

VALIDATION OF THE EADC-ADNI HARMONIZED PROTOCOL FOR MANUAL HIPPOCAMPAL SEGMENTATION

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Background

An international Delphi panel has defined a harmonized protocol (HarP) for the manual segmentation of the hippocampus on MR. Aim of this study is to study the concurrent validity of the HarP towards local protocols, and its major sources of variance.

Methods

14 tracers segmented 10 ADNI cases scanned at 1.5T and 3T following local protocols, qualified for segmentation based on the HarP through a standard web-platform and re-segmented following the HarP. The 5 most accurate tracers followed the HarP to segment 15 ADNI cases acquired at 3 time points on both 1.5T and 3T.

Results

The agreement among tracers was relatively low with the local protocols (absolute left/right ICC 0.44/0.43) and much higher with the HarP (absolute left/right ICC 0.88/0.89) (Figure). On the larger set of 15 cases, the HarP agreement within (left/right ICC range: 0.94/0.95 to 0.99/0.99) and among tracers (left/right ICC range: 0.89/0.90) were very high. The volume variance due to different tracers was 0.9% of the total, comparing favourably to variance due to scanner manufacturer (1.2), atrophy rates (3.5), hemispheric asymmetry (3.7), and field strength (4.4), and significantly smaller than the variance due to atrophy (33.5%, $p < 0.001$), and physiological variability (49.2%, $p < 0.001$). The coefficient of variation due to tracer was very low (2.4%) (Table).

Conclusions

The HarP has high measurement stability compared to local segmentation protocols, and good reproducibility within and among human tracers. The coefficient of variation of tracers (2.4%) is much lower than that estimated for CSF biomarkers (between 13 and 36%). Hippocampi segmented with the HarP can be used as reference for the qualification of human tracers and automated segmentation algorithms.