

Researchers supercharge brain stimulation by repurposing an antibiotic

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University of Calgary researchers have shown that the antibiotic D-Cycloserine (DCS) increases the effectiveness of transcranial magnetic stimulation (TMS) for people with major depressive disorder (MDD). TMS is a non-invasive, well-recognized therapy for people who have treatment resistant depression. Even so, it doesn't work for everyone.

Researchers suspect the problem may be connected to a process in the brain essential for learning and memory.

"We think TMS works by driving the brain to adapt to stimulation through a process called [synaptic plasticity](#)," explains Dr. Alexander McGirr, MD, Ph.D., principal investigator on the study. "One of the challenges, however, is that [major depression](#) is associated with reduced synaptic plasticity, and so TMS may be asking the depressed brain to adapt to stimulation in a way that it can not readily do. Adding D-Cycloserine to the TMS treatment appears to enhance TMS's ability to drive synaptic plasticity and treat depression."

All participants in the study underwent TMS every day for four weeks. Half of those also received DCS while the other half received a placebo. Results, published in *JAMA Psychiatry*, show that almost 75 percent of participants treated with DCS and TMS benefitted, compared to only 30 percent of those treated with TMS and a placebo. Depressive symptom severity was measured using the gold standard [Montgomery Asberg Depression Rating Scale](#).

"The combination treatment seemed to have benefits beyond [depressive symptoms](#). The participants in this study that received DCS and TMS also had greater improvements in their symptoms of anxiety and overall well-being," says study first author Jaeden Cole a member of the McGirr lab.

The clinical trial involved 50 people. McGirr's team plans to duplicate the research method with a larger group to be sure of the clinical efficacy and safety of this experimental treatment.

"It is hard to convey how important this work could be for patients or the level of excitement that has been brewing since Dr. McGirr first presented these results," says Dr. Valerie Taylor, MD, Ph.D., head of the

Department of Psychiatry at the Cumming School of Medicine. "If confirmed, this could change practice and have a very significant impact on patients' treatment outcomes."

DCS is still used in the treatment of multidrug resistant tuberculosis and has been researched in other psychiatric applications such as trauma, and anxiety-related disorders. While the drug is not currently available in Canada, McGirr believes additional research proving the benefit of this combined therapy could pave the way for the drug's reintroduction here.

More information: Jaeden Cole et al, Efficacy of Adjunctive D-Cycloserine to Intermittent Theta-Burst Stimulation for Major Depressive Disorder, *JAMA Psychiatry* (2022). [DOI: 10.1001/jamapsychiatry.2022.3255](https://doi.org/10.1001/jamapsychiatry.2022.3255)

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