SAM Questions – Thursday, April 12

Thursday, April 12, 2018 8:00am-8:30am

SAM - Mythbusters Screening Edition: Setting the Record Straight

1. What is the reduction in the mortality from breast cancer screening in women actually screened in recent case-control studies?
    A. 20%
    B. 25%
    C. 33%
    D. 48%

Answer: D

References:

Hendrick, RE, Helvie, MA. AJR 2011; 196: W 112-116.

Broeders, M, Moss, S, Nystrom, L et al. J Med Screen 2012: 19 suppl 1:14-25.

2. What is the reduction in mortality estimated by the USPSTF with yearly vs. every-other-year screening?
    A. 10%
    B. 20%
    C. 30%
    D. 40%

Answer: B

Reference: JAMA 2015; 314(15), 1607

3. Between the ages of 35 and 40, what is the percentage increase in the incidence of breast Cancer?
    A. 50%
    B. 75%
    C. 100%
    D. 200%

Answer: C

References: Populations: Total US (Katrina/Rita Adjustment), 1969-2011 Counties. National Cancer Institute, Division of Cancer Control and Population Sciences, Surveillance Research Program, Surveillance Systems Branch. Released 2012.

Surveillance, Epidemiology and End Results (SEER) Program, SEER 18 Registries, National Cancer Institute.

Thursday, April 12, 2018 8:30am-9:00am - Edward A. Sickles, MD

SAM - A Practical Guide to Improving Your Mammography Screening Performance

1. Increasing the cancer detection rate for asymmetries and focal asymmetries involves:
   A. Recall if the breasts are extremely dense
   B. Recall if both breasts are more dense than on previous examination
   C. Recall if there is bilateral nipple inversion
   D. Recall if there is associated architectural distortion
   E. Recall if there is associated fat necrosis

Answer: D. Recall if there is associated architectural distortion

Rationale: In deciding whether or not to recommend recall for asymmetries (findings seen on only one of the two standard mammographic views) and focal asymmetries, the radiologist should take into account several factors that increase the likelihood of increasing he cancer detection rate. First, recall if there is a hint of any additional abnormal finding (such as architectural distortion [the correct answer], calcifications or mass), because the presence of any of these additional findings substantially increases the likelihood of malignancy. Second, assess the size of the lesion versus its palpability, because large lesions should be palpable if malignant (hence no recall if large and nonpalpable) whereas small lesions may be nonpalpable yet still malignant. Third, for (one-view-only) asymmetries, assess the depth of the finding within the breast, because a very deep lesion may not have been included in the image field on the view in which it was not seen, such that recall is required to "see" deeper into the breast on that view. Fourth, for (one-view-only) asymmetries, estimate the amount of dense tissue in the breast, because the presence of a substantial amount of dense tissue may cause a cancer to be obscured on one of the standard views, such that recall is required to obtain images in different projections to un-obscure the lesion. The four incorrect choices are benign findings that do not substantially increase the likelihood of malignancy and therefore should not substantially affect the cancer detection rate.

Reference: Sickles EA**.** The spectrum of breast asymmetries: imaging features, work-up, management. Radiol Clin North Am 2007; 45:765-771.

2. The most effective approach to reduce the recall rate involves:
   A. Use CAD, use digital mammography, screen with MRI, compare with priors
   B. Use CAD, use digital mammography, screen with MRI, advance-schedule exams
   C. Use CAD, use digital mammography, batch reading, identify summation artifacts
   D. Screen with MRI, advance-schedule exams, batch reading, identify summation artifacts
   E. Compare with priors, advance-schedule exams, batch reading, identify summation artifacts

Answer: E. Compare with priors, advance-schedule exams, batch reading, identify summation artifacts

Rationale: There are several procedural and interpretive approaches that have been demonstrated to reduce the recall rate at screening mammography. First, compare the current examination with one or more previous examinations (when previous examinations are available for comparison, the recall rate is reported to be less than half of that when previous examinations are not available or do not exist). Second, accept women for screening only if scheduled in advance (this is the most effective procedural approach to increase the likelihood that previous examinations will be available for comparison). Third, utilize batch reading (it has been reported that the recall rate for batch-read screening examinations is significantly lower than the recall rate for screening examinations read while the woman waits for her results, and that this reduction in recall rate is not accompanied by any change in the cancer detection rate). Fourth, identify summation artifacts (it has been reported that more than half of one-view-asymmetries that might lead to recall at screening mammography may be reliably characterized as summation artifact – superimposition of normal breast structures – without the need for recall). Note that the use of CAD, the use of digital mammography, and screening with MRI are reported to either increase the recall rate or have no effect on the recall rate.

Reference: Sickles EA. Successful methods to reduce false-positive mammography interpretations. Radiol Clin North Am 2000; 38:693-300.

3. What is the best overall strategy for improving screening mammography outcomes?
   A. Increase the cancer detection rate, obtain more CME than required
   B. Increase the cancer detection rate, reduce the recall rate
   C. Reduce the recall rate, obtain more CME than required
   D. Perform yearly audits, increase the cancer detection rate
   E. Perform yearly audits, reduce the recall rate

Answer: B. Increase the cancer detection rate, reduce the recall rate

Rationale: It is presumed (but without support from direct scientific evidence) that performance of mammography audits and obtaining continuing medical education in mammography will improve screening mammography outcomes. However, there is robust scientific evidence that both an increase in the cancer detection rate and a reduction in the recall rate represent improvements in screening mammography outcomes. Therefore, neither performing yearly audits nor obtaining more CME than required is as good a strategy as increasing the cancer detection rate or reducing the recall rate. In weighing the relative value of cancer detection rate and recall rate, most radiologists and most women agree that an increase in the cancer detection rate is a much more valuable outcome. After all, the primary goal of screening mammography is to detect cancer, not to recall very few women for additional work-up. However, it also is important to understand that no single outcome measure is a reliable indicator of screening mammography performance. If, in order to achieve a high cancer detection rate, one recalls 99% of women, this would be clinically unacceptable. Similarly, if in order to achieve a low recall rate, one reduces the cancer detection rate by 25%, this also would be clinically unacceptable. The best overall strategy for improving screening mammography outcomes is to first achieve a high cancer detection rate and then attempt to reduce the recall rate while maintaining the cancer detection rate at its high level. Therefore, the correct answer to the question is choice B.

Reference: Sickles EA. Successful methods to reduce false-positive mammography interpretations. Radiol Clin North Am 2000; 38:693-300.

Thursday, April 12, 2018 9:00am-9:30am - Sarah M. Friedewald, MD

SAM - Using Tomosynthesis to Catch More and Recall Less

1. When triangulating lesions in mammography, the lateral lesions on the ML view will move ____ when compared to the MLO view.
   A. Lower
   B. Stay the same
   C. Higher
   D. More lateral

Answer: A. Lower

Rationale: Basic principles of triangulation: lateral lesions will move lower and medial lesions will move higher in the ML view compared to the MLO view.

Reference: Curr Probl Diagn Radiol. 2008 Jan-Feb;37(1):1-14.

2. What is one assumption error when lesions localize to incorrect quadrants on the tomosynthesis scroll bar?
   A. Age of patient
   B. Patient dose
   C. Nipple location
   D. Risk of breast cancer

Answer: C. Nipple location

Rationale: Assuming nipple is located in the exact center of the scroll bar leads to errors in lesion localization. The other answers are irrelevant to lesion localization.

Reference: Friedewald SM, Young VA, Gupta D Lesion localization using the scroll bar on tomosynthesis: Why doesn't it always work? Clin Imaging. 2018 Jan - Feb;47:57-64.

3. Which of the following is true?
    A. All skin lesions are located in the first or last 3 slices of the reconstructed tomosynthesis images
    B. All lesions within the first or last 3 slices of the reconstructed images are within the skin
    C. Tomosynthesis does not help in determining whether or not the lesion is within the skin
    D. Patients always have to return for diagnostic imaging to determine if calcifications are within the skin

Answer: B. All lesions within the first or last 3 slices of the reconstructed images are within the skin

Rationale: Skin thickness is approximately 3 mm, therefore anything within the first or last 3 slices (assuming 1 mm reconstruction) are within the skin. However, the reverse is not true; some skin lesions can be located deeper into the tomosynthesis stack.

Reference: Friedewald SM, Young VA, Gupta D Lesion localization using the scroll bar on tomosynthesis: Why doesn't it always work? Clin Imaging. 2018 Jan - Feb;47:57-64.

Thursday, April 12, 2018 9:30am-10:00am - Regina J. Hooley, MD

SAM - Screening the Breast with Ultrasound - How to Make the Most of It Without Tearing Your Hair Out

1. In a woman with a normal mammogram, which of the following findings initially discovered on screening breast ultrasound can be assessed as BI-RADS 3?
    A. Multiple bilateral simple and complicated cysts
    B. An oval hypoechoic solid mass with circumscribed margins
    C. A round hypoechoic mass with micro-lobulated margins
    D. An irregular hypoechoic lesion at a lumpectomy site

Answer: B

Rationale: Multiple bilateral simple and complicated cysts (at least three with at least one in each breast) are benign and should usually be assessed as BI-RADS 2. A round, hypoechoic mass with micro-lobulated margins is typically a suspicious finding for which biopsy is recommended. An irregular hypoechoic lesion at a lumpectomy site is an expected finding consistent with post-operative changes and should be assessed as BI-RADS 2, as long as the lumpectomy site is stable on mammography. Studies show that BI-RADS 3 lesions, including oval, hypoechoic masses with circumscribed margins have a low malignancy rate of less than 1% and can be assessed as BI-RADS 3. For these masses, initial 12 month follow-up can also be considered.

References:

Barr RG, Zhang Z, Cormack JB, Mendelson EB, Berg WA. Probably benign lesions at screening breast US in a population with elevated risk: prevalence and rate of malignancy in the ACRIN 6666 trial. Radiology. 2013 Dec;269(3):701-12.

Berg WA, Sechtin AG, Marques H, Zhang Z. Cystic breast masses and the ACRIN 6666 experience. Radiol Clin North Am. 2010 Sep;48(5):931-87.

Eun Young Chae, Joo Hee Cha, Hee Jung Shin, Woo Jung Choi, and Hak Hee Kim. Reassessment and Follow-Up Results of BI-RADS Category 3 Lesions Detected on Screening Breast Ultrasound. AJR Am J Roentgenol. 2016 206:3, 666-672.

2. Technologist performed handheld screening breast ultrasound:
    A. Requires that the technologist be certified by the ARRT
    B. Should only be performed by dedicated ultrasound technologists
    C. Has an equal cancer detection rate compared to physician performed exams
    D. Should involve feedback by the radiologist

Answer: D

Rationale: Technologists should be certified for breast ultrasound by wither the ARRT or ARDMS (national ultrasound technology societies in the United States). However, this certification is not universally mandated and is not specific to screening. Certification can be obtained by both mammography or ultrasound technologists. Compared to physician performed exams, technologist performed handheld screening ultrasound has a slightly lower cancer detection rate (average of 4/1000 v. 2.5/1000 women screened). Technologists should be supervised by the radiologists and receive feedback regarding technique, image quality, follow-up and biopsy results (including false positives and false negatives).

References:

Berg WA, Mendelson EB. Technologist-performed handheld screening breast US imaging: how is it performed and what are the outcomes to date? Radiology. 2014 Jul;272(1):12-27.

Berg WA, Blume JD, Cormack JB, Mendelson EB. Training the ACRIN 6666 Investigators and effects of feedback on breast ultrasound interpretive performance and agreement in BI-RADS ultrasound feature analysis. AJR Am J Roentgenol. 2012 Jul;199(1):224-35.

3. Reasons to include scanning of the axilla as part of the screening ultrasound exam include:
    A. It is superficial and easily accessible
    B. The cancer detection rate may increase significantly
    C. It is recommended as per the B-RADS 5^{th} edition
    D. The false positive rate will increase

Answer: A

Rationale: The axilla may be routinely included in screening breast ultrasound because it is small, superficial and easily accessible and reinforces the importance of scanning the entire peripheral breast. Axillary breast tissue is present in up to 6% of the general population. One pitfall of screening the axilla is that the false positive rate will increase without a significant increase in cancer detection, so inclusion of the axilla may not be necessary for automated or handheld screening ultrasound. The BI-RADS 5^{th} edition does not set a standard to include the axilla in screening ultrasound examinations and therefore it is considered optional.

References:

Lee SH, Yi A, Jang MJ, Chang JM, Cho N, Moon WK. Supplemental Screening Breast US in Women with Negative Mammographic Findings: Effect of Routine Axillary Scanning. Radiology. 2017 Oct 30:171218.

Seifert F, Rudelius M, Ring J, Gutermuth J, Andres C. Bilateral axillary ectopic breast tissue. Lancet 2012;380(9844):835.

Sickles EA, D'Orsi CJ, Bassett LW, et al. ACR BI-RADS mammography. In: ACR BI-RADS atlas, breast imaging reporting and data system. 5th ed. Reston, Va: American College of Radiology, 2013.

Yang WT. Axilla. In: Berg WA, Yang WT, eds. Diagnostic imaging: breast. 2nd ed. Salt Lake City, Utah: Amirsys, 2013.

Thursday, April 12, 2018 10:30am-11:00am - Linda Moy, MD

SAM - Evolving Approaches to Abbreviated MR Screening

1. The abbreviated breast MRI exam (AB-MR) usually consists solely of:
    A. Non-contrast T1-weighted scan
    B. First post-contrast T1-weighted scan
    C. Second post-contrast T1-weighted scan
    D. Third post-contrast T1-weighted scan

Answer: B

Rationale: The American Cancer Society recommends Breast MRI screening as an adjunct to mammography in high risk women. An AB-MR scan has been proposed as a shorter exam that may allow screening MRI to be performed on a larger group of high-risk women. This AB-MR exam utilizes the first post-contrast scan, i.e., the images obtained immediately after the injection of the contrast agent, gadolinium. The hypothesis is that most breast cancers have tumor neoangiogenesis and should enhance during the wash-in phase of contrast. Although, there is variability in the AB-MR protocols that have been published in the literature, none have recommended using only the second or mid-phase of post-contrast. Also, no published papers have suggested solely using the third or delayed post-contrast scan. Although, there is a need to develop a non-contrast AB-MR, the current evidence suggest that a post-contrast scan should be included if a non-contrast scan such as diffusion weighted imaging is performed to maintain the high sensitivity of breast MRI.

References:

Kuhl CK, Schrading S, Strobel K, Schild HH, Hilgers RD, Bieling HB. Abbreviated breast magnetic resonance imaging (MRI): first postcontrast subtracted images and maximum-intensity projection-a novel approach to breast cancer screening with MRI. J Clin Oncol 2014; 32: 2304–10.

Morris EA. Rethinking breast cancer screening: ultra FAST breast magnetic resonance imaging. J Clin Oncol. 2014 Aug 1;32(22):2281-3.

2. The published report the sensitivity of an abbreviated breast MRI exam to be:
    A. 60 - 65%
    B. 70 - 75%
    C. 80 - 85%
    D. 90 - 95%

Answer: D

Rationale: There have been many reports that compared the diagnostic accuracy of an AB-MR exam. A few papers compared the sensitivities of both the AB-MR protocol to the full diagnostic breast MRI exam. These papers report the sensitivities of the AB-MR exam to be in the range of 86 – 100%, comparable to the sensitivities of the standard, full MR exams of 92 – 100%.

References:

Kuhl CK. Abbreviated breast MRI for screening women with dense breast: the EA1141 trial. Br J Radiol. 2017 Oct 27. doi: 10.1259/bjr.20170441. [Epub ahead of print].

Grimm LJ, Soo MS, Yoon S, Kim C, Ghate SV, Johnson KS. Abbreviated screening protocol for breast MRI: a feasibility study. Acad Radiol 2015; 22:1157–1162.

Moschetta M, Telegrafo M, Rella L, Stabile Ianora AA, Angelelli G. Abbreviated combined MR protocol: a new faster strategy for characterizing breast lesions. Clin Breast Cancer 2016; 16:207–211.

3. Compared to the full diagnostic protocol, the AB-MR exam leads to:
    A. Shorter acquisition time but longer interpretation time
    B. Shorter acquisition time and shorter interpretation time
    C. Longer acquisition time but shorter interpretation time
    D. Longer acquisition time and longer interpretation time

Answer: B

Rationale: The AB-MR protocol typically only includes the first-post contrast scan and is acquired during the initial phase of contrast enhancement. The full protocol acquires images during the early phase of contrast enhancement, and, at least one additional scan during the delayed phase. Therefore, the full diagnostic exam is longer and contains more images. Studies show the AB-MR exam leads to a shorter acquisition time and faster interpretation without significantly affecting the sensitivity, confirming Kuhl's seminal study. The utilization of AB-MR protocols may result in lower cost and faster throughput, increasing availability and provide greater access to screening breast MRI in women at intermediate risk and high risk for breast cancer.

References:

Mango VL, Morris EA, David Dershaw D, et al. Abbreviated protocol for breast MRI: are multiple sequences needed for cancer detection? Eur J Radiol 2015; 84:65–70.

Harvey SC, Di Carlo PA, Lee B, Obadina E, Sippo D, Mullen L. An abbreviated protocol for high-risk screening breast MRI saves time and resources. J Am Coll Radiol 2016; 13:374–380.

Heacock L, Melsaether AN, Heller SL, et al. Evaluation of a known breast cancer using an abbreviated breast MRI protocol: correlation of imaging characteristics and pathology with lesion detection and conspicuity. Eur J Radiol 2016; 85:815–823.

Thursday, April 12, 2018 11:00am-11:30am - Marc Hurlbert, PhD

SAM – Reaching the Underserved and the Underscreened

1. Which major US city does not have a black:white disparity in breast cancer mortality rates in the most recent time period of 2010-2014?
    A. Detroit
    B. Chicago
    C. Los Angeles
    D. Houston

Answer: A

2. Which city implemented community-wide improvements in breast imaging and is now showing a narrowing of the gap in black:white breast cancer mortality rates?
    A. Charlotte
    B. San Antonio
    C. Los Angeles
    D. Chicago

Answer: D

3. Which structural and quality issues contribute to the racial disparities in breast cancer mortality?

A. Mammography imaging quality
B. Later stage diagnoses due to missed breast cancers
C. Breakdown in the diagnostic referral process
D. Lack of access to targeted therapies
E. All of the above
F. None of the above

Answer: D

References: Hunt BR, Hurlbert MS: Black:white disparities in breast cancer mortality in the 50 largest cities in the United States, 2005-2014. Cancer Epidemiol 45:169-173, 2016.

Sighoko D, Murphy AM, Irizarry B, et al: Changes in the racial disparity in breast cancer mortality in the ten US cities with the largest African American populations from 1999 to 2013: The reduction in breast cancer mortality disparity in Chicago. Cancer Causes Control 28:563-568, 2017.

Rauscher GH, Khan JA, Berbaum ML, et al: Potentially missed detection with screening mammography: does the quality of radiologist's interpretation vary by patient socioeconomic advantage/disadvantage? Ann Epidemiol 23:210-4, 2013.

Rauscher GH, Conant EF, Khan JA, et al: Mammogram image quality as a potential contributor to disparities in breast cancer stage at diagnosis: an observational study. BMC Cancer 13:208, 2013.