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ENHANCED MIND-MATTER INTERACTIONS FOLLOWING rTMS INDUCED FRONTAL LOBE INHIBITION: A NOVEL NEUROBIOLOGICAL APPROACH TO PSI RESEARCH

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Grant 210/18

Background: While psi is a subject of intense debate, it is reasonable to postulate that putative effects involving these phenomena must involve the brain. Building on this premise, we devised a novel neurobiological model of psi which posits that the frontal lobes of the brain act as a filter to inhibit psi. In support of this model, our initial studies showed significant psi effects as measured by mind-matter interactions in individuals with brain damage in the left medial middle frontal lobe involving Brodmann areas 9, 10, and 32. However, our data were based on only 2 cases.

Aims: To determine, using rTMS, whether the left medial middle frontal region of the brain acts as a filter to inhibit psi as measured by mind-matter interactions.

Method: We studied 3 groups of healthy participants (n=36 per group; total 108): rTMS induced lesions in left medial middle frontal region, rTMS induced lesions in right medial middle frontal region, and sham stimulation. A protocol of rTMS, known as continuous theta burst stimulation (cTBS), was used to reduce cortical excitability with an effect lasting about 20 to 30 minutes. cTBS was delivered to the left or right medial middle frontal region, targeting Brodmann areas 9, 10, and 32. The experimental task was to influence the numerical output of a portable Random Event Generator. The output was translated into movement of an arrow on a computer screen to the right or left. Participants were asked to concentrate on moving the arrow to the right or left. The arrow pointed in the direction that they were asked to move it. The arrow tip started at the midline.

Results: In support of our *a priori* hypothesis, we found significant psi effects following rTMS inhibition of the left medial middle frontal lobe compared to sham stimulation when participants tried to move the arrow on the computer screen to the right [$\beta = -0.17$, 95% CI: (-0.29, -0.05), $t = -2.80$, $p = 0.006$, $d = 0.38$]. * β = parameter estimate; d = Cohen's d (effect size)

Conclusions: Our study marks the *third replication* by our research team and suggests that the left medial middle frontal region of the brain acts as a filter to inhibit psi. Our results also suggest that individuals with left frontal lesions may represent an enriched sample for detection and replication of psi effects. The implications of our work have the

potential to reshape our understanding of the relation between the brain and seemingly random events.

Keywords: Frontal lobes, Mind-matter interactions, Repetitive transcranial magnetic stimulation, Psi, Parapsychology

Publications:

Freedman, M., Binns, M. A., Meltzer, J. A., Hashimi, R., & Chen, R. (2023). Enhanced mind-matter interactions following rTMS induced frontal lobe inhibition. *Cortex*, S0010-9452(23)00273-3. Advance online publication.
<https://doi.org/10.1016/j.cortex.2023.10.016>

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