

Effect of Brain MRI Coil Attenuation Map Processing on PET Image Quantification and Uniformity for the GE SIGNA PET/MR

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Attenuation correction of brain MRI coils used on PET/MR systems can be prone to error emanating from artifacts in CT-based coil attenuation maps. In this study editing was applied to coil CT images to reduce the impact of metal-induced artifacts. In addition, CT-based attenuation maps were generated for the coil mirrors and four levels of smoothing were applied to the attenuation maps. A uniform phantom experiment was performed to assess absolute quantification, and both axial and transaxial image uniformity. For the three coils tested, the edited CT attenuation maps improved absolute quantification (mean error 0.2% vs. 7.2% in the central axial 15 cm) and axial uniformity by up to 59% (33% on average) compared to the vendor-supplied attenuation maps, although transaxial uniformity deteriorated by up to 25% (11% on average). The inclusion of the mirror marginally improved axial uniformity in the majority of cases, but also slightly degraded transaxial uniformity. The impact of changing smoothing was minor, with the system default setting of 10 mm FWHM Gaussian producing the best results overall.

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