

Whole Body MR Imaging vs. FDG-PET: Comparison of Diagnosis Accuracy of M-stage in Lung Cancer Patients

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Introduction: Assessment of M-stage is very important for management in lung cancer patients. For this purpose, FDG-PET is widely utilized as whole-body imaging tool for cancer staging with high diagnostic capability (1, 2). Recently, some investigators have suggested that whole-body MR imaging (MRI) has the capability for cancer screening and/or staging similar to FDG-PET (3-5). However, no one has directly compared diagnostic accuracy of M-stage in lung cancer between these two methods. We hypothesized that whole-body MRI has potential for accurately assessment of M-stage in lung cancer patients similar to FDG-PET. The purpose of the present study was to prospectively compare diagnostic accuracy of M-stage between whole-body MRI and FDG-PET in lung cancer patients.

Materials and Methods: Seventy consecutive patients with pathologically diagnosed lung cancers (40 men, 30 women; mean age 69 years) prospectively underwent whole-body MRI, FDG-PET, pre-therapeutic standard radiological examinations for diagnosis of M-stage and more than one-year follow-up examinations. As the pre-therapeutic standard radiological examination and follow-up examination, contrast-enhanced brain MRI, contrast-enhanced whole-body CT and bone scintigraphy were performed in each patient. Cervical, thoracic and/or lumbar MRIs with administration of contrast media were performed in patients with suspicious of bone metastases on bone scintigraphy. Final diagnosis of M-stage in each patient was determined according to the results of standard radiological examination and follow-up examinations.

As whole-body MR imaging, short TI inversion-recovery turbo spin-echo images (TR 3200ms/ TE 60ms/ TI 165ms) and dual-phase T1-weighted gradient-echo images (TR 100ms/ TE 2.3 and 4.6ms/ FA 75°) with and without contrast-media (Gadoteridol, ProHans, Eisai, Japan) were obtained on coronal and sagittal planes by using moving-table system and body coil on a 1.5 T MR scanner (Gyrosan Intera, Philips Medical Systems). Other scan parameters were as follows: 265 × 530mm field of view, 7 stacks, 128 × 256matrix, 8mm slice thickness, and 1mm slice gap. All FDG-PET examinations were performed by using standard whole-body PET protocol on a PET scanner (ALLEGRO, Philips Medical Systems). Probabilities of presence of metastases on whole-body MRI and FDG-PET were evaluated by using 5-point visual scoring systems on per patient basis.

To determine the inter-observer agreement, kappa statistics were performed. Then, ROC-analysis was performed for comparison of diagnostic capabilities between whole-body MRI and FDG-PET. Sensitivity, specificity and accuracy were also compared between whole-body MRI and FDG-PET by using McNemar test on per patient basis.

Results: Representative cases are shown in Figure 1 and 2. Kappa values of whole-body MRI and FDG-PET were 0.58 and 0.54, and inter-observer agreements of both methods were considered as moderate. The results of ROC-analysis were shown in Figure 3. Although area under the curve (Az) of who-body MRI (Az=0.85) was slightly larger than that of FDG-PET (Az=0.82), there were no significant difference between two methods (p>0.05). Sensitivity, specificity and accuracy of whole-body MRI were 76.5 (13/17) %, 90.6 (48/53) % and 87.1 (61/70) %, respectively. Sensitivity, specificity and accuracy of FDG-PET were 70.6 (12/17) %, 86.8 (46/53) % and 82.9 (58/70) %, respectively. There were no significant difference of diagnostic capability between whole-body MRI and FDG-PET (p>0.05).

Conclusion: Whole-body MRI can accurately diagnose M-stage in lung cancer patients, similar to FDG-PET.

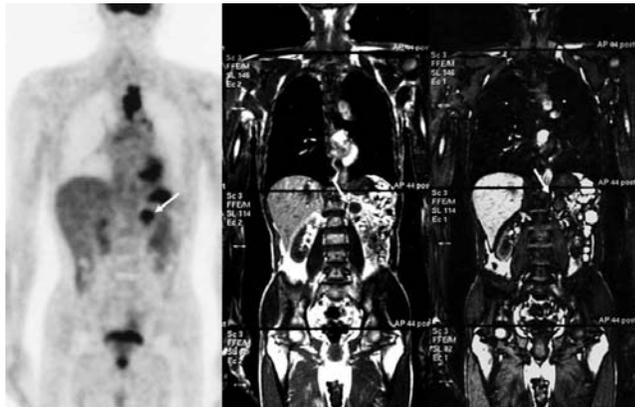


Fig. 1A

Fig. 1B

Figure 1. 73-year old male patient with squamous cell carcinoma and Lt. adrenal gland metastasis

High FDG uptake on the PET scan (A) and no decrease in signal on the dual-phase gradient-echo T1-weighted images (B) also suggest a left adrenal gland metastasis (arrow).



Fig. 2A

Fig. 2B

Figure 2. 73-year old male patient with adenocarcinoma and brain metastasis

Although FDG-PET (A) did not suggest a brain metastasis, contrast-enhanced in-phase T1-weighted image (B) clearly demonstrated cerebellar metastasis (arrow).

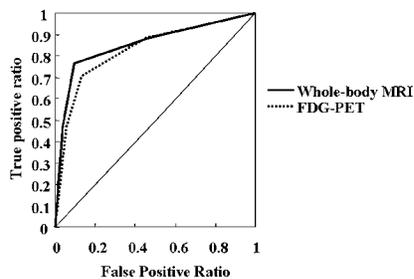


Figure 3. ROC curves of whole-body MRI and FDG-PET

Az of whole-body MRI had no significant difference with that of FDG-PET (p>0.05).

References.

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