The impact of resistance versus endurance type exercise on the muscle protein signalling response

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The present proposal is designed to examine the differences in molecular signalling response to resistance versus endurance type exercise, leading to skeletal muscle protein synthesis.

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

Summary

ID

NL-OMON31827

Source
ToetsingOnline

Brief title
Muscle protein signalling after resistance and endurance exercise

Condition

- Other condition

Synonym
muscle anabolism, protein signaling

Health condition

inspanningsfysiologie/spiergroei

Research involving
Human

Sponsors and support

Primary sponsor: Universiteit Maastricht
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: Endurance exercise, Muscle, Protein signaling, Resistance exercise

Outcome measures

Primary outcome

The difference in phosphorylation and activation of different signalling

proteins during and after resistance and endurance exercise.

Secondary outcome

The difference in blood glucose, insulin and amino acid concentration during

and after resistance versus endurance exercise.

Study description

Background summary

It has been well established that both endurance and resistance type exercise activities lead to muscle protein synthesis in the post-exercise recovery phase. Activation of the mTOR pathway is generally associated with resistance type exercise, whereas the adaptation to endurance type exercise is generally associated with the activation of the AMPK-PGC1α signalling pathway. However, some studies suggest that the mTOR pathway is also involved in the synthesis of muscle proteins after endurance type exercise activities. Research is warranted to confirm these suggestions.

Study objective

The present proposal is designed to examine the differences in molecular signalling response to resistance versus endurance type exercise, leading to skeletal muscle protein synthesis.

Study design

Subjects will be tested on 2 occasions, seperated by 2 weeks. In the morning, they will receive a standardized breakfast, rest for 2 hours and then perform an endurance or resistance exercise session of 1 hour. Muscle samples will be taken before, immediately after, and 4 and 22 hours after exercise to measure the signalling proteins that are involved in the signal transduction pathway of muscle protein synthesis. Subjects will receive standardized meals throughout the day.

Intervention

The test starts with a standardized breakfast in the morning. This is followed by a 2 hour resting period, whereafter the first muscle biopsy is taken and the exercise protocol will start. This consists of 1 hour of resistance exercise or 1 hour of cycling exercise. At the end of the protocol a second muscle biopsy is taken. This is followed by another resting period of 4 hours, after which a third biopsy is taken. Subjects will receive a lunch at 12.00 and prepacked dinner and snacks to take home. After an overnight fast, they will return to the university the next morning at 9.00 am, and a fourth biopsy is taken, whereafter aubjects will receive a breakfast.

Study burden and risks

The risks involved in participating in this experiment are minimal. Insertion of the cathethers in a vein is comparable to a normal blood draw and the only risk is of a small local haematoma. This is the same for the muscle biopsy. The incision made for obtaining the muscle biopsy (performed by an experienced physician) will heal completely.

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

healthy men
Age: 18-28
Body mass index (BMI) < 25
Untrained

Exclusion criteria

Use of medication
BMI > 25
Enrolled in an endurance and/or strenght training program

Study design

Design

Study type:	Interventional
Intervention model:	Crossover
Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	06-05-2008
Enrollment:	15
Type:	Anticipated

Ethics review

Approved WMO

Date:	24-04-2008
Application type:	First submission
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	NL22538.068.08