The effect of nitrate supplementation: source of supplementation

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

Summary

ID

NL-OMON42176

Source
ToetsingOnline

Brief title
Nitrate supplementation: source

Condition

- Other condition

Synonym
blood pressure, Pharmacokinetics

Health condition

Effect van nitraatsuppletie op plasma nitriet waarden en bloeddruk (niet aandoenings gerelateerd)

Research involving
Human

Sponsors and support

Primary sponsor: Universiteit Maastricht
Source(s) of monetary or material Support: NWO (STW)

Intervention

Keyword: blood pressure, nitrate, nitrite

Outcome measures

Primary outcome

The primary parameter will be plasma levels of nitrite following an acute dose

of nitrate from different sources.

Secondary outcome

- plasma concentration of nitrate, glucose and free fatty acids

- resting blood pressure

- gastro-intestinal tolerance questionnaire and questions about the

palatability of the drinks

Study description

Background summary

Oral ingestion of nitrate (NO3-) has been shown to increase plasma nitrate and nitrite levels. Significant lowering of pulmonary oxygen uptake during exercise, as well as significantly lower blood pressure values at rest have been observed after supplementation with nitrate. These effects are attributed to increased endogenous NO production, which is related to the increase in plasma nitrite levels. So far, studies have primarily used sodium nitrate (NaNO3) and red beetroot juice to induce these metabolic effects. However, it is unknown whether similar effects on plasma nitrite levels can be expected when ingesting the juice that is derived from other nitrate-rich vegetables. Indeed, no study has yet described a direct comparison between different nitrate-rich beverages with respect to the bioavailability of nitrate/nitrite and the possible hemodynamic effects. Based on the gaps in current literature, our main goal will therefore be to gain further insight into the effects of

nitrate supplementation with different sources on plasma nitrite levels. This will be investigated in healthy recreationally active men and women by exploring the ability of NaNO3- and natural nitrate-rich food products to increase plasma nitrite levels, and to decrease blood pressure as secondary parameter.

Study objective

The main aim of the current study will be to compare the ability of different nitrate sources to increase plasma nitrite levels. The effects of oral ingestion of NaNO3 will be compared to that of three natural nitrate-rich food sources matched for total nitrate content (i.e. concentrated red beetroot juice, a spinach based beverage, and rocket salad based beverage). In addition, we will investigate whether possible effects on plasma nitrite levels are accompanied by changes in blood pressure.

Study design

Single centre, cross-over study with 4 arms

Intervention

Acute bolus ingestion containing 800 mg (12.9 mmol) nitrate in the form of NaNO3- in a water solution, red beetroot juice, a spinach based beverage, or a rocket salad based beverage. All 4 trials will be performed in a cross-over manner separated by a 1 week washout period.

Study burden and risks

Subjects will be required to report to the laboratory for a total of 5 visits, including screening. Prior to the first experimental visit (visit 2), subjects will be asked to record their diet and activity for 48 h and refrain from strenuous physical exercise or labour for the 48 h preceding the visit. Subjects will be asked to avoid caffeine and alcohol for 12 h and 24 h preceding each visit, respectively. They will be asked to replicate their food intake and refrain from exercise for the 48 h prior to subsequent visits. Also, subjects will be asked not to eat or drink after 22pm the evening before the test day. They will be asked to fill in a medical questionnaire on the day of the screening.

The subjects will be asked to give 11 blood samples of 7.5 mL every visit (44 blood samples or 330 mL in total over 4 visits). For blood collection, a small teflon catheter will be inserted into a forearm vein with the assistance of a small needle, which is subsequently removed. The discomfort of this procedure is transient and is very similar to having an injection by a needle, or when donating blood. Once the needle is removed, there should be no sensation from

the catheter. During the course of the experiment, blood will be drawn periodically from the catheter. Some minor discomfort may occur and a small hematoma may result. The researchers will also be aware of the possibility of the subject fainting when placing the catheter.

The administered dose of nitrate in the natural food products (red beetroot juice, rocket salad, spinach) has been administered in multiple clinical and exercise studies and all the products are commercially available supplements/food products. The most commonly reported side effect of red beetroot juice is beeturia (red-colored urine/feces, 15-20% of the population). In general, a common reported side effect of ingestion of nitrate-rich food products such as red beetroot juice is mild gastrointestinal distress (bloating, belching). The dose of $NaNO_3^-$ used in the current study has been administered in multiple clinical and exercise studies. No adverse events were reported, except for reports of mild headache (which may or may not be associated with ingestion of the sodium nitrate). The long term effects of nitrate ingestion still need to be fully investigated.

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 (not being diagnosed with a cardiovascular or metabolic disease and/or no presence of mental/psychological conditions)
- 18 - 45 years of age
- 18.5 < BMI < 30 kg/m2
- Engagement in regular physical activity (> 1 h a week)

Exclusion criteria

- Use of medication
- Smoking
- Currently supplementing diet with nitrate
- Lactose intolerance

Study design

Design

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

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	12-09-2014
Enrollment:	30

Type:	Actual

Ethics review

Approved WMO Date:	02-07-2014
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	NL48645.068.14

Study results

Date completed:	01-12-2015
Actual enrolment:	22