



# Diffusion for Breast Application

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Professor Kaori Togashi has been involved in MRI of the female pelvis for more than 30 years. She estimates herself lucky to have started her research at the very early stage of body MRI development. Initially Prof. Togashi was excited to see detailed morphology and experience clinical usefulness of pelvic MRI. Then she gradually recognized the power of MRI beyond morphology; MRI as a functional imaging.

**C**ine MRI is one of the field of Prof. Togashi's interests in which detailed movie image revealed uterus as a "Dynamic functional organ". After getting promoted to the current position in 2004, she has also been fascinated by the potential of DWI and FDG-PET imaging as other functional imaging modalities.

*Could you quickly explain what DWI is?*  
 DWI is an image based on diffusion of water in the tissue. In the context of body MRI, the main role of DWI is evaluation of tumor. Along with FDG-PET, DWI is a powerful tool to detect unnoticed small metastasis or to estimate aggressiveness of tumor in various cancers including pros-

tate cancer, uterine cancer, ovarian cancer, liver tumor, and breast cancer.

*How do you use it in your daily routine for breast application? How does it help you in your diagnosis process?*

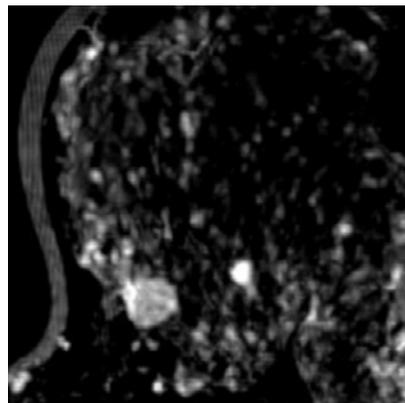
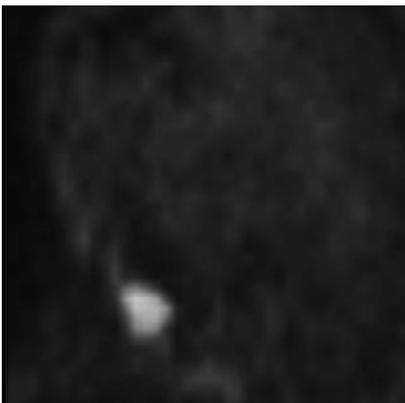
In our institution, DWI is now incorporated into almost all of the routine body MR protocols. DWI helps radiologists in detecting known/unknown cancer site and improve our confidence in diagnosing malignancy, particularly when contrast enhanced images show inconclusive results or contrast agent is contraindicated. DWI does not need contrast agent and is, therefore, easy to add on with minimum burden to patients. In addition, apparent diffusion coefficient (ADC) value,

a quantitative parameter, provides us with measurable information of the tumor cellularity, composition or structure. For example, ADC value is associated with cellularity and also with proliferative marker in certain types of breast cancer. Outside breasts, DWI sometimes helps in identifying unexpected metastasis to lymph nodes and bones.

*Could you briefly present a case study to our readers?*

A lady was diagnosed as bilateral fibroadenomas on ultrasound. MRI showed bilateral round circumscribed masses. However, one of the mass showed high signal intensity on DWI ( $b=1000$  s/mm<sup>2</sup> right) with ADC value of  $0.9 \times 10^{-3}$  mm<sup>2</sup>/s, which was too low for typical fibroadenoma. Pathological examination revealed this lesion as breast cancer. //

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Round circumscribed mass pointed out on hypersignal on b-1000 (left) and post-contrast T1-WI (right) series.