CTAC and MRAC-ZTE based data for the same regions is 0.3% ± 0.4%, ranging from -3.8% to 3.6%. **Conclusion:** Quantitative measurements on PET images reconstructed using ZTE based attenuation correction implemented on the GE SIGNA PET/MR were very similar to those obtained using CT based attenuation correction, supporting the use of ZTE based attenuation correction for fully quantitative PET brain imaging. This agrees with our previous findings using a different PET tracer (^{11}C-Ro15-4513) [1]. **References:** [1] Firouzian A, Delso G, Hallett W, Comparison of MR based Attenuation Correction Methods with CT Based Attenuation Correction in Dynamic Brain PET Imaging, EJNMMI (2018) 45 (Suppl 1):S695.

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Deep Direct Attenuation Correction of Brain PET images using Emission Data and Deep Convolutional Encoder-Decoder for application to PET/MR and dedicated brain PET scanners

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Aim/Introduction: Attenuation correction (AC) is one of the main nontrivial obstacles in PET/MRI and dedicated Brain PET systems. Different methods have been proposed to address the AC of PET images. Recent developments in the field of Machine learning have enable new approaches to cross modality mapping. The main aim of this study is to explore the possibility of inferring the attenuation corrected PET image directly from the non-attenuation corrected image using deep convolutional auto encode decoder. **Materials and Methods:** In total 100 patients brain PET data were used in current study. DeepDAC consists of a paired encoder and decoder. Non attenuation corrected (NAC) PET images are treated as the network input in encoder part and decoder part try to reconstruct pixel-wise continuously-valued of measured attenuated corrected (MAC) PET image. The DeepDAC was trained using 80 randomly-selected data and evaluated in the remaining 10 subjects and 10 patient as external validation set. Quality of the synthesized images, was quantitatively assessed by different image quality parameters. Variability of image quantification was assessed by radiomic features (SUVmax, SUVmean,TLG and and second and high order texture) in 83 brain region delineated based on Hammers N30R83 maximum probability atlas. Reliability of measurement determined by pixel-wise Relative Errors (%) with respect to radiomics features values (RFV) in CTAC PET images and t-test statistical analysis. **Results:** RMSE values were (1.19±0.5) e-2 and (1.19±0.49) e-2 for testing and external validation set. PSNR and SSIM value for test and external validation were 38.70±3.54, 39.22±3.65 and 0.988± 0.006, 0.989±0.006 respectively. RE of SUVmean was -0.1 ± 2.14 for all region and only three region has significant difference with MAC image, however the mean of difference of this region were 0.02 with range of -0.83 - 1.18. SUVmax has mean RE of -3.87 ± 2.84 for all brain regions and 17 regions in brain had significant difference from MAC image with mean RE of -3.99 with range of -8.46 - 0.76. Homogeneity from GLCM had highest number (Twenty) of sub region with significant difference from MAC with mean RE of 7.22 but in all brain sub region mean RE of homogeneity were 2.5 ± 3.65. **Conclusion:** The present study demonstrated that direct AC of PET image using deep auto encoder decoder is a promising technique for brain PET images. Deep learning technique pave the road toward emission-based AC in PET images applicable in PET/MRI and dedicated Brain PET scanners. **References:** None.

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PET/MRI attenuation correction in the pelvic region with a statistical decomposition method

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Aim/Introduction: Quantification in PET/MRI is of importance, and its accuracy is currently limited by the MR based attenuation correction estimate. A common method for attenuation correction of the pelvic region is based on a 2-echo Dixon MRI sequence for segmentation of fat and water and does not account for bone. In this work, we evaluate a new method for attenuation correction using an algorithm based on statistical decomposition of a T2 weighted MRI scan. **Materials and Methods:** Substitute CT images (sCTs) were calculated from T2 weighted MRI scans with a statistical decomposition algorithm, originally developed for MRI-based radiotherapy dose-planning [1]. These sCTs benefits from having bone density information included, in addition to fat and water information. Prostate cancer patients from the PARAPLY study [2] were retrospectively