

BRIDGING THE GAP BETWEEN PHYSIO- AND PSYCHOPATHOLOGY: THE EXAMPLE OF DEEP BRAIN STIMULATION IN HUMAN-REPETITIVE BEHAVIOURS

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Deep brain stimulation (DBS) is able to target with precision specific cerebral networks, thus offering hope for severe and treatment refractory illnesses, as well as to investigate in the detail the subcortical bases. In obsessive-compulsive disorder (OCD), DBS is being tested at several nodes of a prefrontal-subcortical circuit, including the subthalamic nucleus (STN). Functional imaging studies of OCD patients have shown abnormal metabolic activity of the orbito-frontal and cingulate cortices, as well as of the anterior part of the striatum. In animal and human studies, these structures have been associated with performance-monitoring and more generally metacognitive processes, thus suggesting that metacognitive dysfunctions might be central to OCD leading to pathological doubt. In this conceptual framework of hyperactive distrust metacognitive mechanism in OCD, checking behaviour can be regarded as an ill-founded metacognitive strategy designed to restore confidence in the outcome of one's actions. Within the basal ganglia network, the STN could act a crucial part in this process regarding its role in the inhibitory control of behaviour. Moreover, anatomy and neuro-computational models of the basal ganglia show that this nucleus is in the position to implement cortical metacognitive control by increasing the threshold for decision. This framework has the advantage of providing a theoretical basis to the promising clinical results obtained for STN-DBS in severe resistant OCD. Bearing in mind this model, it can be postulated that DBS, by its action on STN, positively interferes with the neural mechanism underlying compulsive behaviour.