The role of branched-chain amino acids (BCAAs) in the stimulation of skeletal muscle protein synthesis and glucose uptake in healthy, young volunteers

Published: 03-08-2023
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To determine the role of dietary BCAA ingestion and omittance on MPS and insulin sensitivity

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Glucose metabolism disorders (incl diabetes mellitus)
Study type	Interventional

Summary

ID

NL-OMON53406

Source
ToetsingOnline

Brief title
Branched-chain amino acids in skeletal muscle

Condition

- Glucose metabolism disorders (incl diabetes mellitus)
- Glucose metabolism disorders (incl diabetes mellitus)
- Muscle disorders

Synonym
insulin resistance, Muscle loss

Research involving
Human

Sponsors and support

Primary sponsor: Wageningen Universiteit

Source(s) of monetary or material Support: The Physiological Society

Intervention

Keyword: Branched-chain amino acids (BCAAs), Glucose uptake, Muscle protein synthesis, Skeletal muscle

Outcome measures

Primary outcome

Muscle protein synthesis rates, expressed as fractional synthetic rate (FSR),

in the basal and postprandial state.

Secondary outcome

Muscle glucose uptake (i.e. direct measure of muscle insulin sensitivity).

Fat and fat-free mass (via DXA scan)

Study description

Background summary

The loss of muscle mass with ageing is accompanied by reduced physical performance, loss of functional capacity, increased risk of falling and increased likelihood of developing chronic metabolic diseases. The building blocks of our muscles, called amino acids, are important for the quantity and health of our muscles. Branched-chain amino acids (BCAAs, i.e. leucine, isoleucine, and valine) are a specific subgroup of amino acids thought to be important for maintaining muscle mass, but may also prevent muscles from getting important nutrients (i.e. glucose) from the blood. Effect of BCAA on muscle protein synthesis (MPS) predominantly done by supplementing. However, the effect of acute ingestion of BCAA on MPS and glucose uptake (i.e. direct measure of muscle insulin sensitivity) is currently not known.

Study objective

To determine the role of dietary BCAA ingestion and omittance on MPS and insulin sensitivity

Study design

Randomized, parallel (two groups) study design.

Intervention

A single test day during which participants will orally ingest a dietary supplement containing all amino acids (FullAA) or a supplement containing all amino acids but BCAAs (NoBCAA). Continuous intravenous tracer infusion of labelled amino acids will be combined with repeated blood and muscle samples.

Study burden and risks

The risks associated with this research are minimal. The muscle biopsies will be taken through a small (5 mm) incision, after local anesthesia of the skin and muscle fascia. These incisions will heal completely. Three intravenous cannulas will be placed, which could lead to a local hematoma. Insertion of the cannulas may cause pain, swelling, bruising, dizziness, fainting and very rarely, clot formation, nerve damage and/or infection at the needle stick site.

There are no risks associated with the intravenous infusion of amino acids and the oral intake of commercially available amino acids. When making the DXA scan, a very low amount of X-ray radiation is used. The total exposure to radiation as a result of the DXA scan is so low that it poses no health risks.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)

Inclusion criteria

• Aged from 18-35 years
• 18.5 < BMI < 30 kg·m2
• Recreationally active (performing non-competitive physical exercise at least one time per week for minimally 30 minutes)

Exclusion criteria

• Smoking
• Diabetes (Type 1, Type 2, or genetic form of diabetes)
• Any diagnosed cardiovascular (heart) disease or high blood pressure (>=140 mmHg systolic and/or >=90 mmHg diastolic)
• Chronic use of any prescribed or over the counter pharmaceuticals (excluding oral contraceptives and contraceptive devices)
• Known allergy to lidocaine
• Prone to keloid forming (i.e. hyperplastic growth of scars).
• Regular use of dietary protein and/or amino acid supplements (>3 times per week)
• Currently involved in a structured progressive resistance training programme (>3 times per week)
• A personal or family history of thrombosis (clots), epilepsy, seizures, or schizophrenia.
• Any previous motor disorders or disorders in muscle and/or lipid metabolism
• Presence of an ulcer in the stomach or gut and/or strong history of indigestion
• Known severe kidney problems
• Pregnant or breastfeeding
• Unable to give consent

Study design

Design

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

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	10-01-2024
Enrollment:	28
Type:	Actual

Ethics review

Approved WMO

Date:	03-08-2023
Application type:	First submission
Review commission:	METC Brabant (Tilburg)

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	NL82984.028.23