The impact of milk protein glycation on muscle protein synthesis after resistance training in healthy young men

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To compare the muscle protein synthetic response after ingestion of a milk protein powder with different levels of protein glycation in healthy young men.

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Other condition
Study type	Interventional

Summary

ID

NL-OMON49398

Source
ToetsingOnline

Brief title
MusLy study

Condition

- Other condition

Synonym
building muscle protein, Muscle protein synthesis

Health condition

Spieropbouw na inspanning

Research involving
Human

Sponsors and support

Primary sponsor: Universiteit Maastricht
Source(s) of monetary or material Support: FrieslandCampina,TKI en FrieslandCampina

Intervention

Keyword: glycation, milk protein, muscle protein synthesis, resistance training

Outcome measures

Primary outcome

The primary endpoint will be mixed muscle protein synthesis rates over the full assessment period (6h h), as determined using contemporary stable isotope tracer methodology combined with multiple muscle and blood samples.

Secondary outcome

To compare the impact of low versus high protein glycation on peak plasma lysine concentration, overall plasma amino acid responses, plasma insulin-, and glucose responses.

Study description

Background summary

Protein intake is an essential stimulus for muscle protein anabolism. The muscle protein synthetic response to protein ingestion is mainly determined by the post-prandial plasma amino acid response. A study shows that glycation of proteins during commonly applied milk processing procedures (Maillard reaction), attenuates the digestibility of a dairy product, and the subsequent appearance of amino acids in the circulation. The level of protein glycation in processed dairy products might therefore be an important modulator of the overall protein quality of a product, and its ability to stimulate protein metabolism. However, it has not yet been investigated if the glycation level of dietary protein modulates its capacity to stimulate muscle protein synthesis.

Study objective

To compare the muscle protein synthetic response after ingestion of a milk protein powder with different levels of protein glycation in healthy young men.

Study design

Randomized, parallel groups study design. The nutritional interventions will be single blinded (researchers blinded).

Intervention

All subjects will perform a single bout of whole-body resistance-type exercise. Subsequently, subjects will ingest a beverage containing water, low glycated milk protein (5% blocked lysine), or high glycated milk protein (50% blocked lysine).

Study burden and risks

The burden and risks with participation are small. During the screening, subjects will perform 1-repetition maximum tests to determine maximal strength to calculate the workloads for the test day. A DEXA scan will be done to assess body composition, where the level of radiation is very low compared to the background radiation level in the Netherlands. Furthermore, we will ask the participants to fill out a medical questionnaire. Insertion of the catheters during the test day is comparable to a blood draw and could result in a small hematoma. We will take 14 blood samples during the experimental period. The total amount of blood we draw (140 mL) is much less than the amount of a blood donation (500 mL) and will be completely restored in approximately 1 month. Throughout the test day, a total of three muscle biopsies will be taken under local anaesthesia by an experienced physician, but may cause some minor discomfort only up to 24 h after completion. The discomfort is comparable to muscle soreness or the pain one has after bumping into a table. Participants will come to the university twice: 1 screening (~2h) and 1 experimental day (~9h). On the experimental test day, the subjects will be asked to remain fasted (with the exception of the experimental drinks). In addition, subjects will be asked in the two days prior to the test day not to perform any type of intense physical activity and to avoid consuming caffeine and alcohol in the 12h and 24h prior to the test day, respectively. Participants will be asked to record their nutritional intake and daily activities in the two days prior to the experimental test day. During the experimental test day, subjects will perform a single bout of resistance-type exercise. There is no direct benefit to the participant, only their contribution to the scientific knowledge on the impact of protein glycation on stimulation of muscle protein synthesis.

Contacts

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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 (participating in recreational sports activities * 1 and * 6 h per week, with a maximum of 2 h resistance-type exercise)
- 18.5 * BMI * 30 kg/m2
- No physical limitations (i.e. able to perform all activities associated with daily living in an independent manner).

Exclusion criteria

- Smoking
- Lactose intolerant or allergies to milk proteins
- Regular consumption of protein supplements (e.g. protein powders)
- Musculoskeletal disorders
- Metabolic disorders
- Use of any medications known to affect protein metabolism (i.e. corticosteroids, non-steroidal anti-inflammatories, or prescribed acne medications).
- Chronic use of gastric acid suppressing medication or anti-coagulants
- Recent (<9 months) participation in amino acid tracer (L-[ring-13C6]-phenylalanine and L-[3,5-2H2]-tyrosine) studies
- Unstable weight over the last three months
- Diagnosed GI tract disorders or diseases
- Blood donation in the past 2 months

Study design

Design

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

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	10-09-2020
Enrollment:	54
Type:	Actual

Ethics review

Approved WMO

Date:	27-05-2020

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	NL72586.068.20
Other	Registratie na goedkeuring METC

Study results

Date completed:	06-01-2022
Actual enrolment:	53