CHAPTER ONE: THE HISTORY OF BREAST CANCER AND BREAST IMAGING

1. —— refers to any body fluid or semifluid substance in the body such as blood or lymph.
   A Lymphatic fluid  B Humor  C Metaplasia  D HER2 protein

2. —— disease of the nipple is a rare but inflammatory malignant cancer of the nipple and areola.
   A Paget’s  B Parker’s  C Millinghouse  D Tompkin’s

3. ——, considered the father of Western medicine, supplied the earliest descriptive details of breast cancer.
   A Osler  B Pasteur  C Hippocrates  D Plato

4. Wilhelm Conrad Roentgen (1845 – 1923) discovered x-rays occurred in ———.
   A 1895  B 1906  C 1865  D 1889

5. The introduction of grids in the late ——— introduced a new generation of dedicated mammography machines.
   A 1980s  B 1990s  C 1960s  D 1970s

6. On October 27, 1992, the US Congress passed the MQSA (Mammography Quality ——— Act).
   A Screening  B Service  C Scan  D Standards

CHAPTER TWO: PATIENT EDUCATION AND ASSESSMENT

7. Breast-Specific ——— Imaging (BSGI) is a functional imaging study of the breast.
   A Gradient  B Graph  C Gamma  D Galen

8. Breast cancer is the ——— leading cause of deaths among women in the United States, claiming the lives of thousands annually.
   A first  B second  C third  D fourth

9. Mammography Quality ——— Act (MQSA) regulations state that mammography patients must receive a copy of the mammogram result.
   A Standards  B Service  C Screening  D System

10. Breast cancer can be totally asymptomatic.
    A True  B False

11. Almost ———% of breast cancers are located in the upper quadrants of the breast.
    A 25  B 40  C 60  D 75

12. The American Cancer Society holds that women who fall in high risk categories be screened with ——— in addition to mammograms.
    A CT  B MRI  C US  D nuclear medicine

13. The ACR recommends that the average glandular dose on the mammogram should be no greater than ——— rad with a grid.
    A 0.03  B 0.1  C 0.3  D 0.2

14. Mammography screening is generally acknowledged to have a ———% miss rate.
    A 5 - 8  B 10 - 15  C 20 – 25  D 1 - 3

15. CAD (computer-aided ———) works by first mapping normal healthy breast tissue that is then stored as a reference.
    A diagramming  B diffusion  C DICOM  D diagnosis

16. In ultrasound imaging, the transducer holds the ——— crystals.
    A piezoelectric  B scintillation  C thermal  D graphite mosaic

17. PEM (——— Emission Mammography) imaging is a valuable tool used for detecting the metastatic spread of breast cancer.
    A Positron  B Parity  C Photostimulated  D Phantom

CHAPTER THREE: ANATOMY, PHYSIOLOGY, AND PATHOLOGY . . .

18. ——— ligaments are also called suspensory ligaments.
    A Harrison’s  B Cento’s  C Cooper’s  D Rossini’s
19. The retromammary space is filled with a layer of ——— tissue. 
   A connective  B nervous  C muscle  D adipose or fatty

20. Most normal lymph nodes are less than ——— cm in size and have a kidney-shaped appearance. 
   A 2  B 4  C 6  D 8

21. The hormone ——— directly effects the lobular development during pregnancy. 
   A insulin  B thyroid  C prolactin  D estrogen

22. The incidence of male breast cancer is about ———% of all breast cancers. 
   A 3  B 1  C 4  D 2

23. Klinefelter’s syndrome is a rare disorder characterized by an abnormal chromosome pattern: 
   A XXY  B YYYY  C XYY  D YYX

CHAPTER FOUR: BENIGN AND MALIGNANT DISEASES OF THE BREAST

24. ——— refers to severe, generalized, and massive edema. 
   A Eczema  B Erythema  C Abscess  D Anasarca

25. The ——— sign is an indication of a benign process. 
   A cross-linear  B silhouette  C shadow  D mimic

26. In 2006, the United States lifted a ——— -year ban on implants containing silicone. 
   A 12  B 14  C 24  D 31

27. Spiculated / stellate lesions have a solid central tumor with radiating structures and ——— borders. 
   A circular  B ovoid  C ill-defined  D sharp

28. Calcifications can be clustered/ grouped (——— calcifications in a small diameter area of less than 1cm). 
   A 2  B 3 – 5  C 7 – 10  D 20 – 30

29. Ductal carcinoma in situ (DCIS) accounts for ——— of nonpalpable tumors detected mammographically. 
   A 22% to 23%  B 5% to 7%  C 12% to 17%  D 45%

30. Invasive lobular carcinoma (ILC) accounts for only about ——— % of all breast cancers in most studies. 
   A 2  B 5  C 14  D 10

CHAPTER FIVE: MAMMOGRAPHY EQUIPMENT

31. DLT (digital ——— tape) is a storage option in digital imaging. 
   A linear  B latitude  C luminance  D longitudinal

32. X-ray production processes are very inefficient; only ———% results in x-ray production while the rest is lost as heat. 
   A 3  B 1  C 12  D 22

33. ——— production involves x-ray at energies greater than 1.02 MeV and is not a concern in diagnostic imaging. 
   A Gradient energy  B Laser  C Pair  D Q-shell

34. Photodisintegration involves high -energy x-ray in the region of ——— MeV. 
   A 3  B 8  C 10  D 1

35. The x-ray range found most useful in maximizing contrast in breast tissue is in the ——— keV range. 
   A 17 to 24  B 5 to 9  C 28 to 35  D 12 to 15
36. The reciprocity law fails for extremely short exposure times (less than ——— second).
   A 11/100  B 7/100  C 1/100  D 5/100

37. Regarding automatic exposure control (AEC), the backup timer for grid techniques is preset at 600 mAs and for non-grid at ——— mAs.
   A 400  B 500  C 200  D 300

38. On average, mammography grids have a ratio of:
   A 2:1  B 3:1  C 4:1  D 5:1

   A True  B False

40. ——— is basically the ability to image two separate objects and visibly detect them as separate entities.
   A Radiographic noise  B Resolution  C Sharpness  D Visibility of detail

CHAPTER SIX: MAMMOGRAPHIC PROCESSING AND QM

41. ——— is the ability of a radiographic unit to produce a constant radiation output for multiple combinations of mA and exposure time.
   A Exposure linearity  B Radiation linearity  C Exposure factor  D Radiation factor

42. ——— in mammography refers to the average glandular dose or radiation dose delivered to the center of the breast during an exposure.
   A Glandular core  B Glandular radii  C Glandular dose  D Glandular vertex

43. Centers for Disease Control and ——— (CDC) is known as the main federal agency ensuring the protection, health, and safety of people.
   A Monitoring  B Prevention  C Processing  D Patients

44. Phantom image tests are ——— checks taken to assure that image quality are maintained at optimum levels.
   A daily  B quarterly  C monthly  D weekly

45. Regarding equipment standards, manual compression should not exceed:
   A 20 lbs  B 30 lbs  C 35 lbs  D 45 lbs

46. A typical mammography film should be able to remain in safe lighting for at least ——— seconds without becoming fogged.
   A 40  B 25  C 30  D 60

47. ——— transfer function (MTF) is a measure of the ability of the detector to transfer its spatial resolution characteristic to the image.
   A Magnification  B Multi-spatial  C Modulation  D Maximum

48. At a MQSA inspection, the medical physicist’s report is always checked. Most failures allow a ——— period to provide corrections.
   A 2-month  B 30-day  C 15-day  D 3-month

49. In digital systems, the image brightness (density) is directly controlled by exposure.
   A True  B False

50. The kV on the mammography unit should be accurate within ± ——— % of the indicated kV.
   A 5  B 7  C 9  D 13

51. Viewboxes used for analog mammograms should be capable of producing a luminance of at least ——— cd/m².
   A 2000  B 3000  C 4000  D 5000

52. Regarding analog viewboxes, the fluorescent bulbs should be changed every ——— months.
   A 6-12  B 14-16  C 18-24  D 24-36

53. Regarding room light levels for digital viewing conditions, the recommendation is ——— lux.
   A 3  B 5-10  C 12-15  D 17-20

54. Regarding a failed artifact evaluation of a printer, the problem should be identified and corrected within ——— days.
   A 30  B 40  C 45  D 60
CHAPTER SEVEN: BREAST IMAGING MAMMOGRAPHY

55. ——— means on the other side of the body.
   A  Contralateral    B  Ipsilateral    C  Collateral    D  Opsilateral

56. Patients with a history of breast cysts should be advised to schedule their mammogram ——— after the menstrual period ends.
   A  10 days    B  3 weeks    C  2 weeks    D  1 week

57. MQSA requires that all mammographic projections include a projection label (projection and laterality) placed near the axilla.
   A  True    B  False

58. Supplementary projections recognized by the US Mammography Quality Standards Act include the cleavage or "———" view (CV).
   A  tunnel    B  U    C  valley    D  trench

59. The LMO is an inferolateral to superomedial projection. The tube is rotated ——— degrees parallel to the pectoral muscle.
   A  15 to 20    B  25 to 35    C  40 to 60    D  5 to 10

60. The ——— best demonstrates the upper inner quadrant and the lower outer quadrant of the breast, free of superimposition.
   A  RM    B  SIO    C  CV    D  AT

61. The skin dose for a single projection during mammography screening can be as high as ——— mrad (10 mG).
   A  100    B  1000    C  10000    D  5000

62. Regarding male breast imaging on the MLO, male patients usually require ——— degree tube angulation.
   A  35 to 45    B  55 to 60    C  25 to 30    D  65 to 70

63. Regarding imaging implants, the ——— technique (also called implant displaced or ID projections) is an eight projection series.
   A  Boehm    B  Fruehauf    C  Kuster    D  Eklund

64. Regarding postmastectomy imaging, most literature supports the possibility of another cancer developing at the mastectomy site.
   A  True    B  False

65. Mammograms are not recommended until ——— months after completion of radiation treatment.
   A  1 to 3    B  4    C  6 to 12    D  16 to 20

66. The mammographer should maneuver the pacemaker so that it is ——— when imaging the CC projection.
   A  flat    B  vertical    C  rotated medially    D  rotated laterally

67. In breast imaging, there are three common location terminology: the quadrant method, the clock face and the:
   A  zone    B  region    C  locale    D  map

68. The ability of the mammographic system to capture fine details in the image is defined as:
   A  noise    B  resolution    C  delineation    D  sharpness

CHAPTER EIGHT: BREAST IMAGING – DIGITAL, ULTRASOUND, AND MRI

69. Bytes are a group of ——— bits, where a bit represents the smallest unit of measure of computer storage.
   A  two    B  four    C  eight    D  sixteen

70. ——— resolution is the ability to distinguish and separate between two adjacent structures in the image.
   A  Object    B  Spatial    C  XY    D  Frequency

71. Regarding digital mammography, ——— is the common photoconductor used in direct flat-panel detector systems.
   A  selenium    B  strontium    C  scandium    D  silicon

72. OLEDs (——— light-emitting diode displays) have a higher contrast and better viewing angles than the LCDs.
   A  optical    B  organic    C  orbital    D  object

73. A mammography monitor must be a minimum of ——— megapixels and above.
   A  5    B  7    C  10    D  3
74. The US FDA approved CAD technology in ——— for aiding interpretation of the mammogram.  

75. If imaging with 15 MHz probes, ducts as small as 150 μm (150 micrometer = ——— mm) can be visualized.  
   A 0.15  B 1.5  C 15  D 15000

76. Ultrasound is almost ——— accurate in the diagnosis of cysts.  
   A 70% to 75%  B 82% to 87%  C 89% to 93%  D 96% to 100%

77. Color Doppler ultrasound assigns a different color to the ——— cells in a vessel.  
   A thrombocyte  B red blood  C white blood  D platelet

78. Carcinoma in situ is noninvasive and easy to detect on the ultrasound.  
   A True  B False

79. ——— are seen as irregular-walled cavities with echogenic fluid.  
   A Galactocele  B Lymph nodes  C Hematomas  D Phyllodes

80. ——— tumors are lesions similar in appearance to a large fibroadenoma with well-defined margins and distal enhancement.  
   A Galactocele  B Lymph nodes  C Hematomas  D Phyllodes

81. ——— artifacts occur when the sound is repeatedly reflected within the tissue and produces repeated parallel bands in the image.  
   A Reverberation  B Linear  C Shadow  D Pound

82. MRI signals depend on the presence or absence of ——— nuclei.  
   A carbon  B oxygen  C hydrogen  D phosphorus

83. The ——— technique is used to enhance one tissue type while suppressing the background tissue.  
   A gradient spoiling  B gradient echo  C postprocessing  D inversion recovery

84. The MRI chemical shift artifact is a result of slight differences between the resonating frequencies (——— frequencies) of similar protons.  
   A Leblanc  B Larmor  C Lebleu  D Leclercq

85. Breast MRI is not recommended for general screening of patients with a risk factor less than ——— %.  
   A 20  B 30  C 35  D 25

86. MRI is unable to image microcalcifications - particularly lesions less that ——— mm.  
   A 20  B 15  C 10  D 5

87. ——— is a condition that involves an abnormal increase in sensitivity to stimuli of the senses such as sounds, tastes, textures and touch.  
   A Dysesthesia  B Hyperpigmentation  C Hypesthesia  D Psoriasis

88. The Hologic unit holds the breast stationary and takes ——— while the tube rotates 7.5 degrees to either side in a 15 degree arc.  
   A 25 exposures  B 5 exposures  C 10 exposures  D 15 exposures

89. A typical digital mammogram uses ——— MB per study.  
   A 80 to 100  B 50  C 35  D 60 to 75

90. Studies estimate that ——— % of breast biopsies under MRI are proved to be benign.  
   A about 50  B 80  C 65  D 95

91. The main clinical drawback to MRI (——— breast imaging) is that it uses 8 – 10 times the radiation of a standard mammogram.  
   A monoclonal  B motion  C molecular  D modified
92. Patients undergoing a PET scan must fast for ——— hours.
A 2  B 3  C 4 – 6  D 10 - 12

93. Studies show that scintimammography has a 75% sensitivity and a specificity of ——— % for the detection of malignant lesions.
A 72  B 97  C 65  D 83

CHAPTER TEN: INTERVENTIONAL PROCEDURES

94. ——— is the cosmetic surgery to lift the breast.
A Mammoplasty  B Mastopexy  C Mammoclature  D Mastoplasty

95. Histologic analysis with the patient “under anesthesia,” this process has to be rapid and results are usually given in approximately:
A 2 minutes  B 10 minutes  C 20 minutes  D 30 minutes

96. Most tables used for prone stereotactic breast localization and biopsy have a ——— weight limit.
A 300  B 250  C 200  D 400

97. In the ——— all women had to have open surgical biopsy to confirm a cancer.
A late 1990s  B early 2000s  C 1980s or even early 1990s  D mid 1990s

98. The ABBI (advanced breast biopsy instrumentation) can remove lesions up to ——— cm in diameter.
A 5  B 4  C 3  D 2

99. The rate of insufficient samples for FNAB (fine needle aspiration biopsy) under stereotactic biopsy can reach:
A 39.9%  B 45.2%  C 52%  D 57.8%

100. Without RAR beta, vitamin ——— does not work (function properly) and breast epithelial cells eventually become cancerous.
A  C      B  D      C  E      D  A

101. The US FDA recommends imaging of the breast every ——— years to monitor the silicone-filled implants.
A 3  B 2  C 4  D 5

CHAPTER ELEVEN: TREATMENT OPTIONS

102. ——— is cell death due to lack of blood supply to the tissue.
A Metabolitic  B Hemolytic  C Necrosis  D Ischemia

103. The modified radical mastectomy generally requires a hospital stay of ——— days depending on the body’s rate of healing.
A 7 to 14  B 3 to 4  C 5 to 7  D 1 to 2

104. Often, lumpectomy is followed by ——— of radiation therapy to ensure that all cancer cells in the remaining breast were destroyed.
A 1 week  B 3 weeks  C 12 weeks  D 6 weeks

105. ——— involves the use of local radiation therapy to alleviate a distressing symptom or to prevent a problem.
A Primary radiation  B Palliative radiation therapy  C Combined modality therapy  D Adjuvant radiation therapy

106. To deliver a more precise radiation dose to a malignant tumor, the technology of IMRT (———— Modulated Radiation Therapy) is used.
A Intensity  B Intraductal  C Interventional  D Invasive

107. With chemotherapy, the most used parenteral route is intravenous through a semipermanent catheter or vascular access ——— (VAD).
A diffusion  B direction  C device  D delivery

108. The normal white cell count can range from ——— white blood cells per cubic millimeter.
A 25000 to 30000  B 4000 to 20000  C 400 to 2000  D 1000 to 3000

109. Tamoxifen has been in use since the ——— to treat patients with estrogen receptor positive breast cancer.
A 1970s  B 1980s  C 1990s  D 1960s
110. More than ——— % of breast cancers in the United States are estrogen receptor positive (ER +) cancers.
A  80  B  85  C  90  D  75

111. Laser ablation uses either ——— or MRI guidance to position an optic fiber to the site of the tumor.
A  fluoro  B  plain radiographs  C  ultrasound  D  CT

CHAPTER TWELVE: THE US MAMMOGRAPHY QUALITY STANDARD ACT

112. ———radiography technology has a larger recording latitude than screen–film mammography but uses higher doses of radiation.
A  Hyper  B  Inverse  C  Xero  D  Reverse

113. The US MQSA was enacted on October 27, ———, to establish minimal national quality standards for mammography.

114. Regarding quality assurance, every ——— a facility must renew the FDA or SAC certification through an inspection process.
A  year  B  2 years  C  3 years  D  5 years

115. For an approved analog unit, clinical use of a FFDM (——— Digital Mammograms) can begin under MQSA certification and conditions.
A  Focal-Flipped  B  Focal-fielded  C  Full-Fledged  D  Full-Fielded

116. Mammography radiographs and the medical records of patients must be kept for a period of not less than ——— years.
A  15  B  2  C  11  D  5

117. Category BIRAD (breast imaging reporting and data) ——— refers to a suspicious abnormality, and biopsy should be considered.
A  2  B  3  C  4  D  5

118. Among the requirements of the interpreting physicians, they must maintain continuing education of ——— CMEs each 36 months.
A  15 category 1  B  10 category 2  C  15 category 2  D  10 category 1

119. Medical physicists must have a minimum of ——— contact hours of specialized training in conducting mammography facility surveys.
A  30  B  20  C  15  D  10

120. Expert interpreting physicians have shown that mammography can have a sensitivity of:
A  75%  B  98%  C  95%  D  86%
Fill in each blank. There are two options to submit the post-test.

**Option 1:** Submit the post-test answers online at xrayunits.com on the course page under Step 3 for instant grading and emailed CE certificate. A password is required, which is found in your email receipt.

**Option 2:** Fax this answer sheet to us at 866-386-0472, or you may instead email a phone pic of the answer sheet to clark@xrayunits.com. Allow 2 days for grading, and we will email the CE certificate.

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