The effects of acute exercise on (myokine) gene expression in human skeletal muscle

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The objective of the present study is to identify novel myokines, expression of which is altered in skeletal muscle after a single bout of exercise.

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

Summary

ID

NL-OMON34451

Source
ToetsingOnline

Brief title
MyoGene

Condition

- Glucose metabolism disorders (incl diabetes mellitus)

Synonym
Type 2 Diabetes mellitus; diabetes

Research involving
Human

Sponsors and support

Primary sponsor: Wageningen Universiteit
Source(s) of monetary or material Support: Diabetesfonds Nederland

Intervention

Keyword: Exercise, Gene expression, Muscle, Myokine

Outcome measures

Primary outcome

Main study outcomes include upregulation of genes in skeletal muscle after exercise (with a focus on genes encoding myokines) and changes of blood plasma levels of selected proteins after exercise. The proteins are selected based on gene expression changes measured.

Secondary outcome

PBMC gene expression: gene expression changes in the blood will be assessed

Routine plasma levels: plasma levels of glucose, insulin, fatty acids, cortisol, adrenalin and lactate will be determined.

Heart rate: heart rate will be measured.

Study description

Background summary

Proteins released from muscle during and shortly after exercise, often referred to as myokines, may be central to our understanding of the cross-talk during and after exercise between skeletal muscles and other organs, in particular the liver. So far only a few myokines are identified (e.g. IL-6, IL-8, IL-15, TNF-alpha). Taking into account the role of these several known myokines in developing insulin resistance, revealing new putative myokines might provide valuable information for the treatment and prevention of type 2 diabetes.

Study objective

The objective of the present study is to identify novel myokines, expression of which is altered in skeletal muscle after a single bout of exercise.

Study design

This is an experimental study.

Intervention

The intervention is a single exercise bout that consists of one hour one-legged cycling on a adapted recumbent cycle ergometer at a submaximal rate. The non-exercising leg will serve as control for the exercising leg.

Study burden and risks

During the screening session, blood pressure, height and weight will be measured and a medical questionnaire will be filled in. The two familiarization trails consist of 20 minutes of one-legged cycling on a low work load. The preliminary testing has two parts, a maximum work load test and a maximum oxygen uptake test. Both tests are graded exercise tests to exhaustion. During both tests, heart rate is measured non-invasively and during the maximum oxygen test oxygen uptake is measured non-invasively. The experimental session consists of an one hour exercising period at a submaximal rate. Subjects will cycle with their dominant leg on an adapted recumbent cycle ergometer. Before (T = 0) and after the exercise period (T = 1) muscle biopsies will be taken from both legs. At T = 0, T = 1 and after 2 hours of rest (T= 3), venous blood samples will be obtained. Heart rate will be measured non-invasively. Prior to the experimental session participants are asked to refrain from alcohol and heavy exercise respectively one day and one week before the session, arrive in a fasted state, eat a prescribed dinner the evening before the session.
The time investment requested from the participants is 1 hour at the information meeting, 1.0 hour at a screening session, 2 x 1.0 hours at the familiarization trails, 2,5 hours at the preliminary testing and 5 hours for the experimental session. In total this is an investment of 11.5 hours.
Risks for the subjects during this study are considered low. Muscle biopsies will be taken by an experience physician, and proper precautions will be taken to minimize the risk of complications. Taking a muscle biopsy can generate mild discomfort and result in local bruising. To minimize this risk a pressure bandage will be applied. Venous blood samples can occasionally cause a local haematoma or bruise and some participants may report pain or discomfort. The exercise sessions during this study, in particular the graded exercise tests (one- and two-legged) and the experimental task may induce muscle soreness. This is harmless and disappears after a few days, but it may cause an uncomfortable feeling.
The participant will not have any health-related benefits from this research, but will receive a monetary reward.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

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

Inclusion criteria

• Age 40-60 years
• Male gender
• BMI < 30 kg/m2

Exclusion criteria

• Exercising regularly (> 2 times a week, > 3 hour in total per week)
• Unstable body weight (weight gain or loss > 3 kg in the past three months)
• Following, or have recently followed a (weight-loss) diet
• Donated or intended to donate blood 2 months before until two months after the study
• Medical condition that can interfere with the study outcome (i.e. cardiovascular disease,

pulmonary disease)
• Systolic blood pressure >160 mmHg and/or diastolic blood pressure >100 mmHg
• Use of medications known to interfere with gene expression in the muscles (i.e. statins, fenofibrate)
• Use of antithrombotic therapy (marcoumar, sintromitis).
• Diagnosed diabetes mellitus type 1 or 2.
• Drugs or alcohol abuse (> 3 glasses of alcoholic beverages a day).
• (Chronic) injuries of the locomotor system that can interfere with the intervention
• Participated in another study within the last six months

Study design

Design

Study type:	Interventional
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)

Primary purpose: Basic science

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	11-04-2011
Enrollment:	10
Type:	Actual

Ethics review

Approved WMO Date:	22-11-2010
Application type:	First submission
Review commission:	METC Wageningen Universiteit (Wageningen)
Approved WMO Date:	06-04-2011
Application type:	Amendment

Review commission: METC Wageningen Universiteit (Wageningen)

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	NL33968.081.10