

## Points

- Breast MRI is performed using a special dual-breast coil on a 1.5T MRI scanner.
- It is always performed with intravenous contrast, except for implant evaluation
- It is the best non-invasive technique for picking up lesions in high-risk patients or when mammography is equivocal
- If the breast MRI is normal, it is almost certain that the patient does not have an invasive carcinoma
- It is also the best non-invasive technique for staging and for assessing response to treatment

## Breast MRI

For evaluation of the breast, X-ray mammography is the mainstay modality, with sonomammography acting as a complimentary technique.

Virtually all breast imaging is performed for two broad indications.

1. Screening
2. Further evaluation of clinically known disease



### Screening

X-ray mammography is the gold standard for screening.

Breast MRI can be used for screening in high-risk patients, with dense breasts, especially those with certain specific genes (BRCA1, BRCA2), which predispose to breast cancer and those with familial high risk (Fig. 1). It is also used in those patients in whom mammography has shown an indeterminate or equivocal lesion, to confirm or rule out the presence of disease and if the disease is confirmed, to help determine its nature (Fig. 2).

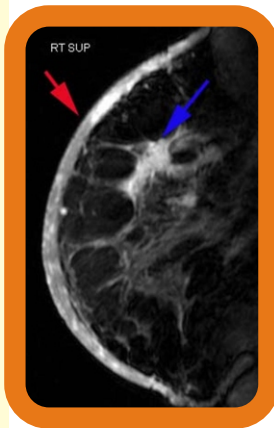


Fig. 1

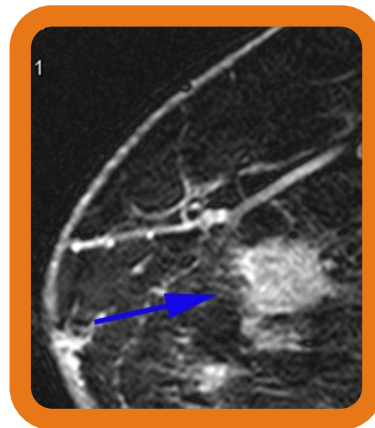


Fig. 2A

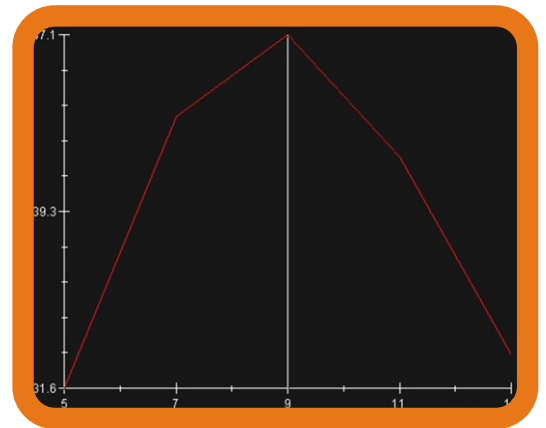


Fig. 2B

### Fig. 1:

Invasive ductal carcinoma. This 45-years old lady had marked skin thickening (red arrow), and the mammogram did not show any abnormality. In view of the thick skin, a contrast-enhanced breast MRI was performed, which revealed an ill-defined mass with spiculated margins (blue arrow).

### Fig. 2 (A,B):

Invasive ductal carcinoma. The mammogram had shown a well-defined, non-spiculated lesion, with indeterminate features. The breast MRI (A) shows a typical lobulated lesion with irregular, spiculated margins (blue arrow). The dynamic mean curve analysis (B), shows a typical V curve with rapid wash-in and wash-out.



## Clinically known disease

In this setting, breast MRI is used for

- Staging, especially if a lumpectomy (breast conservation surgery) is being planned. In this setting, it is very important to know the margins, and the presence or absence of multicentric or multifocal disease (Fig. 3). Breast MRI currently is the best technique for this purpose.
- Post-chemotherapy evaluation. In those patients who undergo chemotherapy, breast MRI is the best technique for evaluating response to treatment.
- Post-breast-implant complications. Breast MRI is an excellent technique for assessing implant-related complications (Fig. 4).

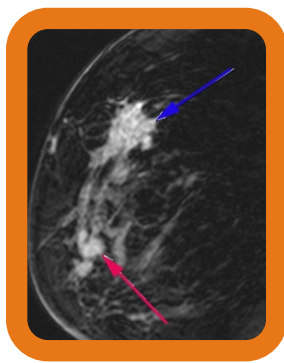


Fig. 3

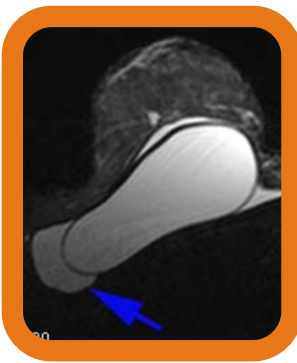


Fig. 4

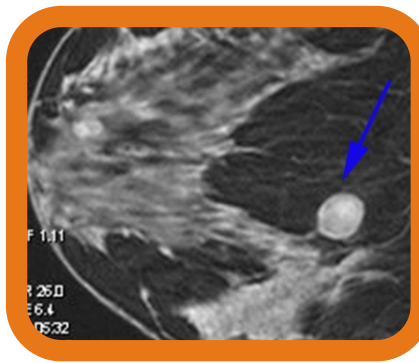


Fig. 5A

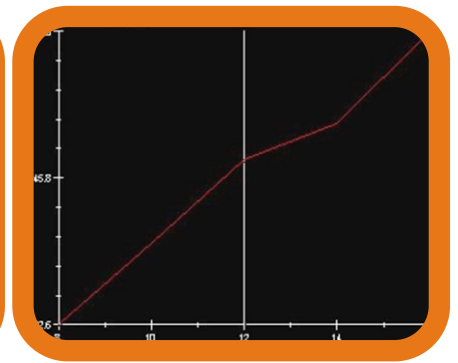
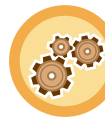


Fig. 5B

**Fig. 3:** Multicentric carcinoma. The breast MRI showed a characteristic lesion in the upper outer quadrant (blue arrow), in a patient who had a lump felt on palpation and a spiculated lesion on the mammogram. The patient was scheduled for a lumpectomy and the MRI was performed to evaluate the exact size and margins. Another lesion was seen (red arrow), in the retro-areolar region, which was not appreciated clinically. The presence of this lesion completely changed the treatment plan and the patient underwent a mastectomy.

**Fig. 4:** The breast MRI study in this patient with bilateral silicone implants, shows edema around the right implant (blue arrow)

**Fig. 5 (A,B):** Fibroadenoma. The breast MRI shows a well-defined, oval lesion (blue arrow), which shows a typical type II pattern on the dynamic study (B), with gradual, progressive uptake.



## Technique

- Breast MRI needs a special coil, which is used to image both breasts at the same time.
- The patient lies in the prone position, with both breasts hanging down through the coil.
- All examinations, except for those performed for implant-related complications, are performed with intravenous contrast examination (gadolinium).
- This contrast study has to be performed dynamically, which also allows us to assess the nature of the contrast enhancement and helps differentiate benign from malignant disease processes (Figs. 2,5).

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