The influence of deep brain stimulation on reward-based selective attention

Published: 24-07-2013
Last updated: 24-04-2024

The main goal of this study is to investigate the influence of STN DBS on the cognitive processes of reward processing and selective visual attention.

Ethical review	Not approved
Status	Will not start
Health condition type	Movement disorders (incl parkinsonism)
Study type	Observational non invasive

Summary

ID

NL-OMON38702

Source
ToetsingOnline

Brief title
DBS and selective attention

Condition

- Movement disorders (incl parkinsonism)

Synonym
attention, reward sensitivity

Research involving
Human

Sponsors and support

Primary sponsor: Academisch Medisch Centrum
Source(s) of monetary or material Support: Ministerie van OC&W,KNAW,ERC-2012-AdG - 323413_REWARDVIEW: What you get is what you see: How Reward Determines Perception (PI: Jan Theeuwes)

Intervention

Keyword: attention, deep brain stimulation, reward

Outcome measures

Primary outcome

Main parameters of interest are the reaction time differences in the visual search tasks, and alterations of perceived stimulus presentation onset. Both can be used as a measure to indicate the degree of influence of DBS on reward processing and selective attention. Previous and ongoing studies on healthy observers in our groups show a beneficial effect of monetary reward on reaction times in visual search tasks (Hickey et al. 2010) and perceived stimulus onset in the simultaneity judgement task. In the present study we aim to test both whether DBS changes these effects of monetary reward and whether stimulation could actually replace the monetary reward as source for the observed influence on selective attention.

Secondary outcome

not applicable

Study description

Background summary

Subthalamic nucleus (STN) deep brain stimulation (DBS) is an effective therapy for the motor manifestations of Parkinson*s disease (PD; Lozano and Lipsman, 2013). In DBS procedures stimulation electrodes are surgically placed directly inside the brain and continuous high frequency stimulation is delivered via an implanted pulse generator that can be programmed externally. Modulating the pathological motor circuits with DBS in PD may produce significant benefits but the precise mechanisms underlying the beneficial effects of DBS are not well understood. Mechanisms of action may reflect differences in the

microenvironment surrounding the DBS electrodes or more remote neural components. DBS does not only alleviate clinical symptoms, but also probes the function of related brain circuits. Several studies have shown non-symptomatic beneficial effects of DBS in patients treated with DBS, such as improvements in psychomotor functions, working memory, probabilistic learning and response inhibition (Coulthard et al., 2012; Frank et al. 2007;van den Wildenberg et al., 2006; van Wouwe et al. 2011; Wilkinson et al., 2011). In order to understand these mechanisms it is important to have a better idea of the non-symptomatic effects of stimulation.

Study objective

The main goal of this study is to investigate the influence of STN DBS on the cognitive processes of reward processing and selective visual attention.

Study design

The study is a cross sectional, double blind study. We will use a within subject design, in which patients will act as their own controls (DBS ON/OFF).We will conduct the experiments in separate blocks, lasting in total 2.5 hours. All tasks that we intend to use in this patient study have already been conducted by healthy observers, revealing clear effects of reward on the distribution of visual attention. We will first repeat the basic experiment in the DBS patients in the absence of stimulation to obtain a baseline measure of the effect shown in the healthy observers. We well then move on to test the impact of stimulation on the underlying reward-based attention mechanisms.

Study burden and risks

The burden for the patients will consist of visiting the AMC to conduct visual search and simultaneity judgment tasks for 2.5 hours.Subjects will have to withhold from the PD medication 12 hours (the night) prior to the experiment. To our knowledge, there will be no additional risks associated with our experiments. Participating patients will not benefit directly from the experiments. They will, however, contribute to the extension of knowledge about deep brain stimulation in future patients. In addition, they will help to improve understanding of reward processing in the human brain.

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

Written informed consent, Patients implanted with a DBS device for the treatment of Parkinson*s, Age > 18 years, Patients with bilateral electrode implants will only be included if the stimulation can be generated by one external pulse generator (Kinetra, ActivaPC, or ActivaRC), Therapeutic stimulation parameters should be such that the patient does not directly feel the stimulation pulses and thus can be blinded to the stimulation ON/OFF condition, Symptoms do not immediately reoccur when Stimulation is turned off, absence of dementia or major psychiatric illness, patients have to withhold from their PD medication 12 h prior to the experiment.

Exclusion criteria

I- Inability to turn off the stimulator for the duration of the experiment on clinical grounds
- Color blindness

Study design

Design

Study type:	Observational non invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)
Control:	Active
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Will not start
Enrollment:	22
Type:	Anticipated

Ethics review

Not approved

Date:	24-07-2013
Application type:	First submission
Review commission:	METC Amsterdam UMC

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL44259.018.13