The effect of insulin resistance on brown adipose tissue activity.

No registrations found.

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

Summary

ID

NL-OMON21276

Source Nationaal Trial Register

Brief title FAST

Health condition

Brown adipose tissue, insulin resistance, non-shivering thermogenesis, skeletal muscle

Sponsors and support

Primary sponsor: Maastricht University Medical Center (MUMC+) **Source(s) of monetary or material Support:** European Union

Intervention

Outcome measures

Primary outcome

1. Standard Uptake Values (SUV) of FDG in active BAT, as measured using FDG PET/CT scans (normal-fed period vs. prolonged fasting period);

2. Energy expenditure, as measured using indirect calorimetry, during thermoneutral and mild cold conditions (normal-fed period vs. prolonged fasting period);

3. Skeletal muscle mitochondrial uncoupling, as measured using high-resolution respirometry, in muscle biopsies (normal-fed period vs. prolonged fasting period);

4. Ex vivo skeletal muscle insulin-stimulated glucose uptake, as a measure of insulin sensitivity (normal-fed period vs. prolonged fasting period).

Secondary outcome

1. Skin temperatures and core temperature during thermoneutral and mild cold conditions (normal-fed period vs. prolonged fasting period);

2. Skin perfusion, using Laser Dopller Flowmetry (normal-fed period vs. prolonged fasting period);

3. Blood parameters, among others insulin, glucose, free fatty acids, catecholamines and thyroid hormones, during thermoneutral and mild cold conditions (normal-fed period vs. prolonged fasting period).

Study description

Background summary

Brown adipose tissue (BAT) activity is considered an imporant heat-producing mechanism during the process of non-shivering thermogenesis during mild cold exposure. The most common method to measure BAT activity is to measure its glucose uptake rate (by means of FDG PET/CT scanning). Human and animal studies have suggested an important role for insulin and insulin sensitivity in glucose uptake in BAT. We hypothesize that in an insulin resistant state BAT glucose uptake is impaired, causing a decrease in BAT activity.

Study objective

We hypothesise that fasting-induced insulin resistance will result in decreased glucose uptake and activity of brown adipose tissue (BAT). In addition, prolonged fasting will lead to reduced mitochondrial uncoupling in skeletal muscle, which is accompanied by reduced nonshivering thermogenesis.

Study design

Participation will take approximately 64 hours.

Intervention

Volunteers will undergo 2 FDG PET/CT scans of the upper body to determine BAT glucose

uptake rate during mild cold exposure. One scan will be performed during a normal-fed period (after 6 hours of fasting). The second scan will be performed after a 55-hour fasting period, which is used to induce an insulin resistant state in otherwise healthy volunteers. To investigate the role of skeletal muscle mitochondrial uncoupling in non-shivering thermogenesis, muscle biopsies will be taken during the normal-fed period and after the prolonged fasting period.

Contacts

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Eligibility criteria

Inclusion criteria

- 1. BMI: 18-25 kg/m2;
- 2. Age: 18-30 years;
- 3. For females: specific oral contraceptive;
- 4. Caucasians;
- 5. Good general health;
- 6. Sedentary (<2 times/week or <3 hours/week sports).

Exclusion criteria

- 1. Diabetes mellitus;
- 2. Elevated fasting blood glucose levels (>5.6 mmol/l);
- 3. Cardiovascular diseases;
- 4. Use of beta-blockers;
- 5. Asthma or other obstructive pulmonary diseases;
- 6. Hyperthyroidism;
- 7. For females: pregnancy;
- 8. Participation in earlier research that included a PET/CT scan;
- 9. Radiation therapy due to medical treatment.

Study design

Design

Study type:	Interventional
Intervention model:	Crossover
Allocation:	Non controlled trial
Masking:	Open (masking not used)
Control:	N/A , unknown

Recruitment

NL	
Recruitment status:	Recruiting
Start date (anticipated):	01-07-2012
Enrollment:	18
Туре:	Anticipated

Ethics review

Positive opinion

4 - The effect of insulin resistance on brown adipose tissue activity. 15-06-2025

Date: Application type:

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
NTR-new	NL3375
NTR-old	NTR3523
Other	METC MUMC / CCMO : 12-3-010 / NL39816.068.12;
ISRCTN	ISRCTN wordt niet meer aangevraagd.

Study results