

The role of fronto-cerebellar networks in food challenged inhibitory control. Data from healthy normal-weight participants and patients with anorexia nervosa

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The ability to control impulses is considerably challenged by appetising food. Converging neuroimaging evidence suggests a crucial role of cerebellum in feeding and inhibitory control.

We explored the effects of different protocols of cerebellar non-invasive stimulation on food specific inhibitory performance. Moreover, we explored the dynamics of fronto-cerebellar effective connectivity in normal-weight participants and patients with anorexia nervosa.

A food Go/NoGo task involving 50% food and 50% non-food images was used. Participants were instructed to respond when they saw a food (Go trials) and refrain from responding when they saw a non-food (NoGo trials) picture or vice versa. Sham, anodal or cathodal transcranial direct current stimulation (tDCS) was applied over the left cerebellar hemisphere to modulate task performance. Moreover, we used paired-pulse transcranial magnetic stimulation to study the functional connectivity between inferior frontal cortex (IFC), cerebellum (Cb), and the primary motor cortex (M1) as a function of corticospinal excitability, both in healthy and anorexic participants.

Our behavioural results showed a deterioration of inhibitory performance following cathodal cerebellar tDCS and a significant correlation between weight-concern psychological assessment and the percentage of omission to food Go/NoGo trials. Moreover, the corticospinal connectivity between Cb and M1 showed a clear trend to reduced motor evoked potentials in anorexic patients than in healthy participants.

Taken together, this data showed the functional involvement of cerebellum in the regulation of food-specific inhibitory control and provided new functional elements concerning the alteration of cerebellar activity in eating disorders.

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Food challenge to neurocognitive functions: evidence from healthy and pathological populations with eating disorders

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