

# The effect of variation of fatty substances found in the blood on patients with type 2 diabetes

<b>Submission date</b> 19/10/2020	<b>Recruitment status</b> No longer recruiting	<input checked="" type="checkbox"/> Prospectively registered <input checked="" type="checkbox"/> Protocol
<b>Registration date</b> 09/11/2020	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 09/11/2020	<b>Condition category</b> Nutritional, Metabolic, Endocrine	<input type="checkbox"/> Individual participant data <input type="checkbox"/> Record updated in last year

## Plain English summary of protocol

### Background and study aims

High blood sugar and fat content are well-recognised risk factors for causing the formation of obstructive plaques in arteries which lead to cardiovascular disease, for example heart attacks. From earlier studies, we know that after eating, high sugar and fat content in the blood seems to have an association with cardiovascular risk in both healthy persons and individuals with type 2 diabetes. This study aims to examine the effect on the body of variation of fat levels in the blood compared to constant fat levels, during a constant high sugar state.

### Who can participate?

This study is open to individuals with type 2 diabetes and non-diabetic individuals between the ages of 30 - 65 years with a body mass index between 27 - 40 kg/m<sup>2</sup> (overweight or obese).

### What does the study involve?

This study includes one screening visit and two procedural visits during which participants will have sugar infused into their blood. Blood will be drawn at various time points during the procedure for analysis. Participants will be closely monitored by trained medical and nursing staff throughout the procedure. There will be one week break between visit 2 and visit 3 to prevent the carried over effects of infusions. We expect individual participants would be in the study for 3-4 weeks in total.

### What are the possible benefits and risks of participating?

**Benefits:** No immediate benefits, however, the knowledge gained in the study will help the management of diabetes in the future.

**Risks:** Potential for a reaction to the fatty substance given by the drip and discomfort from the cannula (plastic needle). A fully advanced life support trained research doctor will be present at all times to manage any emergency situation that arises however this is a rare occurrence. All the potential risks will be fully disclosed and discussed with potential participants at screening before he/she consents to take part in the study.

Where is the study run from?  
University of Hull (UK)

When is the study starting and how long is it expected to run for?  
June 2014 to October 2021

Who is funding the study?  
University of Hull (UK)

Who is the main contact?  
Prof. Thozhukat Sathyapalan, thozhukat.sathyapalan@hey.nhs.uk

## Contact information

**Type(s)**  
Scientific

**Contact name**  
Prof Thozhukat Sathyapalan

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## Additional identifiers

**Integrated Research Application System (IRAS)**  
154259

## Study information

**Scientific Title**  
Effect of acute fluctuations of hyperlipidaemia on insulin resistance and cardiovascular risk in patients with type 2 diabetes

**Study objectives**  
Fluctuation in triglyceride levels confers risk of oxidative stress, beta-cell function and platelet function that is in addition to that predicted by the plasma mean triglyceride value alone.

**Ethics approval required**

Old ethics approval format

### **Ethics approval(s)**

Approved 03/12/2014, NRES Committee Yorkshire & The Humber - South Yorkshire (NHSBT Newcastle Blood Donor Centre, Holland Drive, Newcastle upon Tyne, NE2 4NQ, UK; +44 (0)207 104 8079; southyorks.rec@hra.nhs.uk), ref: 14/YH/1169

### **Primary study design**

Interventional

### **Study design**

Pilot cross-sectional non-randomised non-CTIMP

### **Study type(s)**

Diagnostic

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

Assessing risk of fluctuating lipid levels compared to constant hyperlipidaemia during constant hyperglycaemic state on endothelial function and oxidative stress parameters in type 2 diabetes

### **Interventions**

This study includes one screening visit and two procedural visits. There will be a one week break between visit 2 and visit 3. We expect he or she would be in the study for 3-4 weeks in total. All the participants have a screening assessment to ensure their eligibility for the study and will be required to complete a consent form. The screening includes medical history (including pre-existing conditions and concomitant medications), physical examinations (measurement of height, weight, hip and waist circumference, and resting blood pressure) and blood tests. In women, a pregnancy test will be done before entering the study. Female participants will be asked to use a barrier method for contraception if required during the test.

For visit 2, participants will be required to fast for 12 h, not take their antiplatelet medication (e.g. aspirin) for 72 h before the test, not take their metformin and blood pressure medication on the evening before and the morning of the visit. Participants will also be requested to stop their lipid lowering medication i.e statins 4 weeks before entering the study. A cannula (plastic needle) will be inserted in both forearms. A hyperglycaemic state will be maintained using 20% Dextrose Infusion followed by continuous 20% IV Lipid infusion 90 ml/h and unfractionated heparin. Another cannula will be inserted in the back of the hand and subjected to controlled heat to allow for blood sample collection. A blood sample will be collected at various time points throughout the test.

A similar procedure will be repeated on visit 3 (1 week after visit 2). A hyperglycaemic state will be maintained using 20% Dextrose Infusion followed by intermittent 20% IV Lipid infusion 90 ml/h and unfractionated heparin for 2 hours followed by Normal Saline 45 ml/h for 2 h before re-starting 20% IV Lipid infusion 90 ml/h and unfractionated heparin.

Blood glucose will be checked before sending participants home. Participants should expect to stay in the centre for approximately 8 h. The expenses for travel and parking fees will be reimbursed. Because of the inconvenience of having to spend 8 h in the diabetes centre for the procedure, we will reimburse participants £50 per procedure. However, participants would not be eligible for the reimbursement if they are on state benefit because it might invalidate their benefits.

## Intervention Type

Other

## Primary outcome(s)

1. Beta cell function assessed by insulin measurements taken at fasting and every 10 min from T-30 to T0 and T340 to T360, and hourly during the whole procedure
2. Oxidative stress markers measured using blood samples drawn during visit 2 and 3 before, at the end of 2 h, 4 h and 6 h of the fatty substance infusion and will be centrifuged followed by analysis using the flow cytometer

## Key secondary outcome(s)

Platelet activation/inhibition measured using blood samples drawn during visit 2 and 3 before, at the end of 2 h, 4 h and 6 h of the lipid infusion and will be centrifuged followed by analysis using the flow cytometer

## Completion date

15/10/2021

## Eligibility

### Key inclusion criteria

Diabetes arm:

1. Aged 30 - 65 years
2. BMI 27 - 40 kg/m<sup>2</sup>
3. History of T2DM on diet with or without metformin

Control arm

1. Aged 30 - 65 years
2. BMI 27 - 40 kg/m<sup>2</sup>

### Participant type(s)

All

### Healthy volunteers allowed

No

### Age group

Adult

### Sex

All

### Key exclusion criteria

Diabetes arm:

1. Current smoking
2. Pregnancy/breastfeeding/trying to conceive
3. Participants on anti-diabetes medications except metformin
4. Participants on beta blocker/ thiazide diuretics
5. History of chronic kidney disease stage 3, ALT >3x upper limit of normal and active thyroid disease

6. History of recent cardiovascular event in last 12 weeks
7. History of coagulation disorders
8. History of bronchial asthma
9. History of allergy to insulin, soy oil, purified egg (intralipid)
10. History of taking lipid lowering agents within last 2 weeks
11. Unwilling to be informed to their GP about their participation

Control arm:

1. Current smoking
2. Pregnancy/breastfeeding/trying to conceive
3. History of chronic kidney disease stage 3, ALT >3x upper limit of normal and active thyroid disease
4. History of recent cardiovascular event in last 12 weeks
5. History of coagulation disorders
6. History of bronchial asthma
7. History of diabetes mellitus
8. Participants on beta-blockers or thiazide diuretics
9. History of allergy to insulin, soy oil, purified egg (intralipid)
10. History of taking lipid lowering agents within last 4 weeks
11. Unwilling to be informed to their GP about their participation

**Date of first enrolment**

20/12/2020

**Date of final enrolment**

20/06/2021

## **Locations**

**Countries of recruitment**

United Kingdom

England

**Study participating centre**

**Hull Royal infirmary**

Centre for Diabetes, Endocrinology and Metabolism Research

Brocklehurst Building

220-236 Anlaby Road

Hull

United Kingdom

HU3 2RW

## **Sponsor information**

**Organisation**

Hull and East Yorkshire Hospitals NHS Trust

**ROR**

<https://ror.org/01b11x021>

## **Funder(s)**

**Funder type**

University/education

**Funder Name**

University of Hull

**Alternative Name(s)**

HU

**Funding Body Type**

Private sector organisation

**Funding Body Subtype**

Universities (academic only)

**Location**

United Kingdom

## **Results and Publications**

**Individual participant data (IPD) sharing plan**

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request. Hull and East Yorkshire R & D department will monitor all data collected including safety data throughout the course of the study. The data stored will only have the participant's study number and initials on it. Data will be collected in participant's case notes and a case report form (CRF) designed specifically for the study in line with the sponsor's guidelines and Good Clinical Practice. Data will be collected by the study team. This will include research nurses and medical practitioners. Data will be anonymized and will only be identified by the participant identification number. Data will be collected and retained in accordance with the Data Protection Act 1998. Data will include anthropometric measurements, laboratory investigations which include full blood count , urea, creatinine & electrolytes, liver function test, thyroid function test, HbA1C, creatinine kinase, total cholesterol, triglycerides, LDL and HDL, Insulin and oxidative stress markers (endothelial microparticles) will be examined by local laboratory protocol. Data will can be made available from July 2021 and will be available for 5 years.

**IPD sharing plan summary**

Available on request

## Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">HRA research summary</a>			28/06/2023	No	No
<a href="#">Protocol file</a>	version v2	24/06/2014	09/11/2020	No	No