Prefrontal cortex damage

Patients with prefrontal cortex damage often transgress social rules and show lower accuracy in identifying and explaining inappropriate social behavior. The objective of a study was to examine the relationship between the ability to perceive other unintentional transgressions of social norms and both decision making and emotion recognition as these abilities are critical for appropriate social behavior.

They examined a group of patients with focal prefrontal cortex damage (N = 28) and a group of matched control participants (N = 28) for their abilities to detect unintentional transgression of social norms using the “Faux-Pas” task of theory of mind, to make advantageous decisions on the Iowa gambling task, and to recognize basic emotions on the Ekman facial affect test.

The group of patients with frontal lobe damage was impaired in all of these tasks compared with control participants. Moreover, all the “Faux-Pas”, Iowa gambling, and emotion recognition tasks were significantly associated and predicted by executive measures of inhibition, flexibility, or planning. However, only measures from the Iowa gambling task were associated and predicted performance on the “Faux-Pas” task. These tasks were not associated with performance in recognition of basic emotions. These findings suggest that theory of mind, executive functions, and decision-making abilities act in an interdependent way for appropriate social behavior. However, theory of mind and emotion recognition seem to have distinct but additive effects upon social behavior. Results from VLSM analysis also corroborate these data by showing a partially overlapped prefrontal circuitry underlying these cognitive domains [1)].

Prefrontal cortex in freezing of gait in Parkinson's disease

Freezing of Gait (FOG) is one of the most debilitating Parkinsonian gait impairments, leading to increased fall risk and reduced health-related quality of life. The utility of parkinsonian medications is often limited in the case of FOG and it frequently becomes dopamine resistant.

Studies have suggested that pre-frontal cortex (PFC) dysfunction contributes to FOG; however, most previous findings provide only indirect evidence. To better understand the role of the PFC, Dagan et al., aimed to investigate the impact of high frequency, deep, repetitive transcranial magnetic stimulation (drTMS) of the medial PFC on FOG and its mediators. Nine patients with advanced PD participated in a randomized, cross-over exploratory study. We applied drTMS over the medial PFC for 16 weeks, with real and sham conditions; each condition included an intensive (i.e., 3 times a week) phase and a maintenance (once a week) phase. Scores on a FOG-provoking test, the motor part of the Unified Parkinson's Disease Rating Scale, and gait variability significantly improved after real drTMS, but not after the sham condition. Self-report of FOG severity and cognitive scores did not improve. Due to discomfort and pain during treatment, two patients dropped out and the study was halted. These initial findings support the cause-and-effect role of the pre-frontal cortex in FOG among patients with PD. Due to the small sample size, findings should be interpreted cautiously. Further studies are needed to more fully assess the role of the medial PFC in the underlying mechanism of FOG and the possibility of using non-invasive brain stimulation to modify FOG [2)].

1)
Ouerchefani R, Ouerchefani N, Ben Rejeb MR, Le Gall D. Impaired Perception of Unintentional Transgression of Social Norms after Prefrontal Cortex Damage: Relationship to Decision Making,

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2)
Dagan M, Herman T, Mirelman A, Giladi N, Hausdorff JM. The role of the prefrontal cortex in freezing of gait in Parkinson's disease: insights from a deep repetitive transcranial magnetic stimulation exploratory study. Exp Brain Res. 2017 Aug;235(8):2463-2472. doi: 10.1007/s00221-017-4981-9. Epub 2017 May 16. PubMed PMID: 28509934.