Perceptual and motor aspects of restoration of arm function after stroke

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Ethical review	Approved WMO
Status	Pending
Health condition type	Central nervous system vascular disorders
Study type	Interventional

Summary

ID

NL-OMON31016

Source
ToetsingOnline

Brief title
Perceptual and motor relearning of arm function after stroke

Condition

- Central nervous system vascular disorders

Synonym
cerebrovascular accident, stroke

Research involving
Human

Sponsors and support

Primary sponsor: Revalidatiecentrum Het Roessingh
Source(s) of monetary or material Support: Subsidie van SenterNovem

Intervention

Keyword: (re)learning, recovery, stroke, upper extremity

Outcome measures

Primary outcome

In this study we are interested in the changes in cortical activity (measured by electroencephalography, EEG), muscle activity (measured by electromyography, EMG), and biomechanical aspects (measured by movement analysis techniques) during arm training.

Secondary outcome

Next to the mentioned aspects on impairment level, we are interested in changes of functional abilities of the arm during arm training. This will be measured using the Fugl-Meyer motor assessment (FM), and the Motricity Index (MI).

Study description

Background summary

After a stroke, many patients suffer from an impaired motor task performance. Optimal restoration of arm and hand function is important for stroke patients to independently perform activities of daily living. Several perceptual and motor aspects play a role in the restoration of arm function after stroke. During observation of a movement (motor imagery) similar parts of the brain are active as during execution of a movement (mirror neurons) in healthy persons. This may stimulate motor recovery after stroke by means of motor imagery therapy, where mirror neuron activity during movement observation may facilitate cortical activity related to movement execution.
To further stimulate restoration of arm function, it is important that rehabilitation includes intensive, active and functional movement exercise, adjusted to the abilities of each patient. To achieve a high intensity of training, active movements may be facilitated by the application of gravity compensation, or arm support. To optimize motor relearning, augmented feedback providing additional information about the movement execution can be applied during training by means of a game-like environment, which can also enhance

patient motivation during training.
In summary, relearning of arm movements may be stimulated perceptually by facilitation through motor imagery and via motor aspects by training using gravity compensation in a game-like environment. However, the cortical activity of mirror neurons in stroke patients as mechanism behind motor imagery is still unknown. Also, it is unknown if training with gravity compensation and augmented feedback using a motivating game actually improves arm function of stroke patients. Therefore, we designed this study to examine the potential of motor imagery therapy and gravity compensation training for restoration of arm function after stroke.

Study objective

The objective of this explorative study is to examine the potential of motor imagery therapy and gravity compensation training for restoration of arm function after stroke, separated in two parts; to gain insight in the cortical activity of mirror neurons after stroke (mirror neuron activity), and to investigate whether arm function improves after gravity compensation training with augmented feedback by a motivating game (gravity compensation training).

Study design

The first part (mirror neuron activity) has a cross-sectional design, in which cortical activity is measured during both active movement and movement observation in one measurement session.
In the second part (gravity compensation training) a longitudinal design is used, in which arm function is measured before and after gravity compensation training.

Intervention

No intervention will be given in the part studying the mirror neuron activity.
In the part concerning gravity compensation training, a period of training is applied in which the arm of the patient is supported by an apparatus, which compensates gravity during reaching movements. The arm movements with gravity compensation are practiced in a game-like environment, which provides augmented feedback and enhances motivation. The training has a duration of 6 consecutive weeks, with 3 training sessions of 30 minutes per week and is supervised by a trained physical or occupational therapist.

Study burden and risks

The risks for the subject are limited to a minimum, since the movement tasks represent functional and familiar arm movements and are performed only within the scope of the subject*s ability while he/she is seated. In addition, the measurements used in this study (EEG, EMG, motion analysis, functional scales)

are all non-invasive and involve no risks to the patients in any way.
Participation of a subject in this experiment has no direct benefit for him/her, other than expanding knowledge about underlying mechanisms relevant during the restoration of arm function during post-stroke rehabilitation. This may eventually aid in the development of new applications or adaptations to existing treatments in the rehabilitation of arm function after stroke.

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

Stroke (>6 months post-stroke)
Active (partial) movement or voluntary noticeable initiation of shoulder abduction and/or elbow flexion/extension
Able to decide whether to participate or not and to sign an informed consent

Exclusion criteria

Pain of in the upper part of the body, (like shoulder pain) in rest or during movements
Additional neurologic, orthopedic of rheumatologic ailments, which might constrain the mobility and/or force of the arm
Inability to understand and/or to obey the instructions given

Study design

Design

Study type: Interventional

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

Recruitment

NL

Recruitment status:	Pending
Start date (anticipated):	01-06-2007
Enrollment:	10
Type:	Anticipated

Ethics review

Approved WMO

Date:	09-10-2007
Application type:	First submission
Review commission:	METC Twente (Enschede)

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	NL17290.080.07