

Test-Retest Variability of Relative Tracer Delivery Rate as Measured by [11C]PiB

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Abstract:

Purpose: Moderate-to-high correlations have been reported between the [11C]PiB PET-derived relative tracer delivery rate R1 and relative CBF as measured using [15O]H₂O PET, supporting its use as a proxy of relative CBF. As longitudinal PET studies become more common for measuring treatment efficacy or disease progression, it is important to know the intrinsic variability of R1. The purpose of the present study was to determine this through a retrospective data analysis.

Procedures: Test-retest data belonging to twelve participants, who underwent two 90 min [11C]PiB PET scans, were retrospectively included. The voxel-based implementation of the two-step simplified reference tissue model with cerebellar grey matter as reference tissue was used to compute R1 images. Next, test-retest variability was calculated, and test and retest R1 measures were compared using linear mixed effect models and a Bland-Altman analysis.

Results: Test-retest variability was low across regions (max. 5.8 %), and test and retest measures showed high, significant correlations ($R^2=0.92$, slope=0.98) and a negligible bias ($0.69\pm 3.07\%$).

Conclusions: In conclusion, the high precision of [11C]PiB R1 suggests suitable applicability for cross-sectional and longitudinal studies.

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