

EARLY ASSESSING TUMOR RESPONSE TO TRANSARTERIAL CHEMOEMBOLIZATION BY DIFFUSION-WEIGHTED IMAGING: SELECTION OF THE OPTIMAL B FACTOR

Z. Jiang¹, and W. Peng²

¹Department of Radiology, Affiliated Cancer Hospital of Fudan University, Shanghai, Shanghai, China, People's Republic of, ²Department of Radiology, Affiliated Cancer Hospital of Fudan University, Shanghai, China, People's Republic of

Purpose: To explore the diffusion gradient b-factor that optimizing both the apparent diffusion coefficient (ADC) measurement and contrast-to-noise (CNR) for assessing tumor response to transarterial chemoembolization (TACE) in a rabbit model.

Methods: Twelve New Zealand white rabbits bearing VX2 tumors in the liver were treated with TACE. Diffusion-weighted imaging (DWI) with various b values was performed using the same protocol before and 3 d after treatment with TACE. ADC values and CNR of each tumor pre- and post-treatment with different b factors were analyzed. Correlation between ADC values and extent of necrosis in histological specimens was analyzed by a Pearson's correlation test.

Results: The quality of diffusion-weighted images diminished as the b value increased. A substantial decrease in the mean lesion-to-liver CNR was observed on both pre- and post-treatment DW images, the largest difference in CNR pre- and post-treatment was manifested at b value of 1000 s/mm² (P = 0.036). The effect of therapy on diffusion early after treatment was shown by a significant increase in ADCs (P = 0.007), especially with large b factors (≥ 600 s/mm²). The mean percentage of necrotic cells present within the tumor was 76.3% - 97.5%. A significant positive correlation was found between ADC values and the extent of necrosis with all b values except for b200, a higher relative coefficient between ADC values and percentage of necrosis was found on DWI with b1000 and b2000 (P = 0.002 and 0.006, respectively).

Conclusion: An increasing b value of up to 600 s/mm² would increase ADC contrast pre- and post-treatment, but decrease image quality. Taking into account both CNR and ADC measurement, diffusion-weighted imaging obtained with a b value of 1000 s/mm² is recommended for monitoring early hepatic tumor response to TACE.

References:

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