The effects of age and somatosensory electrical stimulation on motor learning

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Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Other condition
Study type	Interventional

Summary

ID

NL-OMON40988

Source
ToetsingOnline

Brief title
Motor learning in aging

Condition

- Other condition

Synonym
aging senescence

Health condition

Veroudering

Research involving
Human

Sponsors and support

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

Intervention

Keyword: aging, motor learning, somatosensory stimulation, transcranial magnetic stimulation (TMS)

Outcome measures

Primary outcome

The main study parameter is the reduction in absolute error during MP in the

trained right hand.

Secondary outcome

Mechanistic measures include the corticospinal excitability indexed by the size

of the motor evoked potentials (MEPs) produced by transcranial magnetic

stimulation (TMS), short-interval intracortical inhibition (SICI), and

intracortical facilitation (ICF).

Study description

Background summary

Old adults have difficulty in learning new motor tasks. In clinical studies of stroke and dystonia patients somatosensory electrical stimulation (SES) has been used as a promising method to augment motor learning. In this study we examine the effects of age and SES on motor learning in healthy young and old adults. Understanding the mechanism of why and how age impairs motor learning is important for neurorehabilitation settings because many individuals who suffer from a unilateral trauma (e.g. stroke) are over age 65. Based on previous data almost exclusively in patients, we hypothesize that 1) aging impairs the ability to acquire and retain complex motor skills, 2) SES augments motor learning but this augmentation decreases with age, and 3) changes in the excitability of specific motor cortical circuits contribute to the learning

effect and the learning augmentation caused by the SES.

Study objective

The primary objective is to determine the effects of age and SES on motor learning using a motor practice (MP) task. The secondary objective is to determine if the effects of age and SES on the changes in motor cortical and corticospinal excitability during the motor learning process.

Study design

We will use a single-blind MP intervention with or without SES. There are four groups: MP only, MP+SES, SES only and a Control group. A pre-, post- and follow-up test will be conducted.

Intervention

One session of non-invasive MP with the right wrist flexors and extensors for 35 minutes. The MP+SES group receives SES at 10 Hz trains of 5 pulses of 1ms during the practice, the MP group only performs the practice and the SES group only receives the stimulation. Furthermore, there is a control group that does not perform the MP and does not get the SES. This group only performs the pre-, post-test and follow-up test. In between the measurements, the participants in this control group rest when sitting in the same set-up as the participants in the other three groups. They see the trials on the screen, but do not perform the movement.

Study burden and risks

Participants will visit the Center for Human Movement Sciences once. The duration of the session is approximately 2 h. TMS may cause slight discomfort lasting less than a second on the scalp near the coil. It may also cause some twitching of the muscles, the face and jaw, which may be unpleasant and surprising but not painful. SES will be below motor threshold, and can be more surprising than painful. It can cause some momentary burning and tingling sensation. The SES can cause momentary sensation of discomfort when determining the Mmax. There are no known long-term risks of SES or magnetic brain stimulation.

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

Age 18-30 or >65, female or male gender, right-handed

Exclusion criteria

Fracture in the upper extremity over the past year, neurological disorders, pregnancy, medicine known to affect nerve conduction, a history of epilepsy, use of a pacemaker, and metal in the brain/skull

Study design

Design

Study type: Interventional

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

Primary purpose: Diagnostic

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	20-10-2014
Enrollment:	64
Type:	Actual

Ethics review

Approved WMO Date:	12-06-2014
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	NL48718.042.14