**Transcranial direct current stimulation (tDCS) affects resting-state functional connectivity in the reward systems**

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**Background**: Previous research proposes that transcranial direct current stimulation (tDCS) could be used to modulate reward system activity (Chib, 2013). Consequently, tDCS might affect resting-state neuronal networks linked to reward circuits.

**Methods**: 1) Participants: 36 healthy females (20-40 y, right-handed, naïve to tDCS, no use of tobacco products), were randomly assigned to receive tDCS or sham stimulation. 2) tDCS montage: anode between Fp1 and Fp2, cathode over F4 (10-20 EEG system). The stimulation session duration was 20 minutes. The tDCS intensity was 2 mA, and in the sham group the intensity was 0 mA between fade in and fade out periods of 15 seconds. 3) Resting-state fMRI was conducted twice: before (“baseline”) and right after the stimulation (tDCS or sham). Scanning protocol: Philips Achieva 3.0T TX, FOV 192x192mm², matrix 64x64, a voxel size~ 3x3mm³, TR=2000, TE=27 ms, scanning duration 10 min, eyes open. The imaging data was processed and analyzed using SPM12 [http://www.fil.ion.ucl.ac.uk/spm/software/spm12/](http://www.fil.ion.ucl.ac.uk/spm/software/spm12/) and “GIFT” toolbox “Info-max” for Independent component analysis (ICA) [http://mialab.mrn.org/software/gift/index.html](http://mialab.mrn.org/software/gift/index.html). ICA was used to isolate resting-state network maps. Groups were compared according to the simulation condition (baseline_real to stim_real and baseline_sham to stim_sham) by paired-sample t-test. Statistical significance of p<0.05 with FWE and a 10-voxel extent was required. Default mode network, frontal, left and right frontoparietal networks were identified in each subgroup.

**Results**: Increased functional connectivity (FC) was observed in the tDCS group in the right anterior insula, right and left middle frontal gyrus, right and left superior frontal gyrus and right middle temporal gyrus, as compared to the sham group.

**Conclusions**: An increase in FC following tDCS was seen in right anterior insula and prefrontal cortex. This may indicate modulation of the reward circuit activity following tDCS.