Breast imaging techniques to screen high risk patients
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Breast MRI has been recommended to be performed as an annual screening test in high-risk patients by the American Cancer Society (ACS) as well as the UK National Institute for Clinical Excellence (NICE). As mammography has an overall false negative rate of up to 15% in a general population, it is evident that all cancers are not detected by conventional means. The rate of false negative examinations is likely much higher (up to 50%) in pre-menopausal women with dense breasts, particularly those who are BRCA carriers. Exploration into alternative screening methods such as full breast ultrasound and MRI has occurred. Of the available methods, MRI holds perhaps the most promise, mostly due to the high-resolution capabilities, full documentation of the examination and the potential to detect pre-invasive DCIS.

What exactly constitutes high risk can be variable and risk models are important to use when trying to determine risk. In general, annual screening is recommended by the ACS for BRCA 1 or 2 heterozygotes, any untested first degree relative of a known mutation carrier, anyone with a > 20% cumulative lifetime risk of developing breast cancer, history of thoracic radiation, or a known syndrome (Li-Fraumeni or Cowden’s). Annual screening breast MRI may be recommended in the following cases after discussion with the patient who understands the benefits and risks: personal history of breast cancer, family history of breast cancer in a first degree relative, prior benign biopsy yielding a high risk lesion (lobular carcinoma in situ (LCIS), atypical ductal hyperplasia (ADH), atypical lobular hyperplasia (ALH), radial scar). There is a paucity of data in the high risk groups and in the group of patients with a personal history at this time. Risk models that are useful are the Tyrer-Cuzick and BRCAPRO. There is no evidence that breast MRI screening benefits women with a <15% life-time risk.

Interestingly, no information exists for screening “dense, difficult to examine” breasts in patients who are not high-risk. Screening by MRI in this population where the incidence of breast cancer is low would very likely result in too many false positive biopsies to justify its use though no data exist to support this view.

A negative MRI examination should not deter biopsy of a suspicious lesion (BIRADS 4 or 5) on mammography or ultrasound. Mammographically suspicious findings, such as suspicious calcifications, spiculated masses or areas of distortion warrant appropriate biopsy, regardless of a negative MR examination. The MRI should ideally be interpreted in conjunction with all other pertinent imaging studies such as mammograms and ultrasounds to arrive at the best treatment option for the patient. With these limitations, breast MRI is best used as an adjunct test to conventional imaging, complementing but not replacing mammography and sonography.


Murphy CD et al. The American Cancer Society guidelines for breast screening with magnetic resonance imaging: an argument for genetic testing. Cancer 2008 Dec 1;113(11):3116-20
Controversies of MRI Staging and its impact on surgery and outcomes

Preoperative Breast MRI detects more cancer in the breast in 16% of women (1) and 4% of women will have an occult cancer found in the opposite breast (2). As expected, mastectomies increase approximately 8% when MRI is used (1). More mastectomies appear justified by improved patient outcomes (3). Intuitively, outcome benefits would include decreased recurrence rates and decreased positive margin rates (leading to decreased reoperation rates).

In the UK COMICE study (9), the first prospective randomized controlled trial to examine preoperative breast magnetic resonance imaging (MRI) in early stage breast cancer, reoperation rates were almost the same whether breast MRI was used (10.4%) or not (11.2%). Reexcision rates at around 10% are extremely low and should be viewed in context of the wider surgical experience. Attempting to remove the smallest volume of tissue possible, our institutional rate is closer to 25%. With the extremely wide negative margins suggested by this data, MRI might have little to add in mapping the area of tumor in this population. It is quite possible that with smaller resection volumes with higher reexcision rates, the effect of MRI should be more pronounced.

Whether preoperative MRI adds benefit with regards to recurrence and overall survival is still not completely examined. To date there is only one small single institution retrospective study (5) examining the question of recurrence and although it found that MRI did not lower recurrence rate, the recurrence rate was exceedingly low in both the MRI (3%) and no MRI groups (4%).

Preoperative breast MRI demonstrates a contralateral cancer detection rate of synchronous otherwise occult cancer in approximately 2 – 5% of patients undergoing preoperative breast MRI (6). A strong argument exists for early detection of contralateral disease which can lead to simultaneous treatment of synchronous cancers rather than multiple treatments on separate occasions. Others have argued that many of these contralateral cancers may be biologically unimportant or treated with chemotherapy or hormone therapy (7,8).

Preoperative breast MRI may not for every patient. COMICE has shown that routine breast MRI in evaluation of early breast cancer may not impact on already low positive margin rates. The question about recurrence and overall survival is still unanswered and therefore the role of preoperative breast MRI is not yet answered. Breast conservation is a well established, safe and effective method of treating breast cancer. As outcomes with conservation improve, the possible impact of MRI on women undergoing conservation may decrease. However, MRI images cancer that is not discovered by other methods, and it seems very possible that there are populations for which the routine application of MRI in managing the initial conservative treatment of women with breast cancer will be beneficial.

It is far too early to dispense with preoperative breast MRI. Future prospective trials hopefully will be performed at high volume centers with state of the art imaging, biopsy capability and experienced
readers with more consistent pathologic margin evaluation including more defined subpopulations of women and long-term outcome data. Only then can we decide how to select those women who will benefit from breast MRI in the preoperative setting.

3. Kuhl C. Breast 2007 Preoperative staging of breast cancer with breast MRI: one step forward, 2 steps back?