

Effect of hand position and feedback on cortico-spinal excitability during bilateral contractions.

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

Summary

ID

NL-OMON41301

Source

ToetsingOnline

Brief title

Hand position and feedback on CSE

Condition

- Other condition

Synonym

not applicable

Health condition

fundamenteel-wetenschappelijk onderzoek

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: bilateral contractions, feedback, hand position, transcranial magnetic stimulation

Outcome measures

Primary outcome

The amplitude of the MEP. This is expressed as a percentage of the electric evoked muscle response (M-max). The MEP amplitude is a measure of corticospinal excitability. We expect the MEP to change due to a different hand position or feedback method.

Secondary outcome

none

Study description

Background summary

When the right hand muscles are contracting, the left motor cortex is active. This activity can be measured with transcranial magnetic stimulation (TMS) by measuring the evoked response in the EMG (motor evoked potential, MEP). The MEP amplitude will increase with increasing activity in the hand. A recent study from our lab (Heetkamp et al., 2014; METc 2011-244) showed a similar or increased MEP amplitude when the left hand also becomes active. These results are in contrast with another study (Soteropoulos et al., 2011). Soteropoulos showed that during bilateral contractions the MEP decreases. We have 3 possible explanations for the difference.

Study objective

There are 3 possible explanations for the differences. First: handposition; Soteropoulos et al. (2011) used a pronated handposition (hand palm flat on the table surface) during index finger abduction while during our experiment the

handposition was neutral (thumbs up). Second: feedback; Soteropoulos used a feedback system with LED lights while we used a line for the force task on a computerscreen. Because our feedback method is more precise, the task becomes more difficult and could yield different results. Third: TMS machine; Soteropoulos used a TMS machine with a mono-phasic pulse while we used a TMS machine with a bi-phasic pulse. This could also be an explanation for the different results.

In this study we want to determine whether 'handpostition', 'task complexity' or 'TMS machine' could be the reason for the increase in MEP amplitude during a bilateral contraction in our study.

Study design

This is an intervention study in which we determine the effect of hand position and feedback method on the cortico-spinal excitability of the motor cortex during bilateral contractions.

We want to include 5 subjects that perform a force production task with their index fingers on different levels of their maximal force. During the task, we stimulate the motor cortex using TMS to measure brainactivation. We repeat the task 3 times under different conditions; feedback line and hand position neutral; feedback LED and hand position neutral; feedback line and hand position flat. After these 5 subjects we will perform an interim analysis on subject level to determine the next step.

We will show the results after 5 subjects to the METc UMCG as well as the desired next step. Depending on the results we will ask for an additional 5 or 10 subjects.

If there is no effect of hand position or feedback, we will measure the same 5 subjects performing the task but use a different TMS machine.

If there is an effect of feedback, we will include another 5 subjects that perform the same task to make sure the difference is due to the feedback method.

If there is an effect of handpostition, we will include an additional 10 subjects that will perform the same task but with a more extensive protocol for the TMS measures. This will give an idea whether the origin of the inhibition is in one hemisphere or between the two hemispheres.

Intervention

The hand position and feedback method are varied between the force tasks. If after 5 subjects we do not see a difference in hand position or feedback, we will also vary the TMS machine between force tasks.

Study burden and risks

There are no known risks of (single pulse) TMS or electric nerve 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

righthandedness
age: 18-35 years

Exclusion criteria

Neurological disorders (epilepsy)
Muscle disorders
Migraine

Study design

Design

Study type: Interventional

Masking: Open (masking not used)

Control: Uncontrolled

Primary purpose: Other

Recruitment

NL

Recruitment status: Recruitment stopped

Start date (anticipated): 10-11-2015

Enrollment: 5

Type: Actual

Ethics review

Approved WMO

Date: 25-09-2015

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

CCMO

ID

NL45413.042.15