WHOLE-BODY MRI AT 1.5 AND 3 TESLA COMPARED TO FDG-PET-CT FOR THE DETECTION OF TUMOR RECURRENCE IN PATIENTS WITH COLORECTAL CANCER

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Purpose: To assess the diagnostic accuracy of whole body-MRI (WB-MRI) at 1.5 and 3 Tesla (3T) compared to FDG-PET-CT in the follow-up of patients suffering from colorectal cancer.

Materials and Methods: 24 patients with a history of colorectal cancer and suspicion of tumor recurrence underwent FDG-PET-CT and WB-MRI with the use of parallel imaging (PAT) for follow-up. High resolution coronal T1w-TSE- and STIR-sequences at four body levels, HASTE-imaging of the lungs, T2w-TSE and contrast-enhanced T1w-sequences of the liver, brain, abdomen and pelvis were performed, using a WB-MRI-scanner at 1.5 (n=14) or 3 Tesla (n=10). Presence of local recurrent tumor, lymph node involvement and distant metastatic disease was confirmed using radiological follow-up within at least 6 months as a standard of reference.

Results: 77 malignant foci in 17 of 24 patients (71%) were detected with both WB-MRI and PET–CT. Both modalities concordantly revealed 2 local recurrent tumors. PET–CT detected significantly more lymph node metastases (sensitivity 93%, n=27/29) than WB-MRI (sensitivity 63%, n=18/29). PET-CT and WB-MRI achieved a similar sensitivity for the detection of organ metastases with 80% and 78%, respectively (37/46 and 36/46). WB-MRI detected brain metastases in 1 patient, 1 false-positive local tumor recurrence was indicated by PET-CT. Overall diagnostic accuracy for PET-CT was 91% (sensitivity 86% / specificity 96%) and 83% for WB-MRI (sensitivity 72% / specificity 93%), respectively. Examination time for WB-MRI at 1.5 and 3 T was 52 and 43 min, examination time for PET–CT was 103 min.

Conclusion: FDG-PET-CT is the method of choice for integrated tumor imaging in the follow-up of colorectal cancer, especially for the diagnosis of lymph node metastases. WB-MRI is useful for the detection of organ metastases, especially to the liver, bone and brain. WB-MRI at 3 Tesla with parallel imaging is feasible and provides further overall scan time reduction at constant image resolution.

Table: WB-MRI protocol for oncologic imaging on a 32-receiver channel whole-body scanner at 1.5 Tesla or 3 Tesla. *At 3 Tesla alternatively a SE-sequence was applied for coronal imaging of the head/neck region. **At 3 Tesla axial STIR imaging of the lung was not performed due to severe pulsation artifacts. ***At 3 Tesla T1-weighted axial imaging of the brain was performed with a Flash-2D gradient echo sequence.