Nitrate and sucrose: GI function

No registrations found.

Ethical review	Positive opinion
Status	Recruitment stopped
Health condition type	-
Study type	Interventional

Summary

ID

NL-OMON22715

Source
Nationaal Trial Register

Brief title
NO Guts

Health condition

- GI blood flow / bloedstroom in maagdarmstelstel

- GI damage / darmschade

- high intensity exercise / hoog intensiteit inspanning

- NO donors / stikstofmonoxide donors

Sponsors and support

Primary sponsor: Maastricht University, Human Movement Sciences
Source(s) of monetary or material Support: Supported by a grant from the Dutch Technology Foundation STW

Intervention

Outcome measures

Primary outcome

Intestinal damage: plasma intestinal fatty acid binding protein (I-FABP)

Secondary outcome

• Splanchnic perfusion, measured by gastrotonometry and arterial blood sampling

• Plasma nitrate and nitrite concentrations

• Plasma glucose

• Resting blood pressure

Study description

Background summary

The gastrointestinal (GI) tract plays an important role in the human body. The GI wall regulates the uptake of nutrients, and also has a very important function as a barrier between the internal and external environment. The penetration of harmful substances and microbiota from the GI lumen (external environment) into the systemic circulation (internal environment) depends on this barrier.

During high-intensity exercise, GI complaints and intestinal injury frequently occur, thereby hampering exercise performance. Splanchnic hypoperfusion, resulting in intestinal damage, has been postulated as one of the key underlying mechanisms for exercise associated GI symptoms. Attenuating such hypoperfusion therefore appears a promising strategy to reduce GI injury and its negative effects on performance. During episodes of splanchnic hypoperfusion, the synthesis of nitric oxide (NO) is suppressed. A previous study of our group found that supplementation with L-citrulline as a donor of the endogenous NOS dependent pathway lead to improved splanchnic blood flow and reduced intestinal damage during high intensity exercise. By acting as a local NO donor, through the nitrate-nitrite-NO pathway, dietary nitrate may also increase microcirculatory blood flow in the splanchnic area. Alternatively, the ingestion of carbohydrates will directly stimulate an increase in splanchnic microcirculatory blood flow, simply through the normal digestive processes taking place. Thus, both strategies may effectively reduce intestinal damage, and as such prove valuable in reducing the negative effects of exercise on the gut.

The aim of this study is to investigate the effects of both dietary nitrate and sucrose ingestion on splanchnic perfusion and intestinal (enterocyte) damage during high intensity exercise.

Study objective

We hypothesize that both nitrate and sucrose will reduce GI damage and improve GI blood flow during high-intensity exercise compared with placebo.

Study design

Screening: 1 hour (inclusive Wmax test)

3 test days: each 5 hours, baseline blood sample + 3 hours of blood sampling and tonometry measurements every 20 min (total 9 samples); 1 hour prior to cycling, 1 hour during cycling and 1 hour post cycling.

Intervention

On each test day the subjects will perform 60 min of cycling at 70% Wmax, were the effect of each intervention on GI parameters will be investigated:

NIT: 1.1 g of $NaNO_3$ (sodium nitrate) dissolved in 200 mL water 2.5 h prior to exercise. 200 mL water provided both 15 min prior and 30 min into exercise.

SUC: 1.1 g of NaCl (placebo) dissolved in 200 mL water 2.5 h prior to exercise. 20 g sucrose dissolved in 200 mL water provided both 15 min prior and 30 min into exercise.

PLA: 1.1 g of NaCl (placebo) dissolved in 200 mL water 2.5 h prior to exercise. 200 mL water provided both 15 min prior and 30 min into exercise.

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Eligibility criteria

Inclusion criteria

- Healthy (see exclusion criteria below)

- 18 - 40 years of age

- 18.5 < BMI < 30 kg/m2

- Engagement in regular cycling activity (at least 2x per wk)

- Wmax > 4.5 W/kg

Exclusion criteria

- Diagnosed or on medication for: Cardiovascular disease; Chronic Obstructive Pulmonary Disease (COPD); Rheumatoid arthritis (RA); Inflammatory bowel disease (IBD); Morbus Crohn and colitis ulcerosa; Irritable bowel syndrome; Inflammatory systemical diseases; Diabetes Mellitus; Diabetes Insipidus; Hypo- or hyperthyreoidism; Kidney failure; Donation of blood within the last 3 months; Cancer, Alcohol use of > 5 units per day; Drugs abuse; Use of regular medication; Oversensitive for sucrose; Phenol Keton Uria (PKU); Acute porphyria in the past.

- Smoking

- Currently supplementing diet with nitrate

Study design

Design

Study type:	Interventional
Intervention model:	Crossover
Allocation:	Randomized controlled trial
Masking:	Double blinded (masking used)
Control:	Placebo

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	10-01-2017
Enrollment:	16
Type:	Actual

Ethics review

Positive opinion Date:	20-03-2017
Application type:	First submission

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
NTR-new	NL6316
NTR-old	NTR6491
Other	NL59697.068.16 : METC163045

Study results

Summary results
N/A