

Preliminary application of diffusion kurtosis imaging in the diagnosis of prostate cancer

Jing Guo-dong¹, Wang Li², Wang Jian², and LU Jian-ping²

¹Chang Hai Hospital, Shang Hai, Shang Hai, China, ²Chang Hai Hospital, Shang Hai, China

Target audience To Improve the diagnostic accuracy of MRI for prostate cancer, prolong patient life and improve the patients quality of life.

Objective To assess the value of the diffusional kurtosis imaging (DKI) for distinguishing benign regions of prostate from malignant, and to find out its optimal threshold for diagnosis.

Methods 36 patients with prostate cancer and 23 with prostate hyperplasia confirmed by pathology, were involved in this study. Routine MRI and ten b-values (0, 50, 100, 250, 500, 750, 1000, 1500, 2000, 2500 s/mm²) diffusion weighted imaging protocols were performed on a 3.0T MR scanner. Then the ADC and the AKC parameter maps of the prostate cancer tissue, the non-cancer tissue in the central lobe and in the peripheral zone of the prostate were measured by the DKI model. The variance of the ADC/AKC value in those different tissues was compared, and the ROC curves were analyzed in order to calculate the sensitivity and specificity of ADC and AKC in the diagnosis of prostate cancer.

Results There is a significant difference in ADC/AKC among the prostate cancer tissue, and DKI model shows high value in the diagnosis of prostate cancer.

Discussion The non-cancer tissue in the central lobe and in the peripheral zone in prostate cancer patients and benign prostatic hyperplasia patients ($P < 0.001$). The optimal threshold for ADC value was 1.617, while the optimal threshold for AKC value was 0.736, the sensitivity and specificity in detecting a prostate cancer tissue were 96.8% (92/98) vs 91.6% (87/95), 95.8% (203/212) vs 99.1% (210/212). The areas under the curve were 0.993 and 0.983.

Conclusion The preliminary findings showed the DKI model is capable of reflecting the variation between the prostate cancer and non-cancer tissues through ADC/AKC value, which has a potential clinical application value in the diagnosis of prostate cancer.

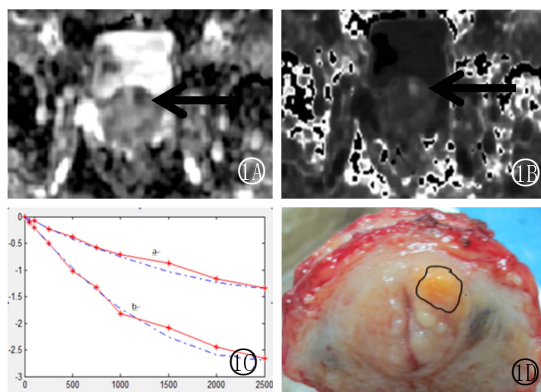


Fig1. A 64-year-old man with gleason 8 confirmed with surgery and pathology on the left side of the central lobe. (A) hypointense on ADC map (B) hyperintense on DKI map (C) organize signal attenuation with b-value (D) b-non cancer tissue (D) 1599 postoperative specimens

References

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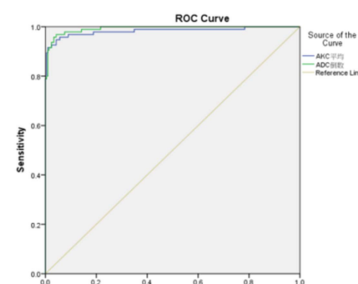


Fig2. ADC AKC ROC curve analysis for