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BIOMARKERS

POSTER PRESENTATIONS

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Biomarkers (non-neuroimaging) / Novel biomarkers

Different abnormalities of electroencephalographic (EEG) markers in quiet wakefulness are related to motor visual hallucinations in patients with Parkinson's and Lewy body diseases

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Abstract

Background: Parkinson's disease (PD) is the second-most common neurodegenerative disorder that affects 2–3% of the population ≥ 65 years of age and may belong to cognitive deficits and dementia in 50% of cases. Disease with Lewy Bodies (DLB) is emerging as another important cause of dementia in pathological aging. PD and DLB are both due to intra-neuronal Lewy bodies and are characterized not only by motor dysfunctions but also by cognitive and/or psychiatric symptoms. An open issue is the extent to which these diseases are distinct entities. In this respect, here we compared cortical sources of resting state eyes-closed electroencephalographic (rsEEG) rhythms in PD and DLB patients having visual hallucinations.

Method: Clinical and rsEEG rhythms in demographic matched PD (N = 93), DLB (N = 46), Alzheimer's disease dementia (AD, N= 70) and healthy elderly (Nold, N = 60) subjects were available from an international archive. Pathological groups were matched for cognitive status. Individual alpha frequency peak was used to determine the delta, theta, alpha1, alpha2, and alpha3 frequency band ranges. Fixed beta1, beta2, and gamma bands were considered. The eLORETA freeware estimated rsEEG cortical sources.

Result: As a confirmation of previous studies, compared to the Nold subjects, the AD, LBD, and PD patients showed higher widespread delta source activities and lower posterior alpha source activities. Specifically, posterior alpha source activities were more abnormal in the AD than the LBD and PD groups, while widespread delta source activities were more abnormal in the PD and DLB than the AD group. As novel results, in relation to the LBD and PD patients without visual hallucinations and the control groups (Nold, AD), those with visual hallucinations were characterized by higher parietal delta source activities (LBD, Figure 1) and parieto-occipital alpha sources activities (PD, Figure 2).

Conclusion: These novel results suggest that in LBD and PD patients resting in the quiet wakefulness, abnormalities in cortical neural synchronization at delta and alpha frequencies in parietal cortex are differently related to visual hallucinations despite the essence of alpha-synucleinopathy.

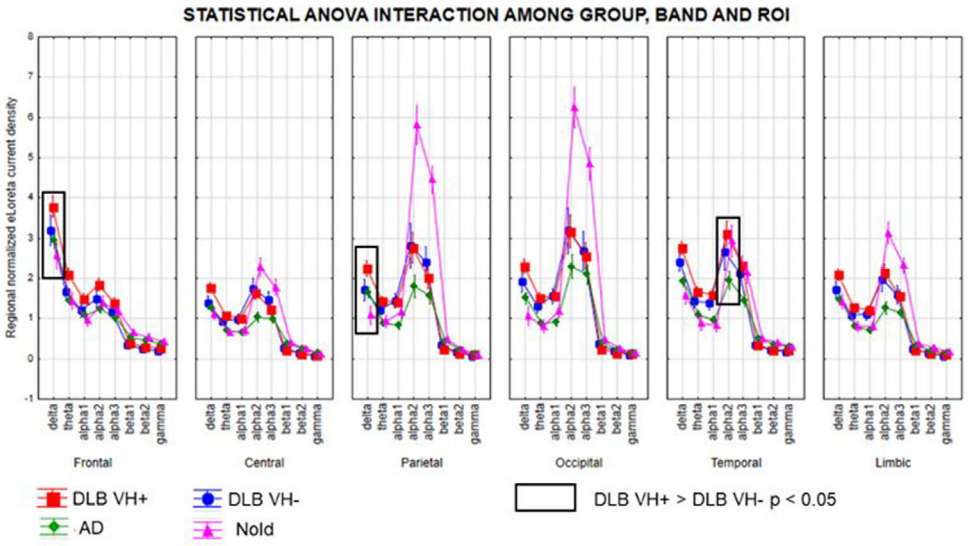

Figure 1. *Grand average of regional resting state EEG source activities (i.e., regional normalized eLORETA solutions) relative to a statistically significant ANOVA interaction effect (F = 15.2; p < 0.00001) among the factors Group (Nold, AD, DLB VH+ with visual hallucinations, DLB VH- without those hallucinations), Band (delta, theta, alpha 1, alpha 2, alpha 3, beta 1, beta 2, and gamma), and ROI (frontal, central, parietal, occipital, temporal, and limbic. Duncan planned post-hoc testing (p < 0.05).*

FIGURE 1

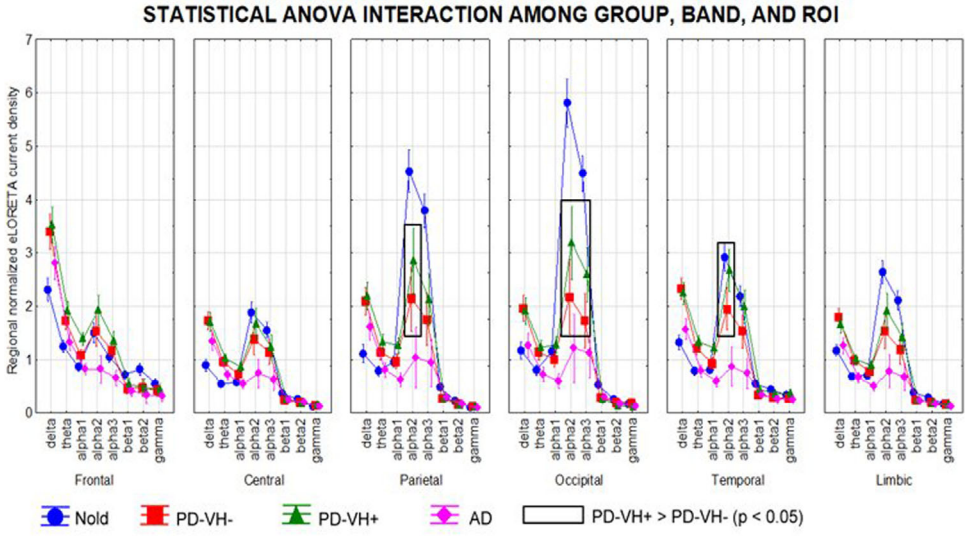

Figure 2. *Grand average of regional resting state EEG source activities (i.e., regional normalized eLORETA solutions) relative to a statistically significant ANOVA interaction effect (F = 15.2; p < 0.00001) among the factors Group (Nold, AD, PD-VH+ with visual hallucinations, PD-VH- without those hallucinations), Band (delta, theta, alpha 1, alpha 2, alpha 3, beta 1, beta 2, and gamma), and ROI (frontal, central, parietal, occipital, temporal, and limbic. Duncan planned post-hoc testing (p < 0.05).*

FIGURE 2