

Brain activity predicting behavioural outcomes in a combined neuromodulation and inhibitory control task in patients with binge eating disorder

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Background: Impaired inhibitory control, particularly towards food stimuli, might represent a risk factor for Binge Eating Disorder (BED). Inhibitory control means the ability to suppress a dominant behaviour and is localized in the dorsolateral prefrontal cortex (dlPFC). We are developing a computer-based training programme to increase inhibitory control that is supported by transcranial direct current stimulation.

Methods: We assess food-related inhibitory control in patients with BED in a double blind study with a so-called antisaccade task via eye tracking at baseline with electroencephalography (EEG, To) and anodal stimulation of the right dlPFC (1mA vs. 2mA) vs. sham stimulation in a crossover design (T₁, T₂). The aim of this study is to explore, if neurological markers for inhibitory control from the EEG (ERN, P₃, N₂) are involved in the execution of the antisaccade task and if they are predicting outcomes at T₁ and T₂.

Results: There was a stable learning effect in the antisaccade task over time and over stimulation conditions. Additionally, patients in the 2 mA vs. sham condition improved in the task and in binge eating frequency in the 2 mA condition, but not in the 1 mA condition. All EEG markers differed at erroneous antisaccade trials from right antisaccade trials and especially P₃ predicted task outcomes at T₁ and T₂.

Conclusion: Inhibitory control and attentional processes are involved in this task and related to improvements, which suggests that a direct training of food-related inhibitory control constitutes a promising treatment approach in patients with BED.

Keywords: binge eating disorder, inhibitory control, neuromodulation