Motor unit activity during voluntary contractions.

Published: 16-07-2007
Last updated: 08-05-2024

In this research we want to study the possible differences in discharge rate, recruitement treshold and de-recruitement treshold of individual motor units during voluntary contractions and CAC.

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Other condition
Study type	Observational invasive

Summary

ID

NL-OMON30700

Source
ToetsingOnline

Brief title
Motor unit activity during voluntary contractions.

Condition

- Other condition

Synonym
fundamental research

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: activation, EMG, force, motor units.

Outcome measures

Primary outcome

Discharge rates, recruitement tresholds and de-recruitement tresholds of

individual motor units during voluntary contractions and CAC.

Secondary outcome

Force and EMG during voluntary contractions and CAC

Study description

Background summary

When producing large amounts of force or during a sustained submaximal contraction except from contractions in the target-muscle also non-target muscles are activated. There are even muscles activated who are contralateral to the 'target' muscle (CAC, contralateraal associated contraction) (Gellhorn 1947; Dimitrijevic et al. 1992; Gandevia et al. 1993; Mayston et al. 1999; Zijdewind and Kernell, 2001). A recent study proved the contralateral motor cortex activated both the associated contractions and the voluntary contractions (Zijdewind, 2006).
We want to research if the activation from this motor cortex to the motor-neuron pool is develops equally for CAC and voluntary contractions.

Study objective

In this research we want to study the possible differences in discharge rate, recruitement treshold and de-recruitement treshold of individual motor units during voluntary contractions and CAC.

Study design

Our protocol will consist of two measure sessions, which will be executed on two different days. In the first session we will use the index finger for the measurements, in the second session we will use the upper arms.
During the experiments subjects will be fixed with both their index fingers or arms in a set up. Force will be measured of the index fingers or the lower arms with help of a force transducer. In the muscle that abduces the index finger (first dorsal interroseus; FDI) or in the muscle that flexes the upper arm (Biceps Brachii; BB) wire electrodes will be placed on both sides (Hence, both index finger abductors and both upper arm flexors). On the FDIs or the BBs and Triceps Brachii (upper arm extensor) EMG electrodes will be placed. During the experiments subjects are asked to perform the following tasks with their index fingers or upper arms:
- Maximal voluntary contraction (MVC) with the target muscle while no instruction is given to the non-target muscle or while the non-target muscle is contracted a little bit (5%MVC). After when subjetcs are to make a voluntary submaximal contraction with the non-target index muscle.
- A fatigue task where subjects have to maintain as long as possible a force of 30% MVC with their target index finger. The test is finished when subject is no longer able to reach the 30% of is original maximal force.
The first task will be executed with the FDI and BB on both sides as target muscle. During the fatigue task only one of the muscles will be used as a target muscle.

Study burden and risks

There is a very small risk of bleeding or infection during the insertion of the needle. Furthermore, there is a small risk that during the extraction of the wires from the muscle small pieces are left behind. However, the material of the wires are biological inert, which means that if there are pieces left behind this has no serious consequence.
The needles we use to implant the wire electrodes in the muscle are sterilised as are the wire electrodes themselves.

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

Right-handedness
Informed consent
18 years or older

Exclusion criteria

Neurological disorders
Muscle disorders
Anti-coagulation medicins

Study design

Design

Study type: Observational invasive

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

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	17-06-2008
Enrollment:	20
Type:	Actual

Ethics review

Approved WMO

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	NL11939.042.07