

Neurophysiological mechanisms of interval timing dissociate inattentive and combined ADHD subtypes.

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Abstract

It is far from conclusive what distinguishes the inattentive (ADD) and the combined (ADHD-C) subtype of ADHD on the neuronal level. Theoretical considerations suggest that especially interval timing processes may dissociate these subtypes from each other. Combining high-density EEG recordings with source localization analyses, we examine whether there are ADHD-subtype specific modulations of neurophysiological processes subserving interval timing in matched groups of ADD ($n = 16$), ADHD-C ($n = 16$) and controls ($n = 16$). Patients with ADD and ADHD-C show deficits in interval timing, which was correlated with the degree of inattention in ADD patients. Compared to healthy controls, patients with ADHD-C display a somewhat weaker, yet consistent response preparation process (contingent negative variation, CNV). In patients with ADD, the early CNV is interrupted, indicating an oscillatory disruption of the interval timing process. This is associated with activations in the supplemental motor areas and the middle frontal gyrus. Patients with ADD display adequate feedback learning mechanisms (feedback-related negativity, FRN), which is not the case in patients with ADHD-C. The results suggest that altered pacemaker-accumulation processes in medial frontal structures distinguish the ADD from the ADHD-C subtype. Particularly in patients with ADD phasic interruptions of preparatory neurophysiological processes are evident, making this a possible diagnostic feature.