

Does Change in Attention Control Mediate the Impact of tDCS on Attentional Bias for Threat?

Limited Evidence from a Double-blind Sham-controlled Experiment in an Unselected Sample

Soins spécialisés en santé mentale

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INTRODUCTION

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ATTENTION CONTROL

Ability to voluntarily regulate the allocation of attentional ressources (e.g., Eysenck & Derackshan, 2011; Heeren et al., 2013; Peers et al., 2013)

Reduced left dorsolateral prefontal cortex (dIPFC) activation (e.g., Bishop, 2009; Britton et al., 2011; Browing et al., 2010; De Raedt et al., 2010)



Attentional bias for threat





METHOD

20 right-handed healthy volunteers

Experimental Manipulation

Transcranial direct current stimulation (tDCS)

Application of a weak DC of **2mA** via 2 electrodes:

Anode (+) Cathode (-)

Anodal stimulation increase cortical activity.

The anode electrode was positioned over the F3 (i.e., corresponding to left DLPFC regions) according to the 10-20 EEG system.

> The reference electrode was placed on ipsilateral arm (e.g., Cogiamanian et al., 2007; Priori et al., 2008)



Research Design and Materials

Double-blind sham-controlled within-subject design

Counterbalanced order



RESULTS

- Impact of tDCS on attentional networks The Stimulation x Network interaction was not significant $F(2,38) = 0.07, p = .93, \eta 2p < .01$
- Impact of tDCS on attentional bias

No significant difference regarding attentional bias between anodal and sham stimulations t(19) = .34, p = .74, d = .33.

Neither attention control nor attentional bias did improve following anodal **tDCS**

POST-HOC ANALYSES

Anodal tDCS over left dIPFC may yield larger improvement (i.e.effect sizes) on cognitive tasks among either depressive or anxious samples than healthy ones.

(e.g., Brunoni & Vanderhasselt, 2014; Dedoncker et al., 2016; Hill et al., 2016)

Bias score

*, p < .05; **, p < .01 after correction for multiple comparisons using the Benjamini– Hochberg false discovery rate procedure.

ADDITIONAL STUDY

OSF Preregistered study – NEW results still not published Coussement, Riesco de Vega, Heeren (in prep) Doi:osf.io/x4quy

	Alerting gains	Orienting gains	Executive gains
LSAS	.15	.13	.08
BDI	.14	.02	.39**
STAI-T	.10	.12	.34*

*, p < .05; **, p < .01 after correction for multiple comparisons using the Benjan Hochberg false discovery rate procedure.

Larger sample size (n = 50)

Sham vs Anodal tDCS during ANT

BDI, LSAS, STAI-T at baseline

Role of both anxious and depressive symptoms in tDCS-induced improvement in executive control

Impact of tDCS on AB : At odds with previous research in clinical samples

BUT

- Our two studies demonstrate that the impact of tDCS on executive control is modulated by the intensity of depressive and anxiety symptomatology
- Future research has to clarify the impact on clinical vs. healthy samples