Left prefrontal activity and the voluntary control of social emotional behaviour

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Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Other condition
Study type	Interventional

Summary

ID

NL-OMON35035

Source
ToetsingOnline

Brief title
The PFC and the control of social motivational behaviour

Condition

- Other condition

Synonym
not applicable

Health condition

niet van toepassing

Research involving
Human

Sponsors and support

Primary sponsor: Radboud Universiteit Nijmegen
Source(s) of monetary or material Support: VIDI-subsidie van Dr. K. Roelofs

Intervention

Keyword: Approach-avoidance, Left prefrontal cortex, Social emotional behaviour, Theta-burst stimulation

Outcome measures

Primary outcome

Reaction times and error rates on the approach-avoidance task will be used to

test whether the congruency effect in the cTBS condition applied over the vlPFC

is larger than in the other TMS conditions.

Secondary outcome

Aarterial spin labelling during task performance is used to investigate the

effects of the different TMS conditions on cerebral blood flow. Moreover,

hormonal levels of cortisol and testosterone are measured in order to control

for differences in performance on the approach-avoidance-task between subjects.

Study description

Background summary

The left ventrolateral prefrontal cortex (vlPFC) is found to be involved in the control of social emotional behaviour. This social emotional behaviour could be quantified by means of the approach-avoidance (AA) task, in which happy or angry facial expressions should be either approached or avoided by pulling or pushing a joystick, respectively. It is found that people are more likely to approach positive and to avoid negative facial expressions (affect-congruent condition). In the affect-incongruent condition (i.e. avoid positive and approach negative faces), on the other hand, reaction times are found to be longer because the automatic emotional tendencies have to be suppressed (the so-called congruency effect). The aim of this project is to investigate whether

activity of the vlPFC is crucial for the control of social emotional behaviour. In order to infer a causal relationship, Trancranial Magnetic Stimulation (TMS) will be applied over the vlPFC. We hypothesize that the congruency effect will increase after inhibition of the left vlPFC.

Study objective

The aim of this study is to investigate whether the vlPFC is crucially involved in the voluntary control of social emotional behaviour. Presumably, the congruency effect will be larger (i.e. higher reaction times in the incongruent condition) on the approach-avoidance task after inhibition of the left vlPFC by TMS. This finding would indicate a crucial role for the vlPFC in overruling automatic emotional tendencies.
In previous studies, endogenous testosterone and cortisol were found to modulate social emotional behaviour. Therefore, hormonal measures will be taken into account. We expect to find a positive correlation between cortisol and the congruency effect and a negative correlation between testosterone and the congruency effect.
Furthermore, to investigate (and control for) the influence of TMS on cerebral blood flow, Arterial Spin Labeling (ASL) will be performed. By means of this technique, it is possible to magnetically label the blood supply to the region of interest (PFC), which gives an indication of the cerebral blood flow in the specific region. We expect to measure less cerebral blood flow in the left vlPFC after inhibition with TMS.

Study design

The study will consist of four sessions, each separated by approximately a week. During the first session, the motor threshold (MT) will be determined (to determine the stimulation intensity in the later TMS-sessions) and a structural MRI-scan will be made (in order to localize the TMS coil on the left vlPFC in the other TMS-sessions). Furthermore, during this first session, a short cTBS protocol (20 sec.) will be applied on the vlPFC at a low intensity (80% of aMT). By this means, subjects will be allowed to indicate whether they would like to proceed with the experiment. In the other three sessions, an off-line TMS-protocol will be used in which Theta Burst Stimulation (TBS) or repetitive TMS (5 Hz.) will be administered. In order to control for the effects of TMS on the cerebral blood flow, subjects will perform the AA-task during the measurement of ASL. Moreover, because endogenous testosterone and cortisol were found to influence approach-avoidance behaviour, these hormones will also be taken into account.

Intervention

All participants will receive two different theta-burst stimulations of 600 pulses and one repetitive TMS (5Hz.) of 200 pulses at 80% of active motor

threshold on three different sessions:
1. Continuous TBS (inhibition) over the vlPFC (experimental intervention).
2. Repetitive TMS (5Hz.) over the vlPFC (to control for stimulation).
3. Continuous TBS over the vertex (to control for site).

All TMS protocols will take 40 sec.

Study burden and risks

TMS is not painful at the level of intensity used in this project (i.e. 80% of active motor threshold). From the previous literature we know that, in rare cases, subjects could report a (light) headache, which could be treated easily with paracetamol. On the basis of incidental epileptic seizures triggered by TMS in early 90*s, safety-guidelines were established to set up the maximum duration of TMS stimulation (Wassermann, 1998). Therefore, our protocols will follow these safety TMS guidelines. Furthermore, all subjects will be pre-screened for relevant medical history, drug abuse, head trauma, neurological or psychiatric illness, pregnancy, heart disease, cardiac pacemakers, medication pumps, tricyclic antidepressants, neuroleptics, family history of neurological illness, psychiatric illness or epilepsy. Because the risk associated with participation can be considered negligible and the burden can be considered minimal, we do not expect adverse events during the project.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

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

Inclusion criteria

Healthy, right-handed males aged 18-35 years. All subjects will have normal or corrected-to-normal vision.

Exclusion criteria

Contra-indications for TMS and fMRI: drug abuse, head trauma, neurological or psychiatric illness, pregnancy, heart disease, claustrophobia, cardiac pacemakers, metal objects in the body, medication pumps, tricyclic antidepressants, neuroleptics and a family history of neurological illness, psychiatric illness or epilepsy.

Study design

Design

Study type: Interventional

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	29-03-2010
Enrollment:	40

Type:	Actual

Ethics review

Approved WMO Date:	23-03-2010
Application type:	First submission
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)

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	NL29916.091.09