

Magnetic Resonance, Ultrasound, and Mammography in the Detection of Breast Cancer

Case Study

www.siemens.com/healthcare

SIEMENS

Magnetic Resonance, Ultrasound, and Mammography in the Detection of Breast Cancer: A Case Report

By Gladys Goh Lo, MD, Diplomate, American Board of Radiology, Radiologist-in-Charge, Department of Diagnostic & Interventional Radiology, Hong Kong Sanatorium & Hospital; Wong Ting Ting, MD, MBBS (HK), FRCS (Edin), Consultant in Surgery, Hong Kong Sanatorium & Hospital; Christine S. Lo, Li Ka Shing Faculty of Medicine, The University of Hong Kong

CASE REPORT

This 45-year-old-female had magnetic resonance (MR) breast diffusion-weighted imaging (DWI) as a test subject at our institution. DWI performed using the 3 Tesla (T) MAGNETOM® Trio, A Tim® system, showed a high signal bilobulated mass measuring 1.5 centimeters at 8:00 (location A). The apparent diffusion coefficient (ADC) map showed the diffusion coefficient of this lesion to be abnormal [Fig. 1A and 1B]. Upon this unexpected discovery of a suspicious mass, conventional dynamic contrast-enhanced breast MRI¹ was performed. This showed a smoothly marginated bilobulated rim-enhancing mass measuring 1.8 centimeters at location A [Fig. 2A]. The signal-intensity-to-time curve showed rapid uptake of contrast with rapid wash-out (type III graph) [Fig. 2B]. At a second site at 10:00 (location B), there was an irregularly marginated mass with homogeneous enhancement. This mass measured 1.4 centimeters. The signal-intensity-to-time curve showed continuous uptake of contrast [Fig. 3A and 3B]. The diffusion coefficient at location B was normal. In addition, there were benign-appearing nodules with benign signal-intensity-to-time curves. The other breast also had several benign-appearing nodules. Breast ultrasound (ACUSON Sequoia™ ultrasound system) showed a polylobulated hypoechoic mass at location A with

some shadowing. This mass measured 1.8 centimeters [Fig. 4]. Digital mammography (MAMMOMAT™ Novation^{DR}) showed an area of architectural distortion associated with punctuate microcalcification at location B. The suspicious mass on MRI at location A was not seen on the mammogram. Mammogram of the other breast was normal [Fig. 5A, 5B, 5C, and 5D]. Preoperative sentinel node scintigraphy was performed using the Symbia® gamma camera to map the sentinel lymph node for evaluation of infiltration. Following surgery, histology showed a two-centimeter ductal carcinoma in situ (DCIS) in breast tissue from location A. Sclerosing adenosis was found in breast tissue from location B. Axillary lymph nodes did not show any infiltration.

DISCUSSION

Our preliminary study^{2,3} on 31 patients comparing breast diffusion and contrast-enhanced MRI at 3T showed qualitative DWI to have a high sensitivity of 95 percent for breast carcinoma. Adding quantitative ADC map results in a specificity of 91 percent. These values are comparable to our contrast-enhanced breast MRI data. The positive DWI finding in this case correlates with the findings in our clinical study and our paper. Diffusion imaging

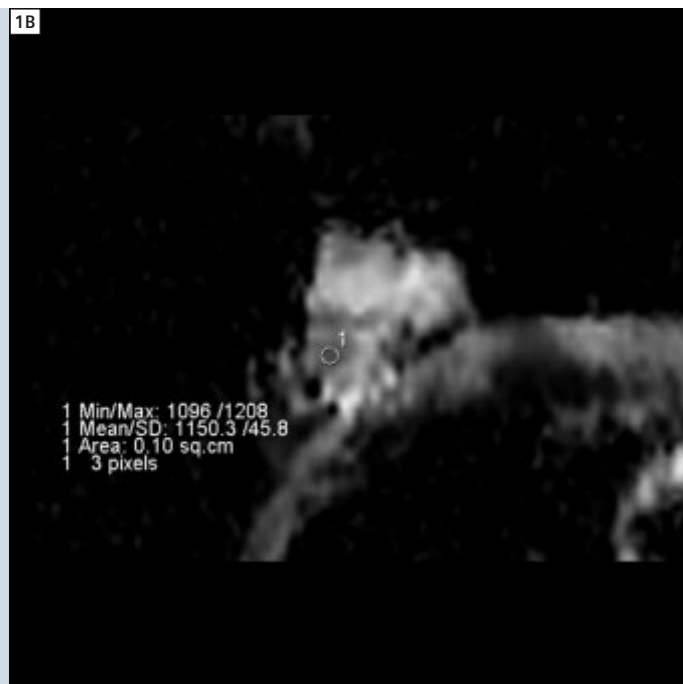
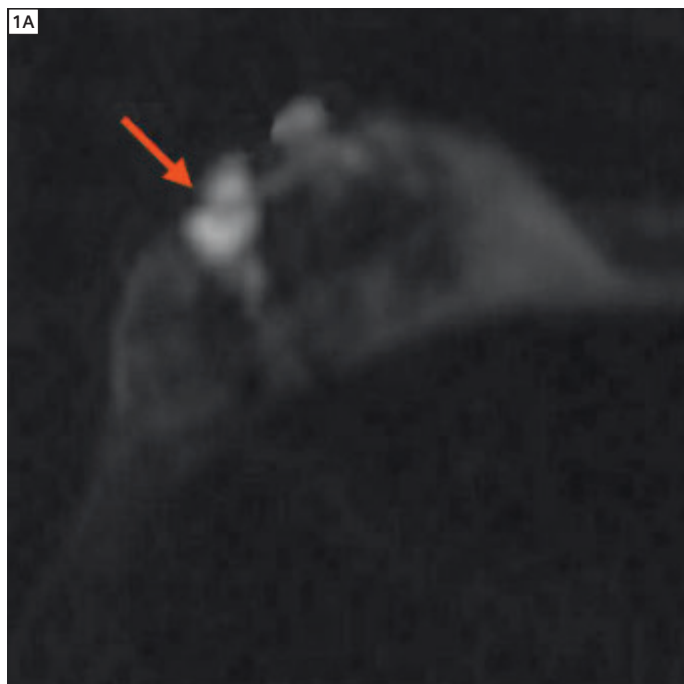
correctly identified the tumor at location A as malignant. Diffusion was normal for the mass at location B, which turned out to be benign.

DWI may be useful and cost effective as a preliminary evaluation for women where mammography has difficulty, for example, evaluating dense breast tissues in younger women. DWI may help triage women who really need contrast-enhanced breast MRI¹, which is a longer study (30 minutes versus five minutes) and is associated with higher costs when contrast agent is used. Currently, there are certain limitations. A small percentage of DCIS and lesions smaller than five millimeters may not be seen on the DWI. However, breast DWI is a highly sensitive technique and deserves to have a considerable role in breast MR examinations. Its usefulness in tumor treatment follow-ups should also be investigated.

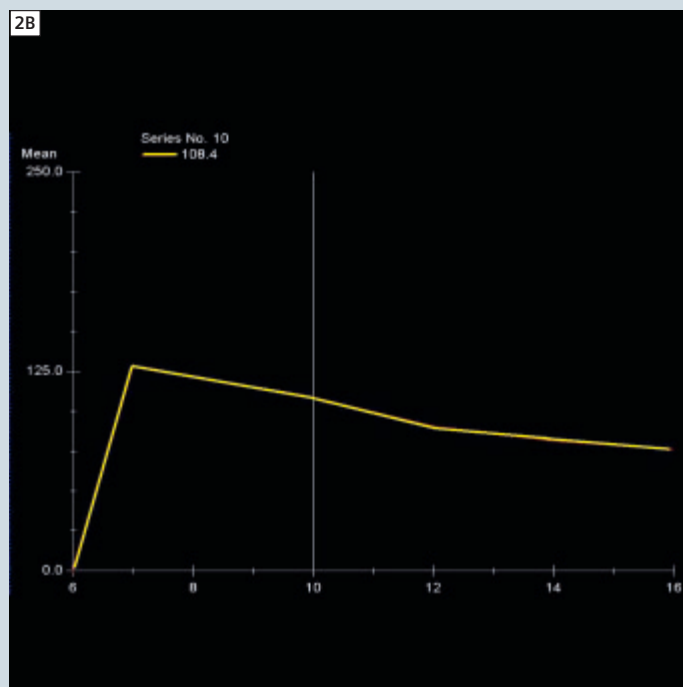
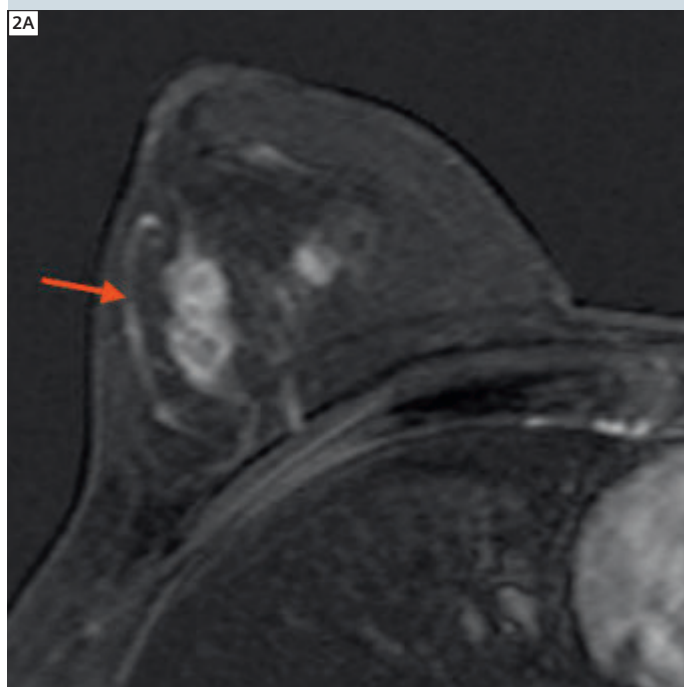
¹ Not available in the U.S.

References

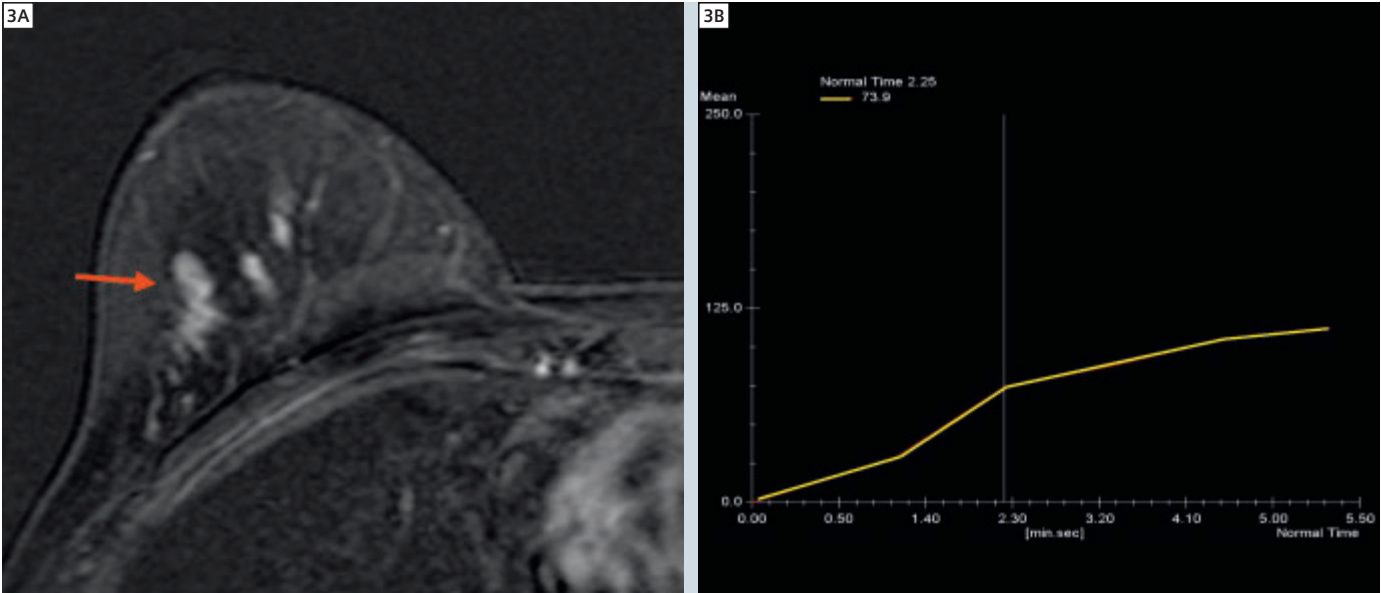
- Lo G., Ai V., Chan J., et al. Qualitative and Quantitative Diffusion Weighted Imaging of Breast Lesion at 3T, presented at ISMRM 2008 poster presentation.
- Lo G., Ai V., Chan J., et al. Diffusion Weighted Magnet Resonance Imaging of Breast Lesions: First Experiences at 3T, JCAT in press.



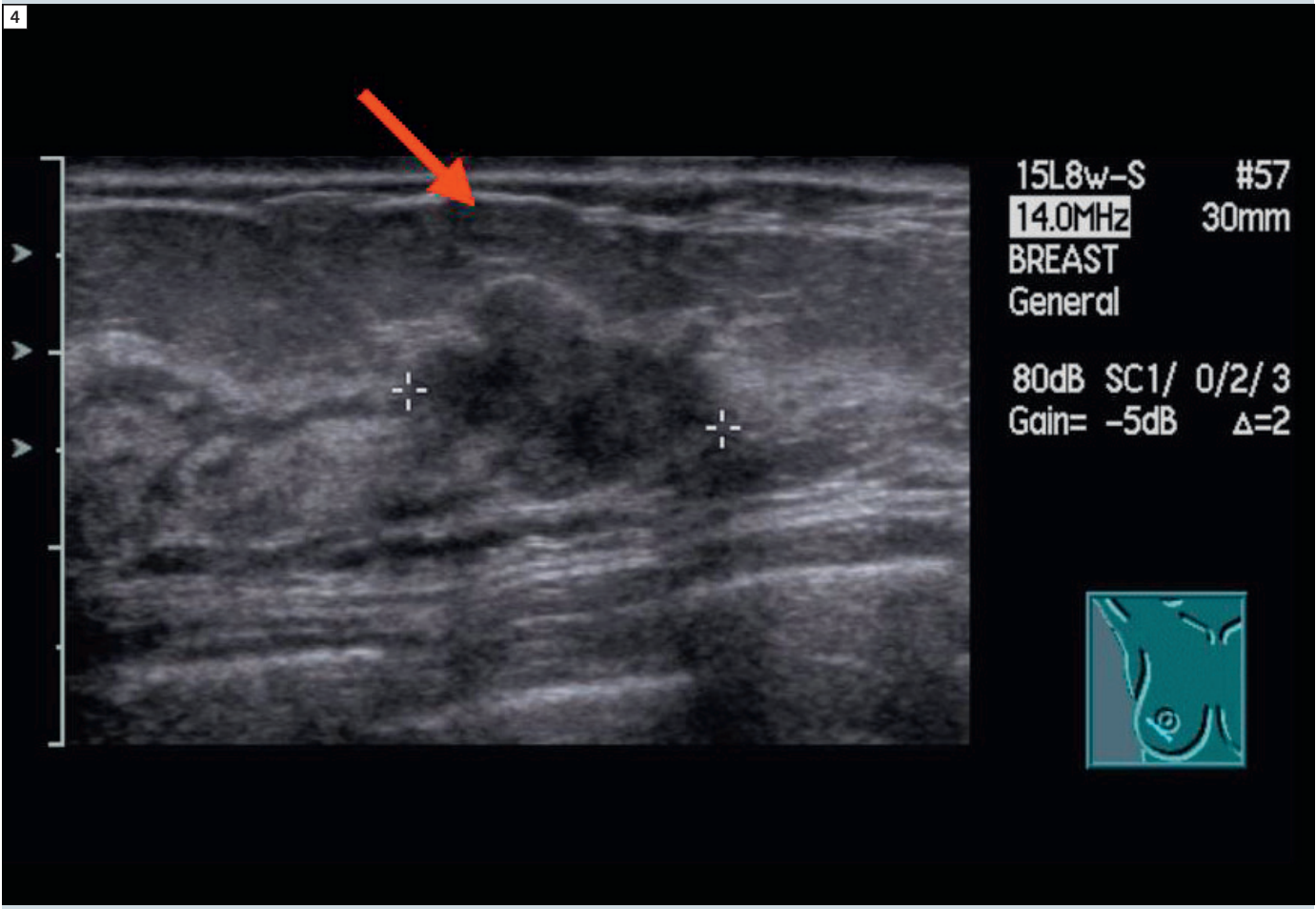
1 DWI shows high signal lesion at 8:00 (location A) [Fig. 1A]. Abnormal ADC map ($1.15 \times 10^3 \text{ mm}^2/\text{s}$) at location A [Fig. 1B].



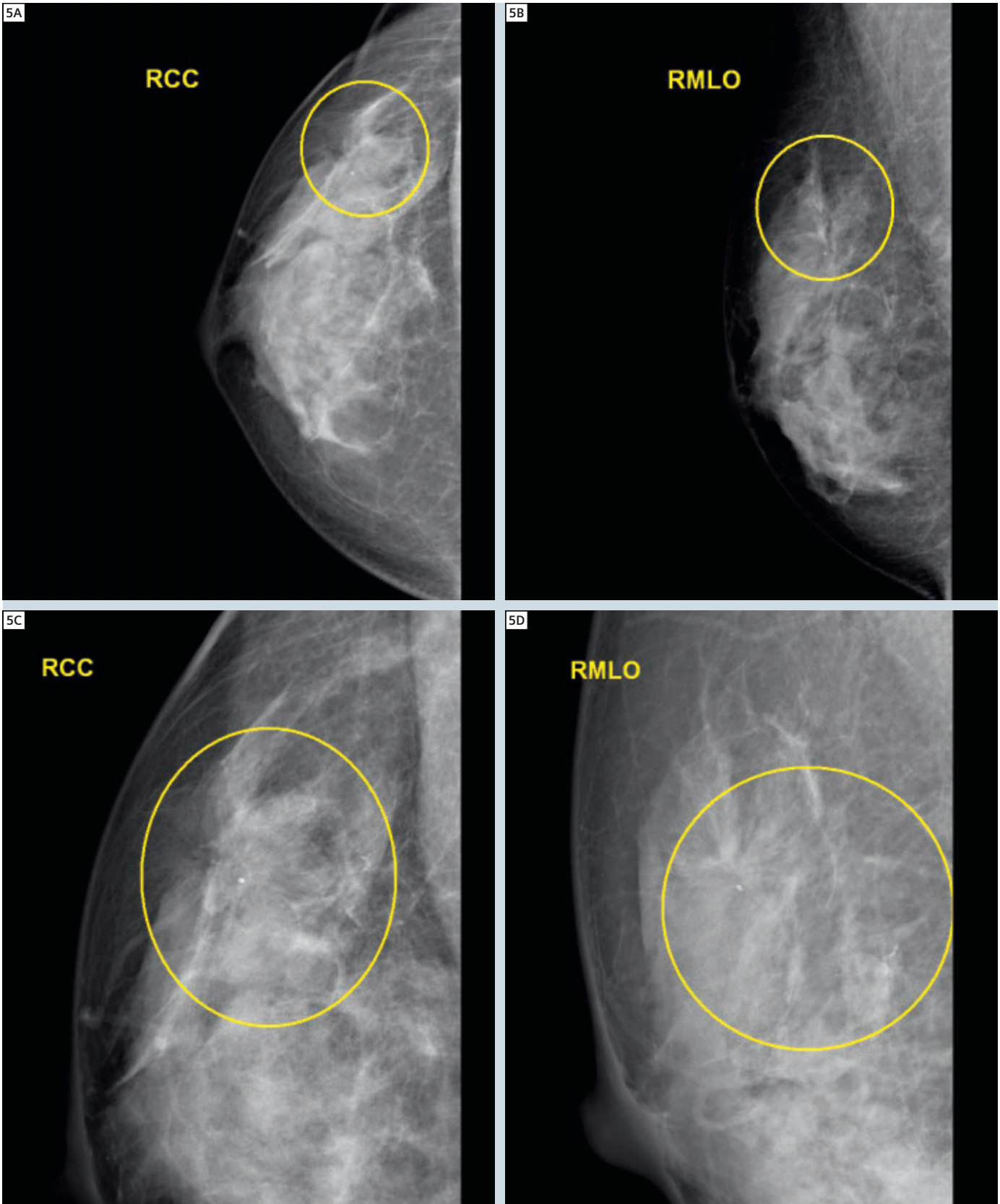
2 MR Breast with contrast. Bilobulated rim-enhancing mass at location A (Fig. 2A). Signal intensity-time curve shows rapid wash-in and wash-out (type III graph) at location A (Fig. 2B).



3 Irregular marginated mass at 10:00 (location B) [Fig. 3A]. Signal intensity-time curve with continuous uptake of contrast (type I graph) at location B [Fig. 3B].



4 Rt breast ultrasound. Polylobulated hypoechoic mass with shadowing at location A.



5 Rt breast mammogram. Heterogeneously dense breast with architectural distortion at location B (Fig. 5A, B). Cone view with magnification shows architectural distortion at location B (Fig. 5C, D).

The information in this document contains general descriptions of the technical options available, which do not always have to be present in individual cases. The required features should therefore be specified in each individual case at the time of closing the contract.

Siemens reserves the right to modify the design and specifications contained herein without prior notice. Please contact your local Siemens Sales representative for the most current information.

Note: Any technical data contained in this document may vary within defined tolerances. Original images always lose a certain amount of detail when reproduced.

Please find fitting accessories:
www.siemens.com/medical-accessories

Global Siemens Headquarters

Siemens AG
Wittelsbacherplatz 2
80333 Muenchen
Germany

**Global Siemens
Healthcare Headquarters**

Siemens AG
Healthcare Sector
Henkestr. 127
91052 Erlangen
Germany
Phone: +49 9131 84-0
www.siemens.com/healthcare

Legal Manufacturer

Siemens AG
Wittelsbacherplatz 2
DE-80333 Muenchen
Germany