The anabolic response following ingestion of a plant-based protein product in vivo in healthy young men

Published: 06-04-2017
Last updated: 11-04-2024

To compare the anabolic properties of a meal-like amount (40 g) plant-based protein when compared with animal-based protein on muscle protein synthesis rates in vivo in humans.

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Other condition
Study type	Interventional

Summary

ID

NL-OMON45741

Source
ToetsingOnline

Brief title
Plantbased protein project

Condition

- Other condition
- Protein and amino acid metabolism disorders NEC
- Muscle disorders

Synonym
muscle growth, Muscle hypertrophy

Health condition

gezonde voeding

Research involving
Human

Sponsors and support

Primary sponsor: Universiteit Maastricht
Source(s) of monetary or material Support: Ministerie van OC&W,Tereos Syral

Intervention

Keyword: Anabolic response, Muscle protein synthesis, Plant-based protein, Young

Outcome measures

Primary outcome

The main study endpoint is the fractional synthetic rate (FSR) of muscle

protein synthesis

In order to determine the FSR, the following parameters will be measured:

* Muscle protein-bound L-[ring-13C6]-phenylalanine enrichments (expressed as

MPE)

* Muscle tissue-free L-[ring-13C6]-phenylalanine enrichments (expressed as MPE)

* Plasma L-[ring-13C6]-phenylalanine enrichments (expressed as MPE)

Secondary outcome

Amino acid concentrations, glucose and insulin concentrations

GI-complaints and palatability after ingestion of the meals (VAS questionnaire)

Study description

Background summary

The regulation of muscle mass and function are critical during muscle growth and repair in both athletes as during advanced ageing, when the loss of muscle mass is a common phenomenom (sarcopenia). Sarcopenia has a large impact on the healthcare system causing an increased morbiditeit, hospitalization and/or institutionalization. The loss of muscle mass is caused by a combination of factors as a suboptimal food intake and a sedentary lifestyle. Aslo, an optimal nutritional status seems to be important during in young individuals. A

disregulation of muscle protein turnover
results in a disbalance between muscle protein synthesis and muscle protein breakdown. The intake of dietary protein is shown to have a positive impact on the synthesis of skeletal muscle proteins. Amino acids stimulates muscle protein synthesis and slows down muscle protein breakdown, resulting in a positive muscle protein net balance in both young and elderly. Plant-based protein sources (such as wheat) and animal-based protein (such as whey and casein) have a different effect on the stimulation of muscle protein synthesis. More than half of the total amount of dietary protein that is consumed by humans worldwide is of plant origin, with plant-based proteins providing up to 80% of dietary protein consumed in less developed regions. It is remarkable that the anabolic properties of the main plant-based protein sources have not been assessed. Greater sustainability and low cost of plant-based protein sources provide us with many opportunities in the emerging markets. However, there are limited studies that have quantified the anabolic response to the ingestion of plant-based protein sources in vivo in humans when compared with animal-based protein sources.

Study objective

To compare the anabolic properties of a meal-like amount (40 g) plant-based protein when compared with animal-based protein on muscle protein synthesis rates in vivo in humans.

Study design

Randomized, parallel, study design.

Intervention

Subjects will either consume 40 g wheat- or chicken protein (isonitrogenous amount) in the form of a ready-to-eat product. Both meals will be baked for 8 minutes with 3 ml of olive oil and served on a white plate (for blinding). The meals have the same texture, color, and overall appearance and should be consumed as part of main meal

Study burden and risks

The burden and risks associated with participation are small. Insertion of the catheters in a vein is comparable to a blood draw and could result in a small hematoma. Muscle biopsies will be taken under local anaesthesia by an experienced physician, but may cause some minor discomfort for maximally up to 24 h after completion. The discomfort is comparable to muscle soreness or the pain one has after bumping into a table. During the experimental trials 16 blood samples (in total 170 mL) will be obtained. The total amount of blood we draw is less than half the amount of a blood donation and will be completely

restored in approximately 1 month. Participants will visit the University twice. The first visit will involve a screening visit (~1.5 h), during which the eligibility of the participant will be assessed and a DEXA scan will be performed. For the second visit (experimental trial) participants are required to come to the University in a fasted state, not having consumed any food or beverages (except for water) as from 20:00 the evening before. Also, 3 days prior to the experimental trial participants need to record their food intake and activities performed. During these 3 days participants are not allowed to perform heavy physical exercise or drink alcohol. There is no direct benefit for the participants, except from their contribution to scientific knowledge and the development of novel concepts for more sustainable protein consumption.

Contacts

Public
Universiteit Maastricht

Universiteitssingel 50
Maastricht 6229 ER
NL
Scientific
Universiteit Maastricht

Universiteitssingel 50
Maastricht 6229 ER
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

* Males
* Aged between 18 - 35 years
* Healthy, recreationally active (max 3 days per week performing activities)
* BMI 18.5 * 27.5 kg/m2

Exclusion criteria

* Females
* Diagnosed Diabetes
* Wheat allergy
* Celiac disease
* Smoking
* Diagnosed metabolic or intestinal disorders
* A history of neuromuscular problems
* Any medications known to (or may) affect protein metabolism (i.e. corticosteroids, non-steroidal anti-inflammatories, or prescription strength acne medications).
* Participation in structured resistance exercise program

Study design

Design

Study type: Interventional

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	23-06-2017
Enrollment:	34
Type:	Actual

Ethics review

Approved WMO Date:	06-04-2017
Application type:	First submission
Review commission:	METC academisch ziekenhuis Maastricht/Universiteit Maastricht, METC azM/UM (Maastricht)

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	NL60380.068.16