Effects of acute exercise on acetylcarnitine concentration in endurance trained- and untrained subjects

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The major research objective is to examine if acute exercise results in a more pronounced increase in acetylcarnitine concentration in sedentary subjects compared to endurance-trained subjects and if the exercise-induced increase in acetylcarnitine...

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Glucose metabolism disorders (incl diabetes mellitus)
Study type	Interventional

Summary

ID

NL-OMON37450

Source
ToetsingOnline

Brief title
Acetylcarnitine in exercise

Condition

- Glucose metabolism disorders (incl diabetes mellitus)

Synonym
inactivity, Insulin resistance

Research involving
Human

Sponsors and support

Primary sponsor: Academisch Ziekenhuis Maastricht

Source(s) of monetary or material Support: NWO

Intervention

Keyword: Acetylcarnitine, Exercise

Outcome measures

Primary outcome

Exercise-induced changes in acetylcarnitine concentrations and dynamics of

acetylcarnitine restoration after exercise

Secondary outcome

* Substrate oxidation

* Blood plasma levels of FFA, triglycerides, glucose and catecholamines

Study description

Background summary

It has been suggested that imbalance between TCA-cycle flux and *-oxidation may underlie insulin resistance, leading to type 2 diabetes mellitus. Acetylcarnitine concentration is suggested to be a marker of such imbalance. It is expected that when TCA- cycle capacity is high (high oxidative capacity), less acetylcarnitine will accumulate.

Study objective

The major research objective is to examine if acute exercise results in a more pronounced increase in acetylcarnitine concentration in sedentary subjects compared to endurance-trained subjects and if the exercise-induced increase in acetylcarnitine is restored more quickly in endurance-trained subjects when compared to sedentary subjects.

Study design

Acetylcarnitine will be determined by 1H-MRS before and after a 30 minute cycling test. Blood will also be collected from the subjects, prior to and just afterwards the cyling protocol, to be able to determine free fatty acids in

blood.

Intervention

N.A.

Study burden and risks

Subjects will come to the university twice. The first time the subjects will be screened to access eligibility, which will include filling in of a medical history questionnaire and a physical activity questionnaire and measurement of height and body weight. Body composition will also be accurately determined by hydrostatic weighing and the subjects* maximal aerobic capacity (VO2-max) and maximal performance (W-max) will be determined by an exercise test (duration of visit ca. 2 h.).

The second visit is a test day (duration ca. 2.5 h.), for which subjects have to report to the university in the late afternoon (ca 17.00), not having eaten after 12.00 o*clock. The test day contains the following measurements: After a baseline MRI/MRS-scan for acetylcarnitine quantification (duration ca. 1 h.), a blood sample will be taken (10 mL) and subjects will cycle for 30 minutes at 50% of W-max. Immediately after cycling, another blood sample (10 mL) will be taken and another MRI/MRS-scan will be performed (duration ca. 1 h.). During cycling an indirect calorimetry measurement will be performed to determine energy expenditure, fat- and carbohydrate oxidation.

The experimental procedures are without significant risks. MRS is a safe procedure (no ionizing radiation), with no known health risk as long as none of the exclusion criteria is met. There is a chance that MRI reveals an unexpected medical condition, of which the subject will be informed. His physician will also be informed.

Contacts

Public
Academisch Ziekenhuis Maastricht

P.O. Box 5800
6202 AZ Maastricht
NL
Scientific
Academisch Ziekenhuis Maastricht

P.O. Box 5800

6202 AZ Maastricht
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

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

Inclusion criteria

- Age 18-40 years
- Normal weight (BMI 18-25 kg/m2)
- Healthy
- Stable dietary habits
- No use of medication
- VO2-max for trained subjects above 50 mL/min/kg
- VO2-max for untrained subjects below 40 mL/min/kg

Exclusion criteria

- Any medical condition requiring treatment and/or medication use OR diminishing exercise tolerance
- Alcohol consumption of more than 20 g per day (± 2 units)
- Unstable body weight (weight gain or loss > 3 kg in the past three months)
- Participation in another biomedical study within 1 month prior to the screening visit
- Contraindications for MRI scan
* Central nervous system aneurysm clips
* Implanted neural stimulator
* Implanted cardiac pacemaker of defibrillator
* Cochlear implant
* Iron- containing corpora aliena in the eye or brain
* Hearing aids and artificial (heart) valves which is contraindicated for MRS

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):	27-04-2012
Enrollment:	13
Type:	Actual

Ethics review

Approved WMO

Date:	18-01-2012
Application type:	First submission
Review commission:	MEC academisch ziekenhuis Maastricht/Universiteit Maastricht, MEC 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	NL38047.068.11