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Validation of MotionFree Brain algorithm in an 11C-Methionine PET/MRI study of pediatric patients with brain tumors

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In this study, we tested a data-driven head motion correction method on 11C-methionine brain PET images of a cohort of paediatric patients and we investigated its impact qualitatively and quantitatively. Twenty-seven paediatric patients with treated high grade glioma underwent 11C-methionine PET/MRI exam using a fully hybrid PET/MR scanner. During PET scan, MRAC and ZTE sequences were acquired to generate attenuation correction maps. Additional diagnostic MR sequences were acquired, before, simultaneously and after PET acquisition. For each patient, PET images were reconstructed offline with and without the data-driven head motion correction algorithm (PETddMoCo and PETnoMoCo, respectively). PET images were qualitatively and quantitatively evaluated. An expert nuclear medicine physician segmented brain lesions. SUVmax, SUVmean, SUVpeak, and MTV were extracted using a fixed threshold of 42%. Their absolute mean percentage differences between PETddMoCo and PETnoMoCo are calculated and compared. Eight-teen patients had a "low"degree of motion, 5 patients "medium"and 4 patients "high". Twelve/27 patients had positive uptake. Qualitatively, no difference was shown in negative patients, while in positive ones two lesions were better defined. The mean percentage differences with the standard deviation for SUVmax, SUVmean, SUVpeak and MTV are: 2.66±1.91%, 1.65±1.71%, 2.77±2.11%, 13.32±9.79% respectively. The difference in SUVmean before and after motion correction was significant.

Field

Systems and applications

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