# High b-value diffusion-weighted MR images of uterine pathologies

**M. Takeuchi[1], K. Matsuzaki[1], and H. Nishitani[1]**

[1]Department of Radiology, University of Tokushima, Tokushima, Tokushima, Japan

**[Introduction]** Various endometrial, myometrial, and cervical malignant pathologies of the uterus may show high signal intensity on diffusion-weighted images (DWI). However, some benign pathologies and normal endometrium of the uterus may also show high signal intensity on DWI. To differentiate between benign and malignant lesions is important for adequate surgical planning. The purpose of this study is to evaluate malignant uterine lesions by high b-value DWI and corresponding isotropic ADC maps for the differentiation between benign and malignant uterine pathologies.

**[Materials and Methods]** 156 uterine lesions including 66 endometrial lesions (44 endometrial cancers/sarcomas and 22 benign endometrial polyps/hyperplasia), 56 myometrial lesions (5 sarcomas, 6 cellular leiomyomas, 17 degenerated/edematous leiomyomas and 28 usual leiomyomas), and 34 cervical cancers were evaluated. DWI with high b-value (b=800 sec/mm$^2$) was performed in all subjects with a spin-echo, single-shot EPI sequence on a system with a 1.5T/3T superconducting units (Signa Excite/Signa Excite HD 3T, General Electric, Milwaukee, WI) with 8ch body-array torso coils. The parallel image-encoding techniques (the array spatial sensitivity encoding techniques: ASSET, General Electric, Milwaukee, WI) were employed. Signal intensity of pathologies on DWI (black and white inversion) was visually evaluated by two radiologists. The isotropic apparent diffusion coefficients (ADCs) of the pathologies were measured from ADC maps.

**[Results]** All malignant uterine lesions (44 endometrial cancers/sarcomas, 5 myometrial sarcomas, and 34 cervical cancers) showed very high intensity on DWI. Benign endometrial polyps/hyperplasia showed low to intermediate intensity on DWI. The ADC in endometrial cancers/sarcomas was 0.86 +/- 0.20 x 10$^{-3}$ mm$^2$/sec, and the ADC in benign endometrial polyps/hyperplasia was 1.58 +/- 0.36 x 10$^{-3}$ mm$^2$/sec. (p<0.01). In endometrial cancers, DWI was useful not only in tumor detection but also in the evaluation of myometrial invasion (Fig. 1). In endometrial polyps/hyperplasia, edematous or cystic components may contribute to their high ADC (Fig. 2). In myometrial lesions, cellular leiomyomas and some degenerated leiomyomas showed high intensity on DWI. The ADC in myometrial sarcomas was 0.78 +/- 0.30 x 10$^{-3}$ mm$^2$/sec, and the ADC in benign leiomyomas was 1.30 +/- 0.28 x 10$^{-3}$ mm$^2$/sec. (p<0.01). The ADC measurement may be useful in differentiating sarcomas from benign leiomyomas, which show hyperintensity on T2-weighted images (Fig. 3). The ADC in cervical cancers was 0.91 +/- 0.21 x 10$^{-3}$ mm$^2$/sec.

**[Conclusion]** High b-value DWI with ADC measurement may be useful in tumor detection, and in differentiation between benign and malignant uterine pathologies.
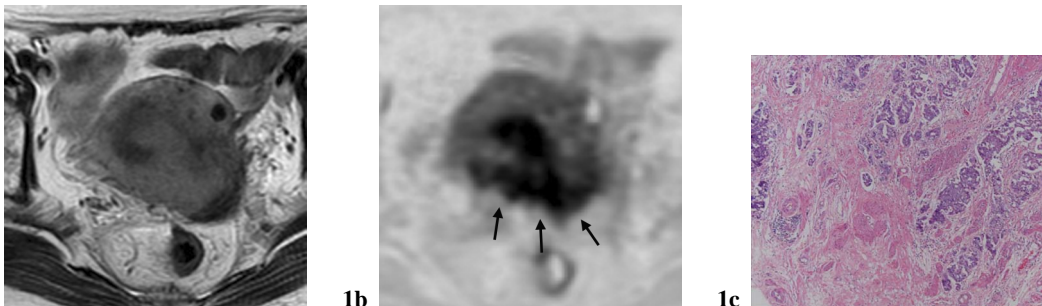


Fig.1a        1b        1c

**Fig.1**: Endometrial cancer: **a.**T2WI; **b.**DWI; **c.**HE, Myometrial invasion (arrows) is clearly demonstrated on DWI.
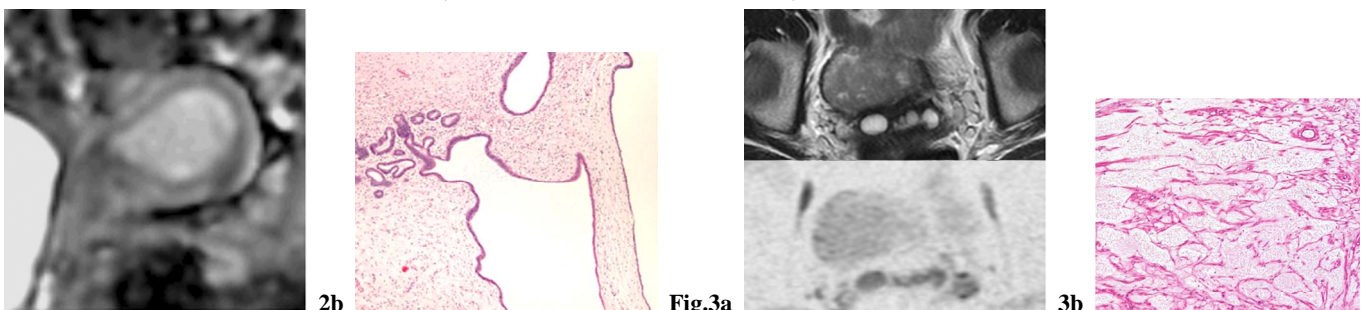


Fig.2a        2b        Fig.3a        3b

**Fig.2**: Endometrial polyp: **a.**ADC map; **b.**HE; Polyp shows high ADC (2.03 x 10$^{-3}$ mm$^2$/sec) reflecting edematous tissue with cystic components.

**Fig.3**: Edematous leiomyoma: **a.**T2WI/DWI; **b.**HE; Hyperintense mass on T2WI shows low intensity on DWI with high ADC (1.84 x 10$^{-3}$ mm$^2$/sec).