Amino acids in type 2 diabetes

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We hypothesize that patients with type 2 diabetes and first-degree realtives of patients with type 2 diabetes are characterized with a diminished branched-chain amino acid oxidative capacity

Ethische beoordeling	Positief advies
Status	Werving gestopt
Type aandoening	-
Onderzoekstype	Observationeel onderzoek, zonder invasieve metingen

Samenvatting

ID

NL-OMON20131

Bron
NTR

Verkorte titel
BCAA-EP

Aandoening

obesity
type 2 diabetes
metabolic syndrome

Ondersteuning

Primaire sponsor: Maastricht University Medical Center (MUMC+)
Overige ondersteuning: NWO (veni grant)
EFSD (European Foundation for the Study of Diabetes)

Onderzoeksproduct en/of interventie

Uitkomstmaten

Primaire uitkomstmaten

i) leucine oxidation rate (umol kg-1 min-1)

ii) insulin sensitivity (umol kg-1 min-1)

Toelichting onderzoek

Achtergrond van het onderzoek

Rationale: Recent research identified clusters of circulating branched-chain amino acids (BCAA), aromatic amino acids (AAA) and amino acid-derived short-chain acylcarnitines in insulin resistant humans, as risk factors in the development of type 2 diabetes. The elevated amino acid clusters may derive from elevated amino acid supply or incomplete amino acid catabolism. These findings shed new light in the aetiology of diabetes, which for long time was considered to be related only to disturbances in fat and glucose metabolism, underlying the development of insulin resistance and compromised mitochondrial function. Here, I propose the novel hypothesize that type 2 diabetes mellitus (T2DM) is linked to dysregulated amino acid metabolism, resulting in elevated clusters of BCAA, AAA and acylcarnitines causing insulin resistance. Furthermore, I hypothesize that impaired amino acid metabolism underlies impaired mitochondrial oxidative capacity in T2DM via diminished delivery and flux of amino acid-derived tricarboxylic acid cycle (TCA) intermediates.
Objective: The experiments presented in this project include metabolic profiling of amino acid metabolism-derived intermediates in plasma and muscle of patients with T2DM and in first-degree relatives (FDR), which has never been explored before.
Study design: The study presented is an observational study.
Study population: Ten male patients with T2DM, 10 FDR of patients with T2DM and 10 healthy, non-diabetic control participants will be enrolled into the study. Groups will be matched for age and BMI (age: 45-65 yrs; BMI: 27-35 kg/m2).
Main study parameters/endpoints: The main study objectives are i) to determine whether T2DM is related to impaired BCAA metabolism (umol kg-1 min-1) in muscle.
Nature and extent of the burden and risks associated with participation, benefit and group relatedness: The risk on hematomas and inflammation upon taking muscle biopsies is low as sterile material and pressure bandage will be used. Participants will not have a direct benefit from the dietary intervention. The burden of the diet, the risks of the performed measurements and the physical discomfort are relatively low.

Doel van het onderzoek

We hypothesize that patients with type 2 diabetes and first-degree realtives of patients with type 2 diabetes are characterized with a diminished branched-chain amino acid oxidative capacity

Onderzoeksopzet

n= 2 weeks, including 3 visits (including screening)

Contactpersonen

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Deelname eisen

Belangrijkste voorwaarden om deel te mogen nemen (Inclusiecriteria)

In order to be eligible to participate in this study, the participant must meet all of the following criteria:

- male or postmenopausal females

- 45-65 years

- BMI <35 and > 27 kg/m2

- stable dietary habits (no weight loss/gain >5kg in the last 3 months)

- stable physical activity levels for at least 6 months

- participants without T2DM should be normal glucose tolerant (OGTT with fasting plasma glucose <6.1 mmol/l and 2h glucose of <7.8 mmol/l

- FDR will be included on the presence of family history of type 2 diabetes

Patients with T2DM:

- non-insulin dependent patients diagnosed with T2DM for at least 1.5 years using sulphonylurea (i.e.glibenclamide, gliclazide, glimepiride en tolbutamide), and/or biguaniden (metformin) therapy for at least 6 months with a constant dose for at least 2 months

- patients should have a HbA1c < 8.5%

- patients will be included when having no active diabetes-related co-morbidities like cardiovascular diseases, diabetic foot, polyneuropathy, retinopathy

- subjects will be included only when the dependent medical doctor of this study approves participation after evaluating all data obtained during the screening (visit 1)

Belangrijkste redenen om niet deel te kunnen nemen (Exclusiecriteria)

- participants will be excluded when being diagnosed with active cardiovascular disease, diabetic foot, polyneuropathy, retinopathy

- participants will be excluded when having uncontrolled hypertension

- participants following a vegetarian diet or having an allergy against soya

- participants with contra-indication for MRI

Onderzoeksopzet

Opzet

Type:	Observationeel onderzoek, zonder invasieve metingen
Onderzoeksmodel:	Anders
Toewijzing:	N.v.t. / één studie arm
Blindering:	Open / niet geblindeerd

Controle:	N.v.t. / onbekend

Deelname

Nederland

Status:	Werving gestopt
(Verwachte) startdatum:	01-10-2013
Aantal proefpersonen:	30
Type:	Werkelijke startdatum

Voornemen beschikbaar stellen Individuele Patiënten Data (IPD)

Wordt de data na het onderzoek gedeeld: Nog niet bepaald

Ethische beoordeling

Positief advies

Datum:	20-09-2013
Soort:	Eerste indiening

Registraties

Opgevolgd door onderstaande (mogelijk meer actuele) registratie

Geen registraties gevonden.

Andere (mogelijk minder actuele) registraties in dit register

Geen registraties gevonden.

In overige registers

Register	ID
NTR-new	NL4009
NTR-old	NTR4181
Ander register	- : BCAA_EP
ISRCTN	ISRCTN wordt niet meer aangevraagd.

Resultaten

Samenvatting resultaten
N/A