

# Ethnic differences in glucose regulation following interval training

<b>Submission date</b> 13/05/2015	<b>Recruitment status</b> No longer recruiting	<input type="checkbox"/> Prospectively registered
		<input type="checkbox"/> Protocol
<b>Registration date</b> 20/05/2015	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan
		<input type="checkbox"/> Results
<b>Last Edited</b> 06/09/2019	<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

The benefits of regular exercise and physical activity are well established, yet most people fail to do the minimum recommended amount. Many people say that they do not have time to fit in physical activity into their daily lives. High-intensity interval training (HIT) has been proposed as a time-saving form of exercise. HIT has been shown to improve fitness but the benefits to metabolic health e.g. blood glucose regulation (controlling the amount of glucose in the blood) are unclear. It is also uncertain whether people from different ethnic backgrounds respond in the same way to the same physical activity. This is important to establish if HIT is to be recommended to the general population as a therapeutic health tool for people at risk of or with diabetes. The primary aim of this study is to look at the effect of a single bout of high-intensity interval training compared to matched-work continuous exercise on the response of the body to blood glucose levels after a meal (post-meal glucose responses) in white European and South Asian patients at risk of type 2 diabetes. We also want to look at the effect of HIT on cardiovascular risk biomarkers and whether participants enjoy it.

### Who can participate?

South Asian and white European adults aged between 50-75 whose blood glucose is higher than normal but not high enough to be diagnosed with type 2 diabetes.

### What does the study involve?

Participants visit the centre four times, each visit separated by 1-week. The first visit will be a familiarisation visit lasting approximately 2-hours. They are then randomly allocated into one of three groups. Participants in all groups take part in all three of the following treatment sessions but in a different order. In the control condition participants remain seated for the whole day. The other two days are run exactly the same except that HIT or moderate-intensity continuous exercise is performed for approximately 30 minutes. During the treatment days at least every hour participants have a blood sample taken, blood pressure reading taken and are asked to fill out a questionnaire.

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

Participants will find out information about their risk of developing diabetes, daily blood glucose

levels, their fat and cholesterol levels, body fat percentage, current physical activity levels and overall fitness level using the latest technology. Individual feedback will be presented to each participant, explaining what the data means for them. They will find out how their health may benefit from physical activity and be introduced to a novel form of exercise that they might enjoy. The study itself may not be of direct benefit to the individual participant but it will contribute to ongoing work aimed at the prevention and management of type 2 diabetes. Participants will be provided with detailed, personalised education regarding physical activity and blood glucose control. They will also be invited to be contacted regarding future studies conducted at the Leicester Diabetes Centre, which may involve interventions that result in more long-term health benefits. There are risks associated with performing maximal exercise by those unaccustomed to exercise therefore medical history, resting and exercise ECG will be assessed by a specialist cardiac nurse.

There is mild pain and discomfort associated with blood sampling and cannulation, although this is minimal. All procedures will be performed by an experienced research nurse. The study required participants to wear activity and continuous glucose monitoring devices, which may cause some inconvenience. However, devices are small, minimally invasive and will be worn for the minimum period required for meaningful analysis. Making 4 trips including 3 full days to the Leicester Diabetes centre presents a time burden to participants. To minimise disruption to participant's routines individuals will be invited on days convenient to them, provided with meals and offered £50 on completion of the study.

Where is the study run from?

November 2014 to February 2016

When is the study starting and how long is it expected to run for?

Leicester Diabetes Centre, Leicester General Hospital (UK)

Who is funding the study?

Professor Melanie Davies' Senior Investigator Award and funds from the Leicester Diabetes Centre.

Who is the main contact?

1. Miss Charlotte Jelleyman (public)
2. Dr Tom Yates (scientific)

## Contact information

### Type(s)

Public

### Contact name

Prof Tom Yates

### Contact details

Leicester Diabetes Centre  
Leicester General Hospital  
Gwendolen Road  
Leicester  
United Kingdom  
LE5 4PW

**Type(s)**

Scientific

**Contact name**

Dr Tom Yates

**Contact details**

Leicester Diabetes Centre  
Leicester General Hospital  
Gwendolen Road  
Leicester  
United Kingdom  
LE5 4PW

## Additional identifiers

EudraCT/CTIS number

IRAS number

ClinicalTrials.gov number

Secondary identifying numbers

Davies\_0521

## Study information

**Scientific Title**

The effect of a single bout of high-intensity interval training on glucose responses in white European and South Asian patients at risk of type 2 diabetes

**Acronym**

GO for IT

**Study objectives**

The aim of this study is to investigate the effects of high-intensity interval training (HIT) on glycaemic control in white European and South Asian patients at risk of type 2 diabetes, and to compare these effects with matched-work continuous exercise and a non-exercising control.

**Ethics approval required**

Old ethics approval format

**Ethics approval(s)**

1. University of Leicester, 05/05/2015
2. University Hospitals of Leicester NHS Trust R&D, 17/08/2015, ref 167328/829251/14
3. Leicestershire, Northamptonshire and Rutland Research Ethics Committee, 26/05/2015, ref 15/EM/0259

**Study design**

Single-centre fully randomised three treatment crossover trial.

**Primary study design**

Interventional

**Secondary study design**

Randomised controlled trial

**Study setting(s)**

Hospital

**Study type(s)**

Other

**Participant information sheet**

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

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

Individuals at risk of type 2 diabetes

**Interventions**

The experimental conditions are:

1. High-intensity interval training (HIT)
2. Continuous training (CT)
3. Control (CON)

**Intervention Type**

Other

**Primary outcome measure**

Incremental glucose area under the curve: blood samples taken at -1h, 0h, 0.5h, 1h, 2h, 3h, 3.5h, 4h, 5h, 6h, 7h throughout each treatment day will be analysed for glucose concentration using a glucose oxidase method

**Secondary outcome measures**

1. Questionnaires: RPE, positive mood/affect, sleepiness, appetite
2. Blood markers: IL-6, CRP, insulin, leptin, ghrelin, acylated ghrelin, PYY3-36, GLP-1, Selenoprotein-P, LECT2, Follistatin, Fetuin-A, FGF21
3. Blood pressure

These measures will be taken at -1h, 0h, 1h, 1.5h, 2h, 3h, 3.5h, 4h, 5h, 6h, 7h

**Overall study start date**

01/11/2014

**Completion date**

30/09/2018

**Eligibility****Key inclusion criteria**

Current inclusion criteria as of 16/05/2016:

1. Has had 2 hour glucose between 7.8mmol.L-1 and 11.1mmol.L-1 after an oral glucose tolerance test (performed at the Leicester Diabetes Centre as part of another study within 12 months)

OR

Has HbA1c between 5.7% to 6.49% within the last 5 years

2. Is of south Asian (Indian, Bangladeshi, Pakistani) or white European (British, Irish or other European country) descent

3. Adults aged between 50 to 74 years inclusive (subject to females being post-menopausal defined as no menstruation in the last 12 months as reproductive hormones interact with appetite hormone responses)

4. Able to walk and use treadmill

5. BMI  $\geq 27.5\text{kg/m}^2$  (WE) or  $\geq 25\text{kg/m}^2$  (SA)

6. Weight stable (weight has not fluctuated more than  $\pm 5\text{kg}$  in the last 6 months)

7. Ability to communicate in and understand English to participate in the informed consent process

Previous inclusion criteria:

1. Has had 2 hour glucose between 7.8mmol.L-1 and 11.1mmol.L-1 after an oral glucose tolerance test (performed at the Leicester Diabetes Centre as part of another study within 12 months)

OR

Has HbA1c between 6%-6.49% at baseline or at their most recent blood test within the previous 12 months

2. Is of south Asian (Indian, Bangladeshi, Pakistani) or white European (British, Irish or other European country) descent

3. Adults aged between 50 to 74 years inclusive (subject to females being post-menopausal defined as no menstruation in the last 12 months as reproductive hormones interact with appetite hormone responses)

4. Able to walk and use treadmill

5. BMI  $\geq 27.5\text{kg/m}^2$  (WE) or  $\geq 25\text{kg/m}^2$  (SA)

6. Weight stable (weight has not fluctuated more than  $\pm 5\text{kg}$  in the last 6 months)

7. Ability to communicate in and understand English to participate in the informed consent process

## **Participant type(s)**

Patient

## **Age group**

Adult

## **Sex**

Both

## **Target number of participants**

24

## **Key exclusion criteria**

Current exclusion criteria as of 16/05/2016:

1. Regular purposeful exercise ( $\geq 3 \times 20$  minute bouts of self-reported vigorous exercise performed per week)

2. Individuals who stand for extended periods of time (standing has been shown to improve glycaemic variability)
3. Mixed race (including individuals of mixed race would prevent determination of whether ethnicity is a modifying factor in the response to HIT)
4. Use of any glucose lowering medication
5. Dieters/restrained eaters (as assessed using the 3 factor eating QA)
6. Any contraindications to exercise such as abnormal resting ECG, breathlessness or dizziness on exertion, poor circulation, hypo- or hypertension
7. Significant renal or hepatic impairment defining parameters i.e. chronic kidney disease stage 3b, liver markers more than 3x greater than the normal range
8. Consent not given to contact GP with test results

Previous exclusion criteria:

1. Diagnosed type 2 diabetes
2. Regular purposeful exercise ( $\geq 3 \times 20$  minute bouts of self-reported vigorous exercise performed per week)
3. Individuals who stand for extended periods of time (standing has been shown to improve glycaemic variability)
4. Mixed race (including individuals of mixed race would prevent determination of whether ethnicity is a modifying factor in the response to HIT)
5. Use of any glucose lowering medication
6. Dieters/restrained eaters (as assessed using the 3 factor eating QA)
7. Any contraindications to exercise such as abnormal resting ECG, breathlessness or dizziness on exertion, poor circulation, hypo- or hypertension
8. Significant renal or hepatic impairment defining parameters i.e. chronic kidney disease stage 3b, liver markers more than 3x greater than the normal range
9. Consent not given to contact GP with test results

**Date of first enrolment**

02/05/2015

**Date of final enrolment**

31/07/2018

## **Locations**

**Countries of recruitment**

England

United Kingdom

**Study participating centre**

**Leicester Diabetes Centre**

Leicester General Hospital

Gwendolen Road

Leicester

United Kingdom

LE5 4PW

# Sponsor information

## Organisation

University of Leicester (UK)

## Sponsor details

College of Medicine  
Biological Sciences and Psychology  
Level 4 Maurice Shock Building  
Leicester  
England  
United Kingdom  
LE1 7RH

## Sponsor type

University/education

## ROR

<https://ror.org/04h699437>

# Funder(s)

## Funder type

Government

## Funder Name

Melanie Davies Senior Investigator Award

## Funder Name

Leicester Diabetes Centre (UK)

# Results and Publications

## Publication and dissemination plan

The study will be written up and submitted to relevant academic journals. Overall and individual results will be sent to participants in lay language and as personalised plans.

2018 thesis in <https://pdfs.semanticscholar.org/a5d2/a69a9596c8599d8670c5285133950af5b89a.pdf>

## Intention to publish date

30/09/2020

## Individual participant data (IPD) sharing plan

### 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