

Making Your Move into Breast MRI Simple



Breast MRI is a growing clinical imaging modality, particularly for those women who are determined to be at high risk. On March 28, the American Cancer Society (ACS) released new recommendations for the use of MRI for women at increased risk for breast cancer. This was a result of an expert panel organized by ACS that reviewed additional evidence since it last convened in 2003. The new recommendations for annual MRI screening, in addition to mammography, apply to women who:¹

- have a BRCA 1 or 2 mutation
- have a first-degree relative with a BRCA 1 or 2 mutation that are untested
- have a lifetime risk of breast cancer of 20 to 25 percent or more using standard risk assessment models
- received radiation treatment to the chest between ages 10 and 30, such as Hodgkin Disease
- carry or have a first-degree relative who carries a genetic mutation in the TP53 or PTEN genes (Li-Fraumeni syndrome and Cowden and Bannayan-Riley-Ruvalcaba syndromes).

For some women, however, the jury is still out on whether MRI screening is beneficial, even though they have conditions that do give them a higher-than-average risk of breast cancer. The guideline says there still isn't enough evidence to recommend for or against MRI screening in women who have:

- a 15%-20% lifetime risk of breast cancer, based on one of several accepted risk assessment tools that look at family history and other factors
- lobular carcinoma in situ (LCIS) or atypical lobular hyperplasia (ALH)

- atypical ductal hyperplasia (ADH)
- very dense breasts or unevenly dense breasts (when viewed on a mammogram)
- already had breast cancer, including ductal carcinoma in situ (DCIS)
- Screening MRIs are not recommended for women with a lifetime risk of breast cancer below 15%.

Several risk subgroups were also identified; however, data is insufficient to either recommend for or against MR screening. These subgroups are: women with a personal history of breast cancer; carcinoma in situ, atypical hyperplasia; and extremely dense breasts on mammography.

The clinical requirements for breast MR include higher spatial resolution for improved morphology, temporal resolution for contrast uptake curves to aid specificity, increased diagnostic confidence and simplified post-processing and visualization. To address this growing need, GE Healthcare has developed a complete portfolio for breast MRI, including VIBRANT™, a high-density 8-channel surface coil, BREASE™ for spectroscopy and an integrated CAD analysis package from Confirma™ (Kirkland, WA). The entire family of GE Healthcare's Signa® 1.5T and 3.0T MR systems offer advanced applications for breast imaging.

With **VIBRANT** and **VIBRANT XV**, clinicians no longer must choose between scanning for structural detail and scanning rapidly for contrast uptake information – critical to breast imaging. VIBRANT also allows clinicians to acquire bilateral breast images in the sagittal or axial plane with the same high resolution as a unilateral MRI breast exam. The application

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Dr. Robert Lavayssiere

also uses a breast-specific spectral inversion technique, a unique bilateral shim method and an automated image subtraction technique for reliable fat elimination.

The benefits of VIBRANT-XV include isotropic dynamic imaging – the ability to visualize data in any plane with no loss of detail; enhanced depiction of lesion boundary with a 1024 matrix; and the highest clinically useful acceleration available today.

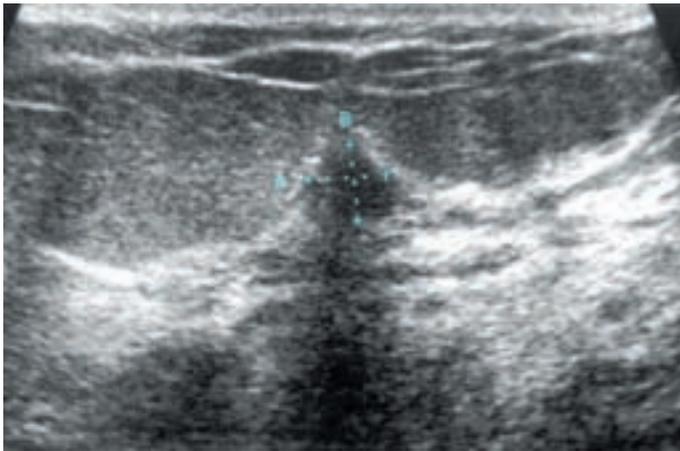
BREASE is a breast specific single-voxel spectroscopy application that increases specificity by providing additional lesion characterization and assessment of early treatment response. It is a proton spectroscopy application optimized

specifically for the breast that uses a signal detection technique to show elevated concentrations of choline. BREASE is a TE-averaged, PRESS spectroscopy acquisition compatible with a 4-, 7-, or 8-channel breast coil.

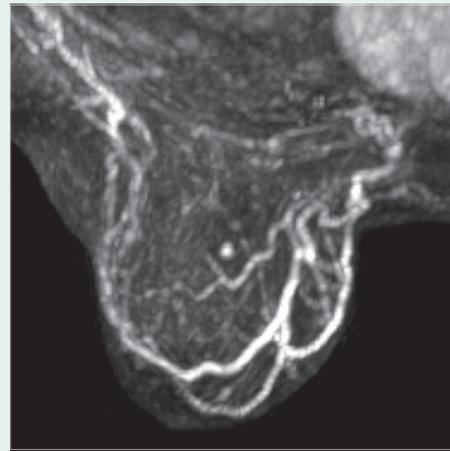
GE's **High-Density (HD) 8-channel Breast Array**, the newest addition to GE's comprehensive Breast MRI portfolio, provides best-in-class signal-to-noise ratio and uniform coverage of the breast and axillary tissue. The coil can be used for bilateral or unilateral imaging and is optimized for ASSET (can achieve an ASSET factor of 3) and VIBRANT (enables an acceleration factor of 4 with VIBRANT-XV) applications.

Case 1

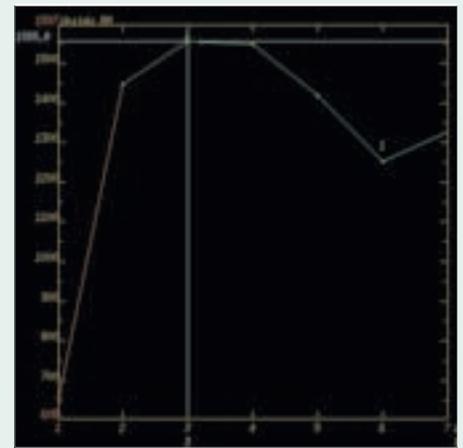
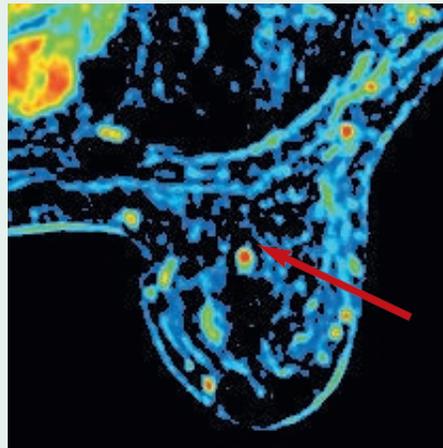
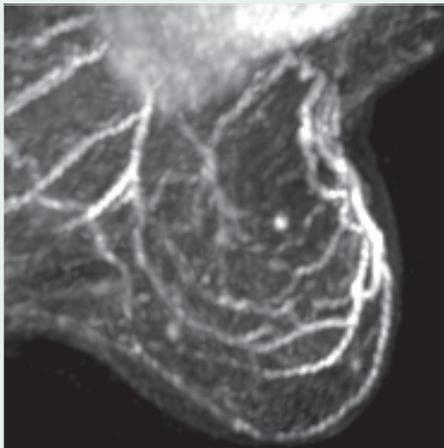
56-year-old woman: follow-up after surgery of a lobular cancer in 2000.

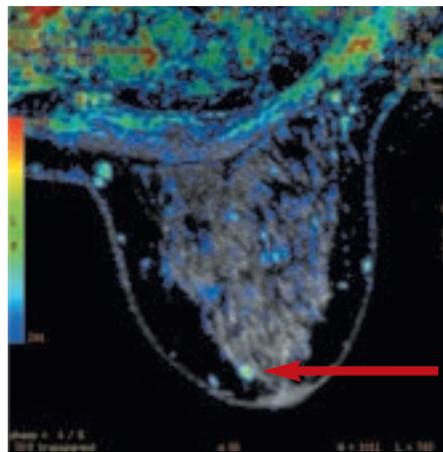
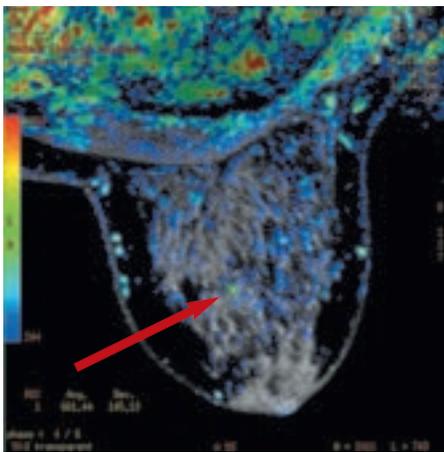
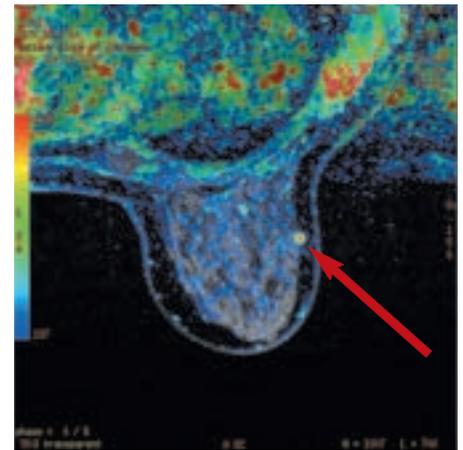
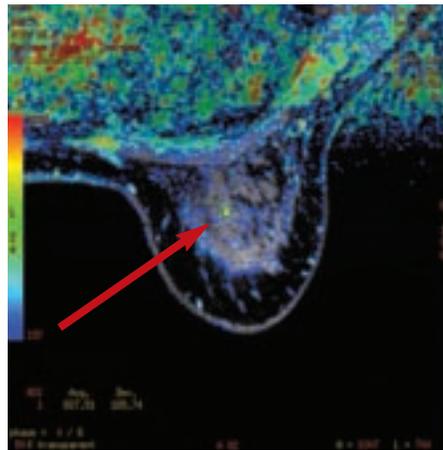
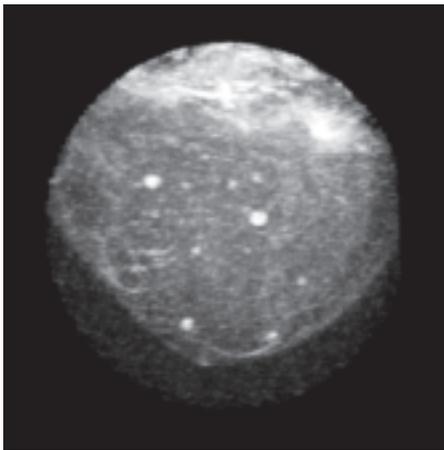


Ultrasound showed only one lesion.



1.5T MR exam done one week before also showed only one lesion.





3.0T MR exam with VIBRANT-XV sequence revealed four lesions.

An Urgent Health Issue

Breast cancer remains a leading cause of premature death in women. The American Cancer Society (ACS) reports that breast cancer is the most common cancer among women, other than skin cancer, and is the second leading cause of cancer death in women, after lung cancer.

Approximately 178,480 women in the United States will be found to have invasive breast cancer in 2007, the ACS estimates. At present, slightly more than two million women living in the United States have been treated for breast cancer.

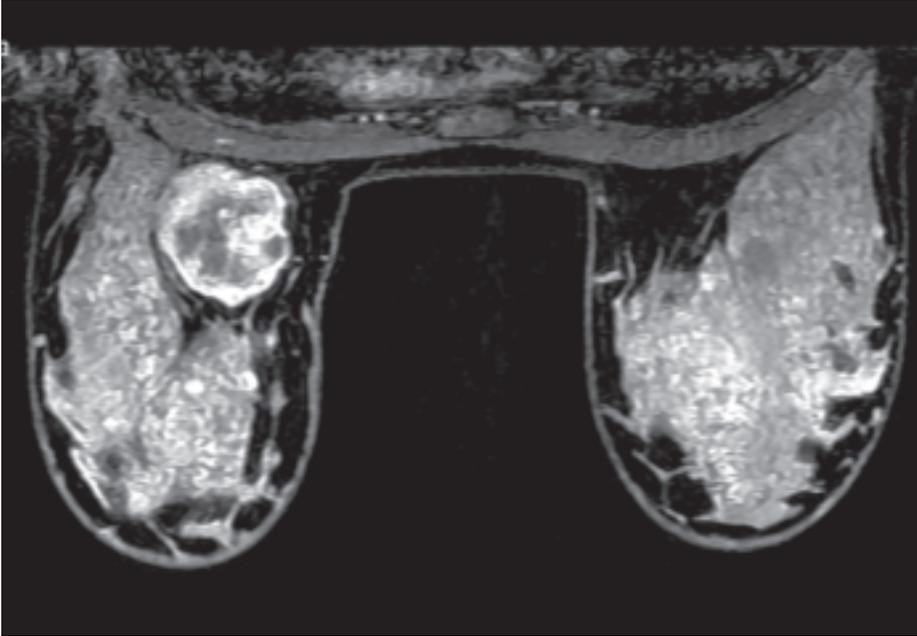
The chance of a woman having invasive breast cancer at some time during her life is about 1 in 8. The chance of dying from breast cancer is about 1 in 33. Breast cancer death rates are going down. The decline is probably the result of finding the cancer earlier and improved treatment.

Imaging Challenges

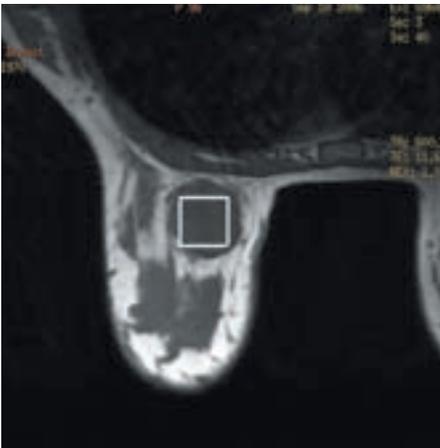
- 1 in 3 breast cancer patients has undiagnosed multi-focal disease.
- 1 in 20 breast cancer patients has undiagnosed bilateral disease.

Case 2

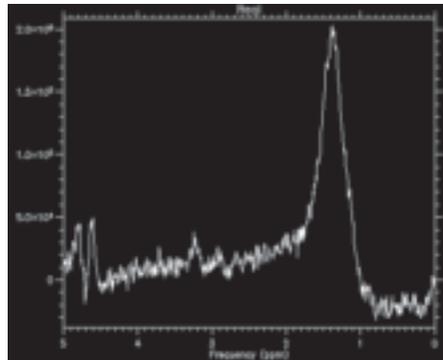
36-year-old woman: Grade III carcinoma.



VIBRANT-XV
TR 10.5/TE 4.3/TI 26
Matrix 756 x 288
BW 83, 0.74 nex
1.5 mm slice thickness
1 min 44/phase
Acceleration factor 2.37



Spectroscopy voxel location onto the reference image.



Resulting spectrum showing a choline peak within suspected lesion.

"Immediately you notice that the images obtained using the Signa 3.0T HDx and the new HD 8-channel breast array coil are striking," said Dr. Robert Lavayssiere, IRM Paris Nord (Sarcelles, France). All 3.0T images were obtained at CHNO des Quinze-Vingts Hospital (Paris, France). "They are high-quality artifact-free images with very good contrast due to very efficient fat saturation and good signal-to-noise ratio despite small slice thickness. The 3D MIP reconstructions from subtracted images are very good and moreover very useful for spatial localization and clinical display.

"The potentials of 3.0T breast imaging include better dynamic acquisition for a higher spatial resolution and better spectroscopic resolution, leading to more accurate evaluation and diagnosis," added Dr. Lavayssiere. ■

Reference:

1. American Cancer Society Guidelines for Breast Screening with MRI as an Adjunct to Mammography. *CA Cancer J Clin* 2007;57:75-89. Press release also available at: www.cancer.org.