The effects of protein type and added leucine on post-exercise muscle protein synthesis

No registrations found.

Ethical review	Positive opinion
Status	Recruiting
Health condition type	-
Study type	Interventional

Summary

ID

NL-OMON23128

Source
Nationaal Trial Register

Brief title
PepsiCo

Health condition

Young healthy men

Sponsors and support

Primary sponsor: NUTRIM School for Nutrition, Toxicology, and Metabolism Maastricht University
Source(s) of monetary or material Support: PepsiCo

Intervention

Outcome measures

Primary outcome

Fractional synthetic rate of muscle protein synthesis

Secondary outcome

• The fractional synthetic rate (FSR) of muscle protein synthesis (mixed, myofibrillar, and mitochondrial proteins) from 0-2 and 2-6 hours in the post-prandial period.

• Plasma free phenylalanine enrichment (expressed as MPE)

• Plasma free tyrosine enrichment (expressed as MPE)

• Plasma total phenylalanine (expressed as ìmol/L)

• Plasma total tyrosine (expressed as ìmol/L)

• Total plasma amino acids (AAmax [ìmol/L])

• Plasma glucose (glucosemax [mmol/L])

• Plasma insulin (insulinmax [mU/L])

Study description

Background summary

Rationale: Dietary protein intake after exercise is necessary to maximally stimulate muscle protein synthesis rates. Data demonstrate that the type/source of protein consumed (e.g., animal vs. plant-derived proteins) can impact the amplitude and duration of muscle protein synthesis during post-exercise recovery. Specifically, bovine milk proteins stimulate greater rates of muscle protein synthesis after resistance exercise than consumption of an isonitrogenous soy-protein beverage. The major proteins in bovine milk are casein (~80%) and whey protein (~20%). In their isolated forms, these proteins greatly differ in their digestion and absorption kinetics. Whey protein is rapidly digested and absorbed leading to a pronounced, rapid, but transient peak in plasma amino acid levels and robust stimulation of protein synthesis. On the other hand, isolated casein is a slowly digested protein that results in a slower, moderate, but more prolonged increase in plasma amino acid availability resulting in a greatly attenuated protein synthesis response compared to whey. No studies have compared the muscle protein synthesis response following bovine milk as compared to its constituent proteins whey and casein. Further, whether the post-exercise muscle protein synthesis response to soy protein can be enhanced when the leucine content of soy is matched to milk remains unknown. We aim to fill this gap in our understanding.
Objective: To define the properties of whey, casein, milk protein, as well as soy protein with and without additional leucine to augment post-exercise muscle protein synthesis when co-ingested with a carbohydrate containing recovery drink.

Study design: Parallel group, randomized, placebo controlled, double blind.

Study population: 72 young (20-30 y inclusive) healthy males.

Intervention: Subjects will perform both aerobic and resistance exercise and consume either a carbohydrate solution or a carbohydrate solution with 20 g whey, 20 g casein, 20 g milk protein, 20 g soy protein, or 20 g soy protein with leucine. In addition, continuous intravenous tracer infusions will be applied, with plasma and muscle samples collected.

Main study parameters/endpoints: Primary: mixed, myofibrillar, and mitochondrial protein bound [13C6] phenylalanine enrichments. Secondary: plasma glucose, insulin, leucine, phenylalanine, tyrosine, plasma [13C6]phenylalanine and (3,5-D2)-tyrosine enrichments.

Study objective

Protein-carbohydrate ingestion stimulates greater muscle protein synthesis than carbohydrate placebo alone. milk and whey protein elicit the greatest anabolic response. Soy protein with added leucine will stimulate muscle protein synthesis equivalent to whey protein

Study design

t=0 Drink. t=0 , t=2h and t=6h muscle biopsies. 14 blood draws

Intervention

Exercise bout followed by ingestion of one of the following beverages:

• Carbohydrate drink (45 g Carbohydrate)

• Carbohydrate drink (45 g Carbohydrate) with 20 g milk protein

• Carbohydrate drink (45 g Carbohydrate) with 20 g whey

• Carbohydrate drink (45 g Carbohydrate) with 20 g casein

• Carbohydrate drink (45 g Carbohydrate) with 20 g soy

• Carbohydrate drink (45 g Carbohydrate) with 20 g soy and leucine

Contacts

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Eligibility criteria

Inclusion criteria

- Males

- Aged between 20-30 years

- Bodyweight between 65-95 kg inclusive

- Healthy, recreationally active

- BMI < 25 kg/m2

Exclusion criteria

- The use of over-the-counter nutritional supplements excluding multivitamins/minerals

- Having any identified metabolic or intestinal disorders

- Use of tobacco products

- Non-steroidal anti-inflammatory drugs (NSAID) in the 4 days prior to the experimental trial

- Allergies to milk proteins (whey or casein) or soy protein

- Vegetarians

- Arthritic conditions

- A history of neuromuscular problems

- Previous participation in amino acid tracer studies

- Individuals on any medications known to affect protein metabolism (i.e. corticosteroids, non-steroidal anti-inflammatories, or prescription strength acne medications).

- Diabetes

- Training more than 4 days per week

Study design

Design

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

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	01-09-2014
Enrollment:	72
Type:	Anticipated

Ethics review

Positive opinion

Date:	12-03-2015
Application type:	First submission

Study registrations

Followed up by the following (possibly more current) registration

ID: 42133
Bron: ToetsingOnline
Titel:

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
NTR-new	NL4844
NTR-old	NTR5098
CCMO	NL49732.068.14
OMON	NL-OMON42133

Study results