

Transcranial alternating current stimulation and sports performance: an explorative study of the association with the genetic background

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Introduction: In recent years transcranial alternating current stimulation (tACS) has emerged in clinical neuroscience. It consists in application of weak electrical currents on the head for several minutes (5-30').

The purpose of the study was to evaluate the effects of tACS stimulation on the sports performance investigating explosive strength of upper and lower limbs. We considered genetic background of participants, in particular ACE and BDNF polymorphisms. ACE gene encodes the enzyme of human angiotensin conversion and its association is with the resistance, while BDNF gene, coding for brain derived neurotrophic factor, is associated with psychological attitude in Sport.

Materials and methods: in the research were involved 17 volunteers (7 males and 10 females) aged between 18 and 49 years (27.8 ± 10.4) that were stimulated (treated group) or not (control group) with tACS for 10 minutes at 50 Hz. Before the stimulation it was collected a sample of saliva in order to extract genomic DNA for the analysis of the genotype by PCR technique. Explosive strength has been evaluated with a set of tests before and after the tACS stimulation.

Results: ANOVA statistical analysis was performed and the results showed a significant negative effect of ID genotype of ACE gene ($p < 0.05$) on the performance. Particularly, on squat jump, counter movement jump and counter movement jump arm swing, while BDNF GG genotype seems to be associated with a better performance only in counter movement jump arm swing. Further investigations need to better understand if the stimulation can be considered as a doping practice improving the performance.