network communication. Eight depressed patients underwent three ECT sessions per week for a total of 16 sessions on average. Functional magnetic resonance imaging (fMRI) was performed before starting the therapy and once a week for four weeks to investigate functional graph theoretical measures of brain connectivity. The complex structure and function of the brain can be described as a graph which is defined as a set of nodes (brain regions) linked by edges (connections). Here we show that several regions included in default mode (DMN), cognitive control (CC) and somatomotor (SM) networks change the number of connections (degree) during four weeks of therapy. In particular, the degree of SM regions (PreCG) and CC regions (IFG, MFG) decreases from week one to week two and increases again in week three. Interestingly, these changes mostly occur between the first and the third week, suggesting that the main effect of ECT on brain connectivity takes place at the very early stages of the therapy, although the first effects on the clinical outcome emerge only later around week four. Those regions have been associated with regulation of emotion expression, language and semantic memory processing, all functions known to be affected in depression. Altogether our results are compatible with a reorganization of brain connections as a consequence of ECT.

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PreCG = Precentral Gyrus; IFG = Inferior Frontal Gyrus; MFG = Medial Frontal Gyrus

Clinical Research: 2. Electroconvulsive Therapy (ECT)

Keywords: ECT, Functional Connectivity, Graph Theory, Depression

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Abstract key: PL- Plenary talks; S- Regular symposia oral; FS- Fast-Track symposia oral; OS- On-demand symposia oral; P- Posters

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VISUO-TACTILE MIRROR PROPERTIES IN BORDERLINE PERSONALITY DISORDER: A PREREGISTERED TMS-EEG STUDY

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Abstract

Empathic abilities have been suggested to involve automatic simulation processes including mirror-like mechanisms in the somatosensory domain, within the so-called tactile mirror system (TaMS). In TaMS, the observation of a touch on one else’s body activates the same cortical network involved in tactile perception, comprising the primary somatosensory cortex (S1). As empathic abilities appear to be altered in patients with borderline personality disorder (BPD), alterations in within the TaMS have been hypothesized. In this context, the combined use of transcranial magnetic stimulation and electroencephalography (TMS-EEG) represents a promising tool to understand TaMS dynamics in terms of effective connectivity.

Here, we aim at investigating TaMS effective connectivity in 20 BPD patients and 20 healthy controls, by means of TMS-EEG. TMS is delivered over left S1 while 74-channel EEG is continuously recorded. TMS-evoked potentials (TEPs) are recorded during real touches and touch observation (visual stimuli either on a body part or on an object), with different time intervals for TMS delivery (20 ms or 150 ms after touch onset). Besides TEPs, empathic abilities and behavioral measures of TaMS functioning are also collected, and the two groups will be compared along the different measures. Hypotheses, methods and planned analyses have been preregistered on Open Science Framework before data collection to improve methodological rigor and transparency.

Preliminary results show that TEPs can be effectively recorded after S1 stimulation and TEPs components at 50 and 100 ms are consistent with previous findings on healthy subjects. Moreover, the subtraction of event-related potentials from TEPs enabled the comparison between TEPs recorded after different touch stimuli and different time intervals for TMS delivery.

Results from the present study will provide novel insights on TaMS connectivity as a putative neurophysiological candidate for BPD deficits, by means of TMS-EEG recordings.

Clinical Research: 10. Transcranial Magnetic Stimulation (TMS)

Keywords: TMS-EEG, Borderline personality disorder, mirror system, TMS-evoked potentials

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DECREASED FRONTAL GAMMA ACTIVITY IN ALZHEIMER’S DISEASE PATIENTS

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Abstract

In Alzheimer’s disease (AD) animal models, synaptic dysfunction has been recently linked to a disorder of high-frequency neuronal activity. In patients, a clear relation between AD and oscillatory activity remains elusive. Here, we attempt to shed light on this relation by using a novel approach combining transcranial magnetic stimulation and electroencephalography (TMS-EEG) to probe oscillatory activity in specific hubs of the fronto-parietal network in a sample of 60 mild-to-moderate AD patients. 60 mild-to-moderate AD patients and 21 age-matched healthy volunteers (HV) underwent three TMS-EEG sessions to assess cortical oscillations over the left dorso-lateral prefrontal cortex (l-DLPFC), the precuneus (PC) and the left posterior parietal cortex (l-PPC). To investigate the relations between oscillatory activity, cortical plasticity and cognitive decline, AD patients underwent a TMS-based neurophysiological characterization and a cognitive evaluation at baseline. The latter was repeated after 24 weeks to monitor clinical evolution.

AD patients showed a significant reduction of frontal gamma activity as compared to age-matched HV. In addition, AD patients with a more prominent decrease of frontal gamma activity showed a stronger impairment of LTP-like plasticity and a more pronounced cognitive decline at subsequent follow-up evaluation at 24 weeks. Our data provide novel evidence that frontal lobe gamma activity is damped in AD patients. The current results point to the TMS-EEG approach as a promising technique to measure individual frontal gamma activity in patients with AD. This index could represent a useful biomarker to predict disease progression and to evaluate response to novel pharmacological therapies.

Clinical Research: 10. Transcranial Magnetic Stimulation (TMS)

Keywords: TMS, EEG, Alzheimer’s Disease, Oscillations

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P2.120

DETERMINING THE TEST-RETEST RELIABILITY OF CONTROLLABLE PULSE PARAMETER TMS (CTMS) METRICS

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