MEG analysis of neural dynamics in attention-deficit/hyperactivity disorder with fuzzy entropy

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Abstract
The aim of this study was to analyze the neural dynamics in attention-deficit/hyperactivity disorder (ADHD). For this purpose, magnetoencephalographic (MEG) background activity was analyzed using fuzzy entropy (FuzzyEn), an entropy measure that quantifies signal irregularity, in 13 ADHD patients and 14 control children. Additionally, relative power (RP) was computed in conventional frequency bands (delta, theta, alpha, beta and gamma). FuzzyEn results showed that MEG activity was more regular in ADHD patients than in controls. Moreover, we found an increase of power in delta band and a decrease in the remaining frequency bands. Statistically significant differences (p-values <0.05; nonparametric permutation test for multiple comparisons) were detected for FuzzyEn in the posterior and left temporal regions, and for RP in the posterior, anterior and left temporal regions. Our results support the hypothesis that ADHD involves widespread functional brain abnormalities, affecting more areas than fronto-striatal circuits, such as the left temporal and posterior regions.