Mitochondrial muscle health and muscle function in elderly

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The present study aims to characterize the relation between skeletal muscle mitochondrial metabolism and muscle health in physically compromised humans.

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

Summary

ID

NL-OMON50517

Source ToetsingOnline

Brief title Mitochondria and muscle health in elderly

Condition

- Other condition
- Muscle disorders

Synonym Aging, weakening

Health condition

Veroudering

Research involving Human

Sponsors and support

Primary sponsor: Universiteit Maastricht **Source(s) of monetary or material Support:** NWO

Intervention

Keyword: Aging, Mitochondria, Skeletal muscle health

Outcome measures

Primary outcome

- * Maximal aerobic capacity
- * Resting and exercise energy metabolism
- * In vivo mitochondrial capacity
- * Mitochondrial metabolism (markers)
- * Ex vivo skeletal muscle mitochondrial function (O2-flux pmol mg-1 s-1)
- * Skeletal muscle DNA, mRNA and protein levels of markers in the mitochondrial

biogenesis, function and metabolism *

Secondary outcome

- * Body composition and muscle mass
- * Physical performance
- * Intramuscular lipids/acetyl-carnitine
- * Dynamic gait stability
- * Muscle strength
- * Activity monitoring
- * Insulin sensitivity
- * Quality of Life
- * Non invasive bio-markers

Study description

Background summary

Sedentary aging is associated with the decline of mitochondrial and skeletal muscle volume, quality and function. The causal link between the loss of mitochondriale homeostasis and muscle health is unknown, however, both appear with advancing age and are associated with the loss of functional capacity corresponding increases in comorbidities and annual healthcare costs. We test the hypothesis that a compromised muscle function in sedentary elderly is due to an impaired mitochondrial health.

Study objective

The present study aims to characterize the relation between skeletal muscle mitochondrial metabolism and muscle health in physically compromised humans.

Study design

A detailed characterization of mitochondrial metabolism and muscle function will be performed in well-defined, (compromised) elderly humans 65-80 years, in a cross-sectional design. To obtain insight in causal relationships, we will not only compare subjects that differ in mitochondrial function (physical activity) but also select for subjects with high versus low muscle function. Healthy, young (20-30 years,) individuals with normal physical activity levels will be included as absolute controls.

Study burden and risks

Subjects will report to the university six times and will spend in total about 24 hours at the university (1 screening visit and 5 test days). Subjects will be asked to fill in different questionnaires and monitor their daily activity for 5 days. Before test days 2 and 4 subjects will collect a 24 hours urine sample. During the test day*s subjects will undergo different physical tests to determine physical function, a maximal exercise test, MRS-measurements of the upper-leg, a cycling protocol of 60 minutes and an hyperinsulinemic euglycemic clamp test. Furthermore the subject will under go a total of two muscle biopsies and two blood draws (from i.v. catheter).

No direct health benefit for the participants is expected. The experimental procedures are without risks, except for blood sampling and sampling of muscle biopsies, which can occasionally cause a local hematoma or bruise. The risk of infection or prolonged bleeding is low due to state of the art technique and sterility measures. The maximal exercise test and cycling protocol can cause muscle soreness. During the hyperinsuline euglycemic clamp the risk to develop hypoglycaemia is rather low, because of the well-experienced researchers

performing this test. Measurements performed during the time course of the study can potentially lead to coincidental medical findings. Subjects will be informed about such a finding and possible advised to contact a doctor about this.

Contacts

Public Universiteit Maastricht

Universiteitssingel 50 Maastricht 6229 NL **Scientific** Universiteit Maastricht

Universiteitssingel 50 Maastricht 6229 NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age Adults (18-64 years) Elderly (65 years and older)

Inclusion criteria

Age: between 20 and 30 years (healthy control group) or between 65 and 80 years (elderly groups) BMI: between 20-30 kg/m2

Exclusion criteria

Diagnosed for diabetes mellitus Contraindications for MRI scan Poor health as judged by the responsible medical doctor. Heart problems: In case of an abnormal ECG in rest, this will be discussed with both the participant and the responsible medical doctor.

Study design

Design

Study type:	Observational invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)
Control:	Active
Primary purpose:	Basic science

Recruitment

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Recruitment status:	Recruitment stopped
Start date (anticipated):	31-08-2017
Enrollment:	152
Туре:	Actual

Ethics review

Approved WMO Date:	26-05-2017
Application type:	First submission
Review commission:	METC academisch ziekenhuis Maastricht/Universiteit Maastricht, METC azM/UM (Maastricht)
Approved WMO Date:	16-01-2019

Application type:	Amendment
Review commission:	METC academisch ziekenhuis Maastricht/Universiteit Maastricht, METC azM/UM (Maastricht)
Approved WMO	
Date:	04-08-2020
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 CCMO ID NL59895.068.17