The contribution of the central nervous system to fatigue in patients suffering from MS

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Ethical review	Approved WMO
Status	Pending
Health condition type	Central nervous system infections and inflammations
Study type	Interventional

Summary

ID

NL-OMON30067

Source
ToetsingOnline

Brief title
Central fatigue in MS patients

Condition

- Central nervous system infections and inflammations

Synonym
MS, multiple sclerosis, white matter disease

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Groningen
Source(s) of monetary or material Support: Ministerie van OC&W,MS-research

Intervention

Keyword: fatigue, fMRI, motor control, MS patients

Outcome measures

Primary outcome

The EMG obtained during the experiment will be analysed with Brain Vision

Analyser. The mean EMG values during a contraction is one of the main parameters

Furthermore, force and brain activitity will be measured. The main focus of

this experiment is the time course of the braina ctivity during the experiment

and the correlation between EMG/force and brain activity.

Secondary outcome

none

Study description

Background summary

Fatigue is a frequently occurring symptom in MS patients. Several studies, using a variety of measures of fatigue, report that approximately 70% of the MS-patients suffer from fatigue (Krupp et al., 1988; van Engelen et al., 2004). Moreover, fatigue is often considered one of the most disabling symptoms by MS-patients; even 40 % of the patients report fatigue as the most serious symptom (Murray, 1985). The underlying pathophysiology of MS-related fatigue is still largely unknown and before directed therapeutic interventions can be explored underlying mechanisms need to be identified and quantified. However, whereas fatigue is generally thought difficult to define and to quantify, the results of the proposed pilot study will yield a pragmatic starting point for objective quantification of central aspects of fatigue, thereby providing a measure to study symptom progression and a possible tool for the evaluation of future drug therapies on fatigue in MS patients.
Mechanisms underlying motor fatigue can be separated into factors residing within the muscle (peripheral fatigue) and factors within the central nervous system (central fatigue). Several lines of evidence suggest that fatigue within MS patients has a dominant central component (Sheean et al., 1997;Roelcke et al., 1997;Colombo et al., 2000;Comi et al., 2001). In the proposed experiments

we intend to investigate both central and peripheral aspects of fatigue in MS-patients using a combination of simultaneously applied techniques; twitch-superimposition, electromyographic (EMG) and force recordings and functional magnetic resonance imaging (fMRI). The twitch-superimposition technique gives an indication of the efficiency of the central nervous system driving the motoneurons. The EMG and force measurements quantify the outcome of the central drive to the motoneurons. Functional MRI-data provide information about the activation of the involved areas of the central nervous system during fatigue. Hence, this combination of techniques gives a unique tool for the study of the central and peripheral aspects of fatigue.

Study objective

In the proposed experiments we intend to investigate both central and peripheral aspects of fatigue in MS-patients using a combination of simultaneously applied techniques; twitch-superimposition, electromyographic (EMG) and force recordings and functional magnetic resonance imaging (fMRI). The twitch-superimposition technique gives an indication of the efficiency of the central nervous system driving the motoneurons. The EMG and force measurements quantify the outcome of the central drive to the motoneurons. Functional MRI-data provide information about the activation of the involved areas of the central nervous system during fatigue. Hence, this combination of techniques gives a unique tool for the study of the central and peripheral aspects of fatigue.

Study design

Subject perform contractions with their index finger in a fMRI scanner.
At first short lasting contractions for the identification of the regions of interest for the analysis of the brain data. Followed by long lasting fatiguing contractions. During the contractions the muscle will be activated and we compared the activity of the muscle (twitch superimposition) with the brains activation.
The data obtained in healthy control subjects will be compared with data from MS-patients (control subjects are age matched).

Intervention

Subjects perform shortlasting contracties in the scanner followed by a fatiguing 3-minute contraction.

Study burden and risks

The time investment is about 4 hours. No risks associated with the fMRI scanner are known.

Contacts

Public
Universitair Medisch Centrum Groningen

A.Deusinglaan 1
9713 AV Groningen
Nederland
Scientific
Universitair Medisch Centrum Groningen

A.Deusinglaan 1
9713 AV Groningen
Nederland

Trial sites

Listed location countries

Netherlands

Eligibility criteria

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

Inclusion criteria

patients suffering from Multiple Sclerosis

Exclusion criteria

neurological disorders other than MS, fMRI exclusion criteria (e.g. metal implants)

Study design

Design

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

Recruitment

NL

Recruitment status:	Pending
Start date (anticipated):	16-10-2006
Enrollment:	30
Type:	Anticipated

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	NL11502.042.06