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Post-Test 1E: Mammography
Reference: Handbook of Mammography, 4th edition

Multiple Choice: Select the best answer.

1. Sensitometry is a method of quantitatively representing the relationship between:
   - **a.** exposure and contrast
   - **b.** exposure and density
   - **c.** development and density
   - **d.** development and contrast

2. Referring to the characteristic curve for a contrast film, which of the following statements is **true**:
   - **a.** the exposure range (along the horizontal axis) is relatively narrow
   - **b.** the exposure range (along the vertical axis) is relatively narrow
   - **c.** the exposure range (along the horizontal axis) is relatively wide
   - **d.** the exposure range (along the vertical axis) is relatively wide

3. Latent image fading due to delayed film processing will affect the following film parameter:
   - **a.** contrast
   - **b.** latitude
   - **c.** density
   - **d.** resolution

4. The useful film densities that make up a radiographic image are represented by which of the following components of a sensitometric curve:
   - **a.** the threshold area
   - **b.** the shoulder area
   - **c.** the slope area
   - **d.** the solarization area

5. Silver is an important by-product of film processing. It can be found in the following processor solutions:
   - **a.** developer and fixer
   - **b.** fixer and wash
   - **c.** wash and developer
   - **d.** developer and silver recovery

6. Processor rollers with a textured surface are commonly found in the following area:
- **a.** developer rack
- **b.** fixer rack
- **c.** wash rack
- **d.** dryer rack

7. With flooded replenishment, starter solution is added to the:
- **a.** developer tank
- **b.** fixer tank
- **c.** replenishment tank
- **d.** developer and replenishment tanks

8. To minimize surface damage to mammography film, some manufacturers have developed a special, smooth design for the processor:
- **a.** feed tray
- **b.** guide shoes
- **c.** crossover racks
- **d.** turnaround assembly

9. A split-phantom test may be used to demonstrate:
- **a.** image quality changes over a period of time
- **b.** variability of AEC exposure response
- **c.** speed differences between various emulsions
- **d.** density changes with processing variables

10. It is important to use seasoned chemistry for performing the following:
- **a.** daily sensitometry
- **b.** crossover procedures
- **c.** screen speed assessment
- **d.** fixer retention testing

11. An estimator strip is associated with the following:
- **a.** silver recovery unit testing
- **b.** verifying densitometer readouts
- **c.** checking chemistry specific gravity
- **d.** fixer retention testing

12. The role of the medical physicist does **not** include the following:
- **a.** operator safety issues
- **b.** image quality assessment
- **c.** patient dose evaluation
- **d.** patient tracking issues

13. The following tests are performed using mammography film from the box that is used for patient imaging:
- **a.** darkroom fog and phantom imaging
- **b.** sensitometry and screen speed
- **c.** crossover procedures and darkroom fog
- **d.** phantom imaging and sensitometry

14. The archival quality of mammography images is verified with the following test procedure:
- **a.** darkroom fog
- **b.** fixer retention
- **c.** silver recovery
- **d.** processor QC

15. Exposing an area of film slightly larger than the size of a spot compression paddle is useful to:
- **a.** include more diagnostic information on the mammogram
- **b.** confirm the correct image location by eliminating adjacent landmarks
- **c.** facilitate radiopaque marker placement on the coned image
- **d.** orient the interpreter to the correct area on the original mammogram

16. The following borders of the breast are firmly attached to adjacent anatomic structures:
- **a.** medial and inferior borders
- **b.** medial and superior borders
- **c.** inferior and oblique borders
- **d.** inferior and lateral borders

17. The process of interpreting mammography images is based on the:
- **a.** comparison of symmetry
- **b.** process of elimination
- **c.** calculation of measurements
- **d.** mammography standards of practice

18. Taut breast compression will do all of the following **except**:
- **a.** provide a more uniform film density
- **b.** visualize more posterior breast tissue
- **c.** provide improved patient comfort
- **d.** improve contrast by reducing scatter

19. The following factors must be taken into consideration when achieving taut breast compression on a mammogram:
- **a.** patient tolerance and breast compressibility
- **b.** breast glandularity and compression pressure
- **c.** tissue thickness and patient tolerance
- **d.** menstrual status and patient tolerance

20. The great majority of pain that is associated with mammography is due to:

- **a.** excessive compression pressure applied to the breast tissue
- **b.** excessive tension on the patient's skin
- **c.** excessive pressure applied along the mobile breast borders
- **d.** applying pressure in the axillary region too quickly

21. Radiopaque markers on a mammogram are used to indicate the:

- **a.** mammographic examination
- **b.** breast quadrant involved
- **c.** location of occult lesions
- **d.** mammographic view/projection

22. Frequently, a separate, external sticker is attached to a mammography image to indicate:

- **a.** the mammography view
- **b.** the current date
- **c.** the technical factors
- **d.** the MLO angulation

23. The "up-and-out" maneuver utilizes:

- **a.** the PNL landmark
- **b.** the PNL measurement
- **c.** breast positioning
- **d.** breast mobility

24. A lesion that is located at the 2:00 o'clock position in the left and the right breast respectively, will be located in:

- **a.** the U.O.Q and the U.I.Q. respectively
- **b.** the U.I.Q. and the U.O.Q. respectively
- **c.** the U.O.Q. in both cases
- **d.** the U.I.Q. in both cases

25. Correct breast elevation for the CC view will be achieved when:

- **a.** the inframammary fold is pulled taut
- **b.** the nipple is in profile
- **c.** the PNL is perpendicular to the thorax
- **d.** the pectoralis muscle is included

26. For the MLO view, an alternate arm position for the patient with limited arm and shoulder mobility would be:

- **a.** resting along the top of the bucky
- **b.** resting at the patient's side
- **c.** hanging freely behind the bucky
- **d.** supported by an I.V. pole

27. With rolled views, the direction of the roll always refers to the tissue:
- **a.** directly adjacent to the compression paddle
- **b.** directly adjacent to the bucky
- **c.** along the medial border
- **d.** along the lateral border

28. The nipple should always be imaged in profile with:
- **a.** tangential views
- **b.** lateral views
- **c.** spot compression views
- **d.** rolled CC views

29. Limited compression should only be used with:
- **a.** implant displaced views
- **b.** implant included views
- **c.** all views on implant patients
- **d.** nipple profile views

30. Implant displaced views will be most successful with the following:
- **a.** retromammary breast implants
- **b.** intramammary breast implants
- **c.** submammary breast implants
- **d.** subpectoral breast implants

31. The 2 most important factors that will facilitate positioning of the patient in a wheelchair are to keep:
- **a.** her head forward and her back straight
- **b.** her back straight and her feet on the floor
- **c.** her back straight and her thorax leaning forward
- **d.** her back straight and her shoulders rolled forward

32. Compared to its location on a MLO view, a lesion that moves UP on a lateral view will be located:
- **a.** in the medial breast tissue on the CC projection
- **b.** in the lateral breast tissue on the CC projection
- **c.** in the posterior breast tissue on the CC projection
- **d.** in the anterior breast tissue on the CC projection

33. The appearance of an abnormality on a specimen image may be considerably different from its appearance on a mammogram because:
- **a.** the technical factors for specimen radiography are very different compared to mammography imaging
- **b.** surrounding breast tissue and skin are not present
- **c.** compression is not comparable with specimen imaging
- **d.** chemical preservatives alter the tissue characteristics

34. It is correct to lean the patient's shoulders back, away from the mammography receptor during CC positioning when the:

- **a.** patient has a pacemaker inserted in the superior tissue
- **b.** patient's shoulder obstructs the path of the compression paddle
- **c.** patient's face encounters the face shield
- **d.** patient is kyphotic

35. The practice of exposing the entire film for routine mammography images relates primarily to:

- **a.** controlling the patient dose as much as possible
- **b.** including the cassette identification on the film
- **c.** creating the best viewing conditions during interpretation
- **d.** improving the opportunity to image adjacent tissue

36. The following information must be included in the permanent film identification of a mammography image:

- **a.** patient name, age and medical record number
- **b.** patient name, medical record number and technical factors
- **c.** technologist identification, patient name and facility name
- **d.** technologist identification, patient name and date sticker

37. The following measurements are used to confirm that adequate tissue has been imaged on a CC projection:

- **a.** the PNL measurement on the CC view must be within 1.0 cm of the PNL measurement on the MLO view
- **b.** the PNL measurement on the MLO view must be within 1.5 cm of the PNL measurement on the CC view
- **c.** the PNL measurement on the MLO view must be within 2.0 cm of the PNL measurement on the CC view
- **d.** the PNL measurement on the CC view must be within 1.5 cm of the PNL measurement on the MLO view

38. Alternate anodes and filters are used for mammography imaging of the:

- **a.** radiographically difficult breast
- **b.** radiographically dense breast
- **c.** breast that cannot be compressed
- **d.** breast with a silicone implant

39. The correct position of the AEC (phototimer) for mammography imaging is:

- **a.** under the thickest breast tissue
- **b.** under the nipple and retroareolar tissue
- **c.** under the glandular breast tissue
- **d.** under the pectoralis muscle shadow

40. As women age and fatty replacement occurs in the breast tissue, the glandular tissue will usually remain in the following area the longest:

- **a.** the axillary region
- **b.** the U.O.Q. of the breast
- **c.** the retroareolar area
- **d.** the subcutaneous area

41. The following protocol is frequently used when previous mammography studies are available for comparison purposes:

- **a.** they are only used if the study is of comparable image quality to the current examination
- **b.** the most recent set of images is used for comparison purposes
- **c.** an earlier study is first compared to the current examination, followed then by comparison with the most recent examination
- **d.** they are only used when the patient reports a new, palpable finding

42. The exposure factors to best image a breast are ultimately selected by the AEC (phototimer) based on breast:

- **a.** size
- **b.** thickness
- **c.** compression
- **d.** density

43. Which of the standard mammography views will image the medial breast tissue:

- **a.** the CC view
- **b.** the MLO view
- **c.** the lateral view
- **d.** the cleavage view

44. The typical scalloped appearance of the subcutaneous glandular tissue on a mammogram is due to:

- **a.** hormonal stimulation
- **b.** premenstrual changes
- **c.** retroareolar structures
- **d.** Cooper's ligaments

45. A pectoralis muscle shadow with a convex contour on the MLO view indicates:

- **a.** complete posterior tissue coverage
- **b.** complete medial tissue coverage
- **c.** correct "up-and-out" positioning
- **d.** a relaxed patient

46. It is ideal to routinely image a layer of fatty tissue behind the breast parenchyma with:

- **a.** craniocaudal views
- **b.** mediolateral oblique views
- **c.** CC and MLO views
- **d.** Supplementary views

47. A correctly exposed mammographic image will demonstrate all of the structures below **except**:

- **a.** the retromammary fatty tissue
- **b.** the skin and subcutaneous tissue
- **c.** the retroareolar structures
- **d.** the axillary tail area

48. Which of the following characteristics of lymph nodes is generally **not** considered worrisome:

- **a.** enlarged size
- **b.** irregular borders
- **c.** increased density
- **d.** spiculated margins

49. Geometric unsharpness is generally due to:

- **a.** film-screen characteristics
- **b.** processing parameters
- **c.** patient related factors
- **d.** equipment characteristics

50. The most common factor responsible for radiographic mottle is:

- **a.** receptor graininess
- **b.** wet pressure marks
- **c.** quantum mottle
- **d.** screen non-uniformity

51. The ratio of output information to input information is know as:

- **a.** modulation transfer function
- **b.** spatial resolution
- **c.** radiographic blurring
- **d.** quantum mottle

52. The key exposure factor responsible for optimizing subject contrast is:

- **a.** mA selection
- **b.** kVp selection
- **c.** time factor
- **d.** density setting

53. The number of line pairs per mm. is a common unit used to express:

- **a.** contrast resolution
- **b.** spatial resolution
- **c.** geometric unsharpness
- **d.** quantum mottle

54. Subject contrast can be improved with the following:

- **a.** small focal spot size
- **b.** high modulation transfer function
- **c.** taut compression
- **d.** optimized film processing

55. Scatter radiation that impacts mammographic images is **not** affected by:

- **a.** kilovoltage
- **b.** collimation
- **c.** compression
- **d.** filtration

56. The effects of image penumbra are controlled by the:

- **a.** screen speed
- **b.** focal spot material
- **c.** focal spot size
- **d.** system resolution

57. A plus-density artifact that occurs parallel to the direction of film travel- seen as ill-defined randomly spaced narrow bands of varying widths and usually only seen on the first film developed after the processor has been on standby is known as:

- **a.** hesitation marks
- **b.** delay streaks
- **c.** chatter
- **d.** slap lines

58. Hesitation lines may occur as a result of:

- **a.** extended film travel
- **b.** worn roller surfaces
- **c.** excessive drive chain tension
- **d.** loose drive chain tension

59. Wet pressure marks resemble:

- **a.** hesitation marks
- **b.** chatter
- **c.** quantum mottle
- **d.** flame patterns

60. In troubleshooting film artifacts, we often feed two films into the processor, changing their orientation so that one enters lengthwise and one enters crosswise. When the orientation of the artifact remains the same, despite this change of feeding pattern, we can determine that the artifact is related to:

- **a.** the mammography equipment
- **b.** the film processor
- **c.** the film manufacturer
- **d.** the x-ray illuminator

61. Film artifacts that are more pronounced when film is processed emulsion side up - can usually be traced to:

- **a.** outside rollers of processing racks
- **b.** inside rollers of processing racks
- **c.** turnaround rollers
- **d.** guide shoes

62. Which of the following artifacts can appear as either a plus or minus density:

- **a.** guide shoe marks
- **b.** static discharge
- **c.** surface drying streaks
- **d.** wet pressure marks

63. The main reason that mammography illuminators require higher luminance levels is:

- **a.** to demonstrate the skin line
- **b.** to visualize the nipple
- **c.** mammography film has a higher optical density
- **d.** mammography film has higher contrast levels

64. The level of the ambient light in a mammography viewing room should be:

- **a.** no greater than the level of light projected through the images
- **b.** no less than the level of light projected through the images
- **c.** no greater than 50 nit
- **d.** no less than 50 nit

65. The value of illuminators with variable intensity is to:

- **a.** optimally view images of many optical densities
- **b.** optimally view the varying densities on mammography images
- **c.** minimize strain on the eyes of the interpreter
- **d.** allow the illuminators to be used for multiple purposes

66. The light output from mammography illuminators should be evaluated:

- **a.** monthly
- **b.** semi-annually
- **c.** annually
- **d.** every 18-24 months

67. The following measure may be helpful to overcome patient motion problems:
- **a.** use the small focal spot
- **b.** use detail imaging screens
- **c.** reduce breast compression
- **d.** increase the exposure mA setting

68. High base-plus-fog readings can occur as a result of:
- **a.** exhausted developer chemistry
- **b.** developer under replenishment
- **c.** developer over replenishment
- **d.** fixer over replenishment

69. Wet films coming from the film processor can result from the following:
- **a.** cold wash water
- **b.** reduced developer time
- **c.** over-replenished fixer
- **d.** exhausted fixer

70. Repeated occurrences of films becoming jammed in the processor should direct your attention to:
- **a.** film emulsion variability
- **b.** improperly mixed chemistry
- **c.** inadequate replenishment rates
- **d.** chemical contamination

71. A repeat analysis should:
- **a.** be calculated for each technologist
- **b.** include a minimum of 350 patient exams
- **c.** include quality control and test films
- **d.** be performed at least quarterly

72. Compton scattering occurs at:
- **a.** low kVp levels
- **b.** high kVp levels
- **c.** low mAs levels
- **d.** high mAs levels

73. Contrast in our mammography images results from:
- **a.** photoelectric interactions
- **b.** compton interactions
- **c.** tissue ionization
- **d.** taut breast compression

74. The best indicator of radiation risk appears to be:

- **a.** ESE measurements
- **b.** MD measurements
- **c.** MGD measurements
- **d.** TLD measurements

75. The current dose limits for mammography are:

- **a.** 3.0 mGy per exposure
- **b.** 3.0 mGy per breast (2 exposures)
- **c.** 300 mGy per exposure
- **d.** 300 mGy per breast (2 exposures)

76. Repetitive motions that mammographers encounter with their work will pose a potential problem for musculoskeletal injury when combined with:

- **a.** extreme temperatures
- **b.** high impact activity
- **c.** recommended recovery time
- **d.** awkward body postures

77. To minimize leg and foot discomfort, the foot pedals for mammography equipment should:

- **a.** be attached to the C-arm gantry
- **b.** require numerous adjustments
- **c.** have a high profile for easy vision
- **d.** be mobile for easy access

78. Personal risk factors that will contribute to musculoskeletal injury with mammographers include:

- **a.** obesity
- **b.** exposure to radiation
- **c.** poor visual acuity
- **d.** excessive workload

79. Back strain and injury can be minimized by doing all of the below **except**:

- **a.** alternating tasks to relieve back strain
- **b.** taking time to lift properly
- **c.** bending from the waist, keeping the back straight
- **d.** pushing rather than pulling whenever possible

80. The upper extremity is at risk to develop musculoskeletal stress and injury with the following conditions:

- **a.** working with outstretched arms
- **b.** working with arms at low levels
- **c.** prolonged periods of inactivity
- **d.** working at high elevations

1E POST TEST ANSWER SHEET

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Please submit ONLY this answer sheet marking.
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1. A B C D	21. A B C D	41. A B C D	61. A B C D
2. A B C D	22. A B C D	42. A B C D	62. A B C D
3. A B C D	23. A B C D	43. A B C D	63. A B C D
4. A B C D	24. A B C D	44. A B C D	64. A B C D
5. A B C D	25. A B C D	45. A B C D	65. A B C D
6. A B C D	26. A B C D	46. A B C D	66. A B C D
7. A B C D	27. A B C D	47. A B C D	67. A B C D
8. A B C D	28. A B C D	48. A B C D	68. A B C D
9. A B C D	29. A B C D	49. A B C D	69. A B C D
10. A B C D	30. A B C D	50. A B C D	70. A B C D
11. A B C D	31. A B C D	51. A B C D	71. A B C D
12. A B C D	32. A B C D	52. A B C D	72. A B C D
13. A B C D	33. A B C D	53. A B C D	73. A B C D
14. A B C D	34. A B C D	54. A B C D	74. A B C D
15. A B C D	35. A B C D	55. A B C D	75. A B C D
16. A B C D	36. A B C D	56. A B C D	76. A B C D
17. A B C D	37. A B C D	57. A B C D	77. A B C D
18. A B C D	38. A B C D	58. A B C D	78. A B C D
19. A B C D	39. A B C D	59. A B C D	79. A B C D
20. A B C D	40. A B C D	60. A B C D	80. A B C D

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