Post-exercise recovery after dietary protein ingestion in healthy young men

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To determine whether the intake of minced beef is equally effective as ingestion of a bovine milk protein beverage in stimulating post resistance exercise muscle protein synthesis rates in young men.

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Protein and amino acid metabolism disorders NEC
Study type	Interventional

Summary

ID

NL-OMON37718

Source
ToetsingOnline

Brief title
Meat Milk

Condition

- Protein and amino acid metabolism disorders NEC
- Muscle disorders

Synonym
age-related muscle loss, sarcopenia

Research involving
Human

Sponsors and support

Primary sponsor: Medisch Universitair Ziekenhuis Maastricht
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: Hypertrophy, Muscle, Protein type, Resistance exercise

Outcome measures

Primary outcome

The main study endpoint is the muscle protein synthesis rate, expressed as fractional synthetic rate (FSR). In order to determine the FSR, the following parameters will be measured in blood and muscle tissue:

Plasma and muscle free phenylalanine concentration (expressed as *mol/L)

Plasma enrichment of L-[ring-2H5]phenylalanine (expressed as mole percent excess (MPE))

Muscle protein bound enrichment of L-[ring-2H5]phenylalanine (expressed as MPE)

L-[ring-2H5]phenylalanine enrichment of the muscle free amino acid pool (expressed as MPE)

Secondary outcome

Secondary endpoints include whole body protein turnover, protein digestion and absorption kinetics and nitrate/nitrite analysis. The following parameters will be calculated:

Exogenous phenylalanine rate of appearance and plasma availability of phenylalanine.

Total rate of phenylalanine appearance and disappearance (= protein turnover)

Endogenous phenylalanine rate of appearance (=protein breakdown)

Study description

Background summary

Resistance exercise and protein ingestion can act separately and synergistically to stimulate muscle protein synthesis rates. This synergy of muscle contraction and protein ingestion provides the basis for training-mediated hypertrophy. Many workers have manipulated post-exercise feeding paradigms in an attempt to define the *optimal* protein source to consume to support muscle protein accretion. Original work was performed using intravenous infusion of mixed amino acids or bolus ingestion of mixtures of crystalline amino acids; however, consuming free amino acids rarely occurs in normal dietary situations. Currently, there has been a great deal of interest in studying the capacity of dairy proteins to stimulate postexercise muscle protein synthesis rates and promote training-mediated hypertrophy. Dairy proteins represent an attractive protein source for researchers to study because they are rapidly digested/absorbed and contain a high proportional of essential amino acid, especially leucine. Both of these characteristics, speed of digestion/absorption and peak amplitude in leucinemia, are fundamental for the maximal stimulation of muscle protein synthesis rates after protein ingestion. However, very little is known about the effects of other types of high-quality animal proteins, such as beef, on stimulating post-exercise muscle protein synthesis rates. Beef is considered a high-quality and widely consumed protein source. Importantly, a 113-g serving of beef contains 30 g of protein (~10 g essential amino acids; ~2 g leucine) and is similar in amino acid composition to that of milk proteins. Certainly, some evidence suggests that the synergistic effect of exercise and feeding on muscle protein synthesis rates is still apparent after consumption of beef. However, the workers did not compare this response to a group that consumed an alternative high-quality isonitrogenous-matched animal-derived protein source. As a result, it can only be speculated on the capacity of beef to stimulate muscle protein synthesis rates as compared to milk proteins during postexercise recovery.
In the present study, we wish to determine the impact of single meal-like amount of minced beef or dairy milk on digestion and absorption kinetics and postexercise muscle protein synthesis rates. This study will be the first to directly compare two commonly consumed protein-rich food items on muscle protein synthesis rates in healthy young men. This information will be highly relevant for developing nutritional interventions for maintaining and accruing muscle mass.

Study objective

To determine whether the intake of minced beef is equally effective as ingestion of a bovine milk protein beverage in stimulating post resistance

exercise muscle protein synthesis rates in young men.

Study design

The present study employs a crossover design. In total, 12 healthy young male subjects will be included in the study. Subjects will be randomly assigned to consume minced beef or milk during trial one. During the test day, subjects will perform leg extension exercise and immediately afterwards consume 35 g of protein either as minced beef or milk. Approximately, two weeks later subjects will return to the laboratory for the identical experimental procedures as trial 1, which includes exercise that is worked-match to trial 1 and consumption of alternative protein source that was not consumed in trial 1.

Intervention

protein type, bovine milk or minced beef

Study burden and risks

The risks involved in participating in this experiment are minimal. Insertion of the catheters in a vein is comparable to a normal blood draw and the only risk is of a small local hematoma. Minimal risk is also true for the muscle biopsy. The incision made for obtaining the muscle biopsy will be performed by an experienced physician and will heal completely. Within our research group we have extensive experience with taking muscle biopsies. During the follow up several days after taking the biopsy no complications have been reported.

The milk protein beverages contain normal nutritional ingredients and for this reason do not form any health risks. The vacuum-packed and pre-weighed meat meals are normal food products and have been cleared for human consumption. The labeled amino acids tracers applied in this experiment are not radioactive and are completely safe. The production of the tracers for intravenous administration will occur in a sterile environment according to GMP guidelines.

There are no complications associated with the procedure of a DEXA scan. The level of radiation emitted during a DEXA is very low, <1 *Sv. This is very minimal exposure compared to the total background radiation level per year in the Netherlands, which is approximately 2.5 mSv/year.

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
BMI < 25 kg/m2

Exclusion criteria

Smoking
Allergies to milk proteins (whey or casein)
Vegetarians
Female
Arthritic conditions
A history of neuromuscular problems
Previous participation in amino acid tracer studies

Study design

Design

Study type:	Interventional
Intervention model:	Crossover
Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Prevention

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	03-05-2012
Enrollment:	12
Type:	Actual

Ethics review

Approved WMO

Date:	26-03-2012
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
Other	METC 11-3-088
CCMO	NL38849.068.11