

# Advances in brain region targeting may support research in treating visual hallucinations in psychiatric patients

May 13 2022

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A literature review in *Harvard Review of Psychiatry* indicates that, while transcranial electrical stimulation (tES) has rarely been used in treating

visual hallucinations (VH) among patients with psychiatric disorders, recent advances in neuroimaging technology show promise in helping tES to more effectively treat VH in psychiatric disorders where VH are a core symptom.

tES is a non-invasive brain stimulation (NIBS) technique that delivers a weak direct or alternating electric current via electrodes placed on the scalp. Nowadays, modern tES devices are equipped with smaller electrodes that can be affixed to more spots on the cranium and provide a more targeted approach to neural network manipulation, enhancing reliability and reproducibility. "Neuroimaging advances, clinical neuroscience developments such as the identification of brain regions causally involved in VH, and personalized NIBS approaches that improve anatomical targeting" may provide a sound foundation for subsequent research on using VH, according to Paulo Lizano, MD, Ph.D., Beth Israel Deaconess Medical Center, in a Perspectives article published in the May/June issue of the *Harvard Review of Psychiatry*.

## **More accurate anatomical measurements lead to better targeting of brain areas that impact visual function.**

Although tES has been shown to improve anxiety and bipolar depression, as well as auditory hallucinations and cognition in schizophrenia, few tES trials on VH have been performed with psychiatric populations or with patients with neurological disorders such as Parkinson's disease, Lewy body dementia, stroke, brain tumors, seizures, or migraines. Currently, antipsychotic, anti-serotonergic, or anti-cholinergic medications are the most common form of treatment for VH in many neuropsychiatric disorders, but there are often not sufficient for targeting VH symptoms.

One case study that Lizano and his co-authors identified during their review as relevant to informing future research involves a 26-year-old female with a ten-year history of recurrent major depressive episodes who experienced daily complex, burdensome VH. After receiving twice-daily transcranial direction current stimulation (tDCS), a form of tES, for five days, she no longer experienced continuous VH, and the most intrusive hallucinations no longer occurred. A 31-year-old male with schizophrenia experiencing refractory VH underwent a three-week tDCS regimen, resulting in a 29% reduction in general, 38% reduction in positive, and 27% reduction in negative, symptoms. However, a clinical trial of Lewy body dementia patients who were treated with tDCS over a four-day period exhibited no reduction in the severity of duration of VH. It's important to note that large-scale clinical trials have yet to be conducted in patients experiencing VH.

Despite the dearth of studies in the literature, recent advances in neuroimaging technology suggest that future studies can implicate a causal relationship between tES and VH treatment. Improvements in scalp-based targeting offers potential for application in NIBS trials involving VH. Lesion network mapping (LNM) studies that specifically identify targets to the [visual cortex](#) may also help.

In addition, individualized modeling techniques and advanced electrical field modeling, though still in their infancy, are a logical next step for larger tES investigations targeting brain regions implicating VH in psychiatric patients. Other promising tES techniques include modulating the retina or [optic nerve](#).

These techniques, combined with meaningful clinical interviews and simulations of behavioral, sensory, and cognitive tasks, can create a "unique multimodal neuroimaging-NIBS approach" to anatomical targeting that can improve how researchers influence visual activity and deliver more effective treatment for psychiatric patients with visual

hallucinations.

**More information:** Nicolas Raymond et al, An Integrated Neuroimaging Approach to Inform Transcranial Electrical Stimulation Targeting in Visual Hallucinations, *Harvard Review of Psychiatry* (2022). [DOI: 10.1097/HRP.0000000000000336](https://doi.org/10.1097/HRP.0000000000000336)

Provided by Wolters Kluwer Health

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