Transcranial direct current stimulation changes appetite and body mass in obese rats

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Transcranial direct current stimulation (tDCS) is a noninvasive intervention to modulate cortical activity. Electrical current generated by stimulator modifies neuronal activity according to the modality of the application. Anodal tDCS is assumed to increase while cathodal tDCS to inhibit cortical excitability. tDCS is effectively used in many different tasks such as learning, visual and somatosensory functions improving these skills. However, the impact of tDCS on energy balance was not clearly determined yet. The hyperphagia / obesity is characterized by restoration of the balance between brain hemispheres. Therefore we aimed in our experiment to limit appetite and therefore body weight gain by the electrical stimulation or inhibition of the selected brain hemisphere by using the tDCS method. The rats fed with diet inducing obesity were exposed to anodal or cathodal tDCS. Active stimulation (400uA, 20 minutes a day) or sham stimulation (40uA, 20 minutes a day) was applied every second day through two weeks. Body weight and food intake were measured every day during the experiment. Both anodal and cathodal tDCS reduced appetite and body weight gain. No significant difference in energy balance was observed depending on electrodes polarity; however, only in anodal tDCS the difference between body weights measured before and after stimulation was negative. We concluded that tDCS is able to change appetite behavior probably by cortical excitability modifications. Further investigations are necessary to explain central and peripheral mechanisms responsible for tDCS effects.

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Biography

Agata Ziomber has completed her PhD from Jagiellonian University and Post-doctoral studies from Jagiellonian University Medical College. She is an Assistant Professor of Department of Pathophysiology in Jagiellonian University Medical College and a medical Doctor - Endocrinologist. She has published 20 articles. In her research she is focusing on neuromodulation as a method to modulate appetite and change body weight. At present, she is a Leader of a project regarding transcranial brain stimulation and energy metabolism.

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