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Autor(en) des Beitrags: Eiber, M; Martinez-Möller, A; Souvatzoglou, M; Holzapfel, K; Pickhard, A; Löffelbein, D; Santi, I; Rummeny, EJ; Ziegler, S; Schwaiger, M; Nekolla, SG; Beer, AJ

Titel des Beitrags: Value of a Dixon-based MR/PET attenuation correction sequence for the localization and evaluation of PET-positive lesions.

Abstract: In this study, the potential contribution of Dixon-based MR imaging with a rapid low-resolution breath-hold sequence, which is a technique used for MR-based attenuation correction (AC) for MR/positron emission tomography (PET), was evaluated for anatomical correlation of PET-positive lesions on a 3T clinical scanner compared to low-dose CT. This technique is also used in a recently installed fully integrated whole-body MR/PET system. Thirty-five patients routinely scheduled for oncological staging underwent (18)F-fluorodeoxyglucose (FDG) PET/CT and a 2-point Dixon 3-D volumetric interpolated breath-hold examination (VIBE) T1-weighted MR sequence on the same day. Two PET data sets reconstructed using attenuation maps from low-dose CT (PET(AC_CT)) or simulated MR-based segmentation (PET(AC_MR)) were evaluated for focal PET-positive lesions. The certainty for the correlation with anatomical structures was judged in the low-dose CT and Dixon-based MRI on a 4-point scale (0-3). In addition, the standardized uptake values (SUVs) for PET(AC_CT) and PET(AC_MR) were compared. Statistically, no significant difference could be found concerning anatomical localization for all 81 PET-positive lesions in low-dose CT.
compared to Dixon-based MR (mean 2.51 ± 0.85 and 2.37 ± 0.87, respectively; p = 0.1909). CT tended to be superior for small lymph nodes, bone metastases and pulmonary nodules, while Dixon-based MR proved advantageous for soft tissue pathologies like head/neck tumours and liver metastases. For the PET(AC_CT)- and PET(AC_MR)-based SUVs (mean 6.36 ± 4.47 and 6.31 ± 4.52, respectively) a nearly complete concordance with a highly significant correlation was found (r = 0.9975, p< 0.0001). Dixon-based MR imaging for MR AC allows for anatomical allocation of PET-positive lesions similar to low-dose CT in conventional PET/CT. Thus, this approach appears to be useful for future MR/PET for body regions not fully covered by diagnostic MRI due to potential time constraints.

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