Somatosensory electrical stimulation to augment skill acquisition and motor memory consolidation: An electroencephalography study

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To determine the mechanisms underlying motor skill training, somatosensory electrical stimulation, and a combined intervention on motor skill acquisition, motor memory consolidation, and interlimb transfer in healthy younger and older adults.

Ethical review	Approved WMO
Status	Completed
Health condition type	Other condition
Study type	Interventional

Summary

ID

NL-OMON43412

Source
ToetsingOnline

Brief title
Somatosensory stimulation and motor learning in healthy adults

Condition

- Other condition
- Fractures

Synonym
Stroke

Health condition

Beroerte

Research involving
Human

Sponsors and support

Primary sponsor: Centrum voor Bewegingswetenschappen
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: Electroencephalography, Motor memory consolidation, Skill acquisition, Somatosensory electrical stimulation

Outcome measures

Primary outcome

Primary outcome measure is the tracing error in the visuomotor task

Secondary outcome

Secondary outcome measures are mechanistic measures as assessed with

electroencephalography. Specifically, we examine changes in the N30-component,

event-related desynchronization, and resting-state coherence.

Study description

Background summary

Sensory input is essential for accurate motor performance. Sensory dysfunctions are associated with motor dysfunctions and this interaction has led to the hypothesis that non-physiological input could enhance or augment motor skill acquisition and motor memory consolidation. The present study aims to examine the possibility that unilateral somatosensory electrical stimulation (SES) could enhance motor performance in the stimulated hand, but also in the non-stimulated hand. In addition, electroencephalography will be used to examine the possibility that changes in motor performance are mediated by changes in brain activity. It is relevant to gain insight in the mechanisms underlying changes in motor performance, because insight into how participants learn a motor task could lead to optimalization of rehabilitation protocols. The motor task as used in the present study will be a difficult visuomotor tracking task, during which participants will be asked to trace a

pre-programmed template as accurately as possible using their wrist flexors and extensors. SES will be weak electrical stimulation with a low intensity.

Study objective

To determine the mechanisms underlying motor skill training, somatosensory electrical stimulation, and a combined intervention on motor skill acquisition, motor memory consolidation, and interlimb transfer in healthy younger and older adults.

Study design

We will use visuomotor practice, somatosensory electrical stimulation, and a combined group as intervention and a no-intervention group as control group in a pre-test, post-test, follow-up design.

Intervention

Weak somatosensory electrical stimulation applied to the right hand, in some conditions combined with non-invasive visuomotor practice with the right wrist flexors and extensors during a 20-minute session

Study burden and risks

Participants report to the Department of Clinical Neurophysiology twice. The first session takes approximately 2.5 hours and the second session 1.5 hours, during which rest needed by participants is taken into account during the visuomotor practice and in between electroencephalography (EEG) measures. Testing consists of motor performance in a visuomotor task and responses to elektrical stimuli and simple hand clenching movements during which EEG is measured. EEG preparation can be unpleasant but not painful, because impedance-reducing gel will be placed on the head using a hollow needle. Electrical stimulation will not be higher than the motor threshold, and can be surprising but not painful. It can cause a temporary tingling sensation. There are no known long-term effects of the techniques that are used in the present study.

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

18-30 or 65 years or older, right handed, written informed consent

Exclusion criteria

Fracture in the upper extremity over the past year, neurological disorders, health or psychiatric problems, medication affecting central nervous system functioning, or MMSE score < 26

Study design

Design

Study type:	Interventional
Intervention model:	Parallel

Allocation:	Randomized controlled trial
Masking:	Single blinded (masking used)

Primary purpose: Treatment

Recruitment

NL

Recruitment status:	Completed
Start date (anticipated):	11-02-2016
Enrollment:	130
Type:	Actual

Ethics review

Approved WMO Date:	05-02-2016
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

ID: 22077
Source: Nationaal Trial Register
Title:

In other registers

Register	ID
CCMO	NL55748.042.15
OMON	NL-OMON22077