

## Enhancing Neural Connections through Music and tDCS: Insights from an fNIRS Study

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**Abstract :** Transcranial direct current stimulation (tDCS) has shown promise as a novel approach to enhance cognitive performance and provide therapeutic benefits for various brain disorders. However, the exact underlying brain mechanisms are not fully understood. We conducted a study to examine the brain's functional changes when subjected to simultaneous tDCS and music (Indian classical raga). During the study, participants in the experimental group underwent a 20-minute session of tDCS at two mA while listening to music (raga) for a duration of seven days. In contrast, the control group received a sham stimulation for two minutes at two mA over the same seven-day period. The objective was to examine whether repetitive tDCS could lead to the formation of additional functional connections between the medial prefrontal cortex (the stimulated area) and the auditory cortex in comparison to a sham stimulation group. In this study, 26 participants (5 female) underwent pre- and post-intervention scans, where changes were compared after one week of either tDCS or sham stimulation in conjunction with music. The study revealed significant effects of tDCS on functional connectivity between the stimulated area and the auditory cortex. The combination of tDCS applied over the mPFC and music resulted in newly formed connections. Based on our findings, it can be inferred that applying anodal tDCS over the mPFC enhances functional connectivity between the stimulated area and the auditory cortex when compared to the effects observed with sham stimulation.

**Keywords :** fNIRS, tDCS, neuroplasticity, music

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