

Shifting perspectives on postural instability in Parkinson's disease

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Primary Objective: To relate the ability to react in time to postural perturbations to set-shifting performance in Parkinson's disease patients. Secondary Objective: To investigate the difference in set-shifting stepping responses between PD and...

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

Summary

ID

NL-OMON34771

Source

ToetsingOnline

Brief title

Shift

Condition

- Movement disorders (incl parkinsonism)

Synonym

Parkinson's disease

Research involving

Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Sint Radboud

Source(s) of monetary or material Support: Internationaal ParkinsonFonds

Intervention

Keyword: Parkinson's disease, postural instability, set-shift

Outcome measures

Primary outcome

The relationship between switch costs, defined as the relative difference in reaction time between response to non-switch trials and response to cognitive-motor switch trials (experimental task 1) and stepping reaction times to perturbations (experimental task 2).

Secondary outcome

Experimental task 1:

- o Switch costs of the cognitive shift only condition and of the motor shift only condition
- o Error rates

Experimental task 2:

- o Excursion of centre of mass
- o Amplitude of the step

Study description

Background summary

Postural instability and falls in Parkinson's disease (PD) are both common and devastating. Improved treatment strategies are urgently needed, but this requires better insights in the underlying pathophysiology. Here, we propose a new hypothesis, namely that a set-shifting deficit in the basal ganglia underlies postural instability in PD. This idea was dictated by several observations. Normal motor control under everyday circumstances requires the ability to rapidly shift between motor programs. This so-called *set-shifting* critically depends upon intact basal ganglia functioning.

Two types of set-shifting can be distinguished: cognitive (alternating between different mental tasks) and motor (shifting between different motor tasks). Both processes are clearly impaired in PD, but have never been linked to balance impairment and falls. Such a relationship seems plausible: when balance is jeopardized subjects must immediately choose from a repertoire of compensatory strategies, in order to prevent a fall. A particularly crucial strategy is the ability to take rapid corrective steps. This often requires set-shifting, depending on what the subject was doing when the fall occurred. For example, when a balance perturbation occurs during quiet standing, the subject must shift away from the movement set *standing* to the movement set *stepping*. Impairments in this motor shifting process would lead to either delayed or even absent stepping responses, culminating in a fall. In addition, cognitive set-shifting is required if the person is engaged in mental activities when the balance perturbation occurs (e.g. holding a conversation).

Prior work already indicated that such *dual task* circumstances are the most common circumstance under which falls occur in PD. However, no one has thus far linked set-shifting difficulties to these falls under dual task circumstances. Therefore, we will investigate the independent and interactive role of cognitive and motor set-shifting in stepping responses in PD. Our primary aim is to relate these set-shifting deficits to the ability to adequately react to postural perturbations, and thereby assess the clinical relevance of these findings. To be able to clarify the Parkinson specific deficits, healthy controls are included in this study as well. Our long-term perspective is to use this new knowledge for development of balance training programs in PD that promote corrective stepping and help to prevent falls.

Study objective

Primary Objective: To relate the ability to react in time to postural perturbations to set-shifting performance in Parkinson's disease patients.
Secondary Objective: To investigate the difference in set-shifting stepping responses between PD and healthy controls.

Study design

Design: A prospective study consisting of two experimental tasks. The first task will be carried out to assess cognitive and motor switching costs followed by the second task in which we will assess the ability to adequately react to postural perturbations.

Duration: Each participant is measured one day. Inclusion of participants is planned to start in November 2010 and to end in September 2011.

Setting: All measurements are performed in the Fall Simulator laboratory at the department of Rehabilitation of the RUN-MC.

Study burden and risks

The burden for the subjects is limited to a visit to our laboratory to participate in measurements with a duration of 1-2 hours, without preparation time. In total we expect the visit to last maximum 3 hours. The experimental procedures and measurement methods will not cause any harm to the patients. To prevent falls due to balance perturbations, subjects will wear a safety harness attached to the ceiling that moves in synchrony with the platform.

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

Patients:

- Idiopathic Parkinson's disease
- Hoehn and Yahr stages 1-2.5
- age between 18 and 70 years

Exclusion criteria

- Cognitive impairment (MMSE < 24)
- Clinically relevant depression or anxiety disorders according to DSM-IV
- Visual impairment
- Vestibular impairment
- other disorders than Parkinson's disease of the neuro-musculo-skeletal system
- inability to perform the set-shift task seated
- any inability to cooperate with the assessments and to give written informed consent

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:	Diagnostic

Recruitment

NL	
Recruitment status:	Recruiting
Start date (anticipated):	01-12-2010
Enrollment:	64
Type:	Actual

Ethics review

Approved WMO	
Date:	19-11-2010
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	NL30920.091.10