

**11<sup>th</sup> Basic and Clinical Neuroscience Congress 2022**  
February 13-14, 2023  
Tehran, Iran

Count: 219

Abstract ID: 302

**subject:** Neuropsychiatry and Psychology: Mood Disorders

**Presentation Type:** Poster

## **Using Prefrontal and Midline Right and Left Frontal EEG-Derived Theta Cordance to Predict the Response to Transcranial Direct Current Stimulation in Patients with Treatment-Resistance Depression**

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**Background and Aim :** Today, due to the existence of different treatment approaches, there is an increasing need to choose the best method and predict the response to treatment in people with major depressive disorder (MDD). There is evidence that changes in electroencephalography (EEG) indexes can precede improvement in symptoms. One of these indexes is theta (4-8 Hz) cordance, which can be a biomarker of treatment effectiveness. This index indicates regional brain activity based on a combination of absolute and relative resting EEG power. There is evidence that early reduction of prefrontal (PF) and midline right frontal (MRF) theta cordance predicts response to various antidepressants.

**Methods :** This study aimed to investigate early changes (baseline to week 1) in PF, MRF and midline left frontal (MLF) theta cordance in 30 MDD patients treated with transcranial direct current stimulation (tDCS). Early changes in PF, MRF, and MLF cordance and in Beck Depression Inventory (BDI) scores were assessed alone, and in combination, to predict early treatment response.

**Results :** The results showed that the changes in PF and MLF cordance at the end of the first week after the tDCS were significantly reduced compared to the baseline. Cordance change in MRF was



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not statistically significant. The results of comparing the changes in BDI score, PF, MLF, and MRF cordances in predicting early response to tDCS, showed that the MRF cordance change is significantly different from the rest of the indexes. Therefore, this index alone cannot be an accurate predictor of early response to tDCS. Prediction treatment outcome (responder/ non-responder) based on combining early changes in theta cordance and DBI scores from baseline to week 1 (?BDI+?PF, ?BDI+?MRF, ?BDI+? MLF), all combined predictor models were statistically significant.

**Conclusion :** These results suggest that early response to tDCS may be optimally predicted by combining both EEG and symptom-based measures after one week of treatment.

**Keywords :** Electroencephalography, Major Depressive Disorder, Transcranial Direct Current Stimulation Theta Cordance