The effect of exercise on the prevention of endothelial ischemia-reperfusion injury

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To examine the impact of an exercise bout on the ability to protect endothelial damage in response to ischaemia reperfusion injury in healthy humans. A secondary objective is to explore the potential difference in efficacy to prevent ischaemia...

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Coronary artery disorders
Study type	Interventional

Summary

ID

NL-OMON40007

Source
ToetsingOnline

Brief title
Exercise-endothelial IR

Condition

- Coronary artery disorders

Synonym
coronary artery disease

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Sint Radboud
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: exercise, ischemia reperfusion, preconditioning

Outcome measures

Primary outcome

Change in endothelial function (measured with flow mediated dilation) after ischaemia reperfusion injury (induced by 20 minutes ischemia) with and without precedence of an acute bout of moderate-intensity endurance or (isocaloric) high-intensity interval exercise.

Secondary outcome

nitrite/nitrate in plasma

Study description

Background summary

Exercise training has strong cardioprotective effects in asymptomatic subjects as well as those with established cardiovascular risk and/or disease. Ischemia-reperfusion (IR) represents a significant and harmful stimulus for tissues, including the myocardium and the vascular endothelium. Recent studies have found preliminary evidence that exercise training is associated with a reduced endothelial IR-injury, which may partly contribute to the protective effects of exercise training. Whether also acute bouts of exercise possess the ability to prevent endothelial IR injury in humans in vivo is currently unknown. Recent studies have demonstrated that different types of exercise training possess different effects, with high-intensity interval training leading to superior effects on physical fitness and the vasculature compared to *traditional* moderate-intensity exercise. Accordingly, different types of exercise may also have a distinct impact on the ability to prevent endothelial IR injury. This is supported by the observation that high-intensity interval training (4 x 4-min high-intensity exercise) has remarkable similarities with ischaemic preconditioning (4 x 5-min ischemia); i.e. a validated and successful method to prevent endothelial IR-injury.

Study objective

To examine the impact of an exercise bout on the ability to protect endothelial damage in response to ischaemia reperfusion injury in healthy humans. A secondary objective is to explore the potential difference in efficacy to prevent ischaemia reperfusion injury between high-intensity interval training and traditional moderate-intensity exercise.

Study design

within-subject cross-over study

Intervention

A bout of traditional moderate-intensity exercise and high-intensity interval exercise

Study burden and risks

Non-invasive cuff occlusion is used to examine endothelial function (5-minute ischaemia) and produce the stimulus that induces ischaemia-reperfusion injury (20-minute ischaemia). Cuff inflation is non-invasive and not associated with a health risk for the subject. Also exercise is not associated with a significant health risk in our participants. Blood will be drawn three times per testing day for ex-vivo analysis of the NO-pathway. The volunteers will not benefit directly from participating in this study.

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 volunteers >18 years
- Written informed consent

Exclusion criteria

-Presence of an absolute contra-indication for the performance of exercise (see also SOP Inspanningstest Department of Physiology):

Study design

Design

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

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	19-09-2013
Enrollment:	24
Type:	Actual

Ethics review

Approved WMO Date:	05-03-2013
Application type:	First submission
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)

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	NL42390.091.12

Study results

Date completed:	28-11-2013
Actual enrolment:	17

Summary results
Trial ended prematurely