3. A 48-year-old woman presented with a palpable right breast mass. Sonography demonstrated the mass (Figure 3-1). Which *one* of the following statements is the **BEST** answer?

A. There is a complicated cyst on sonography.

B. A fine-needle aspiration or core-needle biopsy may be performed.

C. If core-needle biopsy demonstrates a papilloma with mild atypia, then a 6-month follow-up ultrasound is the appropriate recommendation.

D. If core-needle biopsy demonstrates a papilloma with atypia, excisional biopsy should be the next step.

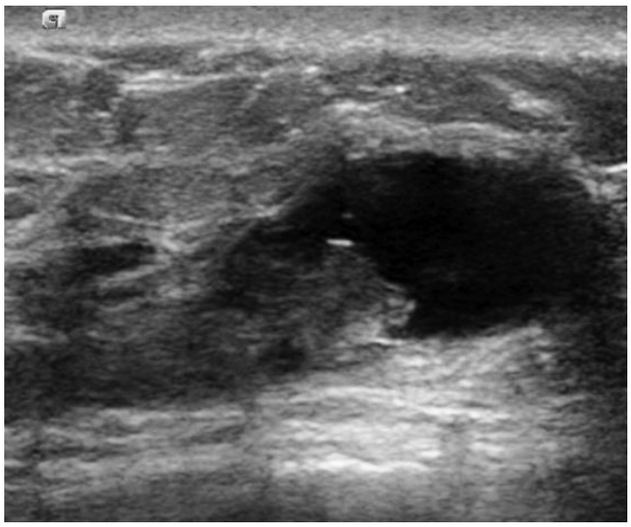

Fig 3-1. Right breast. Ultrasound. Radial plane.

4. A 37-year-old woman with left breast cancer presents for molecular breast imaging. Which *one* of the following **BEST** describes the findings in Figures 4-1 and 4-2?

A. There is nonmass uptake in the left breast.

B. There is mass uptake in the left breast.

C. There is mass uptake in the right breast.

D. There is marked heterogeneous background uptake in both breasts.

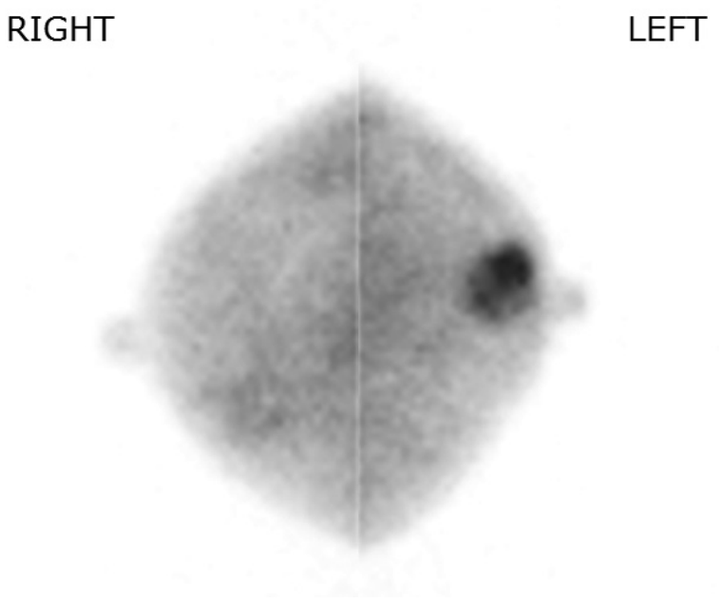

Fig 4-1. Bilateral breasts. Nuclear medicine. Sestamibi molecular breast imaging. Craniocaudal (CC) views.

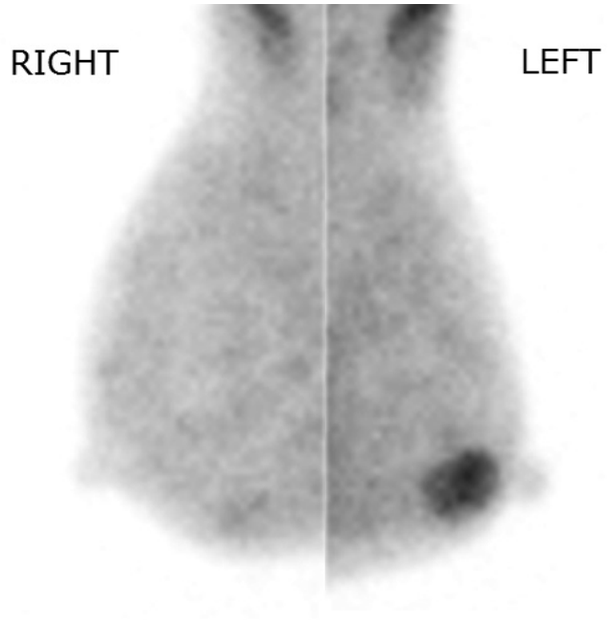

Fig 4-2. Bilateral breasts. Nuclear medicine. Sestamibi molecular breast imaging. Mediolateral oblique (MLO) views.

5. What is the **MOST** *appropriate* American College of Radiology (ACR) Breast Imaging Reporting and Data System (BI-RADS®) category for the findings on this baseline diagnostic mammogram (Figure 5-1) performed after breast-conserving surgery, during which a tumor was completely excised and radiation therapy was given? The prelumpectomy mammogram (Figure 5-2) is provided for comparison, with a clip marking the cancer site.

A. BI-RADS 0

B. BI-RADS 2

C. BI-RADS 3

D. BI-RADS 4

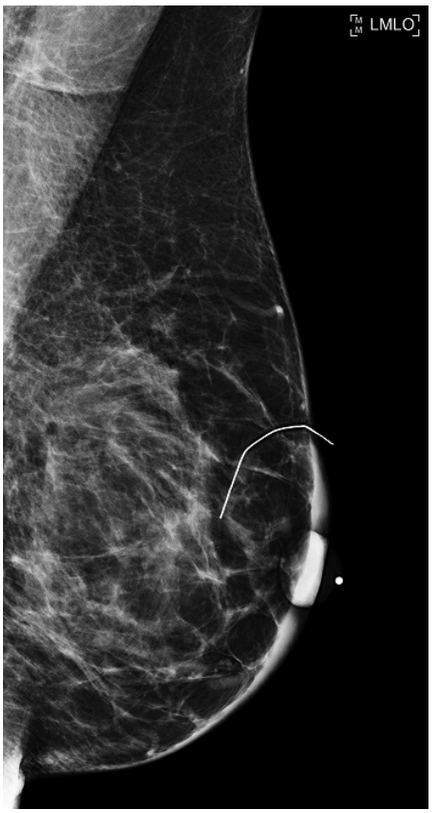

Fig 5-1. Left breast. Mammogram. MLO view. First postlumpectomy mammogram. A BB (marker) is on the nipple. Wire is on the surgical scar.

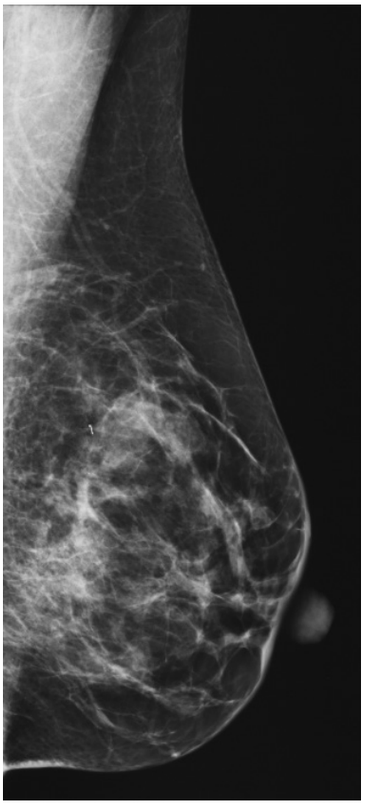

Fig 5-2. Left breast. Mammogram. MLO view. Prelumpectomy mammogram.

47. Regarding DCIS, which *one* of the following statements is **TRUE**?

A. DCIS is a uniform disease.

B. Treatment of DCIS with radiation therapy results in a reduction of breast cancer–specific mortality.

C. DCIS often presents as a palpable mass.

D. HER2 overexpression and a young age at diagnosis increase the likelihood of mortality from breast cancer.

48. Which *one* of the following statements regarding radiation exposure to the thyroid during mammography is **TRUE**?

A. The thyroid is directly exposed to the x-ray beam during mammography.

B. The effective dose to the thyroid during bilateral 2-view mammography is much less than the annual natural background radiation dose in the United States.

C. Women with a history of thyroid cancer should forgo mammography screening.

D. A thyroid shield should routinely be worn by patients undergoing screening mammography.

49. A 60-year-old BRCA1-positive woman presents for a high-risk screening bilateral breast MRI. The MRI technologist notes that the patient has history of breast augmentation with silicone implants. What is the *appropriate* MRI safety label for silicone implants?

A. MR Unsafe

B. MR Safe

C. MR Conditional

D. MR Compatible

50. According to the ACR BI-RADS Atlas 2013 Breast Imaging Lexicon – Ultrasound, which **ONE** of the following terms is used to describe the margin of a mass?

A. Circumscribed

B. Oval

C. Round

D. Irregular

Answer Key

CPI Breast Imaging Module 2016

1. C
2. B
3. D
4. B
5. B
6. C
7. D
8. A
9. D
10. D
11. C
12. D
13. D
14. A
15. B
16. A
17. D
18. D
19. C
20. A
21. D
22. B
23. C
24. B
25. D
26. D
27. B
28. C
29. C
30. C
31. B
32. D
33. B
34. C
35. C
36. A
37. D
38. B
39. A
40. A
41. D
42. C
43. C
44. B
45. A
46. C
47. D
48. B
49. B
50. A
51. D
52. D

Option D is not correct.

Asymmetry is a Breast Imaging Reporting and Data System (BI-RADS®) term reserved for mammography, not breast MRI. It is used to define a discrete but asymmetric area of fibroglandular-density tissue that is visible on only 1 mammographic projection.

Reference(s):

Morris EA, Comstock CE, Lee CH, et al. ACR BI-RADS® Magnetic Resonance Imaging. In: ACR BI-RADS® Atlas, Breast Imaging Reporting and Data System. Reston, VA, American College of Radiology; 2013.

Answer 3 is D.

The ultrasound image (Figure 3-1) demonstrates a complex mass with a large cystic component and a mural hypoechoic mass. If core-needle biopsy demonstrates a papilloma with atypia, excisional biopsy is the best next appropriate step to fully evaluate the entire lesion because papillomas are associated with a slight increase in relative risk of breast cancer (1.5 to 2x). At excisional biopsy, the entire lesion is removed and submitted for pathologic examination.

Patients with central subareolar papillomas commonly present with spontaneous clear, serous, or bloody nipple discharge. However, patients with multiple peripheral papillomas are usually asymptomatic, with masses or clusters of calcifications detected on screening mammography.

Option A is not correct.

Figure 3-1 demonstrates a complex mass rather than a complicated cyst. A complicated cyst is a cyst that contains debris, frequently seen as homogeneous, low-level echoes within the cyst that may shift slowly with changes in the patient's position.

Option B is not correct.

A fine-needle aspiration of a possible papillary mass may not yield a definitive diagnosis because of an insufficient number of aspirated cells for cytologic examination.

Option C is not correct.

If the pathology results demonstrate a papilloma with mild atypia, then excisional biopsy is still needed to fully evaluate the entire lesion. Sampling of a portion of a papilloma may yield benign results; however, other regions of the mass that are not sampled may harbor malignancy.

Reference(s):

Cardenosa G. *Breast Imaging Companion*. 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2008:261.

Foley NM, Racz JM, Al-Hilli Z, et al. An international multicenter review of the malignancy rate of excised papillomatous breast lesions. *Ann Surg Oncol*. 2015;22:S385-S390.

Answer 4 is B.

There is mass uptake in the left breast consistent with the patient's known malignancy (invasive ductal carcinoma), as seen in Figures 4-1 and 4-2. The left breast finding is best described as mass uptake because of convex-outward borders and visualization on 2 views. Conners et al proposed a lexicon to standardize the

interpretation of molecular breast imaging studies. The proposed lexicon uses terminology similar to the current BI-RADS lexicon. At present, there is not a BI-RADS lexicon for molecular breast imaging (MBI).

Nonmass uptake on MBI is similar to nonmass enhancement on MRI and is defined as untake in an area that is not a mass. It may be focal or diffuse and represents an area of uptake that is discrete from background.

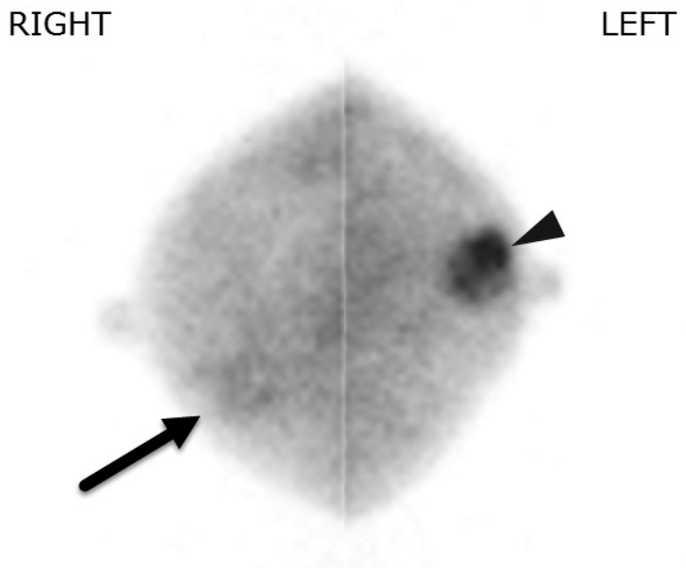

Fig 4-1. Left breast mass and right breast nonmass uptake. Arrowhead points to left breast mass uptake and arrow points to right breast nonmass uptake. Annotated. Bilateral breasts. Nuclear medicine. Sestamibi molecular breast imaging. CC views.

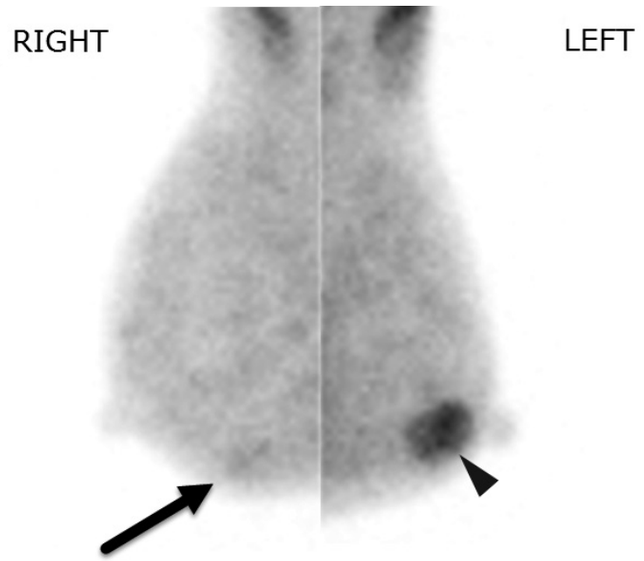

Fig 4-2. Left breast mass and right breast nonmass uptake. Arrowhead points to left breast mass uptake and arrow points to right breast nonmass uptake. Annotated. Bilateral breasts. Nuclear medicine. Sestamibi molecular breast imaging. MLO views.

Option A is not correct.

There is no evidence of left breast nonmass uptake. Nonmass uptake is uptake that does not meet criteria for mass uptake and is distinct from surrounding tissue. There is mild nonmass uptake in the lower inner right breast (Figures 4-1 and 4-2). This is a nonspecific finding and can be seen in benign conditions such as fibrocystic change or, as in the test case, recent biopsy site.

Option C is not correct.

There is no evidence of mass uptake in the right breast. There is mild asymmetric nonmass uptake in the lower inner right breast that corresponded to a recent biopsy site (Figures 4-1 and 4-2). As stated, there is obvious mass uptake in the left breast.

Option D is not correct.

The background uptake for these images is best characterized as mildly heterogeneous, which is uptake equal to or slightly more than that of subcutaneous fat.

Reference(s):

Conners AL, Hruska CB, Tortorelli CL, et al. Lexicon for standardized interpretation of gamma camera molecular breast imaging: observer agreement and diagnostic accuracy. *Eur J Nucl Med Mol Imaging.* 2012;39:971-982.

Answer 5 is B.

Figure 5-1 shows new postsurgical architectural distortion at the lumpectomy bed. Figure 5-2 shows the biopsy marker at the prior cancer site.

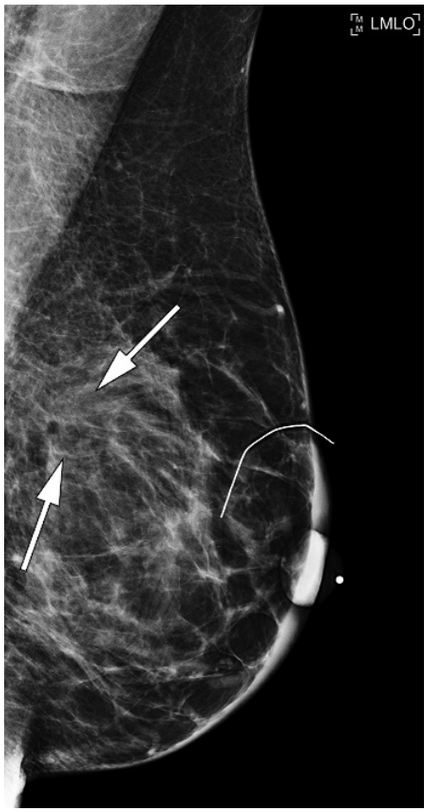

Fig 5-1. Postlumpectomy scar. Annotated. Left breast. Mammogram. MLO view. First postlumpectomy mammogram. BB is on the nipple. Wire demarcates scar. Arrows point to architectural distortion at recent lumpectomy site.

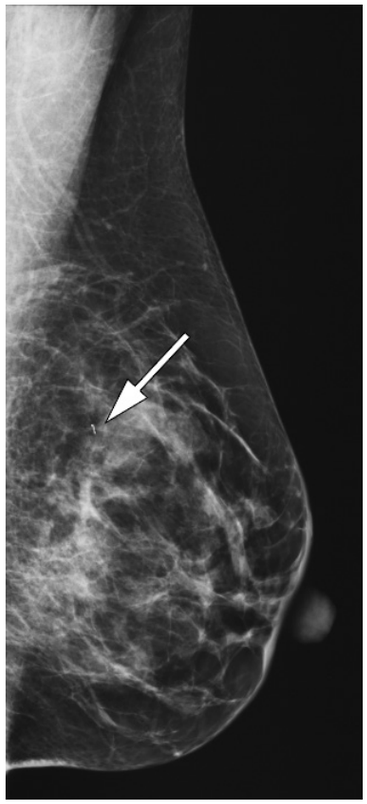

Fig 5-2. Carcinoma. Annotated. Left breast. Prelumpectomy mammogram. MLO view. Arrow points to clip marking prior cancer site. Marker in left breast carcinoma postbiopsy and prelumpectomy.

After lumpectomy surgery, the expected mammogram findings include the following: focal or diffuse skin thickening (which may decrease over time, resolve, or remain mildly thickened but should not increase in thickness over time); focal skin retraction causing breast contour deformity; focal or diffuse edema (trabecular thickening); hematoma or seroma (round or oval mass with convex margins that contract over time); scar seen as architectural distortion; and fat necrosis. Architectural distortion develops in the treated breast secondary to postsurgical scar formation as well as fat necrosis. In this case the area of architectural distortion is postsurgical, a benign (BI-RADS 2) finding.

Option A is not correct.

BI-RADS category 0, incomplete, is used when additional imaging evaluation is needed and/or prior mammograms are needed for comparison. In this case, the prelumpectomy mammogram is provided for comparison, and no new suspicious findings are seen. The current American College of Radiology (ACR) BI-RADS Atlas strongly discourages the use of category 0 assessments for a diagnostic mammogram examination. If ultrasound evaluation is also performed, a final assessment should be issued for the combined diagnostic mammogram and sonogram. Under certain circumstances, BI-RADS assessment category 0 may be used in a diagnostic mammography report, such as when ultrasound equipment or personnel are not immediately available, or when the patient is unable or unwilling to wait for completion of a full diagnostic examination. Category 0 should not be used for diagnostic breast imaging findings that warrant further evaluation with MRI. Rather, the interpreting physician should issue a final assessment in a report that is made before the MRI examination is performed.

Option C is not correct.

In this case, benign expected postlumpectomy changes are seen. A BI-RADS category 3 is a probably benign finding, one with greater than 0% but less than or equal to 2% likelihood of malignancy. Category 3 should not be assigned simply because the interpreter is unsure if the finding is suspicious or benign. Only in very rare cases should a BI-RADS 3 assessment be used in a postlumpectomy patient on the baseline posttreatment examination.

Option D is not correct.

In Figure 5-1, there are no suspicious findings. Stability is usually defined as the absence of interval change on 2 consecutive studies. After stability is established in a postlumpectomy surveillance period, new findings (eg, increased soft-tissue density at the lumpectomy site, mass, microcalcifications, or increasing architectural distortion rather than stable or decreased architectural distortion) should raise the concern for possible tumor recurrence. A BI-RADS category 4 assessment would then be appropriate. A BI-RADS category 4 is a suspicious finding, one with greater than 2% but less than 95% likelihood of malignancy.

Reference(s):

D'Orsi CJ, Sickles EA, Mendelson EB, Morris EA, et al. ACR BI-RADS® Atlas, Breast Imaging Reporting and Data System. Reston, VA, American College of Radiology; 2013.

Krishnamurthy R, Whitman GJ, Stelling CB, Kushwaha AC. Mammographic findings after breast conservation therapy. *RadioGraphics.* 1999;19:S53-S62;quiz S262-263.

Cardenosa G. *Breast Imaging Companion*. 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2008:177.

Answer 47 is D.

HER2 overexpression and a young age at diagnosis increase the likelihood of mortality from breast cancer. DCIS is a heterogeneous disease. Each year 50,000 to 60,000 cases of DCIS are diagnosed, and fewer than 1% of the patients will die from breast cancer. However, there is an increased risk of breast cancer–specific mortality in women who are diagnosed before the age of 40 years, African American women, and those with hormone receptor–negative or HER2-positive DCIS. DCIS rarely presents as a palpable mass, comprising fewer than 5% of cases. Treatment of DCIS with radiation therapy does not result in a decrease in breast cancer mortality.

Option A is not correct.
DCIS is a heterogeneous disease. It may be an aggressive disease in some patients and progress to invasive breast cancer, and yet it may be an indolent disease in other patients.

Option B is not correct.
Treatment of DCIS with radiation therapy does not result in a decrease in breast cancer mortality.

Option C is not correct.
DCIS may present as a palpable mass only infrequently.

Reference(s):

Esserman L, Yau C. Rethinking the standard for ductal carcinoma in situ treatment. *JAMA Oncol.* 2015;1:881-883.

Narod SA, Iqbal J, Giannakeas V, Sopik V, Sun P. Breast cancer mortality after a diagnosis of ductal carcinoma in situ. *JAMA Oncol.* 2015;1:888-896.

Answer 48 is B.

The thyroid receives only a minimal amount of scattered radiation during mammography. The expected dose to the thyroid from a 2-view bilateral digital mammogram is 0.13 μSv, which is much less than the 3.1 mSv received annually from background radiation in the United States. The amount of radiation exposure to the thyroid during mammography is 30 minutes or less of exposure to natural background radiation. Thus, the amount of exposure is negligible.

Option A is not correct.
The thyroid is not directly exposed to the x-ray beam during mammography. It receives only scattered radiation.

Option C is not correct.
A history of thyroid cancer is not a contraindication to mammography.

Option D is not correct.
Use of thyroid shields during mammography is not recommended because of negligible dose to the thyroid during the examination. A thyroid shield can interfere with the examination by creating artifacts or necessitating repeat mammographic views, which lead to an increased radiation dose.

Reference(s):

Sechopoulos I, Hendrick RE. Mammography and the risk of thyroid cancer. *AJR Am J Roentgenol*. 2012;198:705-707.

Answer 49 is B.

A silicone implant is considered MRI safe.

The MR Task Group of the American Society for Testing and Materials (ASTM) International developed a new set of revised terms (released in 2005). This was done to clarify and avoid misuse of confusing and often incorrectly used terms such as *MR Safe* and *MR Compatible*. The new terms, *MR Safe*, *MR Conditional*, and *MR Unsafe*, are defined by the ASTM as follows:

MR Safe:

This is an item that poses no known hazards in any MRI environment. Items include nonmetallic, nonconducting, and nonmagnetic items. Test data to determine the behavior of the items in the MRI environment are not required for these items.

MR Conditional:

This is an item that poses no known hazards in a specified MR environment with specified conditions of use. Specific field conditions that define the MRI environment are required, including results of testing that characterize the behavior of the item in the MRI environment. Any parameter that affects the safety of the item or can produce unsafe conditions must be described.

MR Unsafe:

This is an item that is known to pose hazards in all MRI environments. This includes any magnetic items.

Option A is not correct.
A silicone implant is considered MR Safe.

Option C is not correct.
MR Conditional items are safe in specified environments with specified conditions of use. Silicone implants are always considered MR Safe without any specific environmental conditions needing to be met.

Option D is not correct.
MR Compatible is an old term used when a device was considered MR Safe only under certain MRI conditions with required testing data.

According to the new revised terms of MR safety by the ASTM, MR Compatible is no longer used. This has been done to avoid misuse of the terms *MR Compatible* and *MR Safe*, which could result in serious accidents for the patients and MR personnel.

Reference(s):

Shellock FG, Woods TO, Crues JV 3rd. MR labeling information for implants and devices: explanation of terminology. *Radiology*. 2009;253:26-30.

Answer 50 is A.

The term *circumscribed* is used to describe the margin of a mass. The margin is the edge or border of the lesion. The descriptors of margin, like the descriptors of shape, are important predictors of whether a mass is benign or malignant. A circumscribed (historically, well-defined or sharply defined) margin is one that is well defined, with an abrupt transition between the lesion and the surrounding tissue. For a mass to be described as circumscribed at ultrasound, its entire margin must be sharply defined. Most circumscribed lesions have round or oval shapes.

Option B is not correct.
The term *oval* is used to describe the shape of a mass. This describes a mass that is elliptical or egg-shaped (may include 2 or 3 undulations, ie, gently lobulated or macrolobulated).

Option C is not correct.
The term *round* is used to describe the shape of a mass. A round mass is one that is spherical, ball-shaped, circular, or globular. It has an anteroposterior diameter equal to its transverse diameter; to qualify as a round mass, it must be circular in perpendicular projections. Masses with a round shape are not commonly seen at breast ultrasound.

Option D is not correct.
The term *irregular* is used to describe the shape of a mass. The lesion shape is neither round nor oval.

Reference(s):

Mendelson EB, Böhm-Vélez M, Berg WA, et al. ACR BI-RADS® Ultrasound. In: ACR BI-RADS® Atlas, Breast Imaging Reporting and Data System. Reston, VA: American College of Radiology; 2013.

Answer 51 is D.

The Mammography Quality Standards Act (MQSA) has specific criteria to define an adequate system of tracking positive mammograms and following up the results of positive mammograms. The necessary elements include defining a positive mammogram, following up the positive mammogram, collecting pathology results for all biopsies, correlating pathology results with the mammography assessments, including any cancer cases for patients imaged at the facility (if they become known), and reviewing the audit data yearly for the aggregate of physicians and the individual physicians.

Option A is not correct.
The records may be kept manually.

Option B is not correct.
A shared system is acceptable but is not a requirement.

Option C is not correct.
The data should be reviewed annually.