

EEG dynamics and neural generators in implicit navigational image processing in adults with ADHD

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Abstract

In contrast to childhood ADHD that is characterized by inattention, impulsivity and hyperactivity, most adults with ADHD predominantly exhibit inattention. We used a new oddball paradigm using implicit navigational images and analysed EEG dynamics with swLORETA inverse modelling of the evoked potential generators to study cortical processing in adults with ADHD and age-matched controls. In passive observation, we demonstrated that P350 amplitude, alpha-beta oscillation event-related synchronization (ERS) anticipation, and beta event-related desynchronization (ERD) were significantly smaller in ADHD. In the active condition, P100 duration was reduced and N140 amplitude increased for both deviant and frequent conditions in the ADHD. Alpha ERS and delta-theta ERS were reduced in the ADHD in the deviant condition. The left somatosensory area (BA2) and the right parietal lobe (BA31, BA40) contributed more to the P100 generators in the control than in the ADHD group, while the left frontal lobe (BA10) contributed more to the P100 generators in the ADHD. The left inferior parietal lobe (BA40) contributed more to the N140 generators in the control than the ADHD group while the right posterior cingulate (BA30) contributed more to the N140 generators in the ADHD. These findings reinforce the notion that earlier cortical stages of visual processing are compromised in adult ADHD by inducing the emergence of different event-related potentials generators and EEG dynamics in ADHD. Considering that classical approaches for ADHD diagnosis are based on qualitative clinical investigation possibly biased by subjectivity, EEG analysis is another objective tool that might contribute to diagnosis, future neurofeedback or brain stimulation therapies.