High-b-value diffusion-weighted imaging at 3T for detection of prostate cancer

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PURPOSE:

The purpose of this study was to investigate usefulness of high-b-value diffusion-weighted imaging (DWI) in combination with T2-weighted imaging (T2WI) for detection of prostate cancer.
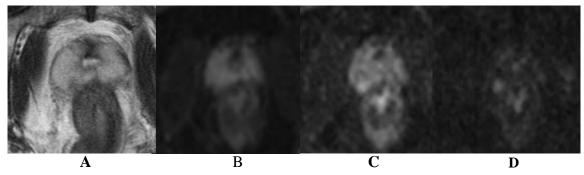
MATERIALS AND METHODS:

Seventy-three patients underwent T2WI and DWI (b = 50, 500, 1000, and 2000) at 3T. Three independent observers reviewed images obtained form combination of T2WI and DWI (b = 500) (protocol A), combination of T2WI and DWI (b = 1000) (protocol B), combination of T2WI and DWI (b = 2000) (protocol C), and combination of T2WI, DWI (b = 50, 500, 1000, and 2000), and ADC maps (protocol D). Area under the receiver operating characteristic (ROC) curve (Az) was calculated under results of systemic biopsy as the standard of reference. Significant difference was defined as a P value less than .05 for the Az tested with a two-tailed paired Student t test.

RESULTS:

Prostate cancer was pathologically detected in 55 of the 73 patients. The sensitivity, specificity, accuracy, and Az for the detection of prostate cancer were as follows: 37%, 76%, 69%, and 0.591, respectively, in protocol A; 59%, 76%, 73%, and 0.667, respectively, in protocol B; 55%, 80%, 75%, and 0.742, respectively, in protocol C; 68%, 72%, 71%, and 0.804, respectively, in protocol D. Mean Az in protocol A was significantly lower than in the other protocols.

CONCLUSION:

Combined reading of DWI with b value more than 1000 or 1000 and T2WI showed higher accuracy in the detection of prostate cancer than combined reading of DWI (b = 500) and T2WI.

A   B   C   D

E

Figure 1. A 75-year-old male with prostate cancer (moderately differentiated adenocarcinoma, Gleason's score 3 + 4 = 7).
A .Presence of a small low intensity area (arrow) is barely noted on T2WI.
B. No abnormal finding is observed on DWI (b = 500).
C. DWI (b = 1000) shows a small high intensity area in the right peripheral zone.
D. DWI (b = 2000) demonstrate the presence of a lesion.
E. ADC map demonstrates decreased diffusion in the right peripheral zone.