3T MR Imaging with Diffusion-Weighted Imaging and Dynamic MR Imaging for Evaluation of Preoperative T and N Staging of Gastric Cancer: Comparison with Multi-detector Row Computed Tomography

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**Target Audience:** Radiologists and radiology residents and fellows.

Purpose: To compare prospectively between 3T MR imaging (MRI) with diffusion-weighted imaging (DWI) and dynamic contrast-enhanced imaging and multi-detector row computed tomography (MDCT) in the preoperative T and N staging of gastric cancer.

Methods: This prospective study was approved by institutional review board and informed consent was obtained. Fifty consecutive patients with histologically confirmed gastric cancer and suspected T2 or higher stages on the preoperative CT scan underwent 3T MR imaging with DWI and dynamic contrast-enhanced imaging. Three patients who were surgically confirmed having peritoneal seeding were excluded. Two experienced radiologists independently reviewed the MDCT, MRI without DWI, and MRI with DWI images to determine preoperative T and N stages. Diagnostic accuracy of each imaging modality was compared using the McNemar test with Bonferroni correction. Interobserver agreement was determined using kappa statistics.

Results: Among the 47 patients who underwent gastrectomy and LN dissection, 9 patients were confirmed as having stage T1b cancer, 10 as T2, 16 as T3, and 12 as T4; and 17 as LN negative and the other 30 as LN positive. For T staging, diagnostic accuracy of MDCT, MRI without DWI, and MRI with DWI did not show statistically significant difference ($\leq$T2 vs. $\geq$T3: 78.7%, 76.6%, and 76.6% by reviewer 1; 78.7%, 72.3%, and 72.3% by reviewer 2, and $\leq$T3 vs. T4: 70.2%, 70.2%, and 70.2% by reviewer 1; 70.2%, 76.6%, and 76.6% by reviewer 2, respectively) ($P > 0.017$) and weighted kappa values were 0.66, 0.40, and 0.45, respectively. For N staging, MR with DWI showed higher diagnostic accuracy (74.5% by reviewer 1, and 73.2% by reviewer 2) than MRI without DWI (65.6% and 51.1%) or MDCT (65.6% and 63.8%), however there were no statistically significant differences ($P > 0.017$). Interobserver agreement for N staging was higher in MRI with DWI (kappa 0.46) than MRI without DWI (0.23) and MDCT (0.25).

Discussion and Conclusion: Our study demonstrated that diagnostic performance of 3T MR imaging was comparable to that of MDCT in the preoperative T and N staging of gastric cancer. In addition, MRI with DWI showed higher diagnostic accuracy for LN metastasis than MRI without DWI or MDCT with better interobserver agreement, although there was no statistically significant difference.

References: (1) Kwee RM, et al. J Clin Oncol 1007;20:2515-2116 (2) Chen CY, et al. Radiology 2007;242:472-482 (3) Kim IY, et al. World J Gastroenterol 2009;15:3992-3998
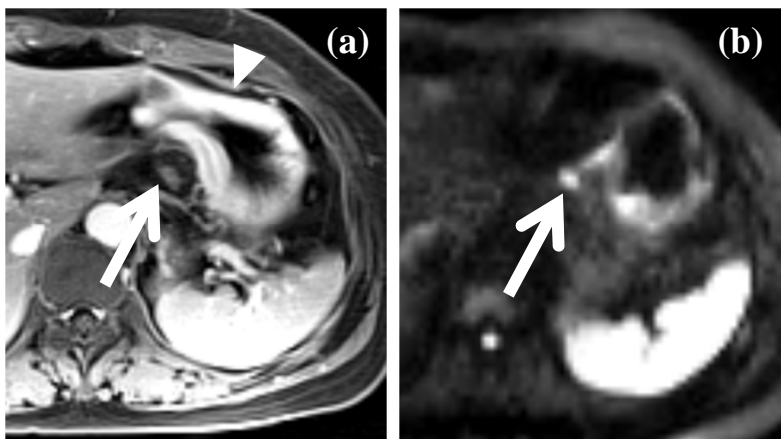
Figure. Gastric cancer with LN metastasis (a) Contrast-enhanced MRI demonstrated diffuse wall thickening with full-thickness enhancement of the gastric body (arrowhead) suggesting advanced gastric cancer. A perigastric LN measuring 5 mm in short diameter (arrow) was considered as a non-metastatic LN in both reviewers. (b) The LN annotated in Fig.(a) showed high signal intensity on DWI with b=1000 s/mm^2 and it was confirmed as a metastatic LN.