^{11}C-PBR28 [3] ($R^2 = 0.93$). Whilst caudate cannot be assumed to be a true reference region, it has been previously shown to have low displaceable fraction of TSPO in rats [5]. In order to explore the association between specific binding and genetics independent of plasma variability, we estimated a pseudo binding potential (BP_{ref}) [4] using grey matter masked caudate as a reference region. The genotypic influence was not observed on the V_T, but was seen on BP_{ref} and particularly evident in cortical regions.

Conclusions: Binding of ^{18}F-PBR111 can be quantified with a 2TC model in healthy subjects. When normalized by a pseudo reference region, there was evidence that the cortical binding was influenced by the status of the rs6971 polymorphism in the TSPO gene.

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P164. Investigation of noise-induced correlations in dual-biomarker parametric imaging from dynamic [^{11}C]PiB PET

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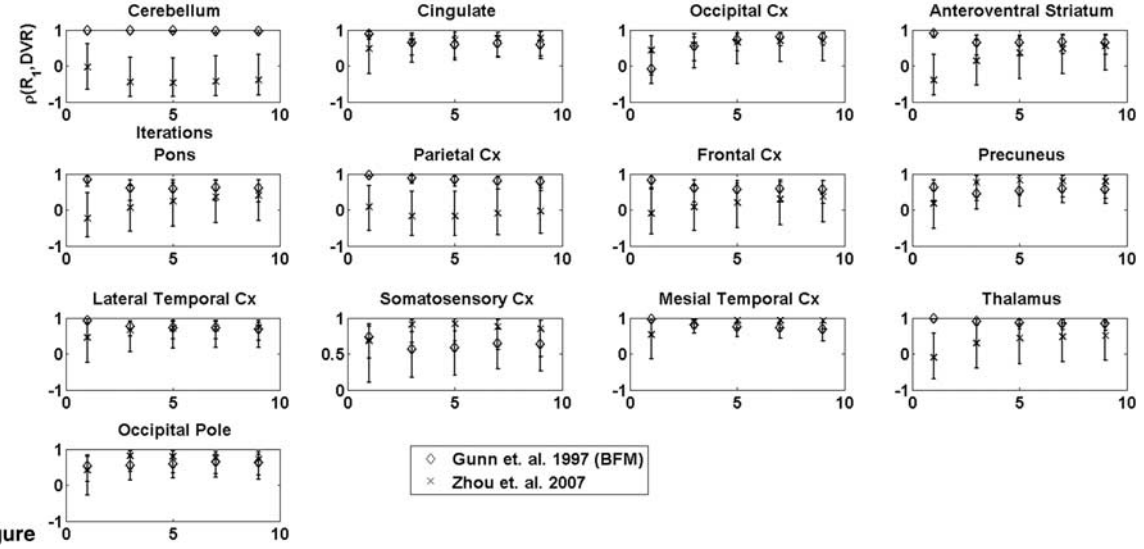
Background: To investigate the impact of noise on correlations between R_1 (relative flow) and BP (binding potential) parametric images as obtained from dynamic [^{11}C]PiB PET. **Motivation and Significance**: Generation of R_1 and BP parametric images from dynamic [^{11}C]PiB PET has been proposed as an approach for dual-biomarker imaging of dementia from a single acquisition. This approach has also been considered to evaluate correlations between flow and β-amyloid depositions. We demonstrate that noise-induced correlations pose significant confounds to interpretation.

Methods: For validation, kinetic parameters (K_1, k_2, k_3, k_4) from [^{11}C]PiB studies of normal controls were estimated, averaged and assigned to a mathematical brain phantom, from which time-activity-curves (TACs) were generated using a 2-tissue compartmental model (blood-volume fraction was set to 3%). This was followed by realistic simulations of dynamic frames for the geometry of the HRRT scanner (including 20 noise realizations in the sinogram-space of the same subject; i.e. simulating no biological correlations). OSEM reconstructions (1-10 iterations) for each dataset were generated. Parametric Images of R_1 and DVR ($= BP + 1$) were obtained via the Simplified Reference Tissue Model (SRTM) using (1) the Basis Function Method (BFM) of Gunn et al. (1997), and (2) linearized formulation and regression (LR) of Zhou et al. (2007) to estimate the parameters. Noise-Bias trade-off curves were obtained for R_1 and DVR images, demonstrating reduced bias with increasing iterations at the cost of enhanced noise levels, as expected. Next, Pearson



Figure

correlation coefficients were determined for each voxel-pair of (R_1, DVR) vectors (across the 20 noise realizations) with lower and upper bounds for a 95% confidence interval, and quantitatively evaluated for each OSEM reconstruction. A hypothesis test for no correlation with a probability value (p-value) of 0.05 was also conducted, and the resulting correlation images were analyzed qualitatively and quantitatively for all OSEM iterations.
Results: Specifically, 13 regions-of-interest (ROIs) were considered. Overall, R_1 and DVR showed statistically significant correlations, across the OSEM iterations, for all ROIs using the BFM approach, while this was also the case for the LR method with the exception of the parietal cortex, pons and occipital pole.
Conclusions: Significant correlations attributed purely to noise were observed between R_1 and DVR parametric images in parametric quantification of dynamic [^{11}C]PiB PET. Caution should be exercised when performing R_1 and DVR analysis, where the detection of biological correlations may be confounded by noise-induced correlations. Future work should explore potential approaches that quantify and account for these associations to provide more accurate estimates of correlations between DVR and R_1 estimates from a single acquisition.

P165. *In vivo* amyloid deposition in the aging brain: methodological considerations for partial volume correction

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Background: PET imaging with amyloid tracers such as [11C]-PiB is contributing to differential diagnosis of Alzheimer's disease (AD) by demonstrating the presence of beta-amyloid plaques. While partial

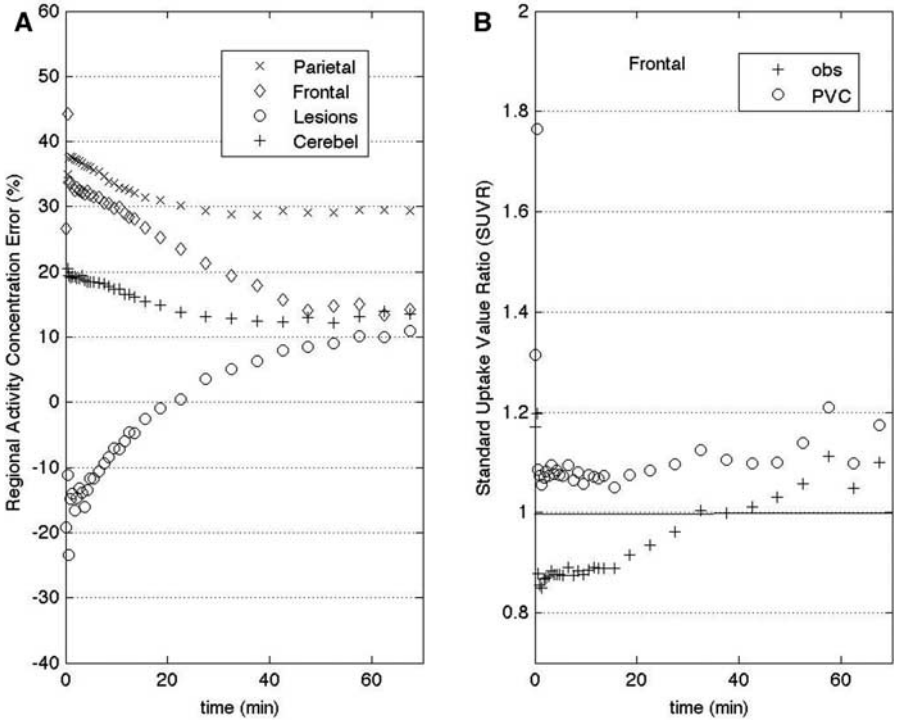

Figure (A) %Error in regional activity concentration in selected regions, and (B) Standard Uptake Value Ratio (cerebellar grey taken as reference region) in a typical PiB study, in the frontal cortex before (+) and after PVC (o).