

# Healthy and anorexic behavior to a food specific Go/NoGo task. The role of cerebellum in food challenged inhibitory control

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## 1. Objectives

Eating and managing the caloric intake is essential for the individual. However, little is still known about how we make food choices and what lies behind the propensity to food. Indeed, the ability to control impulses is challenged by appetising food. Converging evidence indicates a role of cerebellum in feeding and inhibitory control. The present study was aimed to investigate food specific inhibitory control in normal-weight participants (NW) and in adolescents with anorexia nervosa (AN). As a second aim we explored the effects of different protocols of cerebellar non-invasive stimulation on food specific inhibitory performance.

## 2. Materials

A food Go/NoGo task involving 50% food (high- low-calorie) and 50% non-food images was developed. 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 (food target block) or vice versa (non-food target block). Sham, anodal or cathodal transcranial direct current stimulation (tDCS) was applied over the left cerebellar hemisphere to modulate task performance.

## 3. Methods

Baseline performance to the food Go/NoGo task was investigated in a sample of NW and in adolescents with AN. Moreover, the modulation of food Go/NoGo behavior was investigated following cerebellar tDCS combined with food visual presentation in a cross-over, double-blind, sham-controlled design.

## 4. Results

All participants were faster and more accurate to respond to appetising food than to low-calorie and non-food images. AN showed a general worst performance, but an inferior false alarm rate. Furthermore, AN presented an abnormal difference in the omission rate between food and non-food stimuli. Cathodal cerebellar tDCS was able to modulate NW performance increasing the number of omissions.

## 5. Discussion

Faster and more accurate responses to appetising food showed the adaptive unconditioned drive toward high-calorie meals. The low level of false-alarms together with a low omission rate to food stimuli indicate the paradoxical obsession of AN towards food. The modulation of omission rate following cathodal cerebellar tDCS confirm the role of cerebellum in food specific inhibitory control.

## 6. Conclusions

Studying the neuropsychology of food choices in healthy participants and in patients with eating disorder is fundamental to understand the nature of these pathological conditions and to develop innovative treatments. The non-invasive stimulation of the cerebellum could be a promising tool to treat eating disorders, also in their onset at the developmental stage.

## References:

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**Tipo presentazione:** ORALE