

A Dose-Response Study of Human Unacylated Ghrelin on Glycemia during Oral Glucose Tolerance Test in Patients with Type 2 Diabetes Mellitus

Published: 21-06-2010

Last updated: 17-08-2024

Two key questions remain to be answered to further elucidate the mechanism of action: 1) is the effect on glucose metabolism dose dependent in Type 2 diabetes patients? and 2) Does UAG decrease glucose concentrations during an oral glucose loadThis...

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Glucose metabolism disorders (incl diabetes mellitus)
Study type	Interventional

Summary

ID

NL-OMON34644

Source

ToetsingOnline

Brief title

UAG oGTT

Condition

- Glucose metabolism disorders (incl diabetes mellitus)

Synonym

diabetes, insulin sensitivity

Research involving

Human

Sponsors and support

Primary sponsor: Erasmus MC, Universitair Medisch Centrum Rotterdam

Source(s) of monetary or material Support: Eigen middelen; maar het UAG wordt gratis verkregen dmv een unrestricted grant

Intervention

Keyword: diabetes, ghrelin, insulin

Outcome measures

Primary outcome

Glucose levels

Secondary outcome

Not applicable

Study description

Background summary

Ghrelin is a 28 aminoacid peptide that is naturally secreted by the stomach and circulates into 2 different forms: acylated ghrelin (AG), commonly referred to ghrelin, is acylated (octanoyl moiety) on the Serine in position 3, and unacylated ghrelin (UAG), also named un-octanoylated ghrelin, devoid of the acylated moiety.

Ghrelin has been discovered in 1999 as the endogenous ligand of an orphan receptor (GHSR 1a) that had previously been identified as the receptor mediating the pharmacological effects of a new therapeutic class of compounds, the growth hormone secretagogues (GHS).

Ghrelin has been initially characterized for its property of inducing growth hormone (GH) secretion, hence its name, GH-relin, a function mediated by GHSR1a(1;3). Since unacylated ghrelin does not bind to this receptor and has no physiological effect on GH secretion, it has long been considered as a product with no physiological role. As of today, the ghrelin system is known to exhibit numerous biological effects on the secretion of several pituitary hormones, on the gastric acid secretion and motility, on the exocrine and endocrine pancreatic function, on glucose metabolism, on appetite stimulation and on the cardio-vascular system.

Unacylated ghrelin is known to act on some of these systems, sometimes agonizing, sometimes antagonizing the effects of ghrelin. In particular,

unacylated ghrelin has been shown able to prevent the hyperglycaemic effects of ghrelin, when administered concomitantly, in healthy volunteers. This initial observation was followed by several laboratory and clinical works documenting the anti-diabetogenic potential of unacylated ghrelin.

In the Erasmus MC we performed already 2 studies with UAG; one in GH deficient patients and one in morbid obese subjects without overt diabetes. Both of these studies used single bolus i.v. administrations.

Accumulated in vitro, in vivo and clinical evidence suggest that unacylated ghrelin:

- prevents the diabetogenic effects of acylated ghrelin: this has been evidenced in healthy volunteers(5) and in GH-deficient patients(6);
- inhibits both basal and ghrelin-induced glycogenolysis by human hepatocytes;
- in vitro, stimulates insulin secretion from insulinoma cells and promote proliferation and inhibit apoptosis of beta cells, a very unique property;
- enhances portal insulin response to glucose in rats;
- may also reduce fat deposition and triglycerides levels, as evidenced in transgenic mice overexpressing unacylated ghrelin.

Moreover, in collaboration with the University of Turin, we observed that a 16-hour continuous infusion of unacylated ghrelin in healthy volunteers increased the first-phase insulin response following meal, reduced glucose levels, and decreased FFA levels, when compared to a saline infusion.

Also, preliminary data obtained by the same groups (unpublished data; study location Turin) in diet-controlled type 2 diabetes patients suggest that the continuous infusion of UAG for 5 hours reduced fasting and post-prandial glucose as well as post-prandial FFA.

In addition, the proliferative and anti-apoptotic effects documented on beta cells, apparently a very unique property, support the rationale to also develop UAG in type 1 diabetes and in the pancreas islets transplantations.

Finally, results of recent experiments by the group in Turin on circulating angiogenic cells (CAC) suggest that UAG may beneficially impact the vascular remodeling process which is known to be impaired in type 2 diabetes patients.

From literature, we know that patients with so-called neuro-endocrine tumors sometimes produce large amounts of UAG, leading to serum concentrations of more than 0.1 mcg/ml).

Strikingly these patients had no specific phenotype, nor complaints that suggest a direct role of UAG in these symptoms.

Moreover, we have not observed any side-effects in any of the patients that we enrolled in previous study subjects.

Taken together, our data strongly suggest that UAG might have a:

- broad safety range, as ultra-high serum levels don't induce specific signs or symptoms;
- blood glucose lowering effect;
- positive effect on the first phase post-prandial insulin secretion;
- insulin sensitizer, potentially with insulin-sparing effect;
- trophic effect on the endocrine pancreas;
- induces weight loss by preventing fat deposition;
- positive effect on the lipid profile, especially on triglycerides and free fatty acids.

Study objective

Two key questions remain to be answered to further elucidate the mechanism of action: 1) is the effect on glucose metabolism dose dependent in Type 2 diabetes patients? and 2) Does UAG decrease glucose concentrations during an oral glucose load

This study aims to clarify the effects of the continuous infusion of relative low doses of UAG on the glucose and insulin response to an oral glucose load in overweight patients with type 2 diabetes in poor metabolic control (HbA1c > 6.5%).

Study design

Double-blind, cross-over, single-centre, investigator-initiated study

Intervention

Overnight infusion of placebo, low and high dose UAG before an oral GTT the following morning

Study burden and risks

Because of the lack of side-effects in animals and human subjects during administration of UAG so far, the risks are considered to be low

Contacts

Public

Erasmus MC, Universitair Medisch Centrum Rotterdam

Postbus 2040
3000 CA Rotterdam

NL

Scientific

Erasmus MC, Universitair Medisch Centrum Rotterdam

Postbus 2040

3000 CA Rotterdam

NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age

Adults (18-64 years)

Elderly (65 years and older)

Inclusion criteria

- Female or Male subject of 18 years of age or older;
- Documented diagnosis of type 2 diabetes as defined by American Diabetes Association;
- Diagnosis of type 2 diabetes for at least 3 months prior to screening;
- Metformin monotherapy for at least 3 months prior to screening is allowed
- Screening HbA1c between 6.5% and 8.5%;
- Body Mass Index between 25 and 35 kg/m²;

Exclusion criteria

- History of or presence of active concomitant conditions or disease that would interfere with the protocol conduct and study assessments, as judged by the investigator;
- History or presence of long-term type 2 diabetes complications;
- Clinically significant abnormalities in laboratory evaluation at screening, as judged by the investigator;
- Use of systemic corticosteroids within 60 days prior to screening;
- If female, pregnancy or breast feeding;
- Drug or alcohol dependence or abuse;
- Participation in a trial of an experimental drug or device within 60 days prior to screening

Study design

Design

Study type:	Interventional
Intervention model:	Crossover
Allocation:	Randomized controlled trial
Masking:	Double blinded (masking used)
Control:	Placebo
Primary purpose:	Treatment

Recruitment

NL	
Recruitment status:	Recruitment stopped
Start date (anticipated):	16-05-2011
Enrollment:	12
Type:	Actual

Medical products/devices used

Product type:	Medicine
Brand name:	not available
Generic name:	unacylated ghrelin

Ethics review

Approved WMO	
Date:	21-06-2010
Application type:	First submission
Review commission:	METC Erasmus MC, Universitair Medisch Centrum Rotterdam (Rotterdam)
Approved WMO	
Date:	10-09-2010
Application type:	First submission
Review commission:	METC Erasmus MC, Universitair Medisch Centrum Rotterdam (Rotterdam)

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: 27562

Source: NTR

Title:

In other registers

Register	ID
EudraCT	EUCTR2010-019401-41-NL
CCMO	NL31332.078.10