Specific cognitive-neurophysiological processes predict impulsivity in the childhood attention-deficit/hyperactivity disorder combined subtype.

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Abstract

BACKGROUND:
Attention-deficit/hyperactivity disorder (ADHD) is one of the most prevalent neuropsychiatric disorders in childhood. Besides inattention and hyperactivity, impulsivity is the third core symptom leading to diverse and serious problems. However, the neuronal mechanisms underlying impulsivity in ADHD are still not fully understood. This is all the more the case when patients with the ADHD combined subtype (ADHD-C) are considered who are characterized by both symptoms of inattention and hyperactivity/impulsivity.

METHOD:
Combining high-density electroencephalography (EEG) recordings with source localization analyses, we examined what information processing stages are dysfunctional in ADHD-C (n = 20) compared with controls (n = 18).

RESULTS:
Patients with ADHD-C made more impulsive errors in a Go/No-go task than healthy controls. Neurophysiologically, different subprocesses from perceptual gating to attentional selection, resource allocation and response selection processes are altered in this patient group. Perceptual gating, stimulus-driven attention selection and resource allocation processes were more pronounced in ADHD-C, are related to activation differences in parieto-occipital networks and suggest attentional filtering deficits. However, only response selection processes, associated with medial prefrontal networks, predicted impulsive errors in ADHD-C.

CONCLUSIONS:
Although the clinical picture of ADHD-C is complex and a multitude of processing steps are altered, only a subset of processes seems to directly modulate impulsive behaviour. The present findings improve the understanding of mechanisms underlying impulsivity in patients with ADHD-C and might help to refine treatment algorithms focusing on impulsivity.