



Alzheimer's Association International Conference

P2-238 - Functional connectivity in Alzheimer's disease: A resting-state EEG study

 Monday, July 17, 2023

 8:45 AM - 4:15 PM

Theme

Biomarkers

Abstract

Background: Alzheimer's disease (AD) is mainly associated with amnesic deficits. Imaging studies revealed a disruption of functional networks in AD, which plays a crucial role for the cognitive deficits. There is also evidence from resting-state Electroencephalography (rsEEG) studies, which found altered functional connectivity measuring EEG coherence in AD (Babiloni et al., 2021; Wang et al., 2015). This was especially seen for the Alpha frequency band, which is known for its diagnostic potential in the disease. Furthermore, studies suggest that Alpha band marker correlate with cognitive decline in AD (Babiloni et al., 2010). The main aim of the current work is to gain a better understanding of the functional connectivity in Alzheimer's disease based on EEG given a very high temporal resolution.

Method: The sample consisted of 15 patients (AD, 72.3 ± 8.28 years, 66.7 % male) with mild cognitive impairment to mild dementia with a typical cerebrospinal fluid profile of Alzheimer's disease or pathological Amyloid-PET and 15 age-matched healthy controls (HC, 72.93 ± 7.17 years, 53.3 % male). All participants underwent a neuropsychological examination and rsEEG. The rsEEG was recorded with the Neurowerk Amplifier using an elastic cap with 19 electrodes (10-20 system). Raw data were preprocessed and further analyzed with regard to functional connectivity focusing on the Alpha frequency band (Brainstorm, SPSS, EEGLab). Functional connectivity was calculated by the magnitude squared coherence. Coherence was further clustered in global coherence and coherence per electrode. Finally, coherence scores were evaluated in relation to neuropsychological scores.

Results: Centers of functional connectivity were found in frontal-frontal and frontal-parietal/occipital electrode pairs. Alpha frequency band (8 – 13 Hz), particularly Alpha1 frequency band (8 – 11 Hz), yielded the highest coherence scores. When comparing AD and HC, patients showed reduced coherence in Alpha2 (11 – 13 Hz) and Beta (13 – 20 Hz). Additionally, moderate correlations of global coherence and behavioral measures were found mainly for the Alpha1 frequency band.

Conclusion: Alzheimer's disease can be associated with poorer functional connections of certain brain areas and rsEEG coherence might be a potential biomarker for AD.

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