BREAST IMAGING AND BREAST DENSITY: HOW TO ADVISE PATIENTS

Amy S. Campbell, MD
Disclosures

- I do not intend to discuss an off-label use of a product during this activity.

- I have not had any relevant financial relations during the past 12 months to disclose.
Objectives

• Examine the current screening guidelines for both average and high risk patients.
• Review which patients will benefit from additional screening modalities: ultrasound and MRI.
• Look at mandatory reporting requirements for women with dense breasts.
• Discuss the recent literature regarding the addition of advanced screening modalities.
Breast cancer: At the forefront of media coverage
WHAT DOES IT MEAN TO SCREEN?
Appropriate Screening Exam

• Early detection of disease in ASYMPTOMATIC patients
• Test which is acceptable to patients (non-invasive)
• High specificity and sensitivity
• Early detection improves outcome
• Avoid over diagnosis (false positives)
• Cost
Screening Mammography: Average Risk Patient

• Annual mammograms after age 40 for as long as the patient is in good health
  Good health takes into account comorbid conditions, life expectancy of 5 - 7 years, willing to undergo additional testing (biopsy), and willingness be treated for breast cancer if diagnosed.

• Clinical breast exam
  • Every 3 years (20 to 39 year olds)
  • Annually (40 year old greater)

• Self breast exam optional starting age 20
### Average Risk Patient

• **12.2 % lifetime (1 in 8)**

<table>
<thead>
<tr>
<th>Age</th>
<th>Probability of cancer next 10 years...</th>
<th>1 in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 to 39</td>
<td>0.40%</td>
<td>233</td>
</tr>
<tr>
<td>40 to 49</td>
<td>1.45%</td>
<td>69</td>
</tr>
<tr>
<td>50 to 59</td>
<td>2.38%</td>
<td>42</td>
</tr>
<tr>
<td>60 to 69</td>
<td>3.45%</td>
<td>29</td>
</tr>
<tr>
<td>70 to 79</td>
<td>4.31%</td>
<td>23</td>
</tr>
</tbody>
</table>
Screening Mammography: High Risk Patient

AMERICAN COLLEGE OF RADIOLOGY RECOMMENDATIONS

- BRCA 1 or 2 mutations, or who are untested but have a first degree relative who is known to have a BRCA mutation
  - Yearly starting at age 30
- ≥ 20% lifetime risk of breast cancer
  - Yearly starting at age 30
- Mother or sister with early onset (premenopausal) breast cancer
  - Yearly starting at 30 or 10 years earlier than age of diagnosis of the youngest affected relative (but not before age 25)
Screening Mammography: High Risk Patient

AMERICAN COLLEGE OF RADIOLOGY RECOMMENDATIONS

- History of mantle radiation between the age of 10 and 30
  - Yearly starting 8 years after completion of radiation therapy, but not before age 25
- Prior history of invasive breast cancer, DCIS, LCIS, atypia (ADH or ALH), or ovarian cancer
  - Yearly from the time of diagnosis, regardless of age
WHEN DO WE USE SCREENING BREAST ULTRASOUND?
In general, we don’t perform screening breast ultrasound.
Barriers to Widespread Ultrasound Screening

- Reproducibility/Operator dependency
- High false positive rate
- Low positive predictive value for biopsy recommendations
- Inability to image ductal carcinoma in situ
- Limited number of radiologists specialized in breast imaging
- Shortage of qualified breast ultrasound technologists
- Single CPT code
WHEN DO WE USE BREAST MRI?
American College of Radiology Indications

• Surveillance of women with \( \geq 20\% \) lifetime risk of developing breast cancer
• Screening of the contralateral breast in patients with a new breast malignancy
  • Based upon findings of the ACRIN 6667 trial published in the *NEJM* March 2007: 3\% detection rate of clinically, and mammographically occult breast cancers in the contralateral breast.

ACR Practice Guideline, Breast MRI, 2008
American College of Radiology Indications

- Determine extent of disease or the presence of multifocality or multicentricity
- Postlumpectomy with positive margins
- Neoadjuvant chemotherapy
- Patients with breast augmentation
- Recurrence of breast cancer

ACR Practice Guideline, Breast MRI, 2008
American College of Radiology Indications

- Metastatic cancer when the primary is unknown and suspected to be breast origin
- Lesion characterization when other imaging examinations are inconclusive
- Postoperative tissue reconstruction

ACR Practice Guideline, Breast MRI, 2008
Screening MR recommended:

1. BRCA mutation
2. First degree relative BRCA carrier (but untested)
3. ≥ 20-25% lifetime risk of breast cancer
4. Radiation to the chest between age 10-30 years
   - *Radiology* April 2011 (Sung, et al) – Adding MRI to women with a history of chest irradiation resulted in a 4.4% incremental cancer detection rate.
5. Li-Fraumeni and Cowden syndrome
DATA ARE INSUFFICIENT TO RECOMMEND FOR OR AGAINST SCREENING:

1. Personal history of breast cancer (invasive or DCIS)
   - AJR August 2010 (Brennan, et al) – Breast MRI screening of women with only a personal history of breast cancer was clinically valuable finding malignancies in 12%.

2. Atypical hyperplasia (ADH or ALH)

3. Lobular carcinoma in situ (LCIS)

4. Extremely dense breast on mammography
Screening with breast MRI is **inappropriate** for women at less than 15% lifetime risk of breast cancer.

The Society of Breast Imaging concurs with this recommendation.
SCREENING BREAST MRI

- Breast MRI is not meant to replace mammography.
- There are cases of DCIS which are easily detectable on mammography.
- Examinations can be done concurrently.
  - Allows more direct correlation between the two examinations.
  - This is especially important if there is an abnormality on one exam.
- Examinations can be staggered.
  - Allows the patient to have some form of screening every six months.
  - Potentially increases detection of interval cancers.
LEGISLATIVE MANDATES: The state of dense breast reporting
Dense Breast Notification Legislation

• Breast Density and Mammography Reporting Act of 2011 was introduced in the House of Representatives in October 2011.
• Nearly 20 states have passed, rejected or are currently considering legislation that mandates notification of dense breast tissue.
• States that currently have legislation in place:
  • Connecticut
  • Texas
  • Virginia
  • New York
  • California
Connecticut Public Act 09-41

• Effective October 1, 2009
• Patient letter must disclose breast density.
• Where applicable the letter must contain the following statement:
  • “If your mammogram demonstrates that you have dense breast tissue, which could hide small abnormalities, you might benefit from supplementary screening tests, which can include a breast ultrasound screening or a breast MRI examination, or both, depending on you individual risk factors. A report of your mammography results, which contains information about your breast density, has been sent to your physician’s office and you should contact your physician if you have any questions or concerns about this report.”
• Insurers must cover additional screenings with a doctor’s referral.
Connecticut Public Act 09-41

- Outcome review by Yale University Department of Radiology
- **935** women with dense breasts underwent additional screening whole breast ultrasound in the first year following implementation.
- Risk stratification:
  - **614** low risk
  - **149** intermediate risk
  - **87** high risk
- **BIIRADS:**
  - Category 1 or 2 = **701**
  - Category 3 = **187**
  - Category 4 = **47**
- Biopsies/Aspirations Performed = **63**
- Total number of additional cancers = **3**
- **Cancer detection rate = 3.2 cancers per 1000 women screened**

American College of Radiology Statement

- The assessment of breast density is not reliably reproducible.
- Reporting of fatty breasts may convey a false sense of security.
- The significance of breast density as a risk factor for breast cancer is highly controversial.
- Increased demand for additional screening examinations.
- Breast MRI and Ultrasound result in additional false positive examinations and increase the number of benign breast biopsies.
- Lack of insurance coverage could result in further financial disparity.
- **There is no randomized trial data demonstrating adding either ultrasound or MRI to mammography screening saves lives.**

Opinion from the Experts

- The decision to pursue additional screening modalities should not be based on breast density alone. Rather it should come from a discussion between the patient and her physician which includes all factors which may influence her decision to undergo additional imaging.
LITERATURE REVIEW: Recommendations for additional screening based on breast density.
The Early Literature


Screening Breast Ultrasound – ACRIN 6666

• 2809 high-risk women as well as women with heterogeneously dense breast tissue.
• Ultrasound was strictly physician (breast imager) performed and averaged 20 minutes/examination.
• Incremental cancer detection rate of 4.2 per 1000 women.
• The addition of a single screening ultrasound examination to mammography for women of elevated risk results in increased detection of breast cancers that are small and node-negative.
• However, it comes with a substantial risk of false-positive results.

Screening Breast Ultrasound – ACRIN 6666

• Recall rate – First round
  • Mammography alone = 11.5%
  • Addition of supplemental ultrasound = 26.6%

• Positive biopsy rate – First round
  • Mammography alone = 29.2%
  • Addition of supplemental ultrasound = 11.4%

• **Increased recall rate, Decreased positive biopsy rate, and Increased false positives.**

Fajardo LL. Should women be informed of breast density? JACR 2013; 9-10.
Screening Breast Ultrasound vs MRI

- 2809 women at 21 sites with elevated cancer risk and dense breasts.
- 2662 women underwent 3 annual independent screens with mammography and ultrasound in randomized order.
- 612 women underwent the MRI substudy.
- 111 total cancers detected:
  - 33 by mammography alone
  - 32 by ultrasound alone
  - 26 by both mammography and ultrasound
  - 9 by MRI after mammography and ultrasound
  - 11 occult

Screening Breast Ultrasound vs MRI

- Additional cancers detected with supplemental screening:
  - Ultrasound = 4.3 per 1000 screens
  - MRI = 14.7 per 1000 screens
- Number of screens needed to detect one cancer:
  - Mammography = 127
  - Supplemental Ultrasound = 234
  - MRI after negative mammography and ultrasound = 68
- Rate of biopsy for findings seen only on ultrasound = 5%
  - * Only 7% of those patients had cancer

Screening Breast Ultrasound vs MRI

• The addition of screening ultrasound or MRI to mammography in women at increased risk for breast cancer resulted in not only a higher cancer detection rate, but also an increase in false positive findings.
Conclusions

• Risk stratification is an important step in determining if a patient should undergo supplemental screening.
• While supplemental screening modalities do increase cancer detection it is not without trade-offs.
• Patients should be properly counseled regarding the potential for false positive findings and the need for additional invasive procedures.
• There should always be conversation between the patient and her physician before making the decision to pursue supplemental screening.
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