

Specialty Area: Plenary: Breast MRI

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Highlights

- Extensive research in the last 30 years has advanced MRI to become an effective tool in screening and managing breast cancer
- Clinical applications for breast MRI include cancer detection, diagnosis, and response to treatment evaluation.
- Further studies in cost effectiveness and impact on survival will help to guide clinicians in best methods for using breast MRI

Title: How Clinical Research Trials Changed the Use of Breast MRI

Target Audience: Breast Imagers

Objectives: Describe key research findings assessing the effectiveness of MRI as a tool to screen for and manage breast cancer

History of Breast MR: In the 1980s, research in contrast enhanced MRI demonstrated its potential to diagnose malignant breast lesions. More research in the early 1990s established two basic theories of best image acquisition: 1) high temporal or dynamic; and 2) high spatial or static. The dynamic school, more popular in Europe, tended to use image subtraction to suppress the high signal from fat, while the static school, more popular in the U.S., suppressed the fat signal. By 2000, most agreed that high temporal and high spatial resolution were important in order to gain information regarding both pharmacokinetics and morphology of breast lesions, and current technology allows for acquisition protocols that provide both.¹

Clinical applications of Breast MR: Numerous reports evaluating the potential role of breast MRI in defined patient populations have been published. These studies cover the spectrum of cancer detection, diagnosis, and response to treatment evaluation, and include women with a mammographic or palpable abnormality, axillary adenopathy but unknown primary, current cancer diagnosis, and women at high risk for breast cancer.

Further evaluation of mammographic or palpable abnormality: Early breast MRI studies assessed the use of breast MRI for further evaluation of mammographic or palpable abnormalities. In 2004, a large study by the International Breast MRI Consortium provided clear data that MRI should not be used to overrule a recommendation of biopsy as more than 10% of cancers identified on mammography were missed by MR.²

Evaluation of extent of disease: Pioneered by Harms in the early 1990s and confirmed by multiple studies since, MRI is now well established as a tool to assess extent of disease in women recently diagnosed with breast cancer.³ Since then, many studies including both ipsilateral and contralateral detection of additional malignancy have been undertaken. In general, breast MRI appears to identify an additional 3%-5% of cancer in the contralateral breast and 13%-15% in the ipsilateral breast.⁴ There is significant controversy regarding the impact of pre-operative MRI in patients recently diagnosed with breast cancer.

Malignant adenopathy, unknown primary: A small percentage (1-2%) of breast cancer patients present with axillary adenopathy, unknown primary. MRI will detect the occult cancer in 60-80% of patients, allowing many of these to have lumpectomy rather than mastectomy.

Evaluation of Response to Neoadjuvant Chemotherapy: In the mid 1990's, studies reported that MRI was superior to mammography and clinical breast exam in evaluating response to neoadjuvant chemotherapy. Subsequent studies supported these findings but cautioned that the false negative rate of MRI is increased after chemotherapy and MRI cannot exclude microscopic disease.

Screening women for high risk of breast cancer: Multiple studies published since 2000 demonstrate that screening MRI can detect otherwise occult breast cancers in women at high risk.⁵ The first large-scale screening study published was of 1909 women in the Netherlands that found sensitivity for mammography and MRI were 33% and 79.5% respectively.⁶ Recognizing the value of MRI as a breast imaging tool, the American Cancer Society established guidelines for this application in 2007.⁷

Conclusion: Breast MRI has transformed dramatically in the last 30 years and is being used in multiple clinical applications. While much research has been conducted to improve the effectiveness of breast MRI, research addressing impact on patient outcomes is needed.

References:

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