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THE EFFECT OF ONE LEFT-SIDED PREFRONTAL HF-RTMS SESSION ON EMOTIONAL BRAIN PROCESSES

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Introduction: Although repetitive Transcranial Magnetic Stimulation (rTMS) is frequently used to examine emotional changes in healthy volunteers, it remains largely unknown how rTMS is able to influence emotion.

Objectives, aims & methods: In this sham-controlled single-blind crossover study using fMRI, we examined in 20 right-handed healthy female volunteers whether a single high frequency (HF)-rTMS session applied to the left dorsolateral prefrontal cortex (DLPFC) could influence emotional processing while focussing on blocks of positively and negatively valenced baby faces. The task instruction was to focus on one's own emotional status elicited by the visual stimuli.

Results: A single HF-rTMS session selectively influenced the processing of positively and negatively valenced baby faces. When positive information was being processed, one active left-sided HF-rTMS session resulted in enhanced neuronal activity in the left superior frontal cortex (Brodmann area 10) and right inferior parietal cortex (Brodmann area 39).. When negative information was processed, one active stimulation session attenuated neuronal activity in the right insula, while sham stimulation did not.

Discussion: These observations suggest that after one active HF-rTMS session, psychophysiological reactions while processing withdrawal-related stimuli decrease. The increased neuronal activity while processing of positively valenced baby faces might reflect enhanced task-related processing caused by the neuronal activation of the left DLPFC, which could indicate that females are more able to empathize with the depicted happy baby faces. Our results add further evidence as to why HF-rTMS applied to the left DLPFC might improve mood in depressive populations.