

How Does MR Imaging Help Care for My Breast Cancer Patient? Perspective of a Radiation Oncologist

Kaitlin M. Christopherson, MD^a, Benjamin D. Smith, MD^{b,*}

KEYWORDS

• Partial breast radiotherapy • MR imaging • Breast cancer

KEY POINTS

- For patients with preinvasive breast cancer or early-stage breast cancer, MR imaging may help identify patients who are eligible for accelerated partial breast irradiation.
- In early-stage patients, MR imaging may provide benefit in accuracy and consistency of target volume delineation for radiation treatment planning, particularly in the preoperative setting.
- In select patients, MR imaging may identify extramammary disease that alters the overall treatment recommendation, target volumes, and/or doses of radiation therapy.
- MR imaging is capable of showing late sequela of radiation in patients with breast cancer and may have a role in examining late breast fibrosis in future studies.

INTRODUCTION

Radiation therapy (RT) can be used in almost every stage of breast cancer. In preinvasive and early-stage invasive breast cancer, radiation is used in the adjuvant setting after breast-conserving surgery. For advanced-stage patients, radiation may be indicated to treat regional nodal basins and the chest wall following mastectomy and axillary surgery. Even in stage IV disease, there is recently increased interest in aggressive local therapy, particularly in patients with limited metastases (oligometastatic cancer).

The general guiding principles of radiation include targeting malignancies while sparing normal adjacent tissue from high-dose radiation. To achieve the maximal balance between efficacy

and morbidity, it is critically important to accurately define the radiation target. Current practice relies heavily on the utility of computed tomography (CT)-based radiation treatment planning. In the United States, CT-based simulation scans, or treatment planning scans, are the most commonly used planning method for radiation oncologists. On these images, the radiation oncologist defines the target, also referred to as the clinical treatment volume, and defines nearby organs at risk to avoid.

Given the range of possible radiation treatments in breast cancer, MR imaging has several possible applications for the radiation oncologist. Herein, the authors focus on the usefulness of MR imaging for the radiation oncologist in the setting of both early-stage disease and late-stage

Disclosure Statement: The authors have nothing to disclose.

^a Department of Radiation Oncology, The University of Texas MD Anderson Cancer Center, Boone Pickens Academic Tower (FCT6.5075), 1515 Holcombe Boulevard, Houston, TX 77030, USA; ^b Department of Radiation Oncology, The University of Texas MD Anderson Cancer Center, Unit 1202, 1515 Holcombe Boulevard, Houston, TX 77030, USA

* Corresponding author.

E-mail address: Bsmith3@mdanderson.org

Magn Reson Imaging Clin N Am ■ (2017) ■-■

<https://doi.org/10.1016/j.mric.2017.12.007>

1064-9689/17/© 2017 Elsevier Inc. All rights reserved.

disease. For early-stage patients, MR imaging can aid in target delineation and radiation technique selection. For more advanced-stage patients, this article examines how MR imaging may help identify the extent of disease in addition to aid in target volume definition. Last, the authors comment on MR imaging in monitoring of late effects of radiation.

EARLY-STAGE PATIENTS

In early-stage and preinvasive cancers, radiation is used in conjunction with lumpectomy to minimize the risk of subsequent in-breast tumor recurrence and thus maximize the likelihood of breast conservation long-term survival. The most common radiation approach in early-stage disease is whole breast irradiation (WBI), in which tangential radiation beams are directed from the medial and lateral aspects of the affected breast for a series of daily treatments ranging from approximately 3 to 6 weeks (Fig. 1). A tumor bed boost, defined as additional radiation directed to the tissues immediately adjacent to the tumor bed, is frequently delivered following WBI to further lower local recurrence risks. Multiple randomized trials have demonstrated that lumpectomy followed by WBI confers survival equivalent to mastectomy, and as such, WBI is a commonly accepted standard of care.^{1–5} Accelerated partial breast irradiation (APBI) is a newer approach to delivery of radiation for breast cancer, in which only tissues immediately adjacent to the tumor bed are targeted and treated with radiation (Fig. 2). Currently, use of APBI is largely limited to women age ≥ 50 years with estrogen receptor-positive, node-negative tumors measuring 2 cm or less in size.⁶

Within the context of WBI and APBI, MR imaging has several important potential applications. First, by detecting the presence or absence of radiographically occult disease in the breast that is remote from the tumor bed, MR imaging can assist in determining which patients may be safely treated with APBI and which patients would be better served by WBI (or even mastectomy). Second, because of better soft tissue resolution than typically achieved with radiation planning CT scans, MR imaging may assist with delineation of the tumor bed to enhance treatment planning of APBI or the tumor bed boost. Third, recent investigations have focused on developing novel preoperative APBI treatment strategies, and in this setting, MR imaging can be invaluable in identifying the *in vivo* tumor and facilitating accurate targeting with radiation before surgery. Each of these important scenarios is discussed in detail in later discussion.

Patient Selection for Accelerated Partial Breast Irradiation

For early-stage patients who may be candidates for APBI, breast MR imaging may be of value to the radiation oncologist by identifying the presence of malignant foci remote from the tumor bed, which, if present, would disqualify the patient from being eligible for APBI.^{7–10} For example, Tendulkar and colleagues⁸ reviewed 260 patients with early breast cancer treated at the Cleveland Clinic and correlated findings on mammography, MR imaging, and surgical pathology. The objective was to determine if MR imaging was more sensitive than mammography in patient selection for APBI. They focused on patients who would have been eligible for National Surgical Adjuvant Breast and Bowel Project B-39 (a prospective trial evaluating APBI) based on clinical-pathologic grounds. MR imaging detected synchronous, mammographically occult, primaries in 5.8% of patients, most commonly in the ipsilateral breast. They noted that invasive lobular carcinoma (ILC), in contrast to invasive ductal carcinoma, was significantly associated with additional ipsilateral disease (18% of these patients).

A similar study from the University of Chicago prospectively evaluated the benefit of MR imaging for more than 500 patients being screened for APBI and concluded that preoperative breast MR imaging rendered 12.9% of patient ineligible for APBI. Risk factors for ineligibility included tumor size ≥ 2 cm, age less than 50, ILC, and Her-2/neu amplification. A combination of these factors was used to generate a risk score that predicted the likelihood that MR imaging would render a patient ineligible for APBI.⁹

In total, these and other studies indicate that preoperative MR imaging could alter recommendations for partial breast irradiation in up to 13% of patients. Most commonly, MR images reveal more extensive ipsilateral disease or multifocality, but can also detect contralateral breast lesions as well.^{10–14} Known multifocal or multicentric disease would be a contraindication for APBI. It is important to take into account certain clinical and pathologic factors, such as young age, tumor size, and invasive lobular histology, which may lead to a higher yield of additional findings on breast MR imaging. For a young patient with ILC, or a patient with a 2-cm or greater tumor, who is motivated for APBI, it may be reasonable to consider breast MR imaging to rule out possible multifocal or multicentric ipsilateral disease.^{14,15}

Download English Version:

<https://daneshyari.com/en/article/8824435>

Download Persian Version:

<https://daneshyari.com/article/8824435>

[Daneshyari.com](https://daneshyari.com)