



**Specialized Topics in Areas of Radiologic Sciences**  
P.O. Box 2931 Toledo, Ohio 43606  
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## **Unit 39**

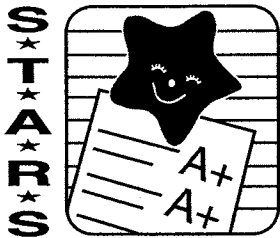
# **Breast Imaging The Requisites**

**by**

**Debra M. Ikeda, M.D.**

**Prepared by: Carolyn J. Frigmanski, M.A.,B.S.R.T. ®  
Founder, S.T.A.R.S.**

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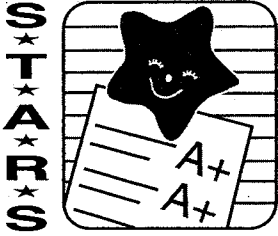
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A handwritten signature in black ink, appearing to read 'Carolyn J. Frigmanski', with a long horizontal line extending to the right.

**Carolyn J. Frigmanski, M.A., B.S.R.T. ®  
Founder, S.T.A.R.S.**



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**Unit 39: Breast Imaging The Requisites by Debra M. Ikeda, M.D.**

Please complete the answer sheet at the conclusion of the post test and return to the S.T.A.R.S. office.

**Chapter 1**

1. Early detection and treatment of breast cancer can lead to a \_\_\_\_\_% to \_\_\_\_\_% decrease in breast cancer mortality.  
a. 10/20                      b. 25/30                      c. 30/40                      d. 50/75
2. American Cancer Society Guidelines for Mammographic Screening of Asymptomatic Women recommends an annual mammogram beginning at age  
a. 35                      b. 50                      c. 40                      d. 65+
3. The Mammography Quality Standards Act (MQSA) of 1992 requires inspections of all mammographic facilities on a(an) \_\_\_\_\_ basis.  
a. annual                      b. semi-annual                      c. bi-annual                      d. quarterly
4. All institutions performing mammography must be certified by the  
a. Bureau of Radiologic Health                      c. American College of Radiology  
b. American Cancer Society                      d. Food and Drug Administration
5. One of the recommended components of screen-film mammography is  
a. a tungsten rotating anode                      c. a stationary grid  
b. automatic exposure control                      d. an aluminum filter
6. The main late occurring radiation risk from mammography is the possible induction of  
a. leukemia                      b. skin cancer                      c. thyroid cancer                      d. breast cancer
7. The kVp values for mammography for molybdenum targets is  
a. 24 - 32 range                      b. 30 - 40 range                      c. 20 - 35 range                      d. 35 - 45 range
8. The recommended focal spot size for magnification mammography is  
a. 0.1 mm                      b. 0.5 mm                      c. 1.0 mm                      d. 0.3 mm
9. The recommended compression force of the paddle is \_\_\_\_\_ to \_\_\_\_\_ pounds.  
a. 25/45                      b. 30/40                      c. 15/25                      d. 40/55

10. The spatial resolution of screen-film cassettes used in mammography is \_\_\_\_\_ lp/mm.
- a. 30                      b. 10                      c. 20                      d. 25
11. Screen-film mammographic images that turn brown over time have been
- a. inadequately rinsed in the final wash                      c. inappropriately developed  
b. stored in humid conditions                      d. inadequately rinsed of fixer
12. Screen-film mammographic images that are too dark may be due to
- a. excessive developer temperature                      c. low developer temperature  
b. contaminated solutions                      d. under replenishment
13. Phantom images should be taken
- a. every quarter                      c. every 6 months  
b. at least weekly                      d. annually
14. The "supervising physician" in a mammographic facility is responsible for
- a. scheduling all the staff                      c. the quality assurance program  
b. distribution of the payroll                      d. all aspects of marketing
15. MQSA requires interpreting physicians to have read \_\_\_\_\_ mammograms over a 24 month period.
- a. 960                      b. 1,000                      c. 1,500                      d. 500
16. MQSA guidelines for registered radiologic technologists includes
- a. 12 continuing education units in a 24 month period                      c. attending mammography conferences  
b. 15 continuing education units in a 36 month period                      d. advanced medical physics courses
17. MQSA equipment can angulate \_\_\_\_\_ degrees from the CC orientation in at least one direction.
- a. 90                      b. 45                      c. 180                      d. 360
18. Repeat analysis for screen-film mammography should be performed
- a. quarterly                      b. monthly                      c. semi-annually                      d. annually
19. Indirect digital detectors use \_\_\_\_\_ screens.
- a. calcium tungstate                      b. rare earth                      c. cesium iodide                      d. amorphous selenium
20. When comparing screen-film mammography and slot scanning to full-field digital mammography, the radiation dose is \_\_\_\_\_ in full-field digital mammography.
- a. higher                      b. similar                      c. minimal                      d. lower
21. New personnel must have \_\_\_\_\_ hours of training specific to digital mammography principles/equipment.
- a. 15                      b. 8                      c. 40                      d. 24

22. Double reading increases the rate of cancer detection by

- a. 5% to 15%
- b. 25%
- c. 25% to 40%
- d. 75%

23. Computer-aided detection systems have been utilized as

- a. a replacement to screen-film systems
- b. a replacement for physicians
- c. a "second reader"
- d. tools for quality assurance programs

## Chapter 2

24. The most important risk factors for breast cancer are

- a. late menarche and early menopause
- b. older aged and female
- c. BRCA 1 gene and younger aged women
- d. BRCA 2 gene and nulliparous

25. An increased risk of breast cancer results in families with

- a. a Middle Eastern heritage
- b. a South American heritage
- c. a female relative with breast cancer
- d. a male relative with breast cancer

26. Women who have an increased risk of breast cancer also experience

- a. early exposure to radiation
- b. early exposure to cigarette smoke
- c. early menopausal changes
- d. multiple pregnancies and childbirths

27. Nipple discharges described as \_\_\_\_\_ are a sign and symptom of breast cancer.

- a. whitish
- b. yellow
- c. serosanguinous
- d. green

28. A physical finding indicative of breast edema is

- a. nipple inversion
- b. peau d'orange
- c. palpable breast lump
- d. skin tethering

29. The honeycomb fibrous structures of the breast are composed of

- a. lactiferous ducts
- b. excretory ducts
- c. interlobular ducts
- d. Cooper's ligaments

30. A \_\_\_\_\_ view mammogram can distinguish a mass versus the appearance of the sternalis muscle.

- a. cleavage
- b. Cleopatra
- c. lateral
- d. craniocaudal

31. Mammographic magnification views may help distinguish a mass versus

- a. a cyst
- b. an inflammatory lymph node
- c. processing artifact
- d. scar tissue formation

32. Breast cancer is most often identified on screening mammograms by the detection of

- a. enlarged lymph nodes
- b. edema
- c. pleomorphic calcifications
- d. calcified ducts

33. The percentage of false negative for all cancers on mammography is
- a. 20                      b. 10                      c. 5                      d. 30
34. Using the clock face description, the outer portion of the left breast is at the \_\_\_\_ o'clock position.
- a. 10                      b. 4                      c. 7                      d. 3
35. The nipple should be in profile on at least \_\_\_\_ mammographic views.
- a. 3                      b. 4                      c. 1                      d. 2
36. The BI-RADS summary category code that has a 95% likelihood of cancer is
- a. 5                      b. 6                      c. 4                      d. 3
37. The preferred mammographic view used to visualize or characterize an outer breast finding is
- a. rolled                      b. Cleopatra/XCCL                      c. superior-inferior oblique                      d. cleavage
38. The preferred mammographic view used to visualize or characterize a palpable finding is
- a. craniocaudal                      b. mediolateral oblique                      c. Cleopatra                      d. spot compression
39. The process of localizing a finding within the breast in a three dimensional position is called
- a. stereoscopy                      b. depth perception                      c. triangulation                      d. biangulation
40. The view to visualize the upper part of the breast when the compression paddle interferes is
- a. "from below"                      b. mediolateral oblique                      c. rolled                      d. cleavage
41. The view or process recommended to delineate calcifications, mass shapes and margins are
- a. spot compression                      b. magnification                      c. cleavage                      d. Cleopatra

### Chapter 3

42. The percentage of breast cancers containing calcifications on histologic examination is
- a. 25% to 50%                      b. 60% to 75%                      c. 75% to 95%                      d. 50% to 80%
43. Heterogenous calcifications are described as
- a. homomorphic                      b. uniform                      c. pleomorphic                      d. agranular
44. The cluster shape composed of coarse or fine heterogenous calcifications is called
- a. segmental                      b. branching                      c. linear                      d. clustered
45. The "swallowtail" or "V" calcification cluster shape is indicative of
- a. fibrocystic disease                      b. lymphadenography                      c. papilloma                      d. calcifying cancer

46. Eggshell-type calcifications within the skin can be best demonstrated with a \_\_\_\_\_ view.
- a. tangential      b. cleavage      c. lateral      d. Cleopatra
47. Strand-like artifacts demonstrated on a mammographic image are produced by
- a. lactiferous ducts    b. the patient's hair      c. interlobular ducts      d. lymph nodes
48. An artifact that simulates the linear calcifications of ductal carcinoma in situ is created by
- a. guideshoe marks    b. safelight leaks      c. fingerprints      d. Pi lines
49. Fibroadenomas may be radiographically identified by calcifications described as
- a. linear      b. grape-like      c. eggshell fragments      d. "popcorn-like"
50. Dystrophic calcifications may determine the need for
- a. follow-up ultrasound      c. contrast-enhanced MR imaging  
b. biopsy      d. annual follow-up mammograms
51. Foreign-body granulomas are radiographically demonstrated as appearing similar to
- a. grapes on a vine      c. calcified blood vessels  
b. kernels of popcorn      d. eggshell fragments
52. Multiple calcification clusters containing a linear calcification is indicative of
- a. papillary carcinoma      c. ductal carcinoma in situ  
b. invasive ductal carcinoma      d. interlobular carcinoma
53. Patients with indeterminate, increasing and pleomorphic calcifications should be
- a. scheduled for biopsy      c. monitored carefully with ultrasound  
b. scheduled for mastectomy      d. evaluated every 6 months

#### Chapter 4

Match the radiologic and/or ultrasound findings in questions 54-59 with the condition in Column A.

#### Column A

54. solid mass with indistinct margins      a. breast metastasis
55. mass with spiculated borders and sclerosing features      b. lipoma
56. mass containing fat      c. post-biopsy scar
57. malignant solid mass with rounded or expansile borders      d. lactating adenoma
58. benign solid mass with rounded or expansile borders      e. lymphoma
59. fluid-containing mass      f. hematoma

60. A three-dimensional space-occupying lesion seen on at least 2 mammographic projections is called a
- cyst
  - tumor
  - mass
  - serotoma
61. A mass with obscured margins and low density would be described as
- lobular
  - round
  - irregular
  - oval
62. Spiculated masses characterized by thin lines radiating from a central portion of a mass are usually
- benign
  - fatty in nature
  - fibrocystic
  - malignant
63. A \_\_\_\_\_ shadow is needed in ultrasound evaluation for the location a palpable mass.
- circular, dense
  - ring-down
  - metallic marker
  - oval, dense
64. One of the ultrasound features of a solid malignant breast mass may be described as
- intensely homogenous
  - possessing 6 or more lobulations
  - producing acoustic shadowing
  - possessing an ellipsoid shape
65. Invasive ductal carcinoma accounts for about \_\_\_\_\_% of all cancers.
- 50
  - 90
  - 75
  - 25
66. Historically, the most difficult breast cancer or carcinoma to be seen on a mammogram is
- papillary
  - intracystic
  - medullary
  - invasive lobular
67. Blunt trauma to the breast tissue may produce
- adenosis
  - fibrosis
  - fat necrosis
  - hyperplasia
68. A round mass that is "taller than wide" on an ultrasound scan is suspicious of a
- cyst
  - cancer
  - lymphoma
  - fibroadenoma
69. Metastasis to the breast may result from the hemologically spread cells of a
- fibroadenoma
  - lymphoma
  - serotoma
  - melanoma
70. Benign tumors which vary on MRI images with changes in the woman's menstrual cycle are
- fibroadenomas
  - cysts
  - papillomas
  - phyllodes
71. A benign tumor that occurs in young pregnant patients during the second or third trimester is called a
- phyllode
  - papilloma
  - milk cyst
  - lactating adenoma
72. A condition that is often seen in pre-menopausal or postmenopausal women receiving hormonal therapy is
- fibrocystic disease
  - lymph node atrophy
  - pseudoangiomatous stromal hyperplasia
  - ductal carcinoma in situ

73. A round or oval mass found in the axilla containing a radiolucent fatty center is a
- a. lymph node
  - b. papilloma
  - c. adenoma
  - d. hematoma
74. The pathologic finding described as a “breast within a breast” is a
- a. phyllode
  - b. papilloma
  - c. sarcoma
  - d. hamartoma
75. The only fat-containing malignancy that is extremely rare is called a
- a. liposarcoma
  - b. papilloma
  - c. sarcoma
  - d. fibroadenoma
76. Simple cysts occur in \_\_\_\_\_% of all women.
- a. 25
  - b. 50
  - c. 10
  - d. 75
77. A(n) \_\_\_\_\_ may occur after mastitis or bacterial entry through a cracked nipple.
- a. abscess
  - b. cyst
  - c. tumor
  - d. hematoma
78. A benign mass that should be left alone is called a
- a. galactocele
  - b. seroma
  - c. fibroadenoma
  - d. abscess
79. An upright mammogram may be advantageous in demonstrating the presence of a
- a. cyst
  - b. hematoma
  - c. breast edema
  - d. galactocele

## Chapter 5

80. Hand-held ultrasound transducers should operate at a frequency of \_\_\_\_ to \_\_\_\_ MHz or greater.
- a. 3.5 to 5
  - b. 7.5 to 10
  - c. 10 to 12
  - d. 12 to 15
81. The normal appearance of Cooper’s ligaments on ultrasound are described as
- a. acoustic shadowing
  - b. hypoechoic
  - c. thin, echogenic lines
  - d. hyperechoic
82. At real-time ultrasound imaging, speckle artifacts in cystic fluid may simulate a
- a. cyst
  - b. abscess
  - c. solid mass
  - d. hematoma
83. One of the characteristics of a benign mass on an ultrasound scan is
- a. irregular borders
  - b. ellipsoid shape
  - c. 6+ lobulations
  - d. hyperechoic
84. One of the characteristics of a suspicious solid breast mass on an ultrasound scan is
- a. acoustic shadowing
  - b. 1- 4 lobulations
  - c. hypoechoic
  - d. an echogenic capsule
85. The first modality of choice to evaluate palpable findings in women younger than 30 years is
- a. x-ray mammography
  - b. MR imaging
  - c. digital mammography
  - d. ultrasound

86. Breast edema may occur in women who have undergone or experienced

- a. chemotherapy                      b. radiation therapy    c. renal failure                      d. cardiac congestion

87. A marker may be utilized to locate the original tumor site before patients undergo

- a. neoadjuvant chemotherapy                      c. breast conservation therapy  
b. radiation therapy                                      d. total mastectomy

88. The preferred imaging modalities for depicting the location of blood vessels in the breast tissue are

- a. x-ray mammography and color Doppler                      c. color and power Doppler  
b. x-ray mammography and MRI                                      d. power Doppler and MRI

89. The gold standard for breast cancer screening and diagnosis is

- a. MRI                                      b. ultrasound                      c. self-breast exam                      d. x-ray mammography

### Chapter 6

90. Unpalpable breast lesion location for pre-biopsy approach should be visualized in \_\_\_\_\_ dimensions.

- a. 2                                      b. 3                                      c. 4                                      d. 1

91. One of the possible untoward outcomes of percutaneous breast biopsy is

- a. minimal bleeding                      b. minimal pain                      c. dramatic scar                      d. pneumothorax

92. When performing an x-ray guided needle localization, orthogonal mammograms should be taken

- a. before and after needle placement                      c. before needle placement  
b. after needle placement                                      d. at the conclusion of the case

93. Specimen radiographs are necessary to confirm

- a. removal of most of the the lesion                      c. removal of the hookwire and lesion  
b. removal of the entire lesion                                      d. removal of the lesion, hookwire and tip

94. Real-time ultrasound is advantageous while performing a

- a. lumpectomy                                      b. cyst aspiration                      c. ductogram                                      d. excisional biopsy

95. During needle aspiration, the needle should be passed at least \_\_\_\_\_ times through the mass.

- a. 3                                      b. 2                                      c. 5                                      d. 4

96. Markers intended for subsequent MRI staging of breast cancer must possess

- a. safety qualities                                      b. "compatibility"                      c. non-metallic properties                      d. various sizes

97. Follow-up of nonspecific benign breast lesions should occur at \_\_\_\_\_ months.

- a. 3 months                                      b. 12                                      c. 24                                      d. 6

## Chapter 7

98. The sensitivity of MRI for invasive breast cancer is over \_\_\_\_\_%.

- a. 90                                      b. 75                                      c. 50                                      d. 35

99. Breast MRI patients should be scanned \_\_\_\_\_ to \_\_\_\_\_ days after the onset of their menstrual cycle.

- a. 3/5                                      b. 5/8                                      c. 7/10                                      d. 10-14

100. One of the essential pieces of equipment for MR imaging of the breast is a

- a. 2.0-T scanner                                      c. compression device for firm pressure  
b. b. dedicated breast coil                                      d. conventional closed-core scanner

101. Incorrect phase-encoding direction from cardiac or respiratory motion will result in

- a. blurring                                      b. bright edges                                      c. poor fat suppression                                      d. ghosting

102. Lesions possessing mild enhancement with smooth borders are considered

- a. malignant                                      b. necrotic                                      c. benign                                      d. fibrous

103. Lesions possessing bright enhancement with bright septations are considered

- a. malignant                                      b. necrotic                                      c. benign                                      d. fibrous

104. The "grapes on a vine" appearance on MR images are indicative of

- a. a papillomas                                      b. a fibroadenomas                                      c. seromas                                      d. lymph nodes

105. Screening MR imaging may be advantageous for women who have had

- a. fibrocystic disease                                      c. previous malignancy  
b. direct free silicone injections for breast augmentation                                      d. severe scarring

## Chapter 8

106. Post procedural changes diminish in severity over time and are stable at \_\_\_\_\_ to \_\_\_\_\_ years.

- a. 3/5                                      b. 5/8                                      c. 10/14                                      d. 1/3

107. The N in the TNM classification of breast cancer from the American Joint Committee on Cancer represents

- a. necrosis                                      b. non-malignant                                      c. lymph node                                      d. national

108. Using the TNM staging classification, a tumor more than 5 cm in its greatest dimension is identified as

- a. T3                                      b. T4                                      c. T2                                      d. T1

109. In-breast tumor recurrences are reported in \_\_\_\_\_% of women at 5 years after completion of therapy.

- a. 10                                      b. 5                                      c. 20                                      d. 30

110. The lymph node most likely to harbor metastasis is called the

- a. sentinel
- b. scout
- c. cancer-carrying
- d. spreading

111. The surgeon can identify a “hot” lymph node in surgery by utilizing a

- a. specimen radiograph
- b. thermogram
- c. hand-held gamma probe
- d. portable ultrasound unit

### Chapter 9

112. The implant type used for breast augmentation in the United States is

- a. liquid silicone
- b. Hydrogel
- c. saline
- d. paraffin silicone

113. MQSA recommends \_\_\_\_\_ views of each implanted breast.

- a. 5
- b. 3
- c. 2
- d. 4

114. A “snowstorm” appearance” of a gel bleed is demonstrated on

- a. ultrasound
- b. MRI
- c. x-ray mammography
- d. nuclear imaging

115. A “keyhole” finding is demonstrated on

- a. ultrasound
- b. MRI
- c. x-ray mammography
- d. nuclear imaging

### Chapter 10

116. The incidence of breast cancer in males is less than \_\_\_\_\_% of all breast cancers.

- a. 10
- b. 25
- c. 5
- d. 1

117. A drug-related cause of gynecomastia is the use of

- a. aspirin
- b. Ibuprofen
- c. Sertraline (Zoloft)
- d. Cialis

118. Pregnancy-associated cancer is breast cancer identified during pregnancy or within \_\_\_\_\_ months of delivery.

- a. 12
- b. 6
- c. 18
- d. 24

119. Breast edema and necrosis is extremely rare and may result from

- a. warfarin (Coumadin) therapy
- b. radiation therapy
- c. chemotherapy
- d. kinesiotherapy

120. Gold particles may mimic calcifications in lymph nodes from previous or ongoing therapy for

- a. gout
- b. mastitis
- c. rheumatoid arthritis
- d. ovarian cancer



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**Please place your lettered selection for each question in the respective box and return *ONLY this post test sheet to S.T.A.R.S.***

1.	11.	21.	31.	41.	51.	61.
2.	12.	22.	32.	42.	52.	62.
3.	13.	23.	33.	43.	53.	63.
4.	14.	24.	34.	44.	54.	64.
5.	15.	25.	35.	45.	55.	65.
6.	16.	26.	36.	46.	56.	66.
7.	17.	27.	37.	47.	57.	67.
8.	18.	28.	38.	48.	58.	68.
9.	19.	29.	39.	49.	59.	69.
10.	20.	30.	40.	50.	60.	70.

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71.	81.	91.	101.	111.
72.	82.	92.	102.	112.
73.	83.	93.	103.	113.
74.	84.	94.	104.	114.
75.	85.	95.	105.	115.
76.	86.	96.	106.	116.
77.	87.	97.	107.	117.
78.	88.	98.	108.	118.
79.	89.	99.	109.	119.
80.	90.	100.	110.	120.