

# Diffusion-Weighted (DW) Imaging in Ovarian Cystic Lesions: Value of DW Imaging Compared to T2-weighted Imaging at 3T MRI

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**Purpose :** Only a few studies on diffusion weighted (DW) imaging of ovarian lesions have been reported (1-3). In previous studies, the role of DW imaging in distinguishing between benign and malignant cystic tumors may be limited. Katayama et al (3) reported that apparent diffusion coefficient (ADC) values may not provide additional information, especially to discriminate benign from malignant lesions due to influence of signal intensity (SI) on T2-weighted images at 1.5T MRI. Therefore the purpose of our study is to determine the accuracy of DW imaging in the characterization of ovarian cystic masses and to clarify the relationship between the SI in T2-weighted imaging and ADC values for the cystic components of the ovarian tumors in patients undergoing pelvic 3T MRI. **Materials and Methods:** 49 women (mean age: 46.5 years old) with 54 ovarian cystic lesions (16 endometrial cysts, 11 mature cystic teratomas, 8 benign cysts, 7 benign cystic tumors, 5 borderline cystic tumors and 7 malignant cystic tumors) referred for the characterization of ovarian masses underwent conventional MR imaging on a 3T MR system (Philips Achieva, Best, The Netherlands) using a 6-element SENSE torso coil. T2-weighted with or without fat suppression (FS) and DW imaging (Single shot SE-EPI, b-values of 0 and 1000 s/mm<sup>2</sup>) were acquired. MR images were retrospectively evaluated in consensus by two experienced radiologists. The circular region-of-interest (ROI) was placed to be as large as possible within the confines of the cystic part of the tumors on T2-weighted with or without FS and DW imaging. The SI of lesion was quantified on T2-weighted imaging as the lesion-bladder contrast ratio (LBC) between lesion and the cystic bladder by using the following formula: (SI<sub>lesion</sub> - SI<sub>bladder</sub>)/SI<sub>bladder</sub>, where SI<sub>bladder</sub> is average ROI of the bladder SI, SI<sub>lesion</sub> is average ROI of the lesion SI on T2-weighted images. The LBC value was plus when the ROI of the lesion was higher signal compared with that of the bladder. Moreover, the ADC value of the lesion was also measured in the same ROI. For comparison of the results, differences among those cystic lesions with respect to the ADC values and LBC were assessed by Tukey's multiple comparison test. Differences with *p* < 0.05 were considered statistically significant.

**Results :** The mean and the standard deviation of the ADC value of endometrial cysts, mature cystic teratomas, benign cysts, benign cystic tumors, borderline cystic tumors and malignant cystic tumors were 1.21 ± 0.68, 0.85 ± 0.66, 2.65 ± 0.10, 2.59 ± 0.27, 2.44 ± 0.31, 2.55 ± 0.16 (× 10<sup>-3</sup> mm<sup>2</sup>/s), respectively (Fig. 1). The ADC values of endometrial cysts and mature cystic teratomas were significantly lower (*p* < 0.01) than those of other cystic lesions: however, there was a overlap in some cases. The ADC values of malignant ovarian tumors showed no significant difference compared with the others except for endometrial cysts and mature cystic teratomas. Figure 2 and 3 show relationship between ADC values and LBC of T2-weighted imaging with or without FS. ADC values have been weakly correlated with LBC of T2-weighted imaging without FS (R<sup>2</sup>=0.35) and successfully correlated with LBC of T2-weighted imaging with FS (R<sup>2</sup>=0.57).

**Conclusion :** In our study, the ADC values of endometrial cysts and mature cystic teratomas were significantly lower than those of other cystic lesions. However, the usefulness of the ADC values in cystic ovarian tumors, particularly as applied to differentiating benign from malignant lesions was limited. This was because the ADC values of ovarian cystic lesions were influenced from SI of T2-weighted images with FS.

**References :** (1) Katayama et al., JCAT 2002; 26 (2): 250-256 (2) Moteki et al., JMRI 2000; 12: 1014-101 (3) Nakayama et al., JMRI 2005; 22: 271-278

Fig. 1 Scatter plots of ADC values

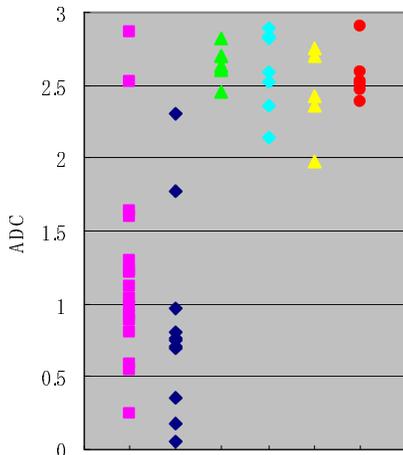


Fig. 2 Relationship between ADC values and LBC of T2-W I without FS

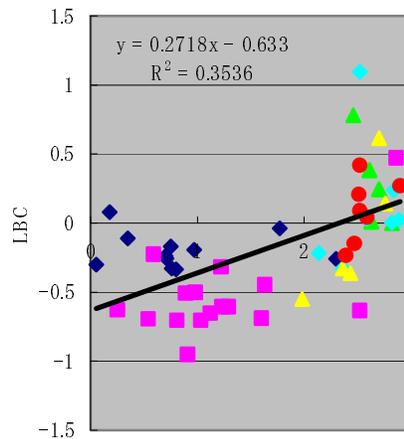
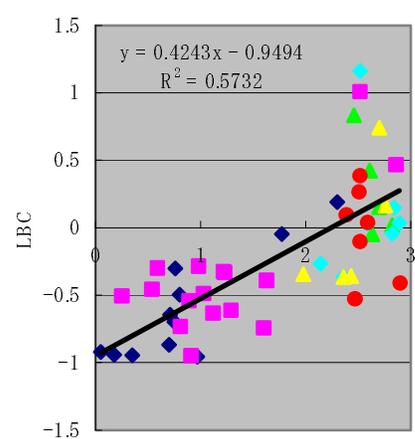


Fig. 3 Relationship between ADC values and LBC of T2-W I with FS



■ endometrial cyst  
 ◆ mature cystic teratoma  
 ▲ benign cyst  
 ◆ benign tumor  
 ▲ border line tumor  
 ● malignant tumor