# Investigation of the cerebral responses to hunger, satiety and food ingestion in people with obesity-related insulin resistance and Type 2 diabetes. A neuroimaging study using an obesity surgery (Roux-en-Y Gastric Bypass) model

Submission date	Recruitment status  No longer recruiting	<ul><li>Prospectively registered</li></ul>	
30/06/2010		☐ Protocol	
Registration date	Overall study status Completed  Condition category Nutritional, Metabolic, Endocrine	Statistical analysis plan	
30/06/2010		Results	
Last Edited		Individual participant data	
11/04/2017		Record updated in last year	

# Plain English summary of protocol

Not provided at time of registration

# Contact information

Type(s)

Scientific

#### Contact name

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#### Contact details

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# Additional identifiers

**EudraCT/CTIS** number

**IRAS** number

# ClinicalTrials.gov number

# Secondary identifying numbers 7405

# Study information

#### Scientific Title

Investigation of the cerebral responses to hunger, satiety and food ingestion in people with obesity-related insulin resistance and Type 2 diabetes. A neuroimaging study using an obesity surgery (Roux-en-Y Gastric Bypass) model

#### Acronym

**DRN 381 (RYGB)** 

# Study objectives

Obesity and related health problems such as Type 2 diabetes are becoming much more common and cause ill health and early death. We do not understand why some people are particularly prone to weight gain and diabetes. One possible explanation is that brain mechanisms controlling food intake are abnormal in people predisposed to obesity and/or diabetes. Roux-en-Y Gastric Bypass (RYGB), a type of surgery for obesity, is effective at causing weight loss. People who have had RYGB exhibit changes in appetite (the drive to eat) and/or satiation (feeling of fullness).

# **Hypotheses:**

Our overarching hypothesis is that brain control of food intake is abnormal in insulin-resistant states, predisposing to obesity and Type 2 diabetes, in a way that is amenable to correction e.g. by RYGB and to increase our understanding of the mechanisms involved. We will examine the following hypotheses:

- 1. That in people who have had successful RYGB the central (brain) responses to food ingestion are different when the effect of surgery is inhibited (mimicking the pre-operative state) and when it is active (the post-operative state)
- 2. That the central responses to food ingestion are abnormal in insulin resistance and obesity

#### Protocol:

We are measuring, in the fasted and fed (post 400 kcal meal) state: regional brain activation using (18F)-fluoro-deoxyglucose positron emission tomography (FDG-PET) brain imaging; gut peptides; and appetite and satiety (using visual analogue scales and an ad-libitum meal).

Study One will be performed in 12 people who have lost weight after RYGB in their normal state and using somatostatin infusion to inhibit the satiety effects of surgery.

Study Two compares responses between three groups of 12 people (who have not had obesity surgery):

- 1. Normal weight (body mass index [BMI] 20 25 kg/m^2)
- 2. Overweight insulin sensitive (BMI 25  $40 \text{ kg/m}^2$  and updated homeostatic model assessment [HOMA2-IR] greater than or equal to 0.76)
- 3. Overweight insulin resistant (BMI 25 40 kg/m2 and HOMA2-IR greater than or equal to 1.47)

# Ethics approval required

# Old ethics approval format

## Ethics approval(s)

MREC approved, ref: 08/H0801/152

# Study design

Single-centre observational screening cross-sectional study

# Primary study design

Observational

## Secondary study design

Cross sectional study

#### Study setting(s)

Hospital

# Study type(s)

Screening

# Participant information sheet

Not available in web format, please use the contact details to request a patient information sheet

# Health condition(s) or problem(s) studied

Topic: Diabetes Research Network; Subtopic: Type 2; Disease: Obesity

#### Interventions

Intravenous somatostatin infusion (to inhibit the satiety effects of RYGB) compared to intravenous saline control (Study One, post RYGB only). Post 400 kcal meal compared to no food intake.

#### Intervention Type

Other

#### **Phase**

**Not Specified** 

#### Primary outcome measure

Regional brain activation: regional brain activation using FDG-PET brain imaging

# Secondary outcome measures

- 1. Appetite and satiety using visaul analogue scales and an ad-libitum meal
- 2. Gut peptides

## Overall study start date

03/06/2009

# Completion date

30/09/2011

# **Eligibility**

# Key inclusion criteria

- 1. Aged 18 years or over
- 2. Able to provide informed consent to participate in the study
- 3. Able to lie flat in the scanner for duration of scans
- 4. Right handedness (because of the possibility of lateralisation of cerebral responses)
- 5. For women of childbearing potential in all groups:
- 5.1. Using effective form of contraception
- 5.2. Willing to have a pregnancy test at the start of each scanning visit
- 5.3. Willing to attend for scanning visits during the first 10 days of their menstrual cycle
- 6. For STUDY ONE (RYGB):
- 6.1. Roux-en-Y gastric bypass 3 months to 10 years previously
- 6.2. BMI 25 40 kg/m^2
- 6.3. Weight loss of more than 10% of excess body weight since surgery
- 7. For STUDY TWO, Group A (non-overweight, no obesity surgery group):
- 7.1. No previous obesity surgery
- 7.2. BMI 20 25 kg/m<sup>2</sup>
- 8. For STUDY TWO, Group B (overweight/obese, no obesity surgery with insulin resistance with or without Type 2 diabetes):
- 8.1. No previous obesity surgery
- 8.2. BMI 25 40 kg/m<sup>2</sup>
- 8.3. HOMA2-IR greater than or equal to 1.47 with or without Type 2 diabetes (managed with diet /exercise/metformin only)
- 9. For STUDY TWO, Group C (overweight/obese, no obesity surgery, insulin-sensitive group):
- 9.1. No previous obesity surgery
- 9.2. BMI 25 40 kg/m^2
- 9.3. HOMA2-IR greater than or equal to 0.76

## Participant type(s)

Mixed

# Age group

Adult

# Lower age limit

18 Years

#### Sex

Both

# Target number of participants

Planned sample size: 48; UK sample size: 48

## Key exclusion criteria

- 1. Inability to give formal consent
- 2. Unable to communicate in spoken English (due to the importance of being able to communicate while study subjects are in the scanner)
- 3. Age less than 18 years
- 4. Pregnancy, planning pregnancy, or breastfeeding

- 5. Currently enrolled in other clinical study
- 6. Left-handedness
- 7. Taking any glucose-lowering medications (except metformin). Subjects taking metformin will be asked to omit it the day before the Test Meal/OGTT visit and the PET scanning visits because metformin affects gastric emptying and thus may affect nutrient absorption).
- 8. Advanced retinopathy
- 9. Any significant brain disorder, e.g. previous significant head injury, epilepsy, cerebrovascular disease
- 10. Use of psychotropic medication, e.g. antidepressants, antipsychotics
- 11. Unstable angina, myocardial infarction in the previous year, uncontrolled congestive cardiac failure
- 12. Chronic kidney disease (Stage 3 5)
- 13. Liver function tests more than three times the upper normal limit
- 14. Coagulopathy (international normalised ratio [INR] greater than 1.5 or platelets less than 50  $\times$  10^9/L)
- 15. Anaemia (Hb less than 10 g/dL)
- 16. Recent history of cancer (less than 5 years)
- 17. Contraindication to magnetic resonance imaging, e.g. cardiac pacemaker

#### Date of first enrolment

03/06/2009

# Date of final enrolment

30/09/2011

# Locations

#### Countries of recruitment

England

United Kingdom

# Study participating centre 133 Coldharbour Lane London

London United Kingdom SE5 9NU

# Sponsor information

## Organisation

Kings College London (KCL) (UK)

#### Sponsor details

Strand London England United Kingdom WC2R 2LS

## Sponsor type

University/education

#### Website

http://www.kcl.ac.uk/

#### **ROR**

https://ror.org/0220mzb33

# Funder(s)

# Funder type

Charity

#### **Funder Name**

Diabetes UK (UK)

# Alternative Name(s)

DIABETES UK LIMITED, British Diabetic Association

# **Funding Body Type**

Private sector organisation

# **Funding Body Subtype**

Trusts, charities, foundations (both public and private)

#### Location

**United Kingdom** 

# **Results and Publications**

# Publication and dissemination plan

Not provided at time of registration

Intention to publish date

Individual participant data (IPD) sharing plan

# IPD sharing plan summary

Not provided at time of registration