

ROC Comparison between Diffusion-weighted MR and PET/CT Imaging to Detect Lymph Node Metastasis from Gastrointestinal Cancer

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Introduction

PET/CT study (PET) with 18F-FDG is one of the useful modalities to survey whole body metastasis, and diffusion weighted MR images (DWI) has been recently used to evaluate lymph nodes metastasis in abdomen and pelvis. The purpose of this study was 1) to evaluate the usefulness of DWI to depict lymph nodes metastasis from gastrointestinal cancer and 2) to investigate the diagnostic accuracy of DWI in comparison with PET.

Materials and Methods

Twenty one consecutive patients (14 males and 7 females) had been examined by both DWI and PET in the Tokushima University Hospital from December 2006 to July 2007. All patients had malignant tumor (carcinoma) in a part of digestive tract by pathological examination and in twelve patients, lymph node metastasis was confirmed in the surgical specimen. Local ethics committee approval was granted and informed written consent was obtained from all patients before the examination. All studies were performed with a 1.5T clinical scanner (Signa Excite HD 1.5T; GE Medical System) with an 8 channel body array coil and PET/CT clinical scanner (Aquiduo; Toshiba Medical Systems). DWI was performed with SE-EPI with 3 axis MPG pulses (b=800s/mm²) using respiratory gating in the abdomen and free breathing in the pelvis. Total amount of ¹⁸F-FDG was calculated by body weight (kg) x 3.7MBq in each patient, respectively. PET and CT images were scanned one hour after from the administration of ¹⁸F-FDG. In this study, these three matters were evaluated; 1) sensitivity, specificity and accuracy of lymph node metastasis detection, 2) usefulness of DWI in comparison with PET using receiver operating characteristic (ROC) analysis and 3) consistency of evaluation between observers assessed by intraclass correlation coefficient (ICC). The axial and maximum intensity projection (MIP) images were interpreted by two board-certificated radiologist and two board-certificated nuclear medicine specialist with knowledge only of each patient's primary focus, sex and age. All reader had at least 5years of experience in each specialty. PET images were not included fusion images of PET and CT in this comparison. The area under the ROC curve (AUC) was calculated with a software provided by the University of Chicago Kurt Rossmann Laboratories.

Results and Discussions

The results of ROC analyses were summarized in fig.1 and table 1. Both readers showed higher AUC of DWIs compared with those of PETs and AUC of the composite ROC curve of DWI was higher than that of PET. Both sensitivity and accuracy of DWIs were higher than that of PET on both readers but specificity of DWI showed lower than that of PET. Same trends were shown in composite data. These results suggested that DWI has an advantage of detection of lymph node metastasis in gastrointestinal cancer. The results of ICC were shown in table 2. The evaluated variation on DWI was larger than that on PET depending on their specialty. This result may suggest that the diagnostic criteria to interpret DWI should become more distinct.

Conclusions

In our study, DWI has a high sensitivity and accuracy for lymph node metastasis of gastrointestinal cancer in comparison with PET, but the evaluated variation on DWI might be large depending on the experience of observers.

Figure 1. Receiver Operating Characteristic (ROC) curve from the composite data.

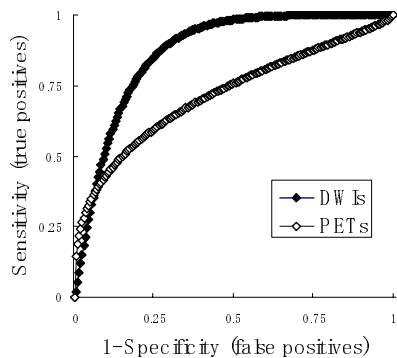


Table 1 Results of Receiver Operating Characteristic analyses of all readers.

	Radiologist				Nuclear Medicine Specialist				Composite			
	AUC	Sens.	Spec.	Accu.	AUC	Sens.	Spec.	Accu.	AUC	Sens.	Spec.	Accu.
DWI	0.87	66.7%	83.3%	73.8%	0.89	66.7%	83.3%	73.8%	0.87	66.7%	83.3%	73.8%
PET	0.79	20.8%	94.4%	52.4%	0.61	12.5%	100.0%	50.0%	0.71	16.7%	97.2%	51.2%

AUC = area under curve; Sens. = sensitivity; Spec. = specificity; Accu. = accuracy.

Table 2 Results of Intraclass Correlation Coefficients of all readers.

	Radiologist	Nuclear Medicine Specialist	Composite
DWI	0.58	0.44	0.46
PET	0.57	0.79	0.65

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