

# The impact of aerobic exercise pre-conditioning to maximize the skeletal muscle adaptive response to resistance type exercise training in healthy older adults

Published: 06-02-2019

Last updated: 12-04-2024

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<b>Ethical review</b>	Approved WMO
<b>Status</b>	Recruitment stopped
<b>Health condition type</b>	Other condition
<b>Study type</b>	Interventional

## Summary

### ID

NL-OMON52892

### Source

ToetsingOnline

### Brief title

AERCO study

### Condition

- Other condition

### Synonym

age-related loss of muscle mass, sarcopenia

### Health condition

Sarcopenie

## Research involving

Human

## Sponsors and support

**Primary sponsor:** Universiteit Maastricht

**Source(s) of monetary or material Support:** NWO - Veni

## Intervention

**Keyword:** Aerobic pre-conditioning, Microvascularization, Muscle hypertrophy, Resistance training

## Outcome measures

### Primary outcome

Type II muscle fiber size (muscle biopsy)

### Secondary outcome

Whole body- and regional body composition (DEXA and MRI scan), muscle strength and physical performance (1RM, SPPB, TUG, handgrip strength), muscle fiber characteristics (muscle biopsy), microvascular perfusion (CEUS) and oral glucose tolerance (OGTT) will be secondary parameters.

## Study description

### Background summary

The progressive loss of skeletal muscle mass with aging, or sarcopenia, has a major impact on our health care system due to increased morbidity and a greater need for hospitalization and/or institutionalization. Traditional whole-body resistance exercise is an effective intervention strategy to counter the detrimental impact of sarcopenia. However, despite its overall beneficial effects, large heterogeneity exists in the muscle's adaptive response to resistance training in older adults. Whereas some individuals show large increases in muscle mass and strength, others seem to only marginally benefit from resistance exercise training. It has been suggested that the age-related reduction skeletal muscle perfusion might be a key limiting factor in the ability to grow muscle during resistance type exercise training in older

adults. However, little is known whether improving skeletal muscle perfusion, through aerobic pre-conditioning, could actually augment the beneficial effect of prolonged resistance exercise training in older adults.

## **Study objective**

The main objective of this study is to determine the effects of 8 weeks aerobic exercise pre-conditioning (to improve muscle fiber perfusion capacity) on the increase in skeletal muscle mass and function during 12 weeks of resistance exercise training in older adults.

## **Study design**

Randomized, controlled intervention study.

## **Intervention**

Participants will be randomly allocated to perform 8 weeks of aerobic pre-conditioning (AER) or no exercise control (CON) group. During aerobic pre-conditioning, participants will perform exercise for 45 minutes at 65-70% of heart-rate max on a stationary bike or cross-trainer, 3 days per week. The main aim to the aerobic exercise pre-conditioning period is to improve skeletal muscle perfusion. Following 8 weeks of pre-conditioning or control, all participants will engage in a 12-week whole-body resistance exercise training program, consisting of six different exercises. Leg press, leg extension, chest press, shoulder press, horizontal row and vertical lateral pull exercise will be performed on weight lifting machines, 3 days per week. To assess the changes in response to the different exercise protocols, a series of standardized measurements will be performed before (pre), after 8 weeks of pre-conditioning (mid), and following 12 weeks of resistance exercise training (post).

## **Study burden and risks**

Risks as the result of participation in this experiment are minimal. There are no complications associated with the procedure of a DXA scan. The level of radiation emitted during a DXA is merely a fraction of that emitted during a regular chest X-ray. During this study 20 blood samples and 5 muscle biopsy samples will be taken. At the site of the blood draw a hematoma could occur. This is the same for the muscle biopsies. The incision made for obtaining the muscle biopsy will heal completely. In some cases, the muscle biopsy can be painful. Infections and bleeding afterwards are possible, but rare. As a result of the aerobic exercise pre-conditioning and resistance type exercise training program, participants will likely experience a gain in muscle mass, strength and a healthy improvement in body composition. Depending on the baseline level of fitness, this will result in an increase in functional performance. It is possible that participants may experience muscle soreness induced by

unaccustomed exercise.

## Contacts

### Public

Universiteit Maastricht

Universiteitssingel 50  
Maastricht 6229 ER  
NL

### Scientific

Universiteit Maastricht

Universiteitssingel 50  
Maastricht 6229 ER  
NL

## Trial sites

### Listed location countries

Netherlands

## Eligibility criteria

### Age

Elderly (65 years and older)

### Inclusion criteria

- Aged between 65-85
- Healthy
- $18 \leq \text{BMI} \leq 30 \text{ kg/m}^2$

### Exclusion criteria

- Smoking
- Diabetes

- Cardiovascular disease
- Participation in any structured training program

## Study design

### Design

Study type:	Interventional
Intervention model:	Parallel
Allocation:	Randomized controlled trial
Masking:	Open (masking not used)

**Primary purpose:** Other

### Recruitment

NL	
Recruitment status:	Recruitment stopped
Start date (anticipated):	06-05-2019
Enrollment:	36
Type:	Actual

## Ethics review

Approved WMO	
Date:	06-02-2019
Application type:	First submission
Review commission:	METC academisch ziekenhuis Maastricht/Universiteit Maastricht, METC azM/UM (Maastricht)
Approved WMO	
Date:	10-07-2019
Application type:	Amendment
Review commission:	METC academisch ziekenhuis Maastricht/Universiteit Maastricht, METC azM/UM (Maastricht)
Approved WMO	
Date:	12-08-2022
Application type:	Amendment

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
CCMO	NL68192.068.18