

# *syngo* GRACE

A quantitative approach in Breast Spectroscopy

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# syngo GRACE – A quantitative approach in Breast Spectroscopy

MR Spectroscopy (MRS) has been a powerful tool in different body parts for quite some time. With *syngo* GRACE, spectroscopy capabilities have now been optimized for the evaluation of breast tissue, in short scan times. MRS of the breast, *syngo* GRACE, focuses on the evaluation of the choline metabolite, which acts as a biomarker that gives essential information about a breast lesions biochemical composition. Indeed, preliminary results show that detection of choline signal in breast tumors correlates with breast cancer, confirmed by biopsy, US and/or mammography. One important aspect of breast MRS however, is the relative quantification which produces a reliable value of choline signal independent of different measurement conditions.

Siemens *syngo* GRACE includes 2 push-button methods for relative quantification of total choline signal in the breast.

- Internal reference:  
*syngo* GRACE quantifies choline using the water signal from the voxel under investigation.
- External reference:  
the signal of an external sample placed in a dedicated holder (part of the Breast Matrix coil) is used for quantification.

First clinical results of volunteer and patient exams (All India Institute of Medical Sciences, New Delhi, India, head: Prof. N.R. Jagannathan) show the quantification of levels of total choline-containing compounds in the breast. *syngo* GRACE with the following parameters was used: Single voxel spin-echo sequence with spectral suppression and frequency correction, TR 1500 ms, TE 100 ms, TA 3:13 min.

Figure 1a and 1b:  
*syngo* GRACE of a 25-year-old volunteer (2<sup>nd</sup> menstrual cycle), voxel size 12 x 7 x 6 mm<sup>3</sup>; quantification using both internal and external reference techniques shows a comparably low level of choline.  
MAGNETOM Avanto

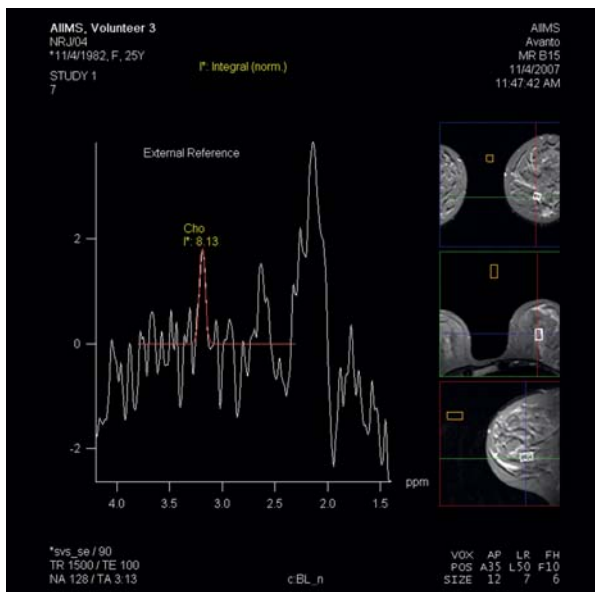


Figure 1a: external water reference

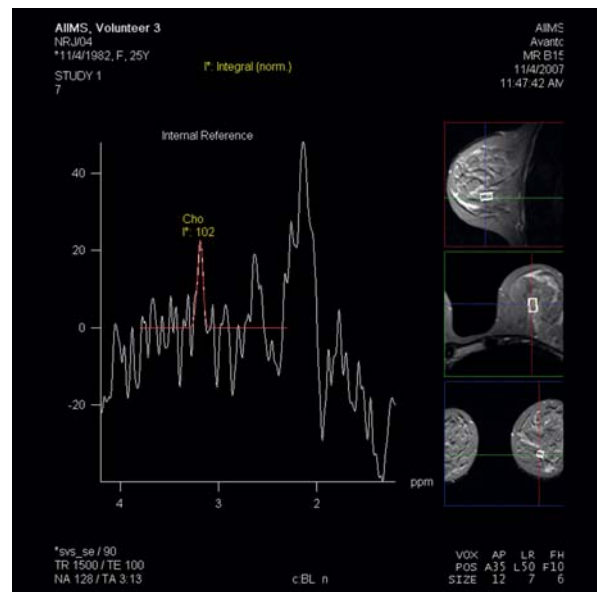


Figure 1b: internal water reference

Figure 2a and 2b:  
 syngo GRACE of a 60-year-old breast cancer patient  
 ( $T_{4b}N_2M_0$ ), voxel size  $10 \times 13 \times 11 \text{ mm}^3$ ; quantification  
 using both internal and external reference techniques  
 shows a comparably high level of choline.  
 MAGNETOM Avanto

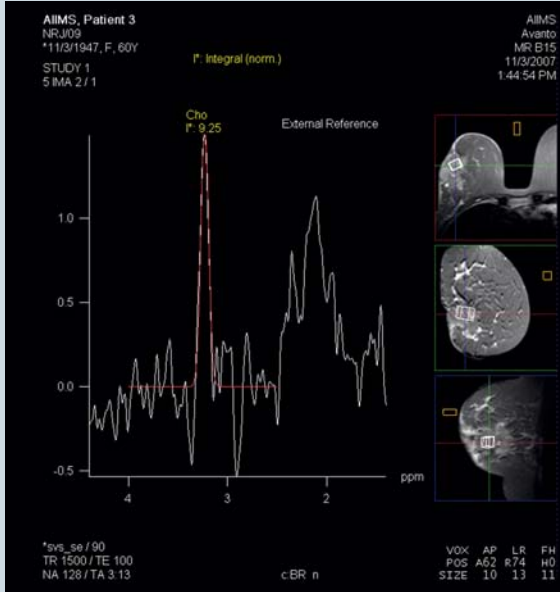


Figure 2a: external water reference

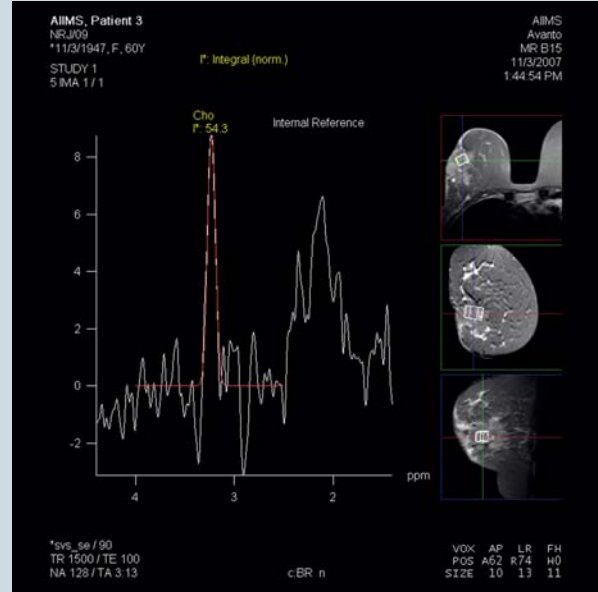


Figure 2b: internal water reference

*syngo* GRACE with its quantification capabilities is an essential tool for advanced breast diagnosis. It provides improved differential diagnosis and enhanced confidence in therapy monitoring as well as in primary diagnosis. *syngo* GRACE is available for all 1.5T MAGNETOM Tim systems with I-class and T-class.

**Note:**

The current status of **internal water** during chemo-/hormone therapy is unknown and choline signal may also be detected in breast tissue of healthy volunteers or benign tumors. Therefore the clinical validity of the internal reference method is still under investigation.

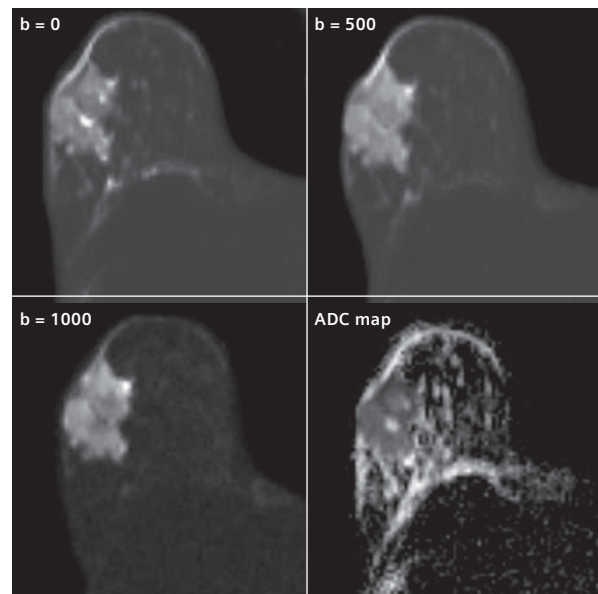


Figure 3:  
 Correlating *syngo* REVEAL, body diffusion of breast cancer patient shown in Figure 2. *syngo* REVEAL is ideal for assessing cancer: malignant lesions here show low signal in ADC map (Apparent Diffusion Coefficient) compared to a high signal in benign lesions.

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