

Improving Visual Hallucinations by Targeting the Visual Cortex with Electrical Stimulation

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The visual system has increasingly been recognized as an important site of pathology in patients with schizophrenia and other psychoses. Visual system impairments manifest as visual perceptual aberrations, deficits in visual processing, and visual hallucinations. These visual symptoms are associated with worse behavioral indicators, poorer outcome and treatment refractoriness. A recent study using lesion network mapping of visual hallucinations identified a causal location in the extrastriate visual cortex, and the association between extrastriate visual cortex activation and visual hallucinations would suggest that this region should be modulated with noninvasive brain stimulation. Two case studies have found that transcranial direct current stimulation of the prefrontal and occipital cortex improved visual hallucinations in treatment refractory patients with psychosis. While promising it is unclear whether the symptom reductions resulted from activity changes in the visual cortex or not. Here we aim to answer the question whether high definition transcranial direct current stimulation when optimally targeted to a specific brain region (extrastriate visual cortex) can engage the target (steady state and emotional visual evoked potentials) and improve behavioral symptoms (visual hallucinations, negative symptoms, visual processing, and cognition). The knowledge gained from this study will contribute to the field of vision by providing a biomarker for clinical response and by personalizing treatment for patients with psychosis suffering from visual symptoms. This grant will allow us to set the foundation for a larger more targeted study utilizing noninvasive brain stimulation to improve visual symptoms in patients with psychosis.