Multistation coronal Whole Body-MRI imaging on 3 T.First results of a feasibility study.

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Introduction

Coronal multistation Whole Body-MRI is a fast and effective method for examination of cancer patients by the use of a rolling table platform (1,2,3,5)). Therefore, the purpose of this study was to do a feasibility study of Whole Body-MRI imaging in a 3T-system for cancer patients with metastatic disease (4).

Methods

Ten cancer patients with different solid tumor entities and ten volunteers were studied prospectively by Whole Body-MRI imaging technique on a 3 T Tesla MRI unit (Magnetom Trio, Siemens, Erlangen, Germany) equipped with a high-performance gradient (40 mT/max. amplitude, slew rate 200 T/m/sec) and 8 channel surface coil array . The new clinical protocol for a multistation coronal TurboSTIR-sequence for Whole Body imaging was created with the following parameters (TR 4200-4000/TE 102 and TI180, pat-factor 2). This sequence was used for imaging different body regions including head, neck, thorax, abdomen, pelvis, and lower extremities. The Whole-Body-MRi was done on1.5 Tesla MRI unit (Magnetom Sonnata, Siemens, Erlangen, Germany) equipped with the identical gradient hardware on the basis of a rolling table platform with an integrated surface body coil.

For FDG-PET 300-500 MBq of FDG were injected intravenously and the uptake time was 90 min. The data were acquired with two-dimensional rings (ECAT EXACT Siemens/CTI, Knoxville, Tennessee, USA). Skeletal scintigraphy was performed with a 99 mTC-DPD radiophamacon for up to six hours after injection of the radiopharmacon. The evaluation was done by two experienced radiologists, nuclear physicians, blinded to the clinical results and to the results of the second imaging techniques and the findings of the two different Whole Body-MRI investigations were compared based on a lesion-to-lesion analysis. Soft tissue masses, lymph node metastases, bone and bone marrow metastases, and visceral metastases in liver, spleen, and lung were evaluated separately.

Results:

Coronary multistation Whole Body-MRI was feasible on a 3T system using a TurboSTIR-sequence. Due to the use of parallel imaging methods, the investigation time was 6 min instead of 8 ½ min using a multistation coronary TurboSTIR Whole Body-MRI on a 1.5 Tesla MRI unit. The multistation coronary Whole Body-MRI on a 3T MRI unit was feasible in all volunteers and in all patients. In comparison to FDG-PET both multistation Whole Body-MRI imaging techniques detected 8/8/8 primary tumors, 7/8/8 lymph node metastases, 2/2/2 soft tissue metastases, 3/3/3 pulmonary metastases and 4/4/4 bone metastases. However, skeletal scintigraphy detected 2/4 cases of metastatic disease of the skeleton. In 2 patients all imaging techniques excluded a recurrent tumor with metastases.

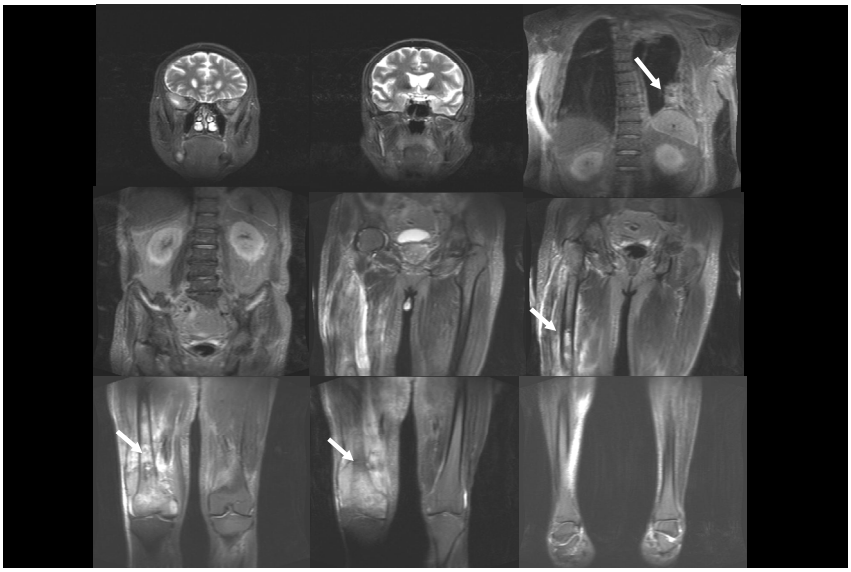

Fig. 1 Whole-Body-MRI using a Turbo-STIR sequence was performed within 6 minutes indicating a lymphoma of the lung and of the right femur. These findings were proven by biopsy.

Discussion

Our preliminary results suggest that coronary multistation Whole Body-MRI can be performed on a 3T MRI unit in volunteers and in patients, thus 3T MRI is an effective method for the examination of cancer patients. However, the clinical potential of Whole Body-MRI on a 3T MRI unit must be proven in further clinical studies by larger series in comparison to the routine staging procedures such as CT, MRI, PET, bone scintigraphy, and Whole Body-MRI on a 1.5 Tesla-system in order to evaluate the diagnostic value of Whole Body-MRI imaging on a 3T system (2).

References

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