Assessment of myocardial susceptibility to ischemia-reperfusion injury following marathon running.

Published: 15-04-2025
Last updated: 02-05-2025

To explore whether vigorous endurance exercise (i.e., running a marathon) alters the magnitude of cardiac damage following myocardial ischemia-reperfusion injury in amateur athletes through using an ex vivo rat heart model of myocardial infarction...

Ethical review	Approved WMO
Status	Pending
Health condition type	Cardiac disorders, signs and symptoms NEC
Study type	Observational invasive

Summary

ID

NL-OMON57441

Source
ToetsingOnline

Brief title
Marathon and IRI injury

Condition

- Cardiac disorders, signs and symptoms NEC
- Vascular injuries

Synonym
Ischemia-reperfusion, vascular damage

Research involving
Human

Sponsors and support

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

Intervention

Keyword: Ischemia-reperfusion, Marathon, Troponin

Outcome measures

Primary outcome

The primary outcome parameter focuses on infarct size (= degree of cell death) introduced by global IR in our ex vivo model of myocardial infarction which is presened as a percentage of infarcted tissue relative to the total ventricular tissue.

Secondary outcome

Isolated rat Heart

- The release of the damage marker Lactate Dehydrogenase (LDH) into the cardiac effluent during reperfusion due to cardiac damage.
- The restoration of mechanical function of the heart. Before starting the experimental protocol, a balloon will be introduced into the left ventricle to measure left ventricular pressure. This allows changes in developed pressure before and after the introduction of ischemia to be examined.
- Protein changes that can provide information about intracellular mechanism will be investigated by Western blot analysis. Alterations in adverse and cardioprotective signalling pathways will be considered.

Participant blood samples

- Participants are assessed on concentrations of markers of injury or stress in plasma (cardiac Troponin T/I, LDH and Creatine Kinase). Plasma samples are collected before, after, and 4 hours after completion of the marathon. Residual

plasma is stored at -80 * for a maximum of 15 years for subsequent analysis.

Study description

Background summary

The cardiovascular health benefits of exercise are substantial, leading to significant reductions in both all-cause and cardiovascular mortality. Nonetheless, evidence is arising that vigorous endurance exercise might also establish acute injury as established by the release of cardiac troponin, a validated marker of cardiac injury. Besides the release of troponin, acute bouts of vigorous exercise also promotes cardiovascular dysfunction and transiently increase the risk for sudden cardiac death.
Prolonged exercise-induced cardiac strain potentially impacts the heart negatively through transient ischemia, biochemical changes from increased metabolism, and mechanical stress from overstretching. These factors, individually or combined, may heighten the heart's vulnerability to the magnitude of cardiac damage, such as exaggerated injury following myocardial ischemia and reperfusion (IR). However, relatively little is known whether strenuous exercise alters the magnitude of cardiac damage to IR injury.

Study objective

To explore whether vigorous endurance exercise (i.e., running a marathon) alters the magnitude of cardiac damage following myocardial ischemia-reperfusion injury in amateur athletes through using an ex vivo rat heart model of myocardial infarction.

Study design

Exploratory and observational research

Study burden and risks

The experimental procedures are observational and only minimally invasive, during blood sampling. Blood sampling, a commonly performed medical procedure, poses no risks, particularly because it is carried out by individuals with extensive experience. The only potential adverse effect is the formation of a small hematoma. However, the incidence of this is low (5%), it is completely reversible, and it does not interfere with daily life. The volunteers will not benefit from participating in this study.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)

Inclusion criteria

- Healthy male volunteers, adults >18 years, <65 years.
- BMI < 30kg/m2
- Recreational athlete (i.e. minimal 1h/week exercise, maximal 5 days/week of exercise)
- Free of cardiovascular disease
- Participants must be enrolled in the respective marathon event.
- No use of medication that alters the effect of cardioprotective signalling:
o β-blockers
o Calcium Channel blockers
o Nitrates
o Opioids
o Anti-platelet agents (e.g. paracetamol, ibuprofen)
o Statins and anti-hyperlipidaemic drugs

o Anti-diabetic treatment

Exclusion criteria

A potential subject who meets any of the following criteria will be excluded from participation in this study:
- Presence of an absolute contra-indication for the performance of exercise.
- Mental impairment leading to inability to cooperate
- Participants are instructed to limit the amount of moderate to vigorous exercises 48 hours before the start of the marathon. This is to prevent a potential cardioprotective phenotype before the start of the study. Participants that have not adhered to the restrictions will be excluded from the study.
- Participants will be excluded in case they do not complete the marathon.

Study design

Design

Study type: Observational invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Prevention

Recruitment

NL

Recruitment status:	Pending
Start date (anticipated):	01-03-2025
Enrollment:	15
Type:	Anticipated

Medical products/devices used

Registration:	No

Ethics review

Approved WMO Date:	15-04-2025
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	NL88985.091.25