

Comparison of whole body MRI and whole body PET-CT for staging of advanced bronchial carcinoma – initial results

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Purpose To compare whole body MRI with whole body PET-CT to correctly evaluate tumor staging in patients with advanced Non-Small-Cell Lung Carcinoma (NSCLC).

Methods and Materials 16 patients (11 m/ 5 f; mean age 62 years – range 49 to 71 years) with stage IIIb to IV NSCLC were examined before chemotherapy using whole body MRI adapted for oncologic staging (SIEMENS Avanto, 5 subsequent table positions, FLAIR ax (Brain), STIR cor (whole body) and ax (Neck), T2w STIR-TSE ax (thorax), T1w SE ax and cor pre and post CM (brain), T1w VIBE 3D ax pre and post CM (thorax), T2w TSE f sax (abdomen), T1w FLASH 2D fs ax pre and post CM (abdomen, neck, pelvis), T2w STIR-TSE ax (pelvis); total acquisition time 60 min). Within 3 days whole body PET-CT was performed (400 MBq F-18-FDG, native CT in low dose technique and after CM application, iterative image reconstruction with CT based attenuation correction, total acquisition time 60 min). Whole body PET-CT was repeated after 3 weeks for first control. Tumors were staged independently by experienced radiologists and nuclear medicines. In cases of discrepancy of tumor staging between whole body MRI and PET-CT, follow-up PET-CT served as control.

Results In 14 out of 16 patients T-staging was identical using whole body MRI and whole body PET-CT. In 2 patients MRI was able to correctly differentiated between tumor infiltration and no tumor infiltration of the chest wall which proved to be correct in the follow-up. In these 2 cases only STIR and T1w VIBE 3D post CM application sequences were able to correctly perform T-stage. In these cases PET-CT over- or underestimated T-stage. In 13 out of 16 patients N-staging was identical, in 1 patient whole body MRI was able do correctly define a hilar lymphatic node, in 2 cases PET-CT was able to correctly define ipsi- and contralateral lymphatic nodes. In all patients M-staging was identical.

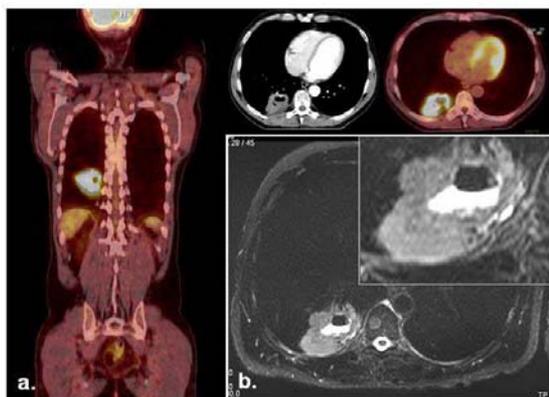


Fig. 1 Patient with a tumor not suspected to infiltrate the chest wall according to PET-CT (a).

According to whole body MRI and follow-up PET-CT there was an infiltration of the chest wall (STIR, b).

Patient	I. PET-CT	II. Whole body MRI	T-staging		N-staging		Both	
			I.	II.	I.	II.	I.	II.
1.	T2N3	T4N3	-	+	+	+	-	+
2.	T2N3	T2N3	+	+	+	+	+	+
3.	T4N0	T4N0	+	+	+	+	+	+
4.	T4N0	T4N1	+	+	+	-	+	-
5.	T4N0	T4N0	+	+	+	+	+	+
6.	T2N3	T2N2	+	+	+	-	+	-
7.	T2N3	T2N3	+	+	+	+	+	+
8.	T4N1	T4N0	+	+	-	+	-	+
9.	T4N3	T4N3	+	+	+	+	+	+
10.	T2N2	T2N2	+	+	+	+	+	+
11.	T3N3	T3N3	+	+	+	+	+	+
12.	T4N2	T4N2	+	+	+	+	+	+
13.	T3N3	T3N3	+	+	+	+	+	+
14.	T4N2	T3N2	-	+	+	+	-	+
15.	T3N2	T3N2	+	+	+	+	+	+
16.	T3N2	T3N2	+	+	+	+	+	+

Tab. 1 List of all included patients. + correct staging, - incorrect staging, M-staging is not shown, as there was no difference between both techniques.

Conclusion Whole body MRI using a dedicated sequence protocol for oncologic staging is able to correctly classify T-stage very accurately in patients with advanced bronchial carcinoma. Especially STIR and T1w VIBE 3D post CM sequences seem to be suitable for correct T-staging. Whole body PET-CT seems to have advantages in correct N-staging.

References:

Schlemmer et al. 2005, Invest Radiol; Eschmann et al. 2004, Nucl Med Comm; Barkhausen et al 2001, RADIOLOGY ; Antoch et al. 2003, JAMA