Neural mechanism of anticipatory postural control during rapid voluntary arm movement in young and elderly people.

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Determine if there is an age (young, middle age, old age) by condition (lying, standing) interaction in the neuronal excitability measured during the preparatory phase of an arm reaction task.

Ethical review	Approved WMO
Status	Will not start
Health condition type	Other condition
Study type	Observational non invasive

Summary

ID

NL-OMON43443

Source
ToetsingOnline

Brief title
Neural mechanism in elderly people

Condition

- Other condition

Synonym
Aging

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, Anticipatory postural adjustment (APA), Electromiography (EMG), H-reflex

Outcome measures

Primary outcome

The main study parameters are the size of a reflex, called H reflex, measured in response to peripheral electrical stimulation if the tibial nerve and normalized for the maximal compound action potential or M wave. That is, the H/M ratio. A second outcome is short-interval intracortical inhibition or SICI, which is the inhibition of the test motor evoked potential (MEP), when the suprathreshold TMS pulse (the test stimulus) is preceded by a few milliseconds with a subthreshold TMS pulse (the conditioning stimulus). SICI is a measure of motor intracortical inhibition, reflecting GABAergic receptors function.

Secondary outcome

Not applicable

Study description

Background summary

Considering the widespread qualitative and quantitative changes in gray and white matter and motor unit remodeling at the periphery, even healthy old adults exhibit a characteristic and well recognizable slowing of self-initiated and responsive voluntary movements. Execution of voluntary movement is preceded by an increase in the preparatory state of the nervous system. Appropriate

setting of this neural readiness is especially relevant in situations when old adults reactively, as often in daily life, respond to an external cue while standing and there is a need to make anticipatory postural adjustments or APAs. How healthy aging affects this neural preparedness, i.e., APA, is unknown. An elucidation of how age affects the neural mechanisms of APA is important because many old adults lose balance and could fall. Understanding and eventually altering by interventions this neural preparedness thus has societal relevance.

Study objective

Determine if there is an age (young, middle age, old age) by condition (lying, standing) interaction in the neuronal excitability measured during the preparatory phase of an arm reaction task.

Study design

The study uses a cross-sectional design to determine the effects of age on neuronal excitability measured during two different body postures (lying, standing).

Study burden and risks

Subjects have to visit the Center for Human Movement Sciences one time for about two hours. The preparation for the measurements will take 30 minutes. Subjects will be familiarized with the task and the environment for 10-20 minutes. Next, we will check if the timing when the stimulation is given is appropriate (10-15 minutes + 10 minutes to check the data). In one condition, subjects will lie and react to an auditory tone by raising their right arm to horizontal (30 min). In a second condition, they will respond to the tone and raise their arm while standing (30 min). After the tone, the H reflex or SICI will be evoked either at rest (no arm elevation, control trials) or just before arm elevation. In each experiment (H reflex or SICI), subjects will raise their arm 100 times in blocks of 20, with no less than 2 minutes of rest between blocks.

The 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.

Peripheral nerve stimulation causes the muscles to twitch that can be more surprising than painful. It can cause some momentary burning and tingling sensation.

There are no known long-term risks of peripheral nerve or magnetic brain stimulation.

Electromyography (EMG) of the soleus, tibialis anterior, biceps femoris, gastrocnemius, deltoideus anterior muscles will be recorded. Therefore the skin underneath the electrodes will be shaved and cleaned. This may cause some light irritation of the skin.

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 and older, male and female gender.

Exclusion criteria

Neurological disorders like epileptic, MS, dementia, inability to stand independently for 10 minutes without rest, medications know to affect balance, any metal in the brain/skull, pregnancy or suspicion of pregnancy (self-reported).

Study design

Design

Study type: Observational non invasive

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

Recruitment

NL

Recruitment status:	Will not start
Enrollment:	86
Type:	Anticipated

Ethics review

Approved WMO

Date:	14-06-2016
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

No registrations found.

In other registers

Register	ID
CCMO	NL55875.042.15