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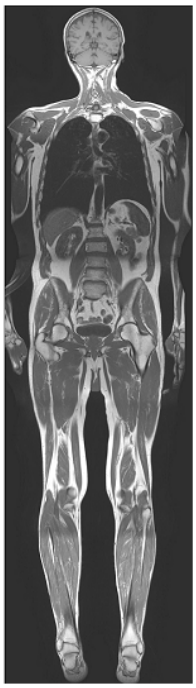
Purpose: To assess the diagnostic accuracy of whole body-MRI (WB-MRI) at 1.5 and 3 Tesla (3T) compared to FDG-PET-CT in the follow-up of patients suffering from colorectal cancer.

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.



			1.5 Tesla	3 Tesla
Sequence	**Image plane**	**Matrix / Resolution (mm³)**	**Acq. time (min)**	**Acq. time (min)**
STIR-WB	coronal	384 / 1.8 x 1.3 x 5.0	9:43	6:40
HASTE-abdo	coronal	384 / 1.4 x 1.3 x 5.0	0:38	0:33
HASTE-lung	axial	320 / 1.3 x 1.2 x 6.0	0:44	0:42
(STIR-lung)**	axial	320 /		-
T2w fs TSE-liver *(freebreathing)*	axial	320 / 1.6 x 1.2 x 5.0	3:41	3:41
T1w TSE-WB*	coronal	384 / 1.7 x 1.3 x 5.0	10:30	7:53
T1w TSE-spine	sagittal	384 / 1.0 x 1.0 x 3.0	7:46	6:15
STIR-spine	sagittal	384 / 1.0 x 1.0 x 3.0	7:22	7:00
Dyn. VIBE liver	axial	384 / 1.9 x 1.5 x 3.0	2:20	2:20
Stat. VIBE thorax**	axial	380 / 1.6 x 1.6 x 1.5	0:25	0:25
T1w fs GRE pelvis	axial	320 / 1.5 x 1.2 x 6.0	1:17	1:10
T1w TSE-brain	axial	320 / 0.7 x 0.7 x 5.0	3:11	-
T1w GRE-brain***	axial		-	3:17
T2w TSE-brain	axial	512 / 0.5 x 0.5 x 5.0	3:11	2:52
Total			**51:49**	**42:48**

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.