

# The effects of single leg immobilization on muscle protein synthesis, protein breakdown, and glucose uptake in healthy young men

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Single leg immobilization affects muscle protein synthesis, breakdown, and glucose uptake

<b>Ethische beoordeling</b>	Positief advies
<b>Status</b>	Werving nog niet gestart
<b>Type aandoening</b>	-
<b>Onderzoekstype</b>	Observationeel onderzoek, zonder invasieve metingen

## Samenvatting

### ID

NL-OMON26917

### Bron

NTR

### Verkorte titel

Muscle protein turnover after immobilization

### Aandoening

Immobilization, muscle wasting

### Ondersteuning

**Primaire sponsor:** McMaster University

**Overige ondersteuning:** Canadian Institutes of Health Research

### Onderzoeksproduct en/of interventie

### Uitkomstmaten

#### Primaire uitkomstmaten

- 1) The effect of single leg immobilization on basal and postprandial skeletal muscle protein synthesis <br>
- 2) The effect of single leg immobilization on basal and postprandial skeletal muscle protein breakdown<br>
- 3) The effect of single leg immobilization on rates of skeletal muscle glucose uptake

## Toelichting onderzoek

### Achtergrond van het onderzoek

Periods of muscle disuse are commonly experienced in young and elderly individuals as a result of short-term hospitalization or leg casting after injury. Periods of immobilization result in a profound loss of muscle mass and strength. Aside from skeletal muscle's central role in movement, the muscle also plays a large role in general health. For example, skeletal muscle is the largest 'sink' into which blood sugar (glucose) is taken up following a meal. Leg immobilization results in an impairment in the body's ability to take up glucose into skeletal muscle tissue, which can eventually result in insulin resistance. In our study, we are interested in looking at the regulation of muscle mass during and after a short period of leg immobilization. We will measure the rate of muscle growth and breakdown as well as the rate of glucose uptake by the muscle. Understanding the underlying mechanisms causing muscle loss after immobilization will help us to create interventions to prevent the loss of muscle mass and function during periods of disuse.

### Doel van het onderzoek

Single leg immobilization affects muscle protein synthesis, breakdown, and glucose uptake

### Onderzoeksopzet

After 3 d immobilization

Pre and Post 3 d immobilization

### Onderzoeksproduct en/of interventie

Day 0

Upon arrival to the laboratory in the fasted state, a saliva and blood sample will be taken. Participants will then ingest heavy water that allows for measuring integrated muscle protein synthesis rates. Two hours after ingestion of the heavy water another sample of saliva and blood will be taken. Participants will then undergo a DXA scan to assess body composition and an ultrasound scan on the mid-thigh region of both legs for the assessment of muscle thickness. Maximal leg strength will be determined using Biodex. After the baseline measurements, a knee brace will be placed on one of the legs to start the immobilization

period.

#### Day 1 - 3

During the immobilization period, participants will collect daily saliva samples upon waking.

#### Day 4

Participants will visit the lab in the fasted state. The knee brace will be removed and subjects will lie on the laboratory bed for the infusion trial. A catheter will be placed in both arms. Before beginning the infusion, a baseline blood sample will be obtained. Following the collection of the baseline blood sample, the first infusion (tracers and 2DG) will be initiated via one of the catheters and continued for the entire duration of the trial. Blood samples will be collected from the other catheter at multiple time points. After 1.5 hours, muscle biopsies are collected under local anesthesia from both legs. Another muscle biopsy will be taken from the immobilized and control leg 2 hours later, signifying the end of the fasted state measurements. Next, to simulate conditions after a meal, the second infusion containing a mixture of amino acids and dextrose will be started. Additional muscle biopsies will be collected from both legs at 90 and 180 minutes of the amino acid/dextrose infusion. The last muscle biopsy marks the end of the infusion trial. After ending the infusion trial, body composition, muscle thickness, muscle cross sectional area, and muscular strength will be measured.

## Contactpersonen

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## Deelname eisen

### Belangrijkste voorwaarden om deel te mogen nemen (Inclusiecriteria)

- 1) Healthy males, between the ages of 18 and 30 y
- 2) BMI between 18.5 and 30.0 kg/m<sup>2</sup>
- 3) Able and willing to provide informed consent

### Belangrijkste redenen om niet deel te kunnen nemen (Exclusiecriteria)

- 1) The use of anti-inflammatory and/or analgesic medication, whether it is prescription or not
- 2) A history of neuromuscular disorders or muscle/bone wasting diseases
- 3) Any acute or chronic illness, cardiac, pulmonary, liver, or kidney abnormalities, uncontrolled hypertension, insulin-dependent or insulin-independent diabetes, or the presence of any other metabolic disease – all of which will be determined via a medical history screening questionnaire
- 4) The use of any medications known to affect protein metabolism (glucocorticoids, non-steroidal anti-inflammatory medication, or prescription strength acne medication, etc.)
- 5) A (family) history of thrombosis
- 6) The use of anticoagulant medications
- 7) Consumption of tobacco-containing products
- 8) Excessive alcohol consumption (>21 units/wk)
- 9) History of bleeding diathesis, platelet or coagulation disorders, or antiplatelet/anticoagulation therapy

## Onderzoeksopzet

### Opzet

Type:	Observationeel onderzoek, zonder invasieve metingen
Onderzoeksmodel:	Anders
Toewijzing:	N.v.t. / één studie arm
Blinding:	Open / niet geblindeerd
Controle:	N.v.t. / onbekend

### Deelname

Nederland	
Status:	Werving nog niet gestart
(Verwachte) startdatum:	01-11-2016
Aantal proefpersonen:	8
Type:	Verwachte startdatum

## Ethische beoordeling

Positief advies	
Datum:	30-09-2016
Soort:	Eerste indiening

## Registraties

### Opgevolgd door onderstaande (mogelijk meer actuele) registratie

Geen registraties gevonden.

### Andere (mogelijk minder actuele) registraties in dit register

Geen registraties gevonden.

## In overige registers

Register	ID
NTR-new	NL5919
NTR-old	NTR6099
Ander register	N/A : 2016-2192-GRA

## Resultaten