Directed information flow is disturbed in Posterior Cortical Atrophy: an EEG study.

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Background: The objective of this study was to investigate whether patients with posterior cortical atrophy (PCA), a subtype of AD characterized by higher order visual deficits and sparing of memory, are more severely affected than typical AD patients in terms of brain oscillatory activity and directed connectivity using electroencephalography (EEG).

Methods: 21-channel EEG recordings of 29 PCA patients with abnormal CSF amyloid and/or tau biomarkers, 29 age-, gender- and disease-severity matched AD- and 29 subjective cognitive decline (SCD) patients were analysed in delta (0-4 Hz), theta (4-8 Hz), alpha (8-13 Hz) and beta (13-30 Hz) frequency bands. Relative power was calculated with Fast Fourier Transform and directed connectivity was analysed using directed Phase Transfer Entropy (dPTE). Pairwise differences between groups were analysed with permutation testing. Relations between posterior dPTE of pooled PCA and AD groups and fragmented letters, dot-count and picture recall scores were investigated with Spearman’s rank correlations.

Results: PCA patients showed a significant increase in relative delta power and a significant decrease in alpha power compared to AD patients, in particular in posterior regions. Compared to SCD, both dementia groups showed significant slowing of oscillatory activity. In SCD patients a posterior-to-anterior pattern of information flow was found. This pattern of information flow was more severely affected in PCA patients compared to AD patients in alpha and beta frequency bands. A positive correlation between posterior dPTE and dot-count scores (in alpha and beta bands), and fragmented letters scores (in beta band) was found.

Conclusions: PCA patients showed more slowing of oscillatory activity and more severe loss of the normal posterior-to-anterior pattern of information flow compared to typical AD patients. These results indicate that PCA is an extreme variant of AD.