

Do the remaining insulin-producing cells in people with type 1 diabetes help to maintain good glucose control after exercise?

Submission date 15/05/2019	Recruitment status No longer recruiting	☐ Prospectively registered
		☐ Protocol
Registration date 24/05/2019	Overall study status Completed	☐ Statistical analysis plan
		☒ Results
Last Edited 14/06/2023	Condition category Nutritional, Metabolic, Endocrine	☐ Individual participant data

Plain English summary of protocol

Background and study aims

When people with Type 1 diabetes exercise, some experience hypoglycaemia (low blood sugar [glucose]), while others do not; in some HbA1c (a marker of diabetes control) gets worse while in others it improves. Exercise is known to increase glucose variability leading to more time with high and low levels. It is now known that many people with long-standing type 1 diabetes can produce small amounts of insulin from the remaining beta-cells in the pancreas. It is unknown if this is important for limiting blood glucose variability at rest and around exercise, and may explain some of the wide variation that is observed in response to exercise in people with Type 1 diabetes. This study aims to examine how residual beta-cell function impacts on glucose control when physically active / exercising in people with Type 1 diabetes.

Who can participate?

Anyone aged 18-65 years old with clinically diagnosed Type 1 diabetes, treated with exogenous insulin (pump or injection), free from diabetes complications can participate.

What does the study involve?

Participants will be required to complete a mixed meal tolerance test and a period of moderate intensity walking exercise for 45 minutes, with blood samples and interstitial glucose recorded before and after exercise

What are the possible benefits and risks of participating?

The benefits of taking part include understanding your own individual responses to exercise, receiving feedback on cardiovascular fitness, and contributing to the care and management of those with Type 1 diabetes. The risks of taking part include experiencing hypoglycaemia, musculoskeletal injury and muscle soreness.

Where is the study run from?

Newcastle upon Tyne NHS Foundation Trust, UK.

When is the study starting and how long is it expected to run for?
October 2016 to May 2019.

Who is funding the study?
1. Diabetes Research and Wellness Foundation, UK
2. Newcastle University, UK

Who is the main contact?
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Additional identifiers

Protocol serial number

C-peptide and exercise in T1D V3 14/07/16

Study information

Scientific Title

The role of residual beta-cell function on post-exercise glycaemic variability in individuals with type 1 diabetes

Study objectives

Type 1 diabetes patients with residual beta-cell function demonstrate improved post-exercise glucose control

Ethics approval required

Old ethics approval format

Ethics approval(s)

Approved 02/09/2016 North East Tyne & Wear South Research Ethics Committee (NHSBT Newcastle Blood Donor Centre, Holland Dr, Newcastle upon Tyne NE2 4NQ; 0207 104 8026; nrescommittee.northeast-tyneandwearsouth@nhs.net), ref: 16/NE/0192

Primary study design

Observational

Study design

Acute observational trial

Study type(s)

Quality of life

Health condition(s) or problem(s) studied

Type 1 diabetes

Interventions

Patients with Type 1 diabetes with a wide range of residual beta-cell function (from negative to clinically significant) will be recruited. Participants will be identified using urinary C-peptide Creatinine Ratio testing, and those eligible will complete a mixed meal tolerance test to establish maximal stimulated serum C-peptide concentrations. Participants will then complete a fixed bout of moderate intensity walking exercise at 60% VO2 peak for 45 minutes, with blood samples and interstitial glucose recorded before and after exercise.

Intervention Type

Behavioural

Primary outcome(s)

The amount of time interstitial glucose is spent in euglycaemia measured using blinded interstitial continuous glucose monitoring

Key secondary outcome(s)

1. Glycaemic variability (SD, CV%, MAGE, J-Index, CONGA, MAG, M-value)
2. Time spent: hypoglycaemic (<3.9mmol/L, <3.0mmol/L), hyperglycaemic (>10mmol/L, >13.9mmol/L, >16.7mmol/L)
3. Hypoglycaemia stage 1 (<3.9mmol/L for 15+ minutes) and stage 2 (<3.0mmol/L for 15+ minutes) and hyperglycaemia incidence level 1 (>10mmol for 15+ minutes) and level 2 (>13.9mmol for 15+ minutes)
4. Corrective bolus/carbohydrate intake

Completion date

01/09/2019

Eligibility**Key inclusion criteria**

1. Aged 18-65 years old
2. Clinically diagnosed Type 1 diabetes
3. Treated with exogenous insulin (pump or injection)
4. Free from diabetes complications

Participant type(s)

Patient

Healthy volunteers allowed

No

Age group

Adult

Lower age limit

18 Years

Upper age limit

65 Years

Sex

All

Total final enrolment

30

Key exclusion criteria

1. Type 1 diabetes participants duration of disease less than 1 year
2. HbA1c > 10% (86 mmol/mol)
3. Unable to complete maximal exercise test

Date of first enrolment

01/10/2016

Date of final enrolment

31/05/2019

Locations

Countries of recruitment

United Kingdom

England

Study participating centre

Newcastle upon Tyne NHS Foundation Trust

Level 1

Regent Point

Gosforth

Newcastle upon Tyne

United Kingdom

NE3 3HD

Sponsor information

Organisation

Newcastle University

ROR

<https://ror.org/01kj2bm70>

Funder(s)

Funder type

Research organisation

Funder Name

Diabetes Research and Wellness Foundation

Alternative Name(s)

Diabetes Research & Wellness Foundation, Diabetes Research and Wellness Foundation UK, DRWF

Funding Body Type

Private sector organisation

Funding Body Subtype

Trusts, charities, foundations (both public and private)

Location

United Kingdom

Funder Name

Newcastle University

Alternative Name(s)**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 current data sharing plans for this study are unknown and will be available at a later date

IPD sharing plan summary

Data sharing statement to be made available at a later date

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	results	01/10/2020	05/10/2020	Yes	No
Results article		10/03/2022	14/06/2023	Yes	No
HRA research summary			28/06/2023	No	No