undergoing annihilation during the PET imaging process?
- a. X-rays are formed.
 - b. Two 511 keV photons are formed.
 - c. A single gamma ray is formed.
 - d. Two high-speed beta particles are formed.

ANS: B REF: 736

91. Which one of the following PET tracer compounds is used to measure glucose metabolism within tissues?
- a. ^{11}C -methionine
 - b. ^{13}N -ammonia
 - c. ^{15}O -water
 - d. ^{18}F -FDG

ANS: D REF: 737

92. What is the name of the device required to produce positron-emitting elements?
- a. Linear accelerator
 - b. Particle accelerator
 - c. Cyclotron
 - d. Positron generator

ANS: C REF: 736

93. Most PET tracers have a half-life of:
- 5 to 10 minutes.
 - 120 seconds to 110 minutes.
 - 1 to 10 seconds.
 - 24 hours.

ANS: B REF: 736

94. Regions of metastatic disease in the body have a(n) _____ uptake of ^{18}F -FDG.
- increased
 - decreased

ANS: A REF: 737

95. Which PET perfusion tracer is given to determine whether certain areas of the heart are receiving sufficient blood flow (perfusion)?
- ^{11}C -methionine
 - ^{13}N -ammonia
 - ^{82}Rb chloride
 - Both B and C

ANS: D REF: 737

96. During a brain seizure, the PET image will demonstrate a(n) _____ in sugar utilization at the seizure site.
- increase
 - decrease

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ANS: A REF: 738

97. PET brain mapping techniques are intended to:
- identify possible primary tumors.
 - identify thought-processing functions of the brain.
 - distinguish between gray and white matter structures.
 - identify key motor or sensory regions of the brain.

ANS: D REF: 738

98. The process of combining PET and CT data sets into a hybrid image is the definition for:
- back projection.
 - Fourier transformation.
 - co-registration.
 - selective filtration.

ANS: C REF: 737

99. Which radioactive tracer is commonly used to assess amino acid metabolism in a central nervous system (CNS) tumor?
- ^{15}O -water
 - ^{13}N -ammonia
 - ^{11}C -methionine

d. Technetium 99m

ANS: C REF: 738

100. Another term for short distance radiation therapy is:

- a. gamma exposure.
- b. external beam.
- c. brachytherapy.
- d. teletherapy.

ANS: C REF: 739

101. Which of the following is considered a type of external beam therapy?

- a. Intraoperative radiation therapy
- b. Linear accelerator
- c. Cobalt 60
- d. All of the above

ANS: D REF: 739-740

102. Cobalt 60 units emit gamma rays at an average energy of_____MeV.

- a. 2.25
- b. 1.25
- c. 8.25
- d. 10.25

ANS: B REF: 739

103. The type of radiation therapy that uses multiple beams of radiation to three-dimensionally target a tumor is termed:

- a. intraoperative radiation therapy.
- b. brachytherapy.
- c. palliative therapy.
- d. stereotactic radiosurgery.

ANS: D REF: 740

104. Which member of the radiation oncology team determines the treatment plan?

- a. Radiation therapist
- b. Radiation oncologist
- c. Radiation oncology nurse
- d. Medical physicist and dosimetrist

ANS: B REF: 740

105. Which member of the radiation oncology team administers the actual radiation treatment?

- a. Radiation therapist
- b. Radiation oncologist
- c. Radiation oncology nurse
- d. Medical physicist and dosimetrist

ANS: A REF: 740

106. Which member of the radiation oncology team serves as a conduit for patient referrals to social services?
- a. Radiation therapist
 - b. Radiation oncologist
 - c. Radiation oncology nurse
 - d. Medical physicist and dosimetrist

ANS: C REF: 740

107. Which member of the radiation oncology team maintains and directs the quality control and quality assurance activities associated with the use of ionizing radiation?
- a. Radiation therapist
 - b. Radiation oncologist
 - c. Radiation oncology nurse
 - d. Medical physicist and dosimetrist

ANS: D REF: 740

108. Sonography uses high-frequency sound waves in the range of _____ MHz.
- a. 1 to 3
 - b. 1 to 10
 - c. 2 to 20
 - d. 25 to 40

ANS: C REF: 741

109. Which generation of ultrasound unit first introduced a two-dimensional gray scale?
- a. A-mode
 - b. Brightness mode (B-mode)
 - c. Real-time
 - d. Doppler

ANS: B REF: 742

110. Which type of ultrasound unit is used to examine the structure and behavior of flowing blood?
- a. A-mode
 - b. Patient mode (B-mode)
 - c. Real-time
 - d. Doppler

ANS: D REF: 742

111. What type of material makes up the functional aspect of the transducer that creates the high-frequency sound?
- a. Crystals
 - b. Tungsten
 - c. Silver/chromium alloy
 - d. Iron oxide

ANS: A REF: 745

112. Elastography is the:
- a. study of heart tissue.

- b. study of skin quality.
- c. assessment of brain function.
- d. assessment of the compressibility of soft tissue.

ANS: D REF: 742 | 745

113. Ultrasound images that demonstrate dynamic motion or changes within a structure are termed:
- a. pulse echo sonography.
 - b. sonographic elastography.
 - c. real-time imaging.
 - d. fusion imaging.

ANS: C REF: 742

114. Sonographic contrast agents are currently only approved by the U.S. FDA:
- a. for cardiac studies.
 - b. for thyroid imaging.
 - c. for vascular studies.
 - d. for echocardiographic studies.

ANS: D REF: 743

115. With modern MRI, the reemitted radio wave signals from the patient are captured by:
- a. external magnetic field.
 - b. solid-state detectors.
 - c. radiofrequency coil.
 - d. analog digital converter.

ANS: C REF: 774 NURSINGTB.COM

116. Which of the following statements is NOT true about the nuclei used in MRI?
- a. They must be radioisotope forms of the nuclei.
 - b. They should be found in abundance in the human body.
 - c. They must have an odd number of protons and neutrons.
 - d. They must be affected by an external magnetic field.

ANS: A REF: 774

117. Which of the following nuclei found in the body is most often used in MRI?
- a. Potassium
 - b. Sodium
 - c. Hydrogen
 - d. Carbon

ANS: C REF: 774

118. Matching of the frequency of a precessing nucleus with a radio wave frequency is termed:
- a. precession.
 - b. relaxation.
 - c. resonance.
 - d. magnetization.

ANS: C REF: 775

119. Longitudinal or spin lattice relaxation when spins begin to precess at smaller angles is termed:
- T1.
 - T2.
 - spin density.
 - free induction decay.

ANS: A REF: 776

120. Transverse or spin-spin relaxation when spins begin to precess out of phase with each other is termed:
- T1.
 - T2.
 - spin density.
 - free induction decay.

ANS: B REF: 776

121. Which of the following factors does NOT contribute to the signal strength emitted from the tissues?
- Spin density
 - T1 relaxation time
 - T2 relaxation time
 - Atomic number

ANS: D REF: 776

122. What is another term for spin density?
- Proton density
 - Magnetic moment
 - Atomic number
 - Magnetic flux

ANS: A REF: 776

123. The location of origin of the MR signal within the patient is determined by:
- TE (time-to-echo).
 - relaxation time.
 - frequency of MR signal.
 - wavelength of MR signal.

ANS: C REF: 776

124. One tesla equals _____ gauss.
- 0.0005
 - 2
 - 100
 - 10,000

ANS: D REF: 777

125. Which of the following statements is true in comparing CT with MRI?
- Patients receive less radiation dose with a CT scan.

- b. CT is better in demonstrating white brain matter pathology.
- c. CT is better in demonstrating gastrointestinal diseases.
- d. CT is better in demonstrating spinal cord conditions.

ANS: C REF: 772

126. Patients with cardiac pacemakers must not be allowed within the _____-gauss line.
- a. 5
 - b. 50
 - c. 10
 - d. 1

ANS: A REF: 780

127. Oxygen tanks and wheelchairs must not be allowed within the _____-gauss line.
- a. 5
 - b. 2.5
 - c. 10
 - d. 50

ANS: A REF: 780

128. Which of the following devices is subject to torquing within the magnetic field?
- a. Stainless steel hip prosthesis
 - b. Ferromagnetic aneurysm clips
 - c. Dental fillings
 - d. Glass eye prosthesis

ANS: B REF: 781 NURSINGTB.COM

129. Tissue heating, during an MRI procedure, is measured in _____per kilogram.
- a. calories
 - b. watts
 - c. joules
 - d. ionizations

ANS: B REF: 781

130. Which of the following occupational workers must have conventional radiographic images of the orbits taken before an MRI head scan?
- a. Radiographer
 - b. Landscaper
 - c. Machinist
 - d. None of the above

ANS: C REF: 781

131. Which of the following devices are allowed within the external magnetic field?
- a. Cochlear implants
 - b. Internal drug infusion pumps
 - c. Neurostimulators
 - d. None of the above

ANS: D REF: 780

132. Which of the following is a contraindication to the contrast media most commonly used for MRI procedures?
- Renal failure
 - Pregnancy
 - Both A and B
 - None of the above

ANS: C REF: 782

133. What type of pulse sequence is generally performed when MRI contrast media is given?
- T1-weighted
 - T2-weighted
 - Proton density
 - Inversion recovery

ANS: A REF: 782

134. Which of the following pulse sequences would produce a T2-weighted image?
- Short TR and short TE
 - Long TR and long TE
 - Long TR and short TE
 - Short TR and long TE

ANS: B REF: 782

135. On a T1-weighted image, fat appears as a _____ signal.
- bright
 - dark
 - light gray
 - dark gray

ANS: A REF: 782

136. On a T2-weighted image, white brain matter appears as a _____ signal.
- bright
 - dark
 - light gray
 - dark gray

ANS: D REF: 782

137. Which of the following techniques can help reduce cardiac motion artifacts?
- Physiologic gating
 - Fast spin echo
 - Signal averaging
 - All of the above

ANS: A REF: 784

138. Which of the following pulse sequences will produce a myelographic effect showing sharp contrast between the spinal cord and CSF?

- a. Inversion recovery
- b. Gradient echo or spin echo–T2 weighted
- c. FLASH
- d. Spin echo–T1 weighted

ANS: B REF: 784

139. MRI is recommended for diagnosing_____necrosis of the hip.

- a. sudden
- b. atypical
- c. avascular
- d. arthritic

ANS: C REF: 784

140. Which of the following factors helps reduce peristaltic motion during an MRI of the abdomen?

- a. Physiologic gating
- b. Use of a gradient pulse sequence
- c. Use of a spin echo pulse sequence
- d. Higher magnet strength

ANS: A REF: 784

141. When used with respect to MRI, the term gradient pulse refers to:

- a. a magnetic field that changes in strength in a given direction.
- b. a briefly applied gradient magnetic field.
- c. the amount of current induced by a moving magnetic field.
- d. a specific RF pulse sequence as net magnetization is inverted and returns to equilibrium.

ANS: B REF: 781

142. Functional MRI is based on the:

- a. decrease in blood flow to the local vasculature that accompanies neural activity in the brain.
- b. changes in blood flow to the local vasculature that accompany neural activity in the brain.
- c. increase in the uptake of contrast media within the brain.
- d. decrease in signal produced during selective neural activity of the brain.

ANS: B REF: 785

143. Neural activity in the brain during a functional MRI procedure is gauged by the:

- a. increase in signal intensity produced by certain regions of the brain.
- b. decrease in signal intensity by certain regions of the brain.
- c. blood oxygen level–dependent (BOLD) signal.
- d. contrast enhancement of selective regions of the brain.

ANS: C REF: 785

MATCHING

Select the correct pathologic indication for each description of a radiographic appearance. (Use each choice only once.)

- a. Fibroadenoma
 - b. Breast carcinoma
 - c. Fibrocystic condition
 - d. Cysts
1. High-density multiple benign cysts throughout the breasts
 2. Benign breast tumor having smooth, well-defined margins
 3. Breast lesion with clustered calcifications with irregular margins
 4. Masses within breasts of similar or only slightly higher density than surrounding areas
1. ANS: C REF: 758
 2. ANS: A REF: 758
 3. ANS: B REF: 757
 4. ANS: D REF: 758

Match each definition with the correct term. (Use each choice only once.)

- a. Transducer
 - b. Reflection
 - c. Gray scale
 - d. Elastography
 - e. Fusion imaging
 - f. Doppler effect
5. Display of various levels of echo brightness or intensity represented in shades of gray
 6. Device that contains specific types of crystals that undergo mechanical stress to produce an ultrasound wave
 7. Two imaging modalities such as MRI or CT and sonography are combined
 8. Alteration in frequency or wavelength of sound waves reflected from moving structure or medium
 9. Acoustic energy that is reflected from a structure back toward the transducer
 10. Technique that uses sonography to compare the mechanical properties of tissues and their relative stiffness
5. ANS: C REF: 745
 6. ANS: A REF: 745
 7. ANS: E REF: 745
 8. ANS: F REF: 745
 9. ANS: B REF: 745
 10. ANS: D REF: 745

TRUE/FALSE

1. The American College of Radiology (ACS) recommends that women older than age 40 should have a screening mammogram.

ANS: T REF: 746

2. The amount of adipose tissue from one female breast to another is fairly consistent.

ANS: F REF: 747

3. The retromammary space is located posterior to the pectoralis major muscle.

ANS: F REF: 747

4. Another term for Cooper's ligament is the suspensory ligament.

ANS: T REF: 748

5. In most breasts, the craniocaudal diameter is greater than the mediolateral diameter.

ANS: F REF: 747

6. The anode-heel effect is less evident in mammography systems because of the anode configuration of the x-ray tube.

ANS: F REF: 751

7. Five to ten pounds of compression of the breast is typically used during mammography.

ANS: F REF: 752

8. Compression of the breast will reduce geometric unsharpness (distortion) of structures within the breast.

ANS: T REF: 752

9. Digital mammography in all likelihood will become the method of choice for breast cancer screening examinations because of its postprocessing capability and other advantages.

ANS: T REF: 753

10. Computed radiography has lower operating costs over analog mammography imaging.

ANS: T REF: 753

11. Digital mammography produces better contrast resolution over analog imaging.

ANS: T REF: 753

12. Sentinel node studies are performed for the detection of a melanoma.

ANS: T REF: 755

13. Breathing must be suspended for projections of the breast.

ANS: T REF: 763

14. The fatty breast will usually require a reduction in exposure factors as compared with the fibroglandular breast.

ANS: T REF: 750

15. Fibrocystic breast is considered to be a benign condition.

ANS: T REF: 758

16. Grids are being used for most mammographic units.

ANS: T REF: 751

17. Compression should not be used on a breast with an implant.

ANS: F REF: 764

18. Osteoclasts are the cells responsible for the building of new bone or bone repair.

ANS: F REF: 766

19. The proximal femur (hip) and the lumbar spine are preferred sites for central analysis for bone density.

ANS: T REF: 770

20. In thin, elderly females, it is difficult to obtain an accurate soft-tissue analysis during a DXA scan.

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ANS: T REF: 771

21. An existing vertebral fracture has been shown to double the risk of subsequent fracture.

ANS: T REF: 771

22. The effective dose from a bone density examination of both spine and hip is typically greater than 10 μ Sv (microSievert).

ANS: F REF: 770

23. Parathyroid hormone when given to a patient will stimulate new bone formation.

ANS: T REF: 768

24. A nuclear bone scan can detect fractures that occurred 2 years earlier.

ANS: T REF: 734

25. Nuclear medicine is an excellent imaging modality to detect pulmonary emboli.

ANS: T REF: 734

26. Nuclear medicine can evaluate the patient for hyperthyroidism.

ANS: T REF: 734

27. Nuclear medicine can provide a functional study of the heart under stress.

ANS: T REF: 734

28. A nuclear medicine bone scan that displays a “hot spot” is indicative of fracture or metastasis.

ANS: T REF: 734

29. In many cases, PET can detect abnormal function before the onset of physical symptoms.

ANS: T REF: 736

30. PET and MRI data sets cannot be co-registered to create a hybrid image.

ANS: F REF: 737

31. Glucose metabolism in the brain naturally increases as an individual grows older.

ANS: F REF: 738

32. Cobalt-60–based units are used for intraoperative radiation therapy (IORT) procedures of the brain.

ANS: F REF: 740

33. A transducer serves as both a transmitter and receiver of echo waves.

ANS: T REF: 741

34. According to current research, there are moderate adverse biologic effects associated with the use of medical ultrasound.

ANS: F REF: 743

35. The FAST sonography examination is most often performed for trauma cases.

ANS: T REF: 743 | 745

36. During a sonographic procedure, gel is applied to the skin to prevent loss of signal between transducer and skin, which would result in poor images.

ANS: T REF: 743

37. Higher-frequency transducers allow a sharper image for superficial structures such as breast tissue.

ANS: T REF: 741

38. A sonographer is expected to produce and evaluate the ultrasound images.

ANS: T REF: 745

39. A sonologist is a physician qualified to interpret sonographic studies.

ANS: T REF: 745

40. MRI uses a low-energy form of ionizing radiation.

ANS: F REF: 772

41. MRI can produce axial, sagittal, and coronal perspectives of the anatomy.

ANS: T REF: 772

42. The rate of precession decreases as the strength of the magnetic field increases.

ANS: F REF: 774

43. The longer the radio wave is applied to the patient, the greater the angle of precession.

ANS: T REF: 775-776

44. The quantity of hydrogen protons within structures being imaged by MRI has no effect on MRI contrast.

ANS: F REF: 776

45. All tissues within the same strength magnetic field respond at the same relaxation rates.

ANS: F REF: 776

46. All high-density or thick structures appear light on MR images.

ANS: F REF: 776

47. There have been some documented adverse long-term effects for childbearing-age technologists working in an MRI department, but additional studies are needed to affirm this.

ANS: F REF: 778 | 781

48. Patient restraints should be used with claustrophobic patients to prevent movement during an MRI examination.

ANS: F REF: 779

49. The loud “knocking” heard during an MRI study is due to the gradient coils.

ANS: T REF: 778

50. Pregnancy is considered an absolute contraindication for an MRI procedure.

ANS: F REF: 778

51. Air will not be visualized on either T1- or T2-weighted images.

ANS: T REF: 782

52. CSF will appear as a bright signal on T1-weighted images.

ANS: F REF: 782

53. CT is recommended over MRI in the evaluation of severe spinal trauma.

ANS: T REF: 784

54. Functional MRI is being used to screen patients for neoplasms in the spine.

ANS: F REF: 785

55. Each gradient coil is an electromagnet.

ANS: T REF: 781

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