Reducing early atrophy with leucine during immobilization of skeletal muscle

No registrations found.

Ethical review	Positive opinion
Status	Pending
Health condition type	-
Study type	Interventional

Summary

ID

NL-OMON23203

Source
NTR

Brief title
REALISM

Health condition

Healthy young adults and elderly both male and female

Sponsors and support

Primary sponsor: Maastricht University
Source(s) of monetary or material Support: Maastricht University

Intervention

Outcome measures

Primary outcome

The main study endpoint is cumulative FSR as a measure of muscle protein synthesis rates (MPS) based on the oral tracer deuterium oxide. In order to determine cumulative FSR, the following parameters will be measured via GC-C-IRMS and GCMS respectively:

- Muscle protein-bound L-[2,3,3,3-2H4]-alanine enrichment (expressed as MPE)

- Plasma free L-[2,3,3,3-2H4]-alanine enrichment (expressed as MPE)

- Saliva 2H2O enrichment (Expressed as APE)

- Fractional breakdown rates (FBR) of muscle protein based on 3,3-D2 phenylalanine tracer dilution in plasma and muscle free pool.

- Fractional synthesis rates (FSR) of muscle protein based on L-[ring-13C6]-phenylalanine tracer incorporation into bound muscle protein.

Secondary outcome

Quadriceps whole-muscle CSA as assessed via CT scan.

- Plasma, muscle free, and muscle protein-bound L-[ring-13C6]-phenylalanine enrichment.

- Activation of signaling molecules regulating muscle protein synthesis and breakdown will be established via Western blots. Quantitative Real-Time PCR Analysis of MAFbx/Atrogin-1, MuRF1, FoxO and Ubiquitin Expression will also be performed.

Study description

Background summary

Recovery from an injury, illness, and/or disease is associated with periods of skeletal muscle disuse. The physical inactivity resulting from muscle disuse leads to a loss of muscle mass and strength. This loss of muscle mass and strength can result in difficulties with daily activities, reduced sports performance, and in some cases a loss of independence. Muscle loss is particularly problematic for older adults who are already at a greater risk for low muscle mass and strength due to age-related sarcopenia. In fact, the loss of muscle mass with ageing, may in part be caused by more frequent short periods of muscle disuse and reduced physical activity. During this study, a one leg cast will be applied for 3 days in order to investigate the effects of such short term immobilization on the loss of muscle mass. Thereby, we want to investigate whether the use of the nutritional supplement Leucine (an amino acid/ building block of proteins) can prevent the muscle loss during these 3 days of immobilization.

Study objective

1) In both younger older adults, 3 days of disuse via unilateral lower-limb immobilization will result in muscle atrophy and coincide with decreased rates of “cumulative” muscle protein synthesis (MPS) during disuse. 2) In both younger and older adults, leucine supplementation during 3 days of disuse via unilateral lower-limb immobilization will attenuate the decline in cumulative MPS and loss of muscle mass. 3) In younger adults, 3 days of disuse via unilateral

lower-limb immobilization will increase postabsorptive muscle protein breakdown (MPB) rates and decreases postabsorptive MPS rates. 4) In younger adults, leucine supplementation during 3 days of disuse via unilateral lower-limb immobilization will reduce the increase in postabsorptive MPB rates and decline in postabsorptive MPS rates following immobilization.

Study design

Screening: subject eligibility + informed consent
3 visits to the university, 3 days of single leg immobilisation, pre and post muscle biopsies. 4 days of D2O intake 3 days of leucine/placebo supplementation

Intervention

- Single leg immobilisation

- Leucine supplementation

Contacts

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Eligibility criteria

Inclusion criteria

- Male or female age 18-35 or 60-80 years of age inclusive

- Healty, Moderatly active

- BMI not lower than 18.5 and not higher than 30 kg/m2

- Having given informed consent

Exclusion criteria

- Previous participation in a 13C amino acid tracer study within the last 5 years

- Lower limb and/or back injuries

- A history of thrombosis/cardiovascular disease

- Use of anticoagulants

- Musculoskeletal/orthopedic disorders

- Structured resistance exercise training

- Use of corticosteroids

- Current use of protein supplements

- Diabetes (type I or II)

- Use of tobacco products

- Pregnant

- Hormone replacement therapy

- Third generation oral contraceptives

Study design

Design

Study type:	Interventional
Intervention model:	Parallel
Allocation:	Non controlled trial
Masking:	Double blinded (masking used)
Control:	Placebo

Recruitment

NL

Recruitment status:	Pending
Start date (anticipated):	01-03-2016
Enrollment:	48
Type:	Anticipated

Ethics review

Positive opinion

Date:	06-01-2016
Application type:	First submission

Study registrations

Followed up by the following (possibly more current) registration

ID: 45771
Bron: ToetsingOnline
Titel:

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
NTR-new	NL5501

Register	ID
NTR-old	NTR5636
CCMO	NL55456.068.15
OMON	NL-OMON45771

Study results