

Apparent Diffusion Coefficient Value as a Predictive Marker to Evaluate Tumor Response in Patients with Cervical Cancer

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Abstract

Background: Cervical cancer is the second common cancer and the third reason of mortality among women in the world which is often occurred in third and fifth decades of their life. Cervical tumor recurrence observed in 30% of the patients and the 5-years survival rate of cervical cancer is about %50. The development of a rapid and non-invasive method for treatment response evaluation is one of the most challenges in cancer treatment management. Diffusion-weighted magnetic resonance imaging (DW-MRI) is a contrast agent free imaging technique that is widely used for oncology studies.

Objectives: In this paper, the capability of ADC value to monitor the treatment response in the cervical cancer patients was evaluated.

Methods: A computerized search using the databases SID, Google Scholars, Pub med and Science Direct, covering the period from 1998 to 2015, was conducted using the following key search terms: "Treatment response", "Diffusion-weighted magnetic resonance imaging", "ADC", "MRI" and "Cervical Cancer". In total, 27 relevant papers were reviewed.

Results: Studies had shown that the mean ADC value of cervical carcinoma ($1.110 \pm 0.175 \times 10^{-3} \text{ mm}^2/\text{s}$) is significantly lower than that of normal cervical tissue ($1.593 \pm 0.151 \times 10^{-3} \text{ mm}^2/\text{s}$) ($P < 0.001$). The mean ADC value of the cervical area significantly increased after chemoradiation treatment ($1.436 \pm 0.129 \times 10^{-3} \text{ mm}^2/\text{s}$) than that before therapy ($1.013 \pm 0.094 \times 10^{-3} \text{ mm}^2/\text{s}$) ($P < 0.001$). There is a statistically significant difference between the ADC values of the normal cervical tissue and cervical area after therapy ($P < 0.01$). Partial response of the bulky tumors could be predicted with high sensitivity (85.7%) and specificity (100%) (AUC 0.96; $P = 0.05$) using the ADC value greater than $0.95 \times 10^{-3} \text{ mm}^2/\text{s}$.

Conclusions: ADC value could be a prognostic factor to monitor the response to therapy for patients with cervical cancer. The addition of DW-MRI to the conventional MRI protocols considerably improved the diagnostic ability of MR imaging method for tumor evaluations.

Keywords: Treatment Response, Diffusion-Weighted Magnetic Resonance Imaging, DW-MRI, ADC, Cervical Cancer

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