(a-tDCS) when the stimulations are applied during the execution of an orientation discrimination task (ODT) (Fertonani et al., in press). But what happen when the same stimulations are applied before task execution?
The aim of this study is to understand if there is a critical timing for the application of tES to obtain the induction of neuroplasticity in the primary visual cortex. Therefore we applied hf-tRNS and a-tDCS before (offline) or during (online) a visual perceptual learning task.
70 healthy subjects participated in the experiment, divided in five groups: a-tDCS offline, a-tDCS online, hf-tRNS offline, hf-tRNS online and sham stimulation. Our results confirm that exists an ideal timing of application, depending on the type of stimulation. High frequency tRNS is efficacious only if applied during the task execution, whereas it's better to apply anodal tDCS before the task.
These results provides important indications for the designing of rehabilitation protocols, highlighting which among the two excitatory techniques is better to choose in relation to its timing of application.

55. The effects of transcranial direct current stimulation on oscillatory brain activity in vegetative state: a preliminary study

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Objectives. We based our study on 2 aspects: (i) the interest in the functional role of oscillatory brain activity in specific frequency bands and the coherence analysis between EEG traces; (ii) the increasing use of non-invasive stimulation of the human brain via transcranial direct current stimulation (tDCS). The aim of the study was to assess the potential effects of the combination of these two lines of research on a group of patients in vegetative state (VS).
Materials. Five patients in VS and 5 age-matched healthy controls received anodal tDCS over the central (C3), parietal (P3), dorso-lateral prefrontal areas (DLPF), and a sham stimulation. tDCS was applied for 20 min at 200 microA. 19 channels-EEG was recorded before and after each stimulation session.
Method. EEG was filtered between 0.5 and 30 Hz by elliptic filters. Fast Fourier Transformation was performed on 2 sec-epochs. For each stimulation site, coherence values were estimated within four frequency bands: Delta (0.5-3.5 Hz), Theta (4-7.5 Hz), Alpha (8-12.5 Hz), and Beta (13-30 Hz). Each coherence map was proportionally thresholded, preserving 50% of the strongest coherence values, to produce a weighted adjacency matrix. The estimated functional connectivity patterns were characterized by means of two global network metrics derived from graph theory: modularity and global efficiency. Modularity measures how the network is organized into modules with high level clustering. Global efficiency measures how efficient the network is in exchanging information at the global level. For each frequency band and site of effective stimulation, we performed a repeated measure analysis of variance (RMANOVA) on each graph measure, using Stimulation (Effective vs. Sham) and tDCS (Pre vs. Post) as factors.
Results. RM-ANOVA computed on modularity in the alpha frequency band revealed a significant interaction between the factors Stimulation and tDCS ($p = .035$) when applying tDCS on DLPF of healthy participants. Two paired t-tests revealed a significant increase of the network modularity (pre tDCS: $.16 \pm .007$; post tDCS: $.21 \pm .014$) when stimulating in DLPF ($p = .009$) compared to SHAM ($p = .76$). No significant effect was revealed on other frequency bands and stimulation site on both healthy participants and VS patients.
Discussion. The tDCS-related modifications of the coherence in the alpha frequencies after DLPF stimulation could indicate that the alpha range is important to transmit information between cortical areas in healthy controls. The increased modularity suggests that the coherently synchronous alpha activities can occur within different modular brain areas and appear substantially independent of one another. This mechanism seems to be lack in VS patients.
Conclusion. Our preliminary study revealed that tDCS but not sham stimulation elevates EEG alpha power and thus demonstrates the feasibility of tDCS to modulate specific oscillatory brain activity. tDCS could be considered a powerful tool for diagnosis/prognosis in altered state of consciousness.

56. A case of isolated and prolonged global aphasia: the role of EEG and FDG-PET in differential diagnosis

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The most common cause of sudden isolated and prolonged global aphasia is stroke, affecting the cortical or subcortical language network. However, an aphasic status epilepticus (ASE) has to be considered as a possible differential diagnosis in awake patients presenting with acute and prolonged language impairment. ASE is suggestive of a localized dysfunction of language processing in the domi-