A4.f Posters - Theme A -β-Amyloid Diseases

A4.f Imaging and Biomarkers for Clinical Inclusion & Outcome Measures: multimodal imaging

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Abstract:

ALZHEIMER'S DISEASE SEVERITY CLASSIFICATION BASED ON ELECTROENCEPHALOGRAPHY FEATURES – A PRELIMINARY RESULT

Aims

As Alzheimer's disease (AD) progresses from normal status through mild cognitive impairment (MCI) to AD, the cognitive function, memory capability, and language ability gradually decline. To get neurophysiological information of the brain function, electroencephalography (EEG) may be useful. In this study, we investigated EEG features associated with cognitive ability, working memory, and language processing according to severity from healthy controls (HC), MCI to AD.

Method

Seventy-seven age-matched elderly participants (mean: 74.0±5.2) have been recruited: 39 HC, 32 patients with MCI, and 6 patients with AD. The subject performed visual oddball task, 1-back working memory task, and verbal fluency task in a consecutive order. The 32-channel wireless EEG with dry electrodes (g.tec, Graz, Austria) was recorded at a sampling rate of 500 Hz during all tasks.

Results

For central, parietal, and left temporal areas, we observed in the oddball task a decrease of P300 peak and a delay of P300 latency in MCI than HC. In the 1-back task, we observed significant alpha power increase ($p<0.05$) and delta power decrease ($p<0.05$) in MCI group than HC. Based on these findings, binary group classification using support vector machine was conducted. As a result, we obtained mean classification accuracy through 10-fold cross-validation between two severity groups: 68.08±7.90% (HC vs. MCI), 86.98±4.77% (HC vs. AD), and 83.74±5.95% (MCI vs. AD).

Conclusion

We found that MCI/AD and HC/AD seemed reasonably classified, however, HC/MCI were harder to classify them. We expect that classification may be improved by acquiring more data from AD patients and finding additional features from verbal fluency analysis, which are under investigation.

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<< Back to session