

PREOPERATIVE MRI EVALUATION OF WOMEN WITH NEWLY DIAGNOSED BREAST CANCER

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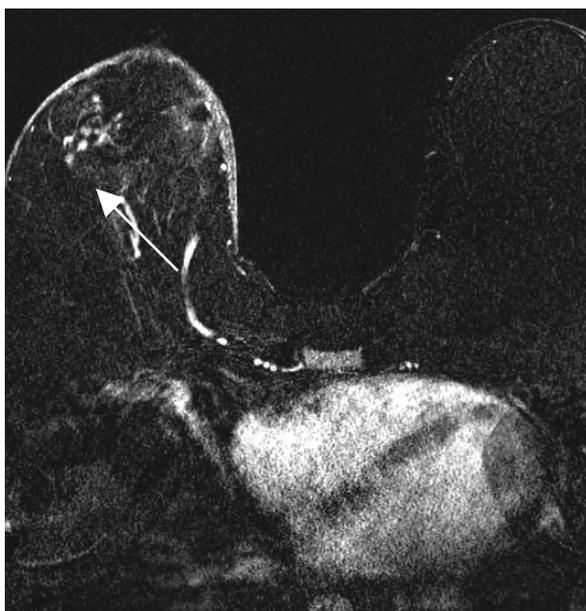
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The current roles of preoperative breast MRI include:

- Assessment of index tumor size,
- Detection of synchronous breast cancers in the contralateral breast,
- Detection of multifocal or multicentric disease in the ipsilateral breast, and
- Evaluation of response to chemotherapy.

The literature has shown the superior accuracy of MRI in determining the size of the index tumor. In a study by Boetes, *et al* [1], histologic tumor size was compared to preoperative MRI, mammogram, and ultrasound. The study showed that there was no significant difference between the size as measured by MRI and pathology. In contrast, tumor size was underestimated, on average, by 14 percent on mammogram and 18 percent on ultrasound.



Subtracted contrast-enhanced axial image shows multiple small enhancing masses in the anterior right breast (arrow). This represents multifocal cancer found in a patient with known right breast cancer.

Contrast-enhanced breast MRI is extremely sensitive in detection of otherwise occult synchronous multifocal tumors, multicentric, and contralateral tumors. Multifocal cancers are usually defined as those within the same quadrant as the index cancer. Identification of multifocality, or of an extensive intraductal component (EIC), often leads to a wider excision rather than a lumpectomy to prevent local recurrence. Multicentric cancers, on the other hand, involve more than one quadrant, and represent a contraindication to breast conservation surgery.

In a study of 96 women with proven breast cancer who were planning for breast conservation surgery [2], MRI detected an additional tumor in 29 (30 percent) that was occult clinically and on mammography; most of these tumors were multifocal. Similarly, in a study by Liberman, *et al* [3], out of 70 women with breast cancer who were initially considered candidates for breast conservation, clinically and mammographically occult ipsilateral cancers were found in 19 (27 percent), of which more than 70 percent were multifocal.

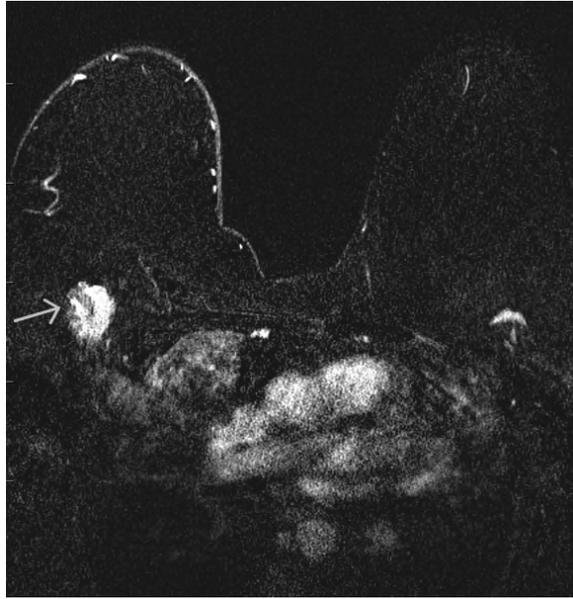
It has been well established that women with breast cancer have an increased risk of contralateral breast cancer. The incidence of synchronous cancer (defined as occurring within three months to one year of the index cancer) in these women is estimated to be about 3 to 10 percent [4]. Using mammography and physical examination alone, synchronous contralateral breast cancers are found in about 2 to 3 percent of women with breast cancer [2]. The addition of MR to the evaluation algorithm increases the sensitivity significantly. Several studies have shown that in about 3 to 6 percent of patients with breast cancer, contra-

lateral cancers are detected by MR only, and are occult on mammography, ultrasound, and physical examination [5, 6]

The most significant prognostic factor in patients with breast cancer is lymph node status [4]. The sensitivity of MR imaging for detection of axillary node metastases, based mostly on signal and enhancement characteristics, is about 83-90 percent, with specificity of 82 percent. This is compared to clinical examination's sensitivity of 53 percent.

Infiltration of the chest wall, pectoralis muscle, or skin defines a breast cancer at the T4-stage level, and as such can significantly change the management of the patient. One study showed an accuracy of 100 percent with regard to presence or absence of pectoralis muscle invasion in posterior breast tumors. This area of the breast is often very difficult to evaluate on mammography or ultrasound [7]. The resultant effect on patient management of preoperative breast MRI has been demonstrated in several studies. One study showed that breast MRI correctly changed the staging or management in 14.3 percent of women [6]. Others have shown a range of 11 to 48 percent [4, 8].

One recent study demonstrated direct evidence that MRI has tremendous potential in curbing recurrence rates. In this study, a group of 121 women with breast cancer who had preoperative MRI was compared to a group of 225 women with breast cancer who did not have preoperative MRI. At approximately 40-month follow-up exams, the group without preoperative MRI had an in-breast recurrence rate of 6.5 percent and contralateral follow-up cancers in 4 percent. In contrast, the percentages for the group who had preoperative breast MRI were 1.2 percent and 1.7 percent, respectively [9]. This not only shows that breast MRI can curb recurrences, but also suggests that what is traditionally considered to be "in-breast recurrence" is actually more likely to be unrecognized foci of cancer that were synchronous with the index tumor [4].



Contrast-enhanced subtracted axial image shows large enhancing metastatic right axillary lymph node (arrow).

In conclusion, breast MRI has proven its superior sensitivity in detection of the extent of tumor and must be integrated as a part of the work-up algorithm in all women with breast cancer. Of particular interest is the detection of synchronous ipsilateral and contralateral tumors, which could substantively curb the recurrence rate of breast cancer. The incidence of multifocality, multicentricity, and contralaterality is higher than previously reported mammographically.

MRI also provides a distinct service in accurately showing tumor response to chemotherapy, which can allow appropriate therapy adjustments and may allow breast conservation therapy in women who otherwise may not have been candidates. With increasing experience in breast MRI and the use of MRI-guided biopsy, the specificity will likely continue to increase, while the number of unnecessary invasive procedures will be minimized. Overall, preoperative breast MRI provides an invaluable tool for guiding appropriate treatment at the time of diagnosis, avoiding preventable recurrences, and even allowing more conservative treatment and fewer biopsies for some women. ■

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