

Likert score 3 prostate lesions: Association between whole-lesion ADC metrics and pathologic findings at MRI/ultrasound fusion targeted biopsy

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Abstract

Background: To assess associations between whole-lesion apparent diffusion coefficient (ADC) metrics and pathologic findings of Likert score 3 prostate lesions at MRI/ultrasound fusion targeted biopsy.

Methods: This retrospective Institutional Review Board-approved study received a waiver of consent. We identified patients receiving a highest lesion score of 3 on 3 Tesla multiparametric MRI reviewed by a single experienced radiologist using a 5-point Likert scale and who underwent fusion biopsy. A total of 188 score 3 lesions in 158 patients were included. Three-dimensional volumes-of-interest encompassing each lesion were traced on ADC maps. Logistic regression was used to predict biopsy results based on whole-lesion ADC metrics and patient biopsy history. Biopsy yield was compared between metrics.

Results: By lesion, targeted biopsy identified tumor in 22.3% and Gleason score (GS) > 6 tumor in 8.5%, although results varied by biopsy history: biopsy-naïve (n = 80), 20.0%/8.8%; prior negative biopsy (n = 53), 9.4%/1.9%; prior positive biopsy (n = 55): 40.0%/14.5%. Biopsy history, whole-lesion mean ADC, whole-lesion ADC₁₀₋₂₅, and whole-lesion ADC₂₅₋₅₀ were each significantly associated with tumor or GS > 6 tumor at fusion biopsy (P ≤ 0.047). In men without prior negative prostate biopsy, whole-lesion ADC₂₅₋₅₀ ≤ 1.04*10⁽⁻³⁾ mm² /s achieved 90.0% sensitivity and 50.0% specificity for GS > 6 tumor, which was significantly higher (P < 0.001) than specificity of PSA (17.5%) at identical sensitivity.

Conclusion: For score 3 lesions in patients without prior negative biopsy, whole-lesion ADC metrics help detect GS > 6 cancer while avoiding negative biopsies. However, deferral of fusion biopsy may be considered for score 3 lesions in patients with prior negative biopsy (without applying whole-lesion ADC metrics) given exceedingly low (~2%) frequency of GS > 6 tumor in this group.

Keywords: MRI; apparent diffusion coefficient; diffusion-weighted imaging; prostate biopsy; prostate cancer.

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