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# Subclinical epileptiform activity accelerates the progression of Alzheimer's disease: A long-term EEG study

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## Abstract

**Objective:** While many studies suggest that patients with Alzheimer's disease have a higher chance for developing epileptic seizures, only a few studies are available examining independent epileptic discharges. The major aims of our study was to determine the prevalence of subclinical epileptiform activity (SEA) in AD compared to healthy elderly controls with the hypothesis that SEA is more frequent in AD than in cognitively normal individuals. Another aim was to analyze the effect of baseline SEA captured with electroencephalography on the progression of the disease with longitudinal cognitive testing.

**Methods:** We investigated 52 Alzheimer patients with no history of epileptic seizures and 20 healthy individuals. All participants underwent a 24-hour electroencephalography, neurology, neuroimaging and neuropsychology examination. Two independent raters analyzed visually the electroencephalograms and both raters were blind to the diagnoses. Thirty-eight Alzheimer patients were enrolled in a 3-year long prospective follow-up study with yearly repeated cognitive evaluation.

**Results:** Subclinical epileptiform discharges were recorded significantly ( $p:0.018$ ) more frequently in Alzheimer patients (54%) than in healthy elderly (25%). Epileptiform discharges were associated with lower performance scores in memory. Alzheimer patients with spikes showed 1.5-times faster decline in global cognitive scores than patients without ( $p < 0.001$ ). The decline in cognitive performance scores showed a significant positive correlation with spike frequency ( $r:+0.664$ ;  $p < 0.001$ ).

**Conclusions:** Subclinical epileptiform activity occurs in half of Alzheimer patients who have never suffered epileptic seizures. Alzheimer patients with subclinical epileptiform activity showed accelerated cognitive decline with a strong relation to the frequency and spatial distribution (left temporal) of spikes.

**Significance:** Our findings suggest the prominent role of epileptiform discharges in the pathomechanism of Alzheimer's disease which might serve as potential therapeutic target.

**Keywords:** Alzheimer's disease; Electroencephalography; Epilepsy; Epileptiform discharge; Neuropsychology.

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