

Diffusion-Weighted MR Imaging of the Prostate: A Primary Study

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Purpose: To evaluate whether diffusion weighted imaging (DWI) can be used to differentiate prostate adenocarcinoma (PCa) from normal prostate peripheral zone (PZ) and prostatitis.

Materials and methods: DWI was performed in 3 groups, 13 benign prostate hypertrophy (BPH) patients, 10 prostatitis patients and 15 PCa patients. All of the prostatitis patients and PCa patients were proved by systemic ultrasound guided biopsy. The locations of the tumor were marked by the pathologist. DW images were obtained with 3 different diffusion factors, factor b, of 300, 500 and 800sec/mm². Each PZ was divided into 6 regions in ADC map and the ADC values were measured in each region by drawing the regions of interest (ROIs). The ADC values of the bladder and the obturator internus were also measured to assess the validity of the method.

Results: Acceptable images for ADC measurement were obtained in 35 (92.1%) patients (13 BPH, 8 prostatitis and 14 PCa). The intensity of PCa appeared to be higher in the DW images while the factor b was greater. When the factor b was constant, the ADC values of the bladder and the obturator internus among 3 groups had no statistical difference, respectively. When b=800s/mm², the mean ADC values of all normal regions, and that of all inflammation regions and that of all cancer ROIs, respectively, were $(2.15 \pm 0.31) \times 10^{-3}$ and $(2.12 \pm 0.33) \times 10^{-3}$ and $(1.17 \pm 0.21) \times 10^{-3}$ mm²/s. The mean ADC value of PCa was significantly smaller ($F=188.61$, $P=0.00$) than that of normal PZ of the prostate and the prostatitis, but the difference between the inflammation regions and the normal PZ had no statistical significance ($P=0.53$).

Conclusion: ADC value measured from DWI can be used to differentiate prostatitis and PCa.

Key words: Prostate; neoplasm; Magnetic resonance imaging; Diffusion weighted

Table 1 Mean ADC values of prostate peripheral zones among different groups($\times 10^{-3}$ mm²/s)

b value (s/mm ²)	Group 1 (Normal PZ) (n=13)	Group 2 (Prostatitis) (n=8)	Group 3 (PCa) (n=14)	F value	P value
300	2.58±0.24	2.51±0.28	1.56±0.26	249.46	0.00
500	2.23±0.29	2.18±0.27	1.33±0.26	175.05	0.00
800	2.15±0.31	2.12±0.33	1.17±0.21	188.61	0.00
F value	49.50	24.48	31.51		
P value	0.000	0.000	0.000		

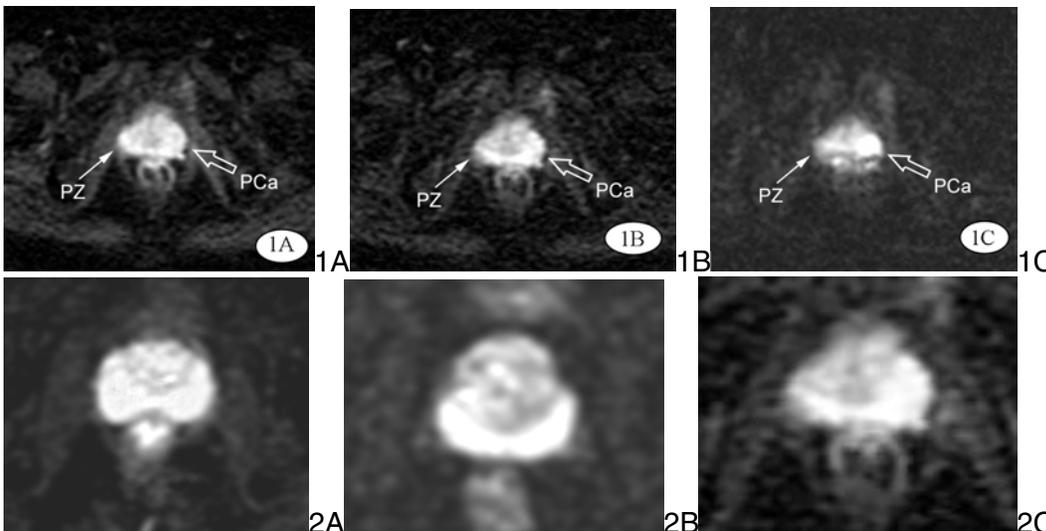


Fig 1. Diffusion weighted images with different b values (1A: b=300 s/mm², 1B: b=500s/mm², 1C: b=800s/mm²).

Fig 2. Diffusion weighted images with b=500 s/mm² 2A: normal PZ, 2B prostatists, 2C: prostate adenocarcinoma in left part of the PZ.