Protein oxidation in stable renal transplant patients measured with a breath test

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To study whether stable renal transplant patients show higher protein oxidation measured with the 13C-breath test as compared to healthy kidney donor subjects.

Ethical review	Approved WMO
Status	Will not start
Health condition type	Protein and amino acid metabolism disorders NEC
Study type	Observational invasive

Summary

ID

NL-OMON46350

Source
ToetsingOnline

Brief title
POST

Condition

- Protein and amino acid metabolism disorders NEC

Synonym
protein oxidation

Research involving
Human

Sponsors and support

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

Intervention

Keyword: breath test, protein oxidation, renal transplant patients, stable isotopes

Outcome measures

Primary outcome

The total protein oxidation measured with the breath test over 330 minutes in

both groups will be compared to answer our main research question.

Secondary outcome

Multiple co-variates will be used in the statistical analysis

Physical properties: bodyweight, Body Mass Index, Resting Metabolic Rate,

fat-free mass

From the food diary: energy intake and protein intake

From 24-hour urine (medical dossier): urea (measure for protein intake) and

creatinine (measure for muscle mass)

From blood: glucose, insulin, CRP and IGF-1

Study description

Background summary

The human body has two options to utilize protein-derived amino acids. Ingested protein is used for synthesizing new proteins until requirements are met, and all surplus protein will be oxidized for energy. Disturbed protein metabolism, i.e. increased oxidation of amino acids and/or decreased incorporation of amino acids, is a major negative determinant for the clinical outcome of patients. The role of disturbed protein metabolism, which can lead to loss of muscle mass, has not been fully elucidated. To initiate, guide and evaluate interventions to minimize or prevent loss of muscle mass, it would be highly useful to be able to monitor the derangements in protein oxidation directly, but until recently a bedside tool to assess protein oxidation was not available. A recently developed non-invasive low naturally enriched 13C-protein 13CO2 breath test has shown to be able to quantify the oxidation rate of ingested low

naturally 13C-enriched milk-proteins derived amino acids directly and therefore elicits the possibility to develop a simple bedside monitoring tool for quantification of amino acid oxidation. The underlying principle of the test is: 13C-protein + O2 * 13CO2 + H2O.
Generally, there are two major fates for the amino acids derived from protein ingestion: 1) uptake into amino acid pool thereby being available for protein synthesis and 2) oxidation of excess amino acids. All amino acids that are oxidized, are not incorporated [6].
For the healthy adult population, a protein intake of 0.8 g/kg bw/day is recommended. However, stable renal transplant patients benefit from a higher protein intake of *1.1 g protein/kg bw/day, suggesting higher protein requirements. Possible reasons for higher protein requirement could be the chronic use of corticosteroids in renal transplant patients, a low grade inflammatory state, or other. Corticosteroids are used to prevent graft failure, but also have side effects, such as muscle wasting/protein catabolism. Whether protein catabolism is altered in renal transplant recipients however, is unknown.
The question is whether in stable renal transplant patients higher levels of protein catabolism (oxidation) can be measured with the 13C-milk protein breath test, as compared to age-controlled healthy subjects.

Study objective

To study whether stable renal transplant patients show higher protein oxidation measured with the 13C-breath test as compared to healthy kidney donor subjects.

Study design

Case control study

Study burden and risks

The following data will be already collected as part of the standard medical dossier: age, height, weight, Body Mass Index, waist-circumference and fat-free mass. Fat-free mass will be measured by bioelectrical impedance analysis, which is a non-invasive method. Body surface area will be calculated upon height and weight, using the formula described by Haycock et al. [4] which is necessary for the calculation of 13CO2 produced (mmol/hour) by the subject. 24-hour urine collection is also part of the standard medical dossier. From the 24-hour urine collection, urea and creatinine are measured, which will serve as a measure for protein intake (estimated by Maroni formula) and lean body mass, respectively [5].
Resting metabolic rate will be measured by indirect calorimetry, which will be used as a covariate.
Before the breath test, all subjects will keep a food diary for three days in order to collect data on their habitual diet (main interest: energy and protein

intake).

Two days before the breath test, all subjects will be asked to refrain from all 13C-enriched products (e.g. maize, sugar cane and pineapple), alcohol, and exercise in order to keep the 13C content in each subjects as low as possible. On the day of the breath test, the subjects will give breath samples by exhalation through a drinking straw into a glass (12 ml) container. The test drink, which is part of the breath test, will consist of 30 g of milk protein dissolved in 500 ml water (t=0). The planning of the experiment will be in consultation with the subjects.

Blood sampling will performed at three time points on the breath test day. At three time points, t=-10, t=120 and t=240 minutes blood will be drawn, unless described otherwise. The blood samples will be analysed for:
- Glucose
- Insulin
- C-reactive protein (only at t=-10)
- Insulin-like growth factor 1 (only at t=-10)

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

- Age 18+
- Male
- Be able to consume a 500 ml test drink within 5 minutes
- Be able to speak the Dutch language
- Give written consent
- For renal transplant patients: received renal transplant >6 months before the study
- For renal transplant patients: stable medication schedule for >2 weeks before the study (e.g. steroid use)
- For healthy subjects: donated kidney >6 months before the study

Exclusion criteria

- Milk (protein) allergy or intolerance
- Diabetes
- Cancer, except skin cancer
- Recreational drug use
- Active infection (CRP >10)
- Habitual average intake of more than 2 glasses of alcohol per day
- Not able to stop alcohol consumption 2 days before the test
- BMI <20 and >35
- Vegetarianism

Study design

Design

Study type:	Observational invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)
Control:	Active

Primary purpose:	Diagnostic

Recruitment

NL

Recruitment status:	Will not start
Enrollment:	32
Type:	Anticipated

Ethics review

Approved WMO

Date:	11-04-2018
Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

ID: 25890
Source: NTR
Title:

In other registers

Register	ID
CCMO	NL63147.042.17
OMON	NL-OMON25890