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The Role of DWI in Evaluating Residual Breast Cancer after Neoadjuvant Chemotherapy: Comparison of 3T and 1.5T

성균관대의대 삼성서울병원 영상의학과

박고운 · 고은영 · 한부경 · 신정희 · 유은영 · 김신영 · 문증희

Purpose: To compare the role of diffusion weighted imaging (DWI) at 3.0-tesla (T) and 1.5T as an adjunct to dynamic contrast enhanced MRI (DCE-MRI) for evaluating residual breast cancer following neoadjuvant chemotherapy.

Materials and Methods: From July 2008 to December 2009, 78 patients underwent breast MRI with DWI (3T MRI n = 50, 1.5T n = 28) following neoadjuvant chemotherapy. DWIs were performed with b-value (sec/mm²) 0, 750 at 1.5T, and 0, 800 or 1000 at 3T MRI. Two radiologists retrospectively reviewed the location, and multicentricity of residual tumors and size of the residual tumor on DCE-MRI, DWI, and DCE-MRI plus DWI with time interval without knowledge of pathological results, and compared with pathology after surgery. The reliability was analyzed using Intraclass Correlation Coefficient (ICC).

Results: Of the 78 patients, 58 had residual cancer and 20 had no residual lesion. Seven patients had multicen-

tric residual tumors. There was no significant difference in diagnostic performances between 1.5T and 3T. But 3T MRI showed significantly higher specificity and accuracy on DCE+DWI than DCE alone ($p = 0.0369$, $p = 0.0202$). In estimating the extent of residual tumor, the reliability at both 1.5T and 3T on DCE-MRI alone (ICC 0.7232 $p < .001$, 0.8204, $p = .000$) has improved on DCE-MRI plus DWI (ICC 0.8874, $p = .000$, 0.8931, $p = .000$).

Conclusion: Adjunct use of DWI could improve the detection of residual cancer, especially at 3T by increasing specificity and accuracy. For estimating size of the residual cancer, DCE-MRI plus DWI showed more reliable results than DCE-MRI alone at both 3T and 1.5T.

Clinical relevance/Application: Adjunct use of DWI increases the specificity and accuracy on DCE-MRI especially at 3T, and improves the estimating size of residual cancer in both 1.5T and 3T.