Evaluating the Role of Preoperative Breast MRI in Improving Diagnostic Accuracy of Breast Cancer Patients
Authors and Disclosures

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The authors have no disclosures or conflict of interests to report.
Preoperative breast MRI is often used as an adjunct to mammography and ultrasound to guide diagnostic and surgical management of breast cancer patients.

Given the high cost and performance time of MRI, it is important to identify which patients would benefit most from preoperative MRI evaluation.
Purpose

* Assess the value of preoperative MRI in characterizing the extent of cancer

* Identify risk factors associated with additional MRI lesions not visualized on prior imaging

* Evaluate the impact on patient management
Materials and Methods

* **Cohort:** 199 patients with biopsy-proven breast cancer who underwent preoperative MRI between January 2014 and February 2018

* **Retrospective chart review:**
  * Accuracy of MRI at predicting extent of disease
  * Frequency of additional lesions detected on MRI
  * Changes in surgical management
Results: Accuracy of MRI at Predicting Disease Extent

- MRI is 98% sensitive in detecting breast cancer.

- MRI predicted tumor size within 10 mm of the pathological tumor size in 155 (78%) patients.

- 72 (36%) MRIs detected additional lesions, which led to additional biopsy-proven sites of cancer in 37 (19%) patients.
Figure 1. Detection of Additional Lesion on Breast MRI

Right MLO (a) and CC (b) views of a mammogram demonstrated a right breast mass at 12 o’clock. Right breast ultrasound from the same day (c) redemonstrated this mass, located 5 cm from the nipple, found to be invasive ductal carcinoma. Sagittal (d) and axial (e, f) MRI showed an additional mass at 1 o’clock, approximately 7-8 cm from the nipple. Second-look ultrasound confirmed the presence of this additional mass. Subsequent core biopsy of the second mass demonstrated an additional focus of invasive ductal carcinoma.
Results: Risk Factors and Impact on Patient Management

- Younger age (<50 years) was associated with increased frequency of additional lesions detected on MRI ($p = 0.004$).

- Risk factors such as race, breast density, histopathology, hormone receptor status, and BRCA positivity did not have a significant association with additional lesions detected on MRI.

- Surgical management was altered in 33 (17%) patients from either a lumpectomy to mastectomy, or mastectomy to bilateral mastectomy.
Figure 2. Risk Factors associated with Additional Lesions on MRI

<table>
<thead>
<tr>
<th>RISK FACTOR</th>
<th>ADDITIONAL FINDINGS (N=91)</th>
<th>NO ADDITIONAL FINDINGS (N=108)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td>0.0041a</td>
</tr>
<tr>
<td>&lt;50</td>
<td>46 (58.2)</td>
<td>33 (41.8)</td>
<td></td>
</tr>
<tr>
<td>≥50</td>
<td>45 (37.5)</td>
<td>75 (62.5)</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td>0.8642a</td>
</tr>
<tr>
<td>White</td>
<td>75 (45.5)</td>
<td>90 (54.6)</td>
<td></td>
</tr>
<tr>
<td>Non-white</td>
<td>16 (47.1)</td>
<td>18 (52.9)</td>
<td></td>
</tr>
<tr>
<td>Breast Density</td>
<td></td>
<td></td>
<td>0.5807b</td>
</tr>
<tr>
<td>Low density</td>
<td>26 (41.9)</td>
<td>36 (58.1)</td>
<td></td>
</tr>
<tr>
<td>High density</td>
<td>63 (47.0)</td>
<td>71 (53.0)</td>
<td></td>
</tr>
<tr>
<td>Density cannot be determined</td>
<td>2 (66.7)</td>
<td>1 (33.3)</td>
<td></td>
</tr>
<tr>
<td>Type of Breast Cancer</td>
<td></td>
<td></td>
<td>0.6504b</td>
</tr>
<tr>
<td>IDC</td>
<td>66 (46.5)</td>
<td>76 (53.5)</td>
<td></td>
</tr>
<tr>
<td>ILC</td>
<td>20 (41.7)</td>
<td>28 (58.3)</td>
<td></td>
</tr>
<tr>
<td>Mixed ILC/ID</td>
<td>3 (75.0)</td>
<td>1 (25.0)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>2 (40.0)</td>
<td>3 (60.0)</td>
<td></td>
</tr>
</tbody>
</table>

| Hormone Receptor Status   |                             |                               | 0.4048c |
| ER/PR+                    | 85 (47.0)                   | 96 (53.0)                     |       |
| HER2+                     | 10 (38.5)                   | 16 (61.5)                     |       |
| Triple negative           | 2 (25.0)                    | 6 (75.0)                      |       |
| BRCA Positivity           |                             |                               | 0.6618d |
| Positive                  | 3 (60.0)                    | 2 (40.0)                      |       |
| Negative                  | 88 (45.4)                   | 106 (54.6)                    |       |

* Data are n (%) unless otherwise stated; percentages might not add to 100% due to rounding.
* aChi-Square test was used to calculate p-value
* bFisher’s exact test was used to calculate p-value
* cN for analysis was 215; additional findings n = 97, no additional findings n = 118
Preoperative MRI is a useful adjunct to conventional breast imaging in characterizing the extent of breast cancer and detecting additional lesions, particularly in younger patients, resulting in clinically relevant changes in patient management.


