

# McQuillen Martensen: Radiographic Image Analysis, 3<sup>rd</sup> Edition

## Chapter 01: Image Analysis Guidelines

### Test Bank

#### MULTIPLE CHOICE

1. The demographic requirements for radiographic images include all the following *except*:
  - a. patient and facility identification.
  - b. time and date.
  - c. birth date.
  - d. technologist's identification.

ANS: D                      REF: 6

2. Which of the following is true about image markers?
  1. They are radiopaque.
  2. They should be reversed before being placed on the IR.
  3. They should be positioned as close to the median plane as possible.
  4. They will be magnified if positioned on the imaging table or patient.
  - a. 1 only
  - b. 1 and 4 only
  - c. 2 and 3 only
  - d. 4 only

ANS: B                      REF: 9

*Match the marker placement with the projection.*

3. Lateral vertebrae
  - a. Laterally, on side being identified
  - b. Anteriorly, identifying side positioned closer to IR
  - c. Place marker anywhere within exposure field
  - d. Laterally, identifying side situated closer to the IR

ANS: B                      REF: 9

4. PA cranium
  - a. Laterally, on side being identified
  - b. Anteriorly, identifying side positioned closer to IR
  - c. Place marker anywhere within exposure field
  - d. Laterally, identifying side situated closer to the IR

ANS: A                      REF: 9

5. PA oblique vertebrae

- a. Laterally, on side being identified
- b. Anteriorly, identifying side positioned closer to IR
- c. Place marker anywhere within exposure field
- d. Laterally, identifying side situated closer to the IR

ANS: D                      REF: 9

6. Lateral hand
- a. Laterally, on side being identified
  - b. Anteriorly, identifying side positioned closer to IR
  - c. Place marker anywhere within exposure field
  - d. Laterally, identifying side situated closer to the IR

ANS: C                      REF: 9

7. Which guideline below should be used to position the identification (ID) plate?
- a. Place the ID plate within the collimated field whenever possible.
  - b. Position the ID plate toward the direction in which the central ray was angled.
  - c. Position the ID plate next to the narrowest anatomic structure.

ANS: C                      REF: 9

8. Good collimation practices will do all the following *except*
- a. decrease radiation dosage.
  - b. affect the amount of scatter radiation that reaches the IR.
  - c. reduce the visibility of recorded details.
  - d. reduce digital radiography histogram analysis errors.

ANS: C                      REF: 14

9. Elongation occurs in all the following situations, except when
- a. the part is off-center.
  - b. the central ray is angled with the part.
  - c. the central ray and part are perpendicular but the IR is angled.
  - d. the central ray and IR are perpendicular and the part is angled.

ANS: D                      REF: 21-22

10. For an open joint space to be obtained, the central ray must be aligned \_\_\_\_ to the joint.
- a. perpendicular
  - b. parallel

ANS: B                      REF: 24

11. When the central ray is angled, the structure situated \_\_\_\_ the IR is projected the most.
- a. farther away from
  - b. closer to

ANS: A                      REF: 20-21

Two images were obtained on the same structure. Image 1 was obtained using a 48-inch source–image receptor distance (SID) and a 5-inch object–image receptor distance (OID), and image 2 was obtained using a 48-inch SID and a 3-inch OID.

12. Which image will demonstrate sharper recorded detail?

- a. Image 1
- b. Image 2

ANS: B                      REF: 28

13. Which image will demonstrate greater size distortion?

- a. Image 1
- b. Image 2

ANS: A                      REF: 21

14. A small focal spot should be used for each of the following situations, except when

- a. fine detail demonstration is important.
- b. extremities are imaged.
- c. the milliamperage setting is above 300.
- d. the patient can control motion.

ANS: C                      REF: 27

15. Which technical factor listed below is primarily used to regulate density?

- a. kVp
- b. mAs
- c. grids
- d. distances (SID, OID)

ANS: B                      REF: 34

16. Which of the following technical factors is primarily used to regulate contrast?

- a. kVp
- b. mAs
- c. grids
- d. distances (SID, OID)

ANS: A                      REF: 46

17. What percentage of kVp adjustment doubles the density on an image?

- a. 5%
- b. 15%
- c. 30%
- d. 100%

ANS: B                      REF: 36

18. An image demonstrating motion and adequate density was obtained using 100 mA at 0.5 seconds. If the time was changed to 0.25 seconds, what mA should be used to maintain density?
- 100 mA
  - 200 mA
  - 300 mA
  - 400 mA

ANS: B                      REF: 36

19. An AP abdomen projection was obtained using 85 kVp at 10 mAs. The resulting image demonstrated excessively low contrast, although the density was acceptable. What new technique could be used to obtain the projection with equal density but higher contrast?
- 72 kVp at 10 mAs
  - 72 kVp at 20 mAs
  - 81 kVp at 13 mAs
  - 98 kVp at 5 mAs

ANS: B                      REF: 48

20. The processor defaced an AP foot projection obtained at 50 kVp at 30 mAs. Before repeating the projection, the technologist noticed that the image was slightly overexposed at the area of interest. It would not have been dark enough to cause it to need repeating. What new technique should the technologist use when she repeats the projection?
- 48 kVp at 30 mAs
  - 50 kVp at 15 mAs
  - 50 kVp at 21 mAs
  - 42 kVp at 30 mAs

ANS: C                      REF: 34

21. A patient stepped on a needle left in the carpet. Because only half the needle has been located and the patient has pain in the foot where the needle penetrated, it is suspected that the other half of the needle is still in the patient's foot. If the average technique for a lateral foot projection is 60 kVp at 75 mAs, what new technique should be used for this situation?
- 51 kVp at 37 mAs
  - 51 kVp at 75 mAs
  - 55 kVp at 75 mAs
  - 60 kVp at 75 mAs

ANS: B                      REF: 59

*Match the technical adjustment required with the trauma device or patient condition.*

22. Emphysema
- +5 kVp or +25%-30%
  - +5-7 kVp or 50%-60% mAs

- c. -15%-20% kVp
- d. +50% mAs
- e. +35% mAs
- f. -8% kVp
- g. +35%-50% mAs

ANS: F                      REF: 40

23. Small to medium plaster cast
- a. +5 kVp or +25%-30%
  - b. +5-7 kVp or +50%-60% mAs
  - c. -15%-20% kVp
  - d. +50% mAs
  - e. +35% mAs
  - f. -8% kVp
  - g. +35%-50% mAs

ANS: B                      REF: 59

24. Wood backboard
- a. +5 kVp or +25%-30%
  - b. +5-7 kVp or +50%-60% mAs
  - c. -15%-20% kVp
  - d. +50% mAs
  - e. +35% mAs
  - f. -8% kVp
  - g. +35%-50% mAs

ANS: A                      REF: 59

25. Ascites
- a. +5 kVp or +25%-30%
  - b. +5-7 kVp or +50%-60% mAs
  - c. -15%-20% kVp
  - d. +50% mAs
  - e. +35% mAs
  - f. -8% kVp
  - g. +35%-50% mAs

ANS: D                      REF: 59

26. Pleural effusion
- a. +5 kVp or +25%-30%
  - b. +5-7 kVp or +50%-60% mAs
  - c. -15%-20% kVp
  - d. +50% mAs
  - e. +35% mAs
  - f. -8% kVp

g. +35%-50% mAs

ANS: E                      REF: 59

27. Postmortem image of head, thorax, and abdomen

- a. +5 kVp or +25%-30%
- b. +5-7 kVp or +50%-60% mAs
- c. -15%-20% kVp
- d. +50% mAs
- e. +35% mAs
- f. -8% kVp
- g. +35%-50% mAs

ANS: G                      REF: 59

28. Soft-tissue demonstration of foreign object

- a. +5 kVp or +25%-30%
- b. +5-7 kVp or +50%-60% mAs
- c. -15% to 20% kVp
- d. +50% mAs
- e. +35% mAs
- f. -8% kVp
- g. +35% to 50% mAs

ANS: C                      REF: 59

29. Osteoporosis

- a. +5 kVp or +25%-30%
- b. +5-7 kVp or +50%-60% mAs
- c. -15%-20% kVp
- d. +50% mAs
- e. +35% mAs
- f. -8% kVp
- g. +35%-50% mAs

ANS: F                      REF: 40

30. The automatic exposure control (AEC) with the thyristor set for a 400-speed screen-film system was used with an 800-speed film-screen system.

- a. The exposure will automatically adjust as the system speed changes to maintain density.
- b. The exposure and kVp will automatically adjust as the system speed changes to maintain density and contrast.
- c. The AEC does not automatically change. The image will be overexposed. The density will be adequate, but the contrast will be low.

ANS: C                      REF: 42

31. All the following are true *except*:

- a. Increasing the OID will always result in a noticeable density loss.
- b. Increasing the OID will reduce the amount of scatter radiation reaching the IR at kVp levels above 60.
- c. Increasing the OID when imaging an anatomic structure that creates significant scatter radiation will require the mAs to be increased 10% for every centimeter of OID elevation.
- d. At tube potentials below 60 kVp, an increase in the OID has little if any effect on density.

ANS: A                      REF: 42-43

32. An 8:1 grid was used for a mobile AP hip projection. The same AP hip projection was later obtained in the Radiology Department using a 12:1 table-Bucky grid. Which of the two hip projections will demonstrate the greatest grid artifact noise if mispositioned?
- a. 8:1 grid
  - b. 12:1 grid

ANS: B                      REF: 53

*Match the patient condition with the subject contrast that the resulting image would display.*

33. Dense bones
- a. High subject contrast
  - b. Low subject contrast

ANS: A                      REF: 46

34. High fat content
- a. High subject contrast
  - b. Low subject contrast

ANS: B                      REF: 46

35. Well-developed muscular structure
- a. High subject contrast
  - b. Low subject contrast

ANS: A                      REF: 46

36. Fluid retention caused by disease
- a. High subject contrast
  - b. Low subject contrast

ANS: B                      REF: 46

37. Bony structures with low mineral content
- a. High subject contrast
  - b. Low subject contrast

ANS: B REF: 46

38. A PA chest projection was obtained using a grid with a recommended 40-inch focal range with a 72-inch SID. Where would the grid cutoff be demonstrated on the projection?
- Peripherally
  - Across the entire image, but more noticeable on one side
  - Evenly across the entire image

ANS: A REF: 36

39. Describe the grid cutoff that occurs if the central ray is angled toward the grid's lead strips.
- On both sides of the image
  - Across the entire image, but more noticeable on one side
  - Evenly across the entire image

ANS: B REF: 36

40. A grid should be used for all of the following, except when
- the part being imaged measures 10 cm.
  - over 60 kVp is used.
  - an increase in image contrast is desired.
  - a decrease in scatter radiation production is desired.

ANS: D REF: 31

41. The following are true about double-exposed screen-film images *except*:
- They appear blurry and can be mistaken for patient motion.
  - They demonstrated high image density.
  - They demonstrate adequate density because the system will adjust for the increased exposure.
  - They can be identified by evaluating the cortical outlines of bony structures.

ANS: C REF: 51

*Place the following tasks in the order in which they should be performed during a trauma examination.*

42. Disinfect equipment, IRs, and positioning devices.
- First
  - Second
  - Third
  - Fourth
  - Fifth
  - Sixth
  - Seventh

ANS: G REF: 62



43. Gather and organize equipment, IR, positioning devices, and other supplies.
- a. First
  - b. Second
  - c. Third
  - d. Fourth
  - e. Fifth
  - f. Sixth
  - g. Seventh

ANS: B                      REF: 58

44. Determine the projections that will be needed.
- a. First
  - b. Second
  - c. Third
  - d. Fourth
  - e. Fifth
  - f. Sixth
  - g. Seventh

ANS: A                      REF: 58

45. Process and evaluate projections.
- a. First
  - b. Second
  - c. Third
  - d. Fourth
  - e. Fifth
  - f. Sixth
  - g. Seventh

ANS: E                      REF: 62

46. Return patient.
- a. First
  - b. Second
  - c. Third
  - d. Fourth
  - e. Fifth
  - f. Sixth
  - g. Seventh

ANS: F                      REF: 62

47. Obtain required projections.
- a. First
  - b. Second

- c. Third
- d. Fourth
- e. Fifth
- f. Sixth
- g. Seventh

ANS: D                      REF: 58-59

48. Determine patient mobility, alertness, and ability to follow requests.

- a. First
- b. Second
- c. Third
- d. Fourth
- e. Fifth
- f. Sixth
- g. Seventh

ANS: C                      REF: 58-59

49. The patient's knee is unable to extend fully for an AP lower leg projection, causing the lower leg to be at a 20-degree angle with the IR. The projection should be obtained with a \_\_\_\_\_-degree central ray angle and \_\_\_\_\_-degree lower leg to IR angle.

- a. 0, 20
- b. 10, 10
- c. 20, 20
- d. 10, 20

ANS: B                      REF: 61

### TRUE/FALSE

1. A PA chest projection is displayed as if the viewer and patient were facing one another.

ANS: T                      REF: 5

2. A left lateral chest projection is displayed with the patient facing the viewer's left side.

ANS: F                      REF: 5

3. A lateral foot projection is displayed as if it were hanging from the toes.

ANS: F                      REF: 5

4. A PA oblique projection (RAO position) of lumbar vertebrae is displayed with the patient's right side on the viewer's left side.

ANS: T                      REF: 5

5. An inferosuperior axial projection of the shoulder is displayed with the anterior surface facing upward.

ANS: T REF: 5

6. Extremity images are displayed so that the anterior or lateral surfaces are facing the viewer.

ANS: F REF: 5

7. When the marker is only faintly or partially demonstrated on the resulting projection, the information should be permanently added directly over the original marker.

ANS: F REF: 12

8. A hypersthenic patient's thorax is wider than that of an asthenic patient.

ANS: T REF: 13

9. A sthenic patient's thorax is longer than that of an asthenic patient.

ANS: F REF: 13

10. A hyposthenic patient has a lower diaphragm than a sthenic patient.

ANS: T REF: 13

11. The asthenic patient has the longest and narrowest thorax.

ANS: T REF: 13

12. The least amount of x-ray beam divergence is at the central ray.

ANS: T REF: 19

13. When an angled central ray is used to record a structure, the structure is projected in the same direction that the x-rays are traveling.

ANS: T REF: 20

14. Off-centered diverged beams will affect structures in the same manner as an angled central ray.

ANS: T REF: 19-20

15. The farther from the central ray one moves, the greater will be the angle of divergence.

ANS: T                      REF: 20

16. When operating mobile radiography units, a source-skin distance of at least 12 inches (30 cm) must be maintained.

ANS: T                      REF: 30

17. Compensating filters that are accurately positioned between the focal spot and patient will reduce radiation exposure.

ANS: T                      REF: 30-31

18. Using a high-ratio grid will reduce radiation exposure.

ANS: F                      REF: 31

19. Shielding of the eyes, thyroid, breasts, and gonads should occur when they lie within 2 inches (5 cm) of the primary beam.

ANS: T                      REF: 33

20. Female gonadal shielding should protect the ovaries, uterine tubes, and uterus.

ANS: T                      REF: 31-32

21. Motion on an image that resulted when a patient yawned during the exposure is considered voluntary.

ANS: T                      REF: 29

22. Penetration and contrast scale are controlled by kVp when using the automatic exposure control (AEC) unit.

ANS: T                      REF: 39

23. The mA should be set at the highest station to meet the minimum response time requirements accurately when using the AEC unit.

ANS: F                      REF: 40

24. If the AEC backup time is too short for the required exposure, the resulting image will be underexposed.

ANS: T                      REF: 40

25. An overexposed image will result if the chosen ionization chamber is located beneath a structure that has a lower atomic number, or is thinner or less dense than the structure of interest.

ANS: F                      REF: 40

26. If the AEC is used on peripheral or very small anatomy where the activated chamber(s) is not completely covered by the anatomy, the capacitor will quickly reach its maximum level, resulting in an underexposed image.

ANS: T                      REF: 40

27. The AEC backup timer should be set at 100% to 150% of the expected manual exposure time to prevent overexposure.

ANS: F                      REF: 40

28. The AEC's thyristor is automatically adjusted for different screen-film combinations before exposures are taken.

ANS: F                      REF: 42

## COMPLETION

1. A(n) (a) \_\_\_\_\_ disease causes the tissues to increase in mass density or thickness, whereas a(n) (b) \_\_\_\_\_ diseases cause the tissue to break down.

ANS: (a) additive, (b) destructive

REF: 38-39