Nocturnal muscle protein synthesis after neuromuscular electrical stimulation in elderly men

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The aim of this study is to investigate the overnight effect of a single bout of NMES on muscle protein synthesis rates in healthy elderly males.

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Protein and amino acid metabolism disorders NEC
Study type	Interventional

Summary

ID

NL-OMON38615

Source
ToetsingOnline

Brief title
ES-PROvernight

Condition

- Protein and amino acid metabolism disorders NEC
- Muscle disorders

Synonym
Loss of muscle mass, Sarcopenia

Research involving
Human

Sponsors and support

Primary sponsor: Universiteit Maastricht
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: Muscle mass, NMES, Protein, Sarcopenia

Outcome measures

Primary outcome

Muscle protein synthesis, expressed as muscle tracer enrichment

Secondary outcome

Plasma tracer enrichment

Study description

Background summary

With human aging there is a gradual but progressive decline in skeletal muscle mass, termed sarcopenia. While the underlying cause of sarcopenia is likely to be multifaceted, a primary factor is that elderly individuals frequently experience short periods of muscle disuse following limb immobilization or bed-rest (due to injury or illness) causing rapid muscle loss. Elderly individuals seem to be more susceptible to muscle disuse atrophy and are less likely to fully regain their muscle tissue during subsequent rehabilitation when compared to the young. Muscle loss during a period of disuse is attributed to an impairment of muscle protein synthesis rates. Accordingly, feasible strategies for maintaining muscle protein synthesis rates in elderly individuals, and thus having the potential to attenuate the loss of muscle mass during disuse need to be pursued. Local neuromuscular electrical stimulation (NMES) in combination with high protein feeding offers such a potential strategy but, as yet, remains relatively unexplored.

Study objective

The aim of this study is to investigate the overnight effect of a single bout of NMES on muscle protein synthesis rates in healthy elderly males.

Study design

Before going to sleep, 12 healthy, elderly men will consume a 40 g bolus of intrinsically L-[1-13C]-phenylalanine labelled casein protein immediately following 70 min of one-legged NMES. Regular blood samples will be collected and muscle biopsies will be obtained immediately prior to protein ingestion and

8 h after ingestion from both legs to determine de novo muscle protein synthesis rates from both the stimulated (STIM) and un-stimulated control (CON) legs.

Intervention

Neuromuscular electrostimulation in one of the two legs

Study burden and risks

The risks involved in participating in this experiment are minimal. Insertion of the catheters in a vein is comparable to a normal blood draw and the only risk is a small local hematoma. This is the same for the muscle biopsies. The incision made for obtaining the muscle biopsy will be done by an experienced physician, following local anesthetics of the skin and muscle fascia, and will heal completely. The test beverages contain intrinsically labeled dietary protein which is safe for human consumption and has been used in previous studies (MEC 11-3-057 and MEC 11-3-088). NMES carries no potential risks other than slight skin irritation from the surface electrodes.

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

- Written informed consent
- Age >= 65 years
- Male

Exclusion criteria

- Type II diabetes
- All co morbidities interacting with mobility and muscle metabolism of the lower limbs (e.g. arthrosis, arthritis, spasticity/rigidity, all neurological disorders, paralysis, hip/knee surgery).
- Use of anticoagulants, blood diseases, allergy for lidocain
- Use of NSAIDs and acetylsalicylic acid
- Patients suffering from PKU (Phenylketonuria)
- Presence of implantable cardioverter defibrillator and/or pacemaker
- Performed regular resistance type exercise in the past 6 months
- Use of any tools to assist during walking (cane/ crutches/ walker)
- (Partial) foot/ leg amputation

Study design

Design

Study type: Interventional

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

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	04-09-2013

Enrollment:	12
Type:	Actual

Medical products/devices used

Generic name:	Neuromuscular Electrical Stimulation
Registration:	Yes - CE intended use

Ethics review

Approved WMO Date:	22-07-2013
Application type:	First submission
Review commission:	METC academisch ziekenhuis Maastricht/Universiteit Maastricht, METC azM/UM (Maastricht)

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
Other	14727
CCMO	NL44582.068.13