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Apparent Diffusion Coefficients in Evaluation of Pediatric Brain Tumors

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Abstract

Background: MRI, which has high sensitivity in brain tumor detection, cannot reliably determine tumor grading or histology. Diffusion-weighted imaging and apparent diffusion coefficients (ADCs) provide information of tumor cellularity that can correlate with grading.

Objective: To investigate ADCs in differentiation low-grade from high-grade pediatric brain tumors.

Material and Method: Preoperative MRI, DWI, and ADC images of pediatric patients with pathologically proven brain tumors were retrospectively reviewed at a university hospital in two-year periods and classified into low-grade and highgrade categories. Regions of interest were placed manually at the center and periphery of the solid tumor regions, then ADC values were calculated at "b" values = 0, 1000 sec/mm2.

Results: The ADC values were calculated in 15 patients, which included 12 males and three females with an age range from three to 14 years. Seven and eight were with low- and high-grade tumors respectively. The ADC values of low-grade tumors were markedly higher than those of high-grade tumors with statistically significant differences by all methods of measurements at the central, peripheral, and average areas on Man-Whitney U test, with p-values of 0.037, 0.009, and 0.021, respectively.

Conclusion: MRI with ADCs for preoperative pediatric tumor evaluation may be useful for predicting tendency of tumor grading and surgical planning.

Keywords: Apparent diffusion coefficients, Pediatric, Brain tumor

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