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Evaluation of template-enhanced ZTE attenuation correction for PET/MR imaging

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The purpose of this study was to evaluate a new, template-enhanced zero-echo-time (ZTE) attenuation correction method for PET/MR scanners. 20 subjects underwent 18F-FDG PET/CT, followed by PET/MR on a GE SIGNA PET/MR. A ZTE sequence was used to generate two attenuation maps: one with the standard segmentation-based method; and another with an enhanced version using pre-registered anatomical templates and CT data to improve the segmentation. Reconstructed PET images were quantified in 67 volumes-of-interest. The PET bias with template-enhanced ZTE was measured to be -0.8% 0.9%, compared with -1.4% 1.1% with regular ZTE attenuation correction. Statistically significant bias reduction (of average and standard deviation) was obtained in the frontal, temporal, parietal, occipital and insula regions. These results indicate that the co-registration of pre-recorded anatomical templates to ZTE data is feasible in clinical practice and can improve the performance of segmentation-based attenuation correction.

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