The impact of passive heat treatment on skeletal muscle perfusion capacity and post-prandial muscle protein synthesis rates in healthy older adults.

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To compare the post-prandial muscle protein synthetic response following ingestion of a whole-food meal (560kCal; 30g protein total) before and after a 8-week passive heat treatment intervention in healthy older men and women.

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

Summary

ID

NL-OMON50238

Source
ToetsingOnline

Brief title
Sauna study

Condition

- Other condition

Synonym
muscle growth, muscle protein synthesis

Health condition

anabole resistentie

Research involving

Human

Sponsors and support

Primary sponsor: Universiteit Maastricht
Source(s) of monetary or material Support: NWO off-road

Intervention

Keyword: Muscle protein synthesis, Passive heat treatment, Protein, Skeletal muscle mass

Outcome measures

Primary outcome

Fractional synthetic rate (FSR) of muscle protein synthesis (MPS) over the 4

hour period following meal ingestion

Secondary outcome

Secondary endpoint is the skeletal muscle microvascular perfusion capacity in

rest and 1h following meal ingestion assessed by contrast enhanced ultrasound.

change in post-prandial plasma amino acid, glucose and insulin concentration.

Changes in type I and type II muscle fiber capillarization assessed in the

post-absorptive muscle biopsy samples by the use of immunohistochemistry

Study description

Background summary

Aging is characterized by loss in skeletal muscle mass, resulting in reduced health and physical performance in daily life of older adults. Dietary protein intake and sufficient physical activity are two key factors in the maintenance of skeletal muscle tissue. During aging, however, people lose the sensitivity to respond to these signals. This loss is referred to as anabolic resistance. Skeletal muscle perfusion plays an essential role in the delivery of oxygen, signals and nutrients required for muscle tissue maintenance. The age-related reduction in muscle perfusion capacity is suggested to be a potential cause in the development of anabolic resistance. Today, exercise training is considered

the only effective intervention strategy to improve skeletal muscle perfusion capacity and thereby counteract anabolic resistance in older adults. Though this intervention strategy is effective, a large group of elderly struggle to comply with intense exercise training programs. In this research study we will assess whether passive heat treatment in the form of sauna bathing can improve muscle tissue perfusion capacity and reduce anabolic resistance to food intake in order to combat the long-term age-related lose in skeletal muscle mass.

Study objective

To compare the post-prandial muscle protein synthetic response following ingestion of a whole-food meal (560kCal; 30g protein total) before and after a 8-week passive heat treatment intervention in healthy older men and women.

Study design

Pre - post within subject design

Intervention

A 8-week passive heat treatment (PHT) intervention at the department of Human Biology, Maastricht University. The PHT intervention will consist of 3 times per week (~45min per session) sitting in a infrared sauna cabin (HM-LSE-3 Professional edition, Health Mate, Belgium).

Study burden and risks

The burden and risks involved in participating in this experiment are small. 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.

The participants will participate in *whole-meal test days *(one before and one after PHT) of ~9h. Insertion of the catheters during the test days is comparable to a normal blood draw and the only risk is a small local hematoma. During each of the 2 experimental test days 16 blood samples (170mL/day) will be obtained. The total amount of blood collected during this study is less than the amount of a blood donation and will be completely restored in approximately 1 month. The stable isotope amino acids tracers that will be infused intravenously during the experimental trial are produced according to GMP standards and are safe for human use. Throughout each whole-meal test day, three muscle biopsies will be obtained under local anesthesia by an experienced physician, but may cause some minor discomfort. The discomfort is comparable to muscle soreness or the pain one has after bumping into the corner of a table.

For each whole-meal test day visit participants are required to come to the university in a fasted state, not having consumed any food or beverages (except

for water) as from 22:00 the evening before. Also, 2 days prior to the experimental test days participants need to record their food intake and activities performed. During these 2 days participants are not allowed to perform heavy physical exercise or drink alcohol.

A commercially available infrared sauna will be used for the PHT-intervention. Participants will perform 3 PHT session per week for 8 weeks at the university, each session will last 30-40 minutes. For healthy older adults there is very little risk of being exposed to this PHT-protocol. Subjects will be provided a rehydration protocol to replace the fluid that was lost during each PHT session.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Elderly (65 years and older)

Inclusion criteria

Healthy volunteers between the age 65 and 85 years

Exclusion criteria

• Allergy for one of the food items used
• >5% weight change in the previous 6 months
• Participating in a structured (progressive) exercise program
• Frequent (more than once per week) user of infrared (or traditional) sauna in the past 3 months
• Smoking
• Diagnosed cardiovasular disease
• Diagnosed musculoskeletal, GI tract, metabolic (e.g. diabetes) or pulmonary (e.g. COPD) disorders
• Use of any medications known to affect protein metabolism (i.e. corticosteroids, non-steroidal anti-inflammatories).
• Chronic use of gastric acid suppressing medication and/ or anti-coagulants
• Recent (<1 year) participation in amino acid tracer (L-[ring-13C6]-phenylalanine and L-[3,5-2H2]-tyrosine) studies
• Blood donation in the past 2 months
• Strict vegetarian diet
• Known allergic reaction to ultrasound contrast agent

Study design

Design

Study type: Interventional

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

Recruitment

NL

Recruitment status:	Completed
Start date (anticipated):	11-04-2022
Enrollment:	14

Type:	Actual

Ethics review

Approved WMO Date:	12-01-2022
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	NL79421.068.21
Other	zal worden geregistreerd na METC goedkeuring