

Growth of skeletal muscle in response to feeding specific amino acids

Submission date 14/09/2016	Recruitment status No longer recruiting	<input type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
Registration date 14/12/2016	Overall study status Completed	<input type="checkbox"/> Statistical analysis plan <input checked="" type="checkbox"/> Results
Last Edited 31/10/2019	Condition category Other	<input type="checkbox"/> Individual participant data

Plain English summary of protocol

Background and study aims

Resistance exercise involves using an external force (such as heavy weights) to cause the muscles to contract. Eating or drinking protein after resistance exercise stimulates the making of new muscle proteins (muscle protein synthesis). Branched chain amino acids (BCAA) are often suggested as the main part of protein responsible for the increased protein synthesis, but no study has directly examined this. The aim of this study is to find out whether consuming BCAA increases muscle protein synthesis after resistance exercise in trained, young adult males.

Who can participate?

Healthy men aged 18-45 who are experienced weight lifters

What does the study involve?

This study consists of two phases. For each phase, participants undertake two 8-hour studies at the School of Sport and Exercise Sciences at the University of Birmingham. Before the studies, participants' body composition and the maximum weight they can lift with one leg are assessed. Participants complete an intense bout of resistance exercise. Following the exercise, in Phase I participants are randomly allocated to consume either a drink containing BCAA or a placebo (dummy) drink. In Phase II, participants are randomly allocated to consume either a carbohydrate drink or a drink containing both BCAA and carbohydrates. Muscle samples (biopsies) are collected from the quadriceps (thigh) and blood samples are taken from a hand vein to work out the rates of protein synthesis.

What are the possible benefits and risks of participating?

Participants will receive information about how their muscle changes after exercise. Participants may experience discomfort during the blood or tissue sampling.

Where is the study run from?

University of Birmingham (UK)

When is the study starting and how long is it expected to run for?

October 2009 to October 2011

Who is funding the study?
GlaxoSmithKline Nutritional Healthcare (UK)

Who is the main contact?
Dr Sarah Jackman

Contact information

Type(s)
Public

Contact name
Dr Sarah Jackman

ORCID ID
<https://orcid.org/0000-0003-2928-8266>

Contact details
Sport and Health Sciences
College of Life and Environmental Sciences
University of Exeter
St Luke's Campus
Heavitree Road
Exeter
United Kingdom
EX1 2LU

Additional identifiers

Protocol serial number
N/A

Study information

Scientific Title
Branched-chain amino acid ingestion stimulates muscle myofibrillar protein synthesis following resistance exercise in humans

Study objectives
Ingestion of only branched-chain amino acids (BCAA) will be sufficient for the stimulation of myofibrillar muscle protein synthesis (MPS) rates after resistance exercise in a fed state in trained, young adult males.

Ethics approval required
Old ethics approval format

Ethics approval(s)
National Research Ethics Service ethics board, 24/09/2009, ref: 09/H1211/77

Study design

Crossover double-blind intervention study

Primary study design

Interventional

Study type(s)

Other

Health condition(s) or problem(s) studied

Resistance exercise

Interventions

This research project was performed in two phases. The design, all procedures, risks and analyses of each phase were the same between the two phases. The only difference was the substances that were ingested. For each phase, 10 healthy, weight trained males aged 18 - 45 (from gyms in the local area) undertook two ~8 hour trials that took place in the School of Sport and Exercise Sciences at the University of Birmingham. Prior to the experimental trials, the maximum weight that could be lifted with one leg and body composition were assessed. During the experimental trials, participants were infused with metabolic tracers, muscle biopsies were collected and blood samples taken to determine rates of protein synthesis. Each participant completed an intense bout of resistance exercise followed by three muscle biopsies. Muscle and blood samples were analyzed to determine the rates of muscle protein synthesis and the signalling mechanisms inside the muscle that lead to increased synthesis. Following the exercise, participants will be randomised to consume either a BCAA-containing solution or a placebo in Phase I. In Phase II, a carbohydrate control solution will be compared to BCAA plus carbohydrates. Thus, in each phase, the BCAA will be compared with the appropriate control.

Intervention Type

Supplement

Primary outcome(s)

Fractional synthetic rate (FSR), measured using gas combustion isotope ratio chromatography mass spectrometry (GCCIRMS) over the 4h period following drink ingestion.

Key secondary outcome(s)

1. Signalling proteins, measured using western blots
2. Amino acids in blood, measured using gas chromatography mass spectrometry (GCMS)
3. Tracers enrichment in muscle, measured using GCMS
4. Tracers enrichment in plasma, measured using GCMS
5. Insulin in serum, measured using enzyme-linked immunosorbent assay (ELISA)
6. Glucose in plasma, measured using automated analysers

Blood sample timepoints: -240, -145, -85, -25, 0, 15, 30, 45, 60, 75, 90, 120, 150, 180, 240 min

Muscle biopsy timepoints: 0, 60 and 240 min

Completion date

01/10/2011

Eligibility

Key inclusion criteria

1. Male, aged 18-45 years
2. Healthy (no known metabolic disorder)
3. Experienced weight lifter for more than 6 months (at least 2 leg resistance training sessions per week)

Participant type(s)

Healthy volunteer

Healthy volunteers allowed

No

Age group

Adult

Lower age limit

18 years

Upper age limit

45 years

Sex

Male

Total final enrolment

10

Key exclusion criteria

Not simultaneously taking part in another scientific/clinical study

Date of first enrolment

01/10/2009

Date of final enrolment

01/05/2011

Locations**Countries of recruitment**

United Kingdom

England

Study participating centre

University of Birmingham

United Kingdom

B15 2TT

Sponsor information

Organisation

GlaxoSmithKline Nutritional Healthcare

ROR

<https://ror.org/01xsqw823>

Funder(s)

Funder type

Industry

Funder Name

GlaxoSmithKline Nutritional Healthcare

Results and Publications

Individual participant data (IPD) sharing plan

The datasets generated and/or analysed during the current study are available from Dr Sarah Jackman on reasonable request.

IPD sharing plan summary

Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	results	07/06/2017	31/10/2019	Yes	No
HRA research summary			28/06/2023	No	No
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes