The effect of caffeine or protein coingestion with carbohydrate on postexercise muscle glycogen synthesis rate

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The aim of the present study is to investigate the effect of added protein+leucine or caffeine to 1.2 g/kg/h CHO on the rate of post-exercise muscle glycogen re-synthesis in healthy, recreational athletes.

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

Summary

ID

NL-OMON32889

Source ToetsingOnline

Brief title Muscle glycogen synthesis after caffeine or protein intake

Condition

• Other condition

Synonym mucle energy stores, muscle recovery

Health condition

inspanningsfysiologie, spierherstel

Research involving

Human

1 - The effect of caffeine or protein co-ingestion with carbohydrate on post-exercis ... 13-05-2025

Sponsors and support

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

Intervention

Keyword: Caffeine, Carbohydrate, Muscle glycogen, Protein

Outcome measures

Primary outcome

The difference in muscle glycogen synthesis during 6 hours of recovery between

carbohydrate only, carbohydrate and protein, and carbohydrate and caffeine

intake.

Secondary outcome

not applicable

Study description

Background summary

Muscle glycogen has been recognized as an important fuel source during prolonged exercise. To optimize glycogen synthesis rates adequate amounts of carbohydrate (CHO) should be ingested. Several studies have examined the amount of carbohydrate that should be ingested to optimise post-exercise glycogen synthesis. These studies revealed an ingestion rate of 1.0-1.2 g/kg/h to be most effective. Elevated insulin levels may further increase glucose uptake and glycogen synthase activity, the latter of which forms the major factor in determining the rate of glycogen synthesis when substrate supply is adequate. Several studies have attempted to increase post-exercise insulin levels by the combined ingestion of carbohydrate, protein and leucine. Whether protein and leucine co-ingestion in addition to a carbohydrate intake of 1.2 g/kg/h could further accelerate post-exercise muscle glyocgen repletion remains to be established.

Recently Pedersen et al. showed that the addition of caffeine to a CHO (1.0 g/kg/h) recovery drink increases the rate of muscle glycogen synthesis by 66% compared with CHO ingestion only. However, other studies investigating the effect of caffeine on muscle glycogen synthesis have shown variable results.

Therefore, the effect of caffeine co-ingestion with carbohydrate warrants further investigation.

Study objective

The aim of the present study is to investigate the effect of added protein+leucine or caffeine to 1.2 g/kg/h CHO on the rate of post-exercise muscle glycogen re-synthesis in healthy, recreational athletes.

Study design

Subjects will perform 3 randomized tests, each separated by at least one week. During those tests subjects will first perform an intensive cycling protocol to deplete their muscle glycogen stores. Thereafter, subjects will rest for 6 hours during which the will receive one of the 3 recovery drinks. The drinks will be provided in a randomized order and will contain carbohydrates only, or combined with protein hydrolysate and leucine, or caffeine. Muscle biopsies will be taken within 15 min after exercise and after 6 h recovery to determine muscle glycogen levels. Blood samples will be taken throughout the test for the measurements of blood glucose and insulin levels.

Intervention

The test starts with a intensive cycling exercise of approximately 90 min. to deplete muscle glycogen levels. 15 min after cycling the first muscle biopsy will be taken. Subsequently, subjects will recover for 6 hours during which they will receive one of the test beverages every 30 min. A blood sample will be drawn every 15 min for the first 90 min and every 30 min thereafter. After 6 hours a second muscle biopsy will be taken.

Study burden and risks

The risks involved in participating in this experiment are minimal. Insertion of the catheters in a vein is comparable to a normal blood draw and the only risk is of a small local hematoma. This is the same for the muscle biopsy. The incision made for obtaining the muscle biopsy (performed by am experienced physician) will heal completely. The test beverages are made from normal nutritional ingredients and for this reason do not form any health risks.

Contacts

Public Universiteit Maastricht Postbus 616 6200 MD Maastricht Nederland **Scientific** Universiteit Maastricht

Postbus 616 6200 MD Maastricht Nederland

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age

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

Inclusion criteria

Healthy men Age: 18-35 Competitive cyclists * Cycling > 100 km a week * VO2max > 55 ml/kg/min BMI < 25 kg/m2

Exclusion criteria

BMI > 25 kg/m2 Not participating in endurance sports Use of medication

4 - The effect of caffeine or protein co-ingestion with carbohydrate on post-exercis ... 13-05-2025

Study design

Design

Study type:	Interventional
Intervention model:	Parallel
Allocation:	Randomized controlled trial
Masking:	Double blinded (masking used)
Control:	Placebo
Primary purpose:	Other

Recruitment

NL	
Recruitment status:	Recruitment stopped
Start date (anticipated):	12-01-2009
Enrollment:	14
Туре:	Actual

Ethics review

Approved WMO	
Date:	03-11-2008
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

ССМО

ID NL24773.068.08