DYNAMIC RISK CONTROL BY HUMAN NUCLEUS ACCUMBENS

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Objectives: We studied the effects of deep-brain stimulation (DBS) of the human nucleus accumbens on decision making. Real-world decisions about reward often involve a complex counterbalance of risk and value. Although the nucleus accumbens has been implicated in the underlying neural substrate, its criticality to human behaviour remains an open question, best addressed with interventional methodology – such as DBS – that probes the behavioural consequences of focal neural modulation.

Methods: In four patients with treatment-resistant psychiatric disease, we combined a psychometric index of risky decision-making with transient electrical modulation of the nucleus accumbens.

Results: We observed profound, highly dynamic alteration of the relation between probability of reward and choice during therapeutic deep brain stimulation in all patients tested. Short-lived phasic electrical stimulation of the region of the nucleus accumbens dynamically altered risk behaviour, transiently shifting the psychometric function towards more risky decisions only for the duration of stimulation.

Conclusions: A critical, on-line role of human nucleus accumbens in dynamic risk control is thereby established.

Keywords. Decision-making, deep-brain stimulation, nucleus accumbens, risk taking

Publications: