

Combined Use of T2-Weighted and Diffusion-weighted 3T MR Imaging for Differentiating Uterine Sarcomas from Benign Leiomyomas

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Purpose: To compare diagnostic ability of sole diffusion-weighted imaging (DWI) and DWI combined with T2-weighted MRI for differentiation of uterine sarcomas from benign leiomyomas.

Materials and Methods: All MR examinations were performed with a 3T MR unit (Acheiva 3T; Philips Medical Systems) using a six-channel SENSE torso coil. T2-weighted imaging (TR/TE=4000/100 ms, 17 ETL, SENSE 2) and DWI (b value = 0, 1000 s/mm², TR/TE=3100/ 53 ms, SENSE 2) were performed in 103 patients with 103 myometrial tumors, including 8 uterine sarcomas and 95 benign leiomyomas in this retrospective trial. The signal intensity (SI) of tumor on T2-weighted images was quantified as the tumor-myometrium contrast ratio (TCR) between lesion and myometrium by using the following formula: $(SI_{\text{tumor}} - SI_{\text{myometrium}}) / SI_{\text{myometrium}}$. The TCR or apparent diffusion coefficient (ADC) value alone and then the ADC value combined with T2-weighted imaging were evaluated for differentiation between sarcomas and benign leiomyomas.

Results : The mean ADC value of sarcomas was $0.86 \pm 0.11 \times 10^{-3} \text{ mm}^2/\text{s}$, which was significantly lower ($p < 0.01$) than that of leiomyomas $1.18 \pm 0.24 \times 10^{-3} \text{ mm}^2/\text{s}$; however, there was a substantial overlap (Fig. 1). The mean TCR of sarcomas was 0.66 ± 0.71 , which was significantly higher ($p < 0.01$) than that of the leiomyomas -0.37 ± 0.34 ; however, there was a considerable overlap (Fig. 2). Figure 3 shows scatter plots of TCR versus ADC values of leiomyomas and uterine sarcomas. When $\text{ADC} < 1.05 \times 10^{-3} \text{ mm}^2/\text{s}$ and $\text{TCR} > 0$ were considered as a sarcoma, a combination of ADC and TCR achieved a significant improvement without any overlap between sarcomas and leiomyomas (sensitivity 100%, specificity 100%).

Conclusion: Our preliminary results indicate that combined use of DWI and T2-weighted imaging was better than DWI or T2-weighted imaging alone in the differentiation of uterine sarcomas from benign leiomyomas.

References : (1) Tamai et al. Eur Radiol 2008;18: 723-730
(2) Namimoto et al., Eur Radiol 2008;Oct 7:Epub.

Fig. 3 Scatter plots of TCR versus ADC values

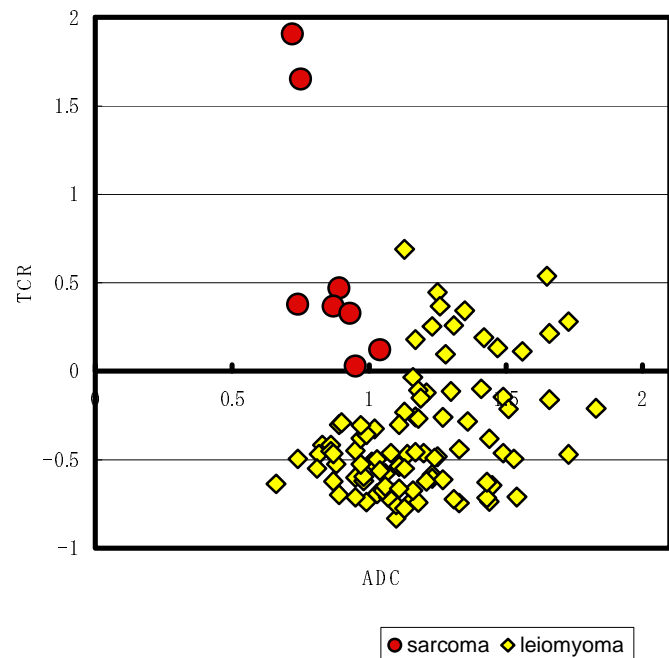


Fig. 1 Scatter plots of ADC values

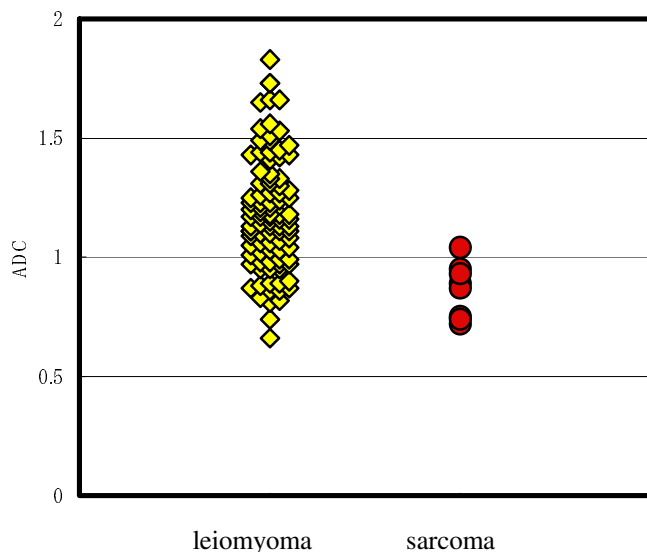


Fig.2 Scatter plots of TCR values

