Value of PET/MRI for assessing tumor resectability in NSCLC - intra-individual comparison with PET/CT

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OBJECTIVE
The purpose of this study was to compare the diagnostic accuracy of positron emission tomography (PET)/MRI with PET/CT for determining tumor resectability of non-small cell lung cancer (NSCLC).

METHODS
Sequential trimodality PET/CT/MRI was performed in 36 patients referred with the clinical question of resectability assessment in NSCLC. PET/CT and PET/MR images including T-weighted sequence (T1-Dixon) and respiration gated T-weighted sequence (T2-Propeller) were evaluated for resectability-defining factors; i.e., longest diameter of the tumor, minimal tumor distance to the carina, mediastinal invasion, invasion of the carina, pleural infiltration, pericardial infiltration, diaphragm infiltration, presence of additional nodules.

RESULT
There was no significant difference of maximal axial diameter measurements of the primary lung tumors and narrow limits of agreement in Bland-Altman analysis ranging from -11.1 mm to +11.8 mm for T2-Propeller and from -14.3 mm to +13.8 mm for T1-Dixon sequence. A high agreement of PET/MR with PET/CT for the different resectability-defining factors was observed (k from 0.769 to 1.000). There was an excellent agreement of T2-Propeller sequence and CT for additional pulmonary nodule detection (k of 0.829 and 0.833), but only a moderate and good agreement using T1-Dixon sequence (k of 0.484 and 0.722).

CONCLUSIONS
In NSCLC the use of PET/MRI, including a dedicated pulmonary MR imaging protocol, provides a comparable diagnostic value for determination of tumor resectability compared to PET/CT. Advances in knowledge: Our findings suggest that whole body PET/MRI can safely be used for the local staging of NSCLC patients. Further studies are warranted to determine whether it is feasible to integrate an imaging sequence in a whole body PET/MRI setting with the
potential advantage of detection of liver or brain metastases.

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