Anticipation of coming events in Parkinson*s Disease and Friedreich Ataxia: is timing more disturbed than spatial prediction?

Published: 29-01-2007
Last updated: 10-05-2024

Is time prediction of a future event specifically disturbed, compared to spatial prediction, in PD and FA, when compared to age-matched control subjects? Do the 2 patient groups differ from each other?

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Movement disorders (incl parkinsonism)
Study type	Observational non invasive

Summary

ID

NL-OMON30538

Source
ToetsingOnline

Brief title
timing and spatial prediction patients

Condition

- Movement disorders (incl parkinsonism)

Synonym
movement disorders

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Groningen

Source(s) of monetary or material Support: Ministerie van OC&W,universiteitsfonds op basis van partikuliere donatie

Intervention

Keyword: anticipation, cerebellum, movement disorders, timing

Outcome measures

Primary outcome

Data analysis concerning the differences between timing and place prediction within and between groups will be performed with statistical programs (MS Excel, SPSS). Reaction times, responses rates, subject descriptives and questionnaire answers will be used for analysis. Differences between the performance in spatial and temporal conditions between patients and controls will be obtained by using a two way ANOVA analysis. Further analyses between groups and conditions will be performed using post hoc analyses. Co-variables e.g. age, sexe and disease severity, will be analysed using regression analysis.

External data presentation will be anonymous.

Secondary outcome

not relevant

Study description

Background summary

To catch a ball implies that the brain needs to estimate *when* that flying object is at a specific location, thus preparing the commands for the appropriate movements. In a recent fMRI study (METc 2006/082), we used a novel design that enabled contrasting the spatial and temporal characteristics of such anticipation, with identical visual stimuli, motor responses and levels of

attention. In this experiment, subjects saw a ball moving on a monitor screen. At the moment it stopped, they had to predict either where the ball would reach the bottom of the screen, or how much time it would take to reach this bottom. This study demonstrated the important role of the parietal cortex in both spatial and temporal anticipation. In timing, additional involvement was seen of pre-Supplementary Motor Area (preSMA), right prefrontal cortex and the functionally inteconnected left side of the cerebellum. Coherent activition of circuitry comprising these cerebral regions indicates that timing includes sequential ordering of previous and future spatial compositions. The contributions of preSMA and cerebellum to specifically timing, raises the question whether dysfunction of these regions leads to disturbed time prediction. In this respect, the behavioural effect of disturbed (pre)SMA function may be assumed to occur in patients with Parkinson*s Disease (PD), while the effect of cerebellar dysfunction can be tested in Friedreich Ataxia (FA).

PD is a neurodegenerative disorder characterized by resting tremor, rigidity and bradykinesia. Apart from simple movement dysfunction, additional symptoms point at deficit in more complex sensorimotor interactions and cognitive disturbances. Basal ganglia dysfunction caused by the loss of dopamine supply from the degenerating substantia nigra is a hallmark in the pathophysiology of PD. Both the reduction of dopaminergic innervations of the medial prefrontal cortex and the decreased frontal cortical outflow of the basal ganglia may explain the association with non-motor symptoms, and support the hypothesis that timing may be more affected than spatial prediction in our paradigm. FA is another slowly progressive neurodegenerative disorder dominated by the manifestation of a cerebellar syndrome. Deterioration of particularly the cerebellum is the reason to study the specificity of timing deficit (with relative sparing of spatial prediction) in this patient group.

Study objective

Is time prediction of a future event specifically disturbed, compared to spatial prediction, in PD and FA, when compared to age-matched control subjects? Do the 2 patient groups differ from each other?

Study design

Twelve PD patients, 8 FA patients and 12 age-matched healthy controls will be included. The FA and PD patients will be selected from the database of the movement disorders section our neurology department (UMCG). PD patients with intermediate disease progression will be selected, based on the unified Parkinson disease rating scale (UPDRS III), score >10, <30. (Age-matched) partners from PD patients will be asked to participate in the research as control population. The remaining healthy control subjects will be selected from a database from the neuro-imaging centre and will be asked to participate.

Handedness is documented and a Mini Mental State Examination (MMSE), lasting about 5 min, is taken to look for general cognitive ability. Subjects with neurological or ophthalmologic disease other than PD / FA will be excluded. The number of FA patients is smaller than that of PD because the disease is rare. There is no personal advantage for the subjects. Participation of the subjects takes approximately one hour, devided over two different days. In the first meeting participants will be instructed, which is at least one week before the actual experiment. They are allowed to withdraw from participation at any time. The name and address of a non involved physician (J.J. de Vries) will be given on the informed consent form.

Experimental paradigm.
Subjects will perform a psychophysical experiment on a computer. They watch the computer screen, on which a ball successively starts moving, stops and disappears from the screen. In 4 different conditions, different spatiotemporal characteristics of the moving ball need to be determined. In the first condition subjects have to indicate where the ball stopped moving, by right-hand pushing one of two buttons of a response box. In the second condition they have to determine whether the ball moved fast or slow. In the third condition subjects have to infer from the preceding movements where the ball would have touched the bottom of the screen. Finally, at the moment the ball stops, subjects have to estimate whether it would have taken more or less than three seconds to hit the bottom of the screen. The 4 conditions, with 9 stimulus fragments each, are randomly ordered in a block. Such blocks are repeated four times within a run. The whole experiment is performed in two 10 min runs with a 5 min pause in between. In this way, 72 responses will be obtained for each condition. The results of task performance will be quantified by error measurements of the responses and ratings of perceived difficulty of the 4 task conditions (scale 1-10, questionnaire). Although subjects are not urged to give responsese as soon as possible, reaction times are documented.

Analysis.
Data analysis concerning the differences between timing and place prediction within and between groups will be performed with statistical programs (MS Excel, SPSS). External data presentation will be anonymous.

Study burden and risks

Burden is restricted to actually spending time to the study. There is no specific risk.

Contacts

Public

Universitair Medisch Centrum Groningen

hanzeplein 1 (postbus 30.001)
9700 RB Groningen
Nederland
Scientific
Universitair Medisch Centrum Groningen

hanzeplein 1 (postbus 30.001)
9700 RB Groningen
Nederland

Trial sites

Listed location countries

Netherlands

Eligibility criteria

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

Inclusion criteria

parkinson UPDRS >10, <30

Exclusion criteria

additional neurological or ophtalmological disease

Study design

Design

Study type: Observational non invasive

Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)

Primary purpose: Diagnostic

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	01-02-2007
Enrollment:	32
Type:	Actual

Ethics review

Approved WMO

Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)

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	NL15152.042.06