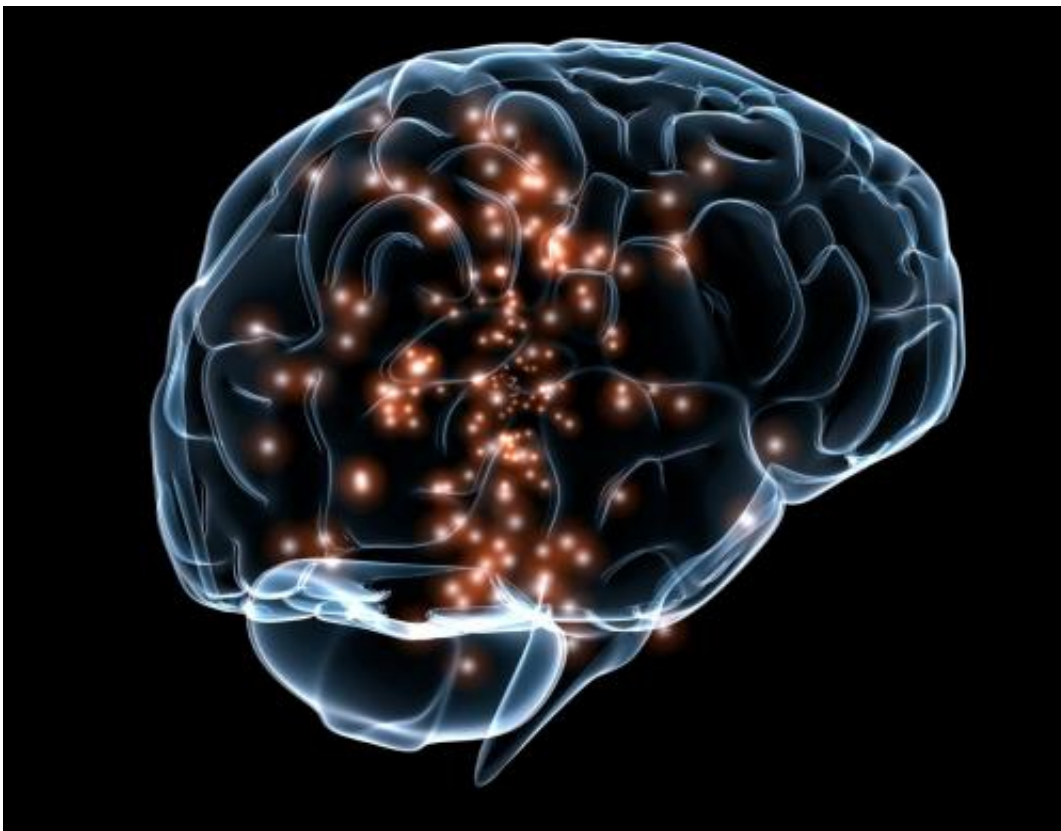


# Twice daily electrical stimulation may boost mental processes in Alzheimer's disease, clinical trial suggests

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Credit: Wikimedia Commons

Twice daily non-invasive electrical stimulation of the brain may boost mental processes (cognitive function) in people with Alzheimer's disease, suggest the results of a small clinical trial published online in the

open access journal *General Psychiatry*.

The technology, known as [transcranial direct current stimulation](#), or tDCS for short, may help to fire up the brain's plasticity, enabling 'rewiring' through the formation of new neural networks, the findings suggest.

tDCS comes in the form of a device with two electrodes, placed over specific areas of a person's head, which deliver a constant low-intensity electrical current. It is starting to be used in many areas of medicine, including for the treatment of depression.

The researchers wanted to find out if tDCS might improve cognitive function in people with Alzheimer's disease, and if so, whether this might be linked to their recovering some level of cortical plasticity—the brain's capacity to form new neural networks.

Some 140 patients with mild to moderate Alzheimer's disease from four different hospitals were randomly allocated to receive either two daily sessions of active (constant low intensity 1–2 mA current) or sham tDCS, for five days of the week for a maximum period of six weeks.

The currents were applied to the [prefrontal cortex](#), the region of the brain involved in higher-order activities, such as planning, decision-making, working memory, moderating social behaviors, and controlling certain aspects of speech and language.

Participants were all aged over 65, had had their disease for more than six months, and had all scored below 26 on the Mini-Mental State Exam (MMSE). A score of 24 is regarded as abnormal and indicative of [cognitive impairment](#). Both groups were comparable in terms of age, sex, and educational attainment.

The MMSE and the Alzheimer's Disease Assessment Scale-Cognitive (ADAS-Cog) Test, which focuses on language and memory, were used to evaluate cognitive performance at the start of the trial, after two weeks, and again after six weeks.

Readings of electrical signaling through the motor pathways of the nervous system, known as motor evoked potential or MEP, were used to indicate changes in neural plasticity.

In all, 133 patients completed the two-week intervention and 124 completed the six-week intervention. Reasons for withdrawal varied, but no one withdrew because of discomfort.

The results showed that after two weeks there was no change in either group, but compared with baseline, 30 daily 20-minute sessions of tDCS significantly improved the cognitive function of those in the tDCS group, particularly their word recall, recall of test instructions, and word recognition. No such improvements were seen in the sham group.

The results also showed that in people with Alzheimer's disease cortical plasticity is impaired, but that this improved after six weeks of tDCS.

In tandem with a decrease in MEP, word recall and word recognition got better among those in the tDCS group, but not among those in the sham group, suggesting that the improvement in cortical plasticity may reflect the degree of cognitive improvement, say the researchers.

But it's still not clear how tDCS might exert its effects, they add, citing previous research, indicating that the technology may alter ion activity, neurotransmitter release, and [electrical activity](#) in various areas of the brain.

The researchers acknowledge various limitations to their findings,

including the small study size, the lack of MRI or electroencephalography scans to chart changes in [brain structure](#), and the absence of cerebrospinal fluid and [blood samples](#) to monitor neurotransmitter changes.

But they nevertheless conclude, "The results of this study strongly indicate that tDCS treatment is a significant and promising intervention for improving cognitive function in [Alzheimer's disease]. In addition, plasticity plays a vital role in cognitive change."

**More information:** Impact of twice-a-day transcranial direct current stimulation intervention on cognitive function and motor cortex plasticity in patients with Alzheimer's disease, *General Psychiatry* (2023). [DOI: 10.1136/gpsych-2023-101166](https://doi.org/10.1136/gpsych-2023-101166)

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