*The PROtective effect of SulforAphaNe on chronic low-grade Inflammation in healthy participants**: The PRO SANI study

Published: 05-10-2021
Last updated: 05-04-2024

The aim of this research is to find out whether eating Broccocress®, a sprout vegetable rich in the substance sulforaphane, can counteract inflammation caused by, among other things, unhealthy food. More precisely, we are investigating whether...

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

Summary

ID

NL-OMON51215

Source
ToetsingOnline

Brief title
The effects of sulforaphane on diet-induced inflammation

Condition

- Other condition
- Lifestyle issues

Synonym
chronic inflammation, Low-grade inflammation

Health condition

Laaggradige chronische ontstekingen

Research involving
Human

Sponsors and support

Primary sponsor: Universiteit Maastricht
Source(s) of monetary or material Support: Topsector Tuinbouw & Uitgangsmaterialen;grant number TU1118.

Intervention

Keyword: BroccoCress, Challenge, Inflammation, Sulforaphane

Outcome measures

Primary outcome

The main endpoint of the present study is to demonstrate that sulforaphane can influence endothelial activation measured as changes in plasma concentrations of sVCAM and sICAM in a caloric challenge test in healthy participants.

Secondary outcome

The secondary objectives of the study are to evaluate the effects of sulforaphane in healthy participants subjected to the *PhenFlex* challenge on:

- The systemic low-grade inflammation score (SIS). The SIS score will be constructed from:

o Biomarkers that represent metabolic tissue inflammation (IL-1 b, IL-6, and tumor necrosis factor alpha [TNF-a])

o Biomarkers of immune cell recruitment (C-C motif ligand-2 [CCL-2]), IL-8, soluble intercellular adhesion molecule-1 [sICAM-1], soluble vascular cell adhesion molecule-1 [sVCAM-1])

o Biomarkers of inflammation resolution (IL-10, adiponectin)

o Biomarkers of overall inflammation (CRP and IL-12 p70).

The SIS will be generated by summing the z-score log-transformed inflammatory biomarkers plasma concentration (CRP, IL-1 b, IL-6, IL-8, IL-12 p70, TNF-a, CCL-2, sICAM-1, and sVCAM-1). The Z-score log-transformed plasma adiponectin and IL-10 levels will be subtracted from SIS because of their well-known anti-inflammatory functions.

- To assess the bioavailability of glucoraphanin and sulforaphane from broccoli sprouts, urine concentrations of SFN and metabolites will be determined; SFN-glutathione, SFN-cysteine-glycine, SFN-cysteine, and SFN-N-acetylcysteine (SFN-NAC).

- NF-*B activity and Nrf2 activity.

- Urinary 11dhTxB2 (AspirinWorks®).

- Heart Rate Variability; to examine if the PhenFlex challenge and intervention can induce changes in heart rate variability and to explore their relationship with changes in inflammatory biomarkers.

Study description

Background summary

The concept of health has changed in recent years: in addition to medicine and pharmacology, there is an increasing interest in lifestyle, in which nutrition plays a central role. Fruits and vegetables seem to have a particularly positive effect on nutritional status and in reducing the risk of lifestyle diseases, such as type II diabetes and cardiovascular disease. Research has shown that the onset and progression of these diseases is in part related to or influenced by inflammation. From the concept that health is defined by the ability to adapt adequately to everyday challenges, so-called "challenges" have recently been designed to better understand people's health status. The work resulted in the standardized so-called "PhenFlex" oral challenge test, composed of 75 g glucose, 60 g palm olein (36.6% monounsaturated fatty acids, 48.8% saturated fatty acids, 9.1% polyunsaturated fatty acids) and 20 g protein,

which is drunk to better map the health status of 'healthy' people.
With this research we want to investigate which substances in fruit and vegetables can reduce inflammation and thus have a health-promoting effect. Cruciferous vegetables such as broccoli, Brussels sprouts and cabbage are rich sources of sulforaphane, a compound that appears to have health-promoting effects. Because sulforaphane has recently gained a lot of interest due to its potential health effects, companies are investing in the development of vegetables with high sulforaphane concentrations.
Broccocress® is a brand name of an edible sprout vegetable that contains a high sulforaphane concentration compared to broccoli, for example. Studies have shown that broccoli sprouts improved "biomarkers" of type 2 diabetes, including reductions in fasting blood glucose levels and stabilization of the insulin response in type 2 diabetic patients, especially obese patients.

Study objective

The aim of this research is to find out whether eating Broccocress®, a sprout vegetable rich in the substance sulforaphane, can counteract inflammation caused by, among other things, unhealthy food. More precisely, we are investigating whether sulforaphane can reduce the formation of inflammation in the body in healthy subjects who consume a simulated "vigorous" unhealthy meal, in the form of PhenFlex "challenge". By consuming the PhenFlex within five minutes, the body responds to this challenge by increasing the content of substances that indicate inflammation. We are investigating whether sulforaphane can reduce the elevation of these substances, which indirectly indicates a protective effect against inflammation. We compare the effect of BroccoCress with the effect of Affilla Cress, a sprout vegetable without sulforaphane. Affilla Cress is used in this study as a non-active substance or placebo.

Study design

Double-blind, crossover, randomized, placebo-controlled study

Intervention

The participants will be randomized into two groups and receive either approximately 16 grams of BroccoCress® or placebo (Affilla Cress®, 16 grams) 90 minutes prior to the oral challenge test at the first visit. At the second visit, participants consume the intervention or placebo serving prior to the oral challenge test, or vice versa, depending on randomization.

Study burden and risks

The risk associated with participation in this study will be related to intake of BroccoCress®, Affilla Cress®, the *PhenFlex* challenge and possible

complications during blood collection. Oral consumption of BroccoCress® and Affilla Cress® is generally well tolerated and has not been associated with significant side effects, other than allergic reactions to Brassicacea species. Allergies to Brassicacea species are rare, and cruciferous plants are considered safe for human consumption. At the same time, cruciferous plants may increase resilience to excessive inflammatory stimuli associated with poor nutrition due to its anti-inflammatory effects. The *PhenFlex* challenge test, a high-fat, high-glucose, high-caloric drink, has been applied in three studies. No side effects were reported after consumption of the PhenFlex challenge in a total of 131 participants. Venipuncture is the most common procedure performed in health care settings. However, possible complications during blood collection can occur. Complications that can arise from venipuncture include haematoma formation, nerve damage, pain, haemaconcentration, extravasation, iatrogenic anaemia, arterial puncture, petechiae, allergies, fear and phobia, infection, syncope and fainting, excessive bleeding, edema and thrombus. For the safety of the participants, we choose to only draw blood at times when we know from the literature that the PhenFlex challenge has an effect on inflammatory biomarkers.

Contacts

Public
Universiteit Maastricht

Nassaustraat 36
Venlo 5911 BV
NL
Scientific
Universiteit Maastricht

Nassaustraat 36
Venlo 5911 BV
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)

Inclusion criteria

1. Signed informed consent form (ICF) prior to initiation of any study related procedures
2. Male or female volunteer
3. Age 18-50 years
4. BMI between 18.5-30 kg/m2
5. Stable weight and no intention to lose weight until completion of the study; no reported weight loss or weight gain of >= 5 kg 3 months prior to inclusion into this study
6. Constant eating habits during at least 3 months prior to inclusion into the study

Exclusion criteria

1. Having a history of medical or surgical events that may significantly affect the study outcomes and inflammatory response
2. Involved in intensive sports activities more than 4 times a week or at top sport level (e.g. playing football, tennis, running, race-cycling, swimming)
3. Regular intake of medication that may affect inflammatory response from 2 weeks before screening until the end of the study, including NSAIDs such as Ibuprofen, Naproxen, Diclofenac. Participants are allowed to use oral contraceptives before and during the study.
4. Psychotic, addictive or other mental disorders limiting the ability to provide informed consent or to comply with the study requirements
5. Aversion, intolerance or allergy to cruciferous vegetables (e.g. kale consumption; bloating) or ingredients of the PhenFlex drink (palm olein, dextrose, protein supplement, vanilla aroma).
6. Use of dietary supplements with potential effects on antioxidant or inflammatory status within 4 weeks prior to inclusion into this study. Examples of dietary supplements not allowed in the study include supplements containing flavonoids, glucosinolates, carotenoids, ergothioneine, polyacetylenes and certain polysaccharides.
7. Excessive alcohol consumption (>= 28 consumptions approx. 250 g alcohol per week)
8. Viral or bacterial infection requiring use of antibiotics, laxatives and anti-diarrheal drugs within 4 weeks prior to inclusion into this study
9. Pregnancy and/or breastfeeding
10. Reported slimming or medically prescribed diet

11. Vegetarian or vegan lifestyle

Study design

Design

Study type:	Interventional
Intervention model:	Crossover
Allocation:	Randomized controlled trial
Masking:	Double blinded (masking used)
Control:	Active
Primary purpose:	Prevention

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	24-11-2022
Enrollment:	12
Type:	Actual

Ethics review

Approved WMO

Date:	05-10-2021
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	NL77272.068.21