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Sugar ingestion patterns

Submission date
28/01/2026

Recruitment status
No longer recruiting

Registration date
06/02/2026

Overall study status
Ongoing

Last Edited
02/02/2026

Condition category
Nutritional, Metabolic, Endocrine

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[_] Results
[_] Individual participant data
[X] Record updated in last year

Plain English summary of protocol

Background and study aims
Eating and drinking foods that contain sugar can affect how the body processes fat. One type of fat in the blood, called triglycerides, can increase after eating and drinking and, if consistently high, may increase the risk of long-term health problems such as heart disease. When large amounts of sugar are consumed, especially quickly, the body may convert some of this sugar into blood fats, also known as triglycerides. This study aims to understand whether drinking sugar quickly in one large amount or slowly in smaller amounts leads to different short-term effects on blood triglycerides and how the body processes dietary intake of sugar and fat in healthy adults.

Who can participate?
Healthy men and women aged 18–65 years may be able to take part. Participants must have a body mass index (BMI) in the normal to overweight range. People with certain medical conditions, food allergies relevant to the study foods, or who are pregnant or breastfeeding will not be eligible.

What does the study involve?
Participants will take part in a crossover study, meaning they will complete three separate study days, each about one month apart. On each study day, participants will consume one of the following test drinks: a large sugar drink consumed all at once, the same amount of sugar consumed slowly in smaller drinks, or water only. On each study day, participants will attend the laboratory for around 6–7 hours, eat a standard study meal, and provide blood and breath samples while resting. Additional short visits will take place before each study day to collect small blood samples and provide a special type of water, known as heavy water, that helps researchers measure how sugar is converted into blood fats. Stool samples will also be collected at home, which will help us determine whether sugar is metabolised or transits through our bowels. Participation is voluntary, and participants may withdraw at any time.

What are the possible benefits and risks of participating?
Participants may receive personalised information about their body composition and blood test results. There may be no direct health benefit from taking part, but the study will help improve understanding of how sugar intake affects metabolism. Risks are minor and include discomfort or bruising from blood sampling, mild dizziness from drinking the heavy water, and very low exposure to radiation from a body composition scan. These risks will be carefully managed by trained staff.

Where is the study run from?
The study is run from the University of Bath, with some visits taking place at a location convenient for the participant.

When is the study starting and how long is it expected to run for?
The study is expected to start in 2025. Each participant will be involved for approximately three to four months, depending on scheduling of visits.

Who is funding the study?
The study is funded by the Wellcome Trust and sponsored by the University of Bristol.

Who is the main contact?
The main contact for the study is the research team at the University of Bristol. Contact details are provided in the participant information materials.

Contact information

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Principal investigator, Scientific

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Additional identifiers

Integrated Research Application System (IRAS)
352907

Study information

Scientific Title
A study to uncover metabolic responses to rapid vs. slow ingestion rates of sugar

Acronym
SIP

Study objectives
The primary objective of this study is to determine whether rapid consumption of sugar (1:1 glucose:fructose) exaggerates postprandial triglyceridaemia compared with slow consumption in healthy adults. Secondary objectives are to determine whether differences in triglyceride responses are explained by changes in whole-body fatty acid synthesis (de novo lipogenesis) and dietary sugar oxidation following sugar ingestion. Exploratory objectives include assessment of postprandial metabolic and molecular responses to different rates of sugar consumption.

Ethics approval required
Ethics approval required

Ethics approval(s)

Approved 30/09/2025, North West - Greater Manchester South Research Ethics Committee (2 Redman Place Stratford, London, E20 1JQ, United Kingdom; +44 207 104 8000; gmsouth.rec@hra.nhs.uk), ref: 25/NW/0266

Primary study design
Interventional

Allocation
Randomized controlled trial

Masking
Open (masking not used)

Control
Placebo

Assignment
Crossover

Purpose
Basic science

Study type(s)

Health condition(s) or problem(s) studied
Postprandial triglyceride metabolism in response to different rates of sugar (glucose and fructose) consumption in healthy adults.

Interventions
This is an open-label, randomised, three-condition crossover trial conducted in healthy adults. Participants will complete three experimental conditions in random order, separated by a four-week washout period.

The interventions are:
1. Control condition: consumption of 500 mL water only (placebo).
2. Rapid sucrose ingestion: consumption of 100 g sugar (50g glucose, 49.8g fructose, 0.2g 13C fructose) dissolved in 500 mL water, ingested as a single bolus at time zero.
3 Slow sucrose ingestion: consumption of 100 g sugar (50g glucose, 49.8g fructose, 0.2g 13C fructose) divided into five 100 mL drinks, ingested every 45 minutes.

Participants will be randomised to the order of conditions. Postprandial metabolic responses will be assessed following each intervention. Participants are randomised to the order of interventions using an online randomisation tool (randomizer.org). The randomisation sequence is generated by JG. The study is open-label, with both participants and researchers aware of the intervention received.

Intervention Type
Other

Primary outcome(s)

1. Postprandial plasma triglyceride concentration measured using Incremental area under the curve (iAUC) for plasma triglyceride concentrations measured from venous blood samples at Baseline (fasting) and repeatedly over a 6-hour postprandial period

Key secondary outcome(s)
1. Whole-body de novo lipogenesis measured using Rate of whole-body fatty acid synthesis measured using deuterated water (heavy water) incorporation at Over a 6-hour postprandial period following ingestion of the test drink

2. Dietary sugar oxidation measured using Oxidation of dietary sugar assessed using 13C fructose at Over a 6-hour postprandial period following ingestion of the test drink

Completion date
01/10/2027

Eligibility

Key inclusion criteria
1. Age: 18-65 years
2. Body mass index (BMI): 18.5-29.9 kg/m²

Healthy volunteers allowed
Yes

Age group
Mixed

Lower age limit
18 Years

Upper age limit
65 Years

Sex
All

Total final enrolment
0

Key exclusion criteria
1. Weight instability (greater than 5kg change in body mass within the last 6months)
2. Diagnosis of any form of diabetes
3. Intolerances or allergies to any study procedures (e.g., lactose intolerance, egg allergy)
4. Fructose malabsorption
5. Inborn errors of fructose metabolism (e.g., fructokinase deficiency, aldolaseB deficiency, fructose1,6bisphosphatase deficiency)
6. Pregnant or lactating
7. Any condition that could introduce bias to the study (e.g., lipid disorders including cardiovascular disease, or therapies that alter lipid or glucose metabolism such as statins or niacin)

8. Following a vegan diet, as participants must consume a highfat meal composed of animal products with the test drink
9. Recent involvement (within the last 6months) in research that could alter metabolism, or donation of a substantial amount of blood (>470mL, the standard NHS blood donation)
10. Inability to speak English

Date of first enrolment
05/12/2025

Date of final enrolment
07/09/2026

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
University of Bath
Claverton Down
Bath
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BA2 7AY

Study participating centre
University of Bristol
Senate House
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Sponsor information

Organisation
University of Bristol

ROR
https://ror.org/0524sp257

Organisation
University of Bath

ROR
https://ror.org/002h8g185

Funder(s)

Funder type

Funder Name
Wellcome Trust

Alternative Name(s)
Wellcome, WT

Funding Body Type
Private sector organisation

Funding Body Subtype
Trusts, charities, foundations (both public and private)

Location
United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan
All data generated or analysed during this study will be included in the subsequent results publication

IPD sharing plan summary
Published as a supplement to the results publication

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Participant information sheet		13/11/2025	28/01/2026	No	Yes