The role of stress and dopamine in habitual behaviour

No registrations found.

Ethical review	Not applicable
Status	Pending
Health condition type	-
Study type	Observational non invasive

Summary

ID

NL-OMON20107

Source
NTR

Brief title
DoSIS

Health condition

This concerns a study in healthy volunteers aiming to study a mechanism driving behaviour.

Sponsors and support

Primary sponsor: Maastricht University
Source(s) of monetary or material Support: NWO

Intervention

Outcome measures

Primary outcome

behavioural performance on an instrumental learning task and functional connectivity measures derived from fMRI data.

Secondary outcome

behavioural inhibitory control and unconscious learning measures. Endocrine stress markers.

Study description

Background summary

Stress is omnipresent in our modern society. Our psychophysiological responses to stress, generally serve adaptive purposes such as promoting the use of simple but fast habits over complex goal-directed behaviour. Nevertheless, such a preference for habitual behaviour under stress may, in vulnerable individuals, constitute a risk factor for psychopathology. For example, stress often precedes emotional eating and binge eating episodes, and is reported by people with a substance addiction as a primary reason for relapsing. Unfortunately, not much is known about the neural mechanism of this stress induced shift towards the use of habits. We do know that different neural circuits govern automatic (amygdala, posterior lateral putamen) and goal-directed (medial striatum, orbitofrontal cortex) behaviour. In addition, dopamine has been shown to play an important role in addictive behaviour, pleasure and reward. What is currently unknown is whether stress and dopamine activity can modulate communication in the habitual- and goal-directed behaviour neural substrates.

The main objective of the present study is to determine the role of dopamine and stress in functional connectivity in neural substrates for habitual- and goal-directed behaviour and their effects in subsequent behaviour.

The study is a 2x2 (drug*stress) between volunteers, partially double blind (only for drug manipulation) experiment. Participants will receive either a single oral dose of methylphenidate 40mg or placebo, and will experience an incidence of stress induction or a no-stress control manipulation.

A maximum of 120 young healthy volunteers will be recruited (N=100; 25 per group; plus drop-out of 20max.). Volunteers will undergo a full medical screening to ensure their safety.

Main dependent variables are the fMRI measure of functional connectivity between the medial aspect of the striatum (i.e. caudate) and the orbitofrontal cortex, and between the amygdala and lateral putamen, and the performance on an instrumental learning task. Additional dependent variables are the neuroendocrine stress markers (cortisol and salivary alpha-amylase), and performance on two impulsivity tasks.

Participants will visit our facilities twice. The first visit entails a full medical screening by a licenced physician ensuring their safety, which will include taking a blood sample through venipuncture and making an electrocardiogram. The second visit will consist of (1) taking study treatments (methylphenidate 40 mg or placebo), (2) undergo a stress manipulation or a control manipulation, (3) taking saliva samples, and (4) filling out questionnaires and doing computer tasks inside and outside the magnetic resonance scanner (time in MRI scanner is max. 60 minutes). During the periods that they are not tested (breaks), they will be seated in

a waiting room where they will be in close contact with one of the researchers. In case they experience (medical) complaints, the medical supervisor will be contacted. The total discomfort experienced by the volunteer is minimal when all precautions are taken into account. Most important precautions are: determining the absence any mental or physical disorder that may interact with methylphenidate, and having volunteers experience lying inside a dummy scanner. Blood samples will be taken by an experienced member of our team. Finally, the stress manipulation has been shown to be well tolerated.

Study objective

Acute stress and increased levels of dopamine in the brain will lead to a shift from goal-directed behaviour to habitual behaviour. The shift will coincide with a change in functional connectivity between brain areas governing goal-direct and habitual behaviour.

Study design

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Intervention

methylphenidate and acute stress

Contacts

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Eligibility criteria

Inclusion criteria

- good physical and mental health as determined by medical history and medical examination, ECG and laboratory examination;

- BMI between 18 and 25 m2/kg;

- written informed consent;

- age between 18-35 (inclusive)

- educational level: at least having finished secondary school

Exclusion criteria

- pregnancy or lactation, or plans to get pregnant in the near future;

- cardiovascular abnormalities as assessed by standard ECG;

- excessive alcohol use, defined as drinking more than 21 glasses of alcohol per week;

- history of drug abuse or addiction;

- hypertension (diastolic> 90; systolic> 140);

- history of psychiatric and neurological disorders

- current use of psychoactive medication or medication known to affect stress responding (e.g., beta-blockers; for women, the use of oral contraceptives is allowed).

- Contraindications to methylphenidate.

Study design

Design

Study type: Observational non invasive

Intervention model:	Parallel
Allocation:	Randomized controlled trial
Masking:	Double blinded (masking used)
Control:	Placebo

Recruitment

NL

Recruitment status:	Pending
Start date (anticipated):	01-09-2016
Enrollment:	100
Type:	Anticipated

Ethics review

Not applicable

Application type:	Not applicable

Study registrations

Followed up by the following (possibly more current) registration

ID: 47481
Bron: ToetsingOnline
Titel:

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

No registrations found.

In other registers

Register	ID
NTR-new	NL5811
NTR-old	NTR5966
CCMO	NL57634.068.16
OMON	NL-OMON47481

Study results