Deep Brain Stimulation: Effects on brain circuits and neurotransmission.

https://www.neurodegenerationresearch.eu/survey/deep-brain-stimulation-effects-on-brain-circuits-and-neurotransmission/

Principal Investigators

Gitte Moos Knudsen

Institution

Rigshospitalet

Contact information of lead PI
Country

Denmark

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Research Abstract

Deep Brain Stimulation (DBS) is a surgical treatment used in medically intractable Parkinson's disease (PD), tremor and dystonia. DBS has potential to treat, e.g., Tourettes syndrome, cluster headache, depression and addiction. Whereas the therapeutic effect of DBS in PD is well established the mechanism underlying its effect is still unclear. Although research initially focused on DBS effects on the dopaminergic degeneration, attention is now directed also to changes in other brain monoamine systems, particularly the serotonin (5-HT) system. Given that up to 25% of DBS-treated PD patients experience affective side effects this becomes very relevant. Positron emission tomography (PET), when used with appropriate radioligands, can

non-invasively generate information about acute changes in serotonin (5-HT) levels in the brain. Studies in non-human primates suggest that such two novel PET radioligands, the 5-HT1B receptor ligand 11C-AZ10419369 and the 5-HT2A receptor agonist compound 11C-Cimbi36, are sensitive to endogenous 5-HT release in the brain. These radiotracers will be used to investigate the regional changes in 5-HT release in response to the DBS electrode being turned on or off. We here propose, in the pig brain, first to calibrate the brain PET-signal by measurements of 5-HT levels and microdialysis under various pharmacological challenges. Next, with simultaneous MR-PET we will investigate the effects on 5-HT and brain network with DBS electrode placement in three separate brain regions of relevance for DBS therapy. Finally, we will investigate DBS-operated PD patients to map the changes in 5-HT in response to the DBS electrode being turned on or off, and relate that to associated changes in the mood. Understanding the effects of DBS on relevant brain targets may facilitate to improve medical therapy of , e.g., depression or substance abuse and support the transition of DBS-treatment to patients with such disorders.

Further information available at:

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