

# Scientists show how magnetic pulses change the brain in treatment for depressed patients

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A group of UK scientists have found a way of understanding how transcranial magnetic stimulation (TMS) can give relief to severely depressed patients. TMS is used as an alternative to Electro-Convulsive Therapy (ECT), but it is not known how it achieves its therapeutic effect. Understanding how it works may open the door to better, more targeted treatment for depression and other conditions.

Transcranial magnetic stimulation works by applying a magnetic pulse to the frontal part of the brain of [depressed patients](#). Like ECT, it seems to 'reset' the brain, but is easier to use because it does not require an anaesthetic, and has few side effects. Because of this, it is increasingly used in [treatment](#) of [depression](#). However, TMS, like ECT, is something of a blunt instrument, as scientists have limited idea how it works. Now a new study has shown that targeted magnetic pulses causes biochemical and connectivity changes across the brain.

In a placebo-controlled study, researchers from the University of Nottingham applied MRI-guided targeted bursts of magnetic pulses to the dorsolateral prefrontal cortex in the brains of 27 healthy volunteers . This is the first time that MRI-guided TMS pulses have been used to look at changes in individual brain networks and brain chemistry. Using the same MRI scanner, they were able to measure the subtle functional changes in the brain caused by the [magnetic pulses](#). They were also able to measure the changes in brain chemistry, using magnetic resonance spectroscopy

Lead researcher Dr Sarina Iwabuchi (Nottingham) said: "We found that one session of TMS modifies the connectivity of large-scale brain networks, particularly the right anterior insula, which is a key area in depression. We also found that TMS alters concentrations of neurotransmitters, such as GABA, which are considered important for the development of depression."

These results mean that for the first time, we have an understanding of the direct effects TMS has on the brain. If we can see the change caused by the treatment, then treatment can be smarter. It also means that treatment can be better tailored to each individual's brain; in other words, this could be personalised treatment for depression.

The work presented in Amsterdam describes a healthy control study. It has shown that personalised TMS treatment is possible, and does indeed lead to brain changes. The next step is to use it as a practical treatment for patients with depression in a clinical trial setting, and in fact this trial is now underway in Nottingham. These are the first steps to personalising this treatment."

Commenting for the ECNP, Professor Catherine Harmer (Oxford) said: "These findings are an exciting step in understanding how targeting the [brain](#) directly with [magnetic stimulation](#) may exert beneficial effects in the treatment of depression. TMS techniques are still evolving and their efficacy in treating depression remains to be fully validated and optimized. This kind of experimental medicine study is therefore essential for the improved personalization and treatment of depression in the future."

Provided by European College of Neuropsychopharmacology

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