Brain and glycemic responses to soft drinks with different sweeteners (SWEETBRAIN)

Published: 25-10-2022
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To determine changes in brain activity in responses to the ingestion of flavored waters sweetened with either the nutritive sugar sucrose or different low-caloric sweeteners.

Ethical review	Approved WMO
Status	Completed
Health condition type	Other condition
Study type	Observational invasive

Summary

ID

NL-OMON51544

Source
ToetsingOnline

Brief title
Brain and glycemic responses to sweet soft drinks

Condition

- Other condition

Synonym
N.v.t.

Health condition

Fysiologie van voedselverwerking.

Research involving
Human

Sponsors and support

Primary sponsor: Wageningen Universiteit
Source(s) of monetary or material Support: Tate & Lyle PLC

Intervention

Keyword: Brain activity, Glycemic response, Sweeteners

Outcome measures

Primary outcome

rCBF in a priori defined homeostatic and reward-related brain regions of

interest (ROIs; hypothalamus, striatum).

Secondary outcome

Seed-based functional connectivity of the ROIs.

Plasma glucose and insulin.

Gastric content volume.

Study description

Background summary

The brain is crucial in the regulation of energy intake and maintaining homeostasis which is subserved by an interaction of homeostatic and reward-related brain areas. These brain areas integrate multiple neural and hormonal signals related to energy content such as sweet taste and food reward in the form of ingested energy. Sugar-sweetened soft drinks have been shown to contribute to overconsumption and obesity. Therefore, there is great consumer interest in drinks with low-caloric sweeteners because they do not contribute to energy intake while still providing the hedonic experience of sweet taste. However, different low-caloric sweeteners may have differential effects on the brain because of (subliminal) taste difference and their different metabolic fate. We hypothesize that the brain and glycemic responses to drinks sweetened with sugar and different low-caloric sweeteners will be different. This may have implications for their reward value.

Study objective

To determine changes in brain activity in responses to the ingestion of flavored waters sweetened with either the nutritive sugar sucrose or different low-caloric sweeteners.

Study design

Randomized crossover design with six treatments.

Study burden and risks

The study poses no risks to the participants. Each participant will take part in a screening session (30 min) and in six intervention sessions (100 min), which require an overnight fast, placement of a canula in an antecubital vein, 6 blood withdrawals (in total 60 mL per visit for 5 visits) and multiple MRI scans over an hour. These measurements carry minimal risk. The burden is considered minimal. There is no direct benefit to the participants.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)

Inclusion criteria

- Age between 18 and 30 years
- BMI between 18.5 and 25 kg/m2
- Apparently healthy (self-reported)
- Right-handed
- Sufficient blood hemoglobin (Hb) levels (women > 7,5; men > 8.5 g/dl) and having antecubital veins suitable for blood sampling via a catheter
- Willing to be informed about incidental findings of pathology and consenting to informing their general practitioner about this.

Exclusion criteria

- Having disturbances of glucose metabolism such as being prediabetic or diabetic
- Use of medication that could influence study results including insulin/metformin/proton pump inhibitors, antacids, anti-depressants
- Allergy or intolerance for any of the study products/compounds (sucrose, sucralose, stevia extraxt, allulose, monk fruit extract)
- Being a regular smoker (smoking more than one cigarette or e-cigarette with nicotin per day)
- Drinking more than 14 glasses of alcohol a week
- Having genetic, psychiatric or neurological diseases affecting the brain
- Gastric disorders or regular gastric complaints (more than once per week), for example heart burn
- Having renal or hepatic disease
- Using recreational drugs more than once per week (e.g. marihuana, XTC, GHB, laughing gas)
- Having given a blood donation in the past two months
- Being pregnant, lactating or planning on becoming pregnant during the study
- Currently following or having followed calorie-restricted diet in the past two months
- Participating in other research during the study period
- Not having a general practitioner
- Being an employee or student of the Division of Human Nutrition and Health
- Having a contra-indication to MRI scanning, including, but not limited to:
o Pacemakers and defibrillators
o Intraorbital or intraocular metallic fragments
o Other metal objects on/in the head which cannot be removed
o Ferromagnetic implants

o Claustrophobia

Study design

Design

Study type:	Observational invasive
Intervention model:	Crossover
Masking:	Double blinded (masking used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Completed
Start date (anticipated):	09-01-2023
Enrollment:	30
Type:	Actual

Ethics review

Approved WMO

Date:	25-10-2022
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
Other	Het onderzoek zal voor aanvang worden geregistreerd in Clinicaltrials.gov
CCMO	NL81742.091.22