

Using targeted brain stimulation to change attention patterns for anxious individuals

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Transcranial direct current stimulation (tDCS) is a painless treatment strategy that uses weak electrical currents to deliver targeted stimulation to the brain via electrodes placed on the scalp. tDCS has shown promise in treating mood, anxiety, cognition, and some symptoms of Parkinson's disease.

A new study published in the current issue of *Biological Psychiatry* now shows that using tDCS to target the [dorsolateral prefrontal cortex](#), a brain region involved in the control of attention, improves the ability of [healthy volunteers](#) to modify their attention to threat.

Individuals with anxiety have a tendency to pay greater attention to threatening stimuli in their environment. In other words, they have a bias towards threatening information that contributes to their higher levels of anxiety.

In addition to pharmacotherapy, [cognitive training](#) techniques are also used to treat anxiety. One of these techniques, called attention bias modification or ABM, specifically targets this pattern of bias.

Thus, it seems reasonable to hypothesize that neurostimulation targeted at an attention-controlling region of the brain would increase the effectiveness of ABM.

Researchers led by first author Dr. Patrick Clarke, at the University of Western Australia, tested this theory. A total of 77 healthy volunteers

received either active tDCS or sham stimulation while completing an ABM task where they were specifically instructed to either attend to or avoid threat.

Compared with those who received sham stimulation, the healthy volunteers who received active stimulation showed greater modification of their attention bias in the direction encouraged by the training.

This study provides evidence that the agent of therapeutic action in ABM interventions can be enhanced via targeted neurostimulation.

"Specifically, it shows how neuroimaging findings can identify appropriate targets for the therapeutic application of neurostimulation, which serves to increase the efficacy of clinical interventions in ways likely to improve patient treatment," Clarke explained.

Dr. John Krystal, Editor of Biological Psychiatry, commented, "The neurobiology underlying tDCS is still being worked out, but this study suggests that one way it may advance treatment is to increase neuroplasticity and promote the efficacy of cognitive training."

Clarke agrees and added, "The results of this study hold direct implications for improving the clinical outcomes delivered by ABM interventions, for individuals with emotional pathology and for those suffering from other conditions that reflect maladaptive patterns of selective attention."

The next steps are to test the combined effectiveness of tDCS and ABM on symptoms in a clinically anxious population. Thus, although future research is necessary before clinical application, the results are encouraging.

More information: "The Causal Role of the Dorsolateral Prefrontal

Cortex in the Modification of Attentional Bias: Evidence from Transcranial Direct Current Stimulation" by Patrick J.F. Clarke, Michael Browning, Geoff Hammond, Lies Notebaert, and Colin MacLeod ([DOI: 10.1016/j.biopsych.2014.03.003](https://doi.org/10.1016/j.biopsych.2014.03.003)). The article appears in *Biological Psychiatry*, Volume 76, Issue 12 (December 15, 2014)

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