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Disease in the small blood vessels, heart failure and diabetes

Submission date 20/05/2025	**Recruitment status** Recruiting	[X] Prospectively registered [_] Protocol [_] Statistical analysis plan [_] Results [_] Individual participant data [_] Record updated in last year
Registration date 26/05/2025	**Overall study status** Ongoing	
Last Edited 01/07/2025	**Condition category** Other	

Plain English summary of protocol

Background and study aims

Heart failure (HF) outcomes are worse in people with type 1 (T1D) and type 2 diabetes (T2D) than in those without diabetes. However, research in this area is lacking and has primarily focused on T2D. There is limited understanding of the pathophysiology of HF in T1D despite its poor prognosis.

The overall aim of this study is to address this knowledge gap in the prevention and treatment of HF in individuals with T1D. The presence of cardiac microvascular disease (MVD) may play an important role in HF and T1D. This study will explore the role of cardiac MVD in patients with T1D and HF using a comprehensive assessment of cardiac imaging in people with and without T1D and HF. This study will address a significant unmet need, providing novel insights into HF in T1D that may support improved prevention and treatment of HF in T1D in future.

Who can participate?

Patients aged 18 years and over with at least one of the following conditions:

1. Diabetes (type 1 or type 2)
2. Heart Failure
3. High blood pressure
4. People with no prior heart problems

What does the study involve?

Participants will attend a study visit during which they will:

1. Have a clinical examination, including measuring height and weight
2. Complete between one and three questionnaires about their health
3. Provide blood and urine samples
4. Have an ECG (heart tracing), echocardiogram (heart ultrasound) and heart MRI scan
5. Have a photograph of the back of their eye taken
6. Have a test of blood flow in their skin

A subset of patients will return for exactly the same tests at 2 years.

What are the possible benefits and risks of participating?

Heart failure and diabetes are major public health issues worldwide. There may not be any direct benefits to participants immediately from taking part in the study, but the information obtained

will be useful to understand the problems patients with heart disease and/or diabetes have. In future, the study findings might be useful in understanding why heart failure develops and in developing new treatments for heart failure. The results of this study will be of interest to those involved in providing healthcare and may influence the way we use existing treatments and the advice we give.
If we do identify something that may impact on a participant's clinical care we will tell them and their GP or other relevant specialist.
The blood sampling has a very small risk of infection because we will make a hole in the skin. There may be some bruising or redness of the area around the needle entry but this does not usually cause any issues. In rare instances some people faint or feel wobbly.
The echocardiography test can sometimes be a little uncomfortable as we occasionally need to press on the chest with the probe to get good pictures, but generally patients manage this without any problems. If you find that the exercise is too much (during the echo scan), you will be able to stop immediately.
During the ECG or testing of the function of the small blood vessels in your skin, the participant's skin may react to the sticky electrode patches. Any skin irritation usually disappears when the patches are removed.
An MRI scan is a safe and painless test that can provide detailed pictures of organs and other structures inside the body. Rarely, people may develop reactions to the contrast agent (dye) and adenosine. They may feel a little short of breath or have a tight chest during the infusion of adenosine, but this feeling passes very quickly once the infusion is stopped.

Where is the study run from?
The study has been organised by the Cardiovascular Research team at the University of Dundee with activities taking place in Ninewells Hospital (UK)

When is the study starting and how long is it expected to run for?
June 2024 to January 2031

Who is funding the study?
British Heart Foundation (UK)

Who is the main contact?
Dr Ify Mordi, i.mordi@dundee.ac.uk

Contact information

Type(s)
Public, Scientific, Principal investigator

Contact name
Dr Ify Mordi

Contact details
Division of Cardiovascular Research
School of Medicine
Dundee
United Kingdom
DD1 9SY
+44 (0)1382385591
i.mordi@dundee.ac.uk

Additional identifiers

Integrated Research Application System (IRAS)
348083

Central Portfolio Management System (CPMS)
66745

Protocol serial number
BHF (Funder) - FS/ICRF/24/26101

Study information

Scientific Title
A cohort study to evaluate the relationship between cardiac microvascular dysfunction, diabetes and cardiac structural and functional abnormalities

Acronym
MIDAS-HEART

Study objectives
The study hypothesis is that cardiac microvascular disease plays an important role in the development and progression of heart failure in individuals with type 1 diabetes.

Ethics approval required
Ethics approval required

Ethics approval(s)
Approved 24/02/2025, East of Scotland REC 2 (TAyside medical Science Centre, Residency Block, Level 3, George Pirie Way, Ninewells Hospital and Medical School, Dundee, DD1 9SY, United Kingdom; +44 (0)1382 383871; tay.eosres@nhs.scot), ref: 24/ES/0092

Primary study design
Observational

Study design
Single-centre observational cross-sectional/cohort study

Study type(s)
Diagnostic

Health condition(s) or problem(s) studied
People with heart failure, diabetes and/or hypertension

Interventions
The researchers will study people with and without diabetes, and people with and without heart failure. Following informed consent, all participants will have a baseline assessment (this may be done as a single visit or split into two visits depending on logistics and participant preference). This assessment will include:

1. A clinical evaluation (medical history, symptoms, prescriptions)
2. Blood and urine tests
3. Heart scans (echocardiography and MRI scan)
4. Between one and three questionnaires to assess their quality of life (number based on whether they have heart failure and/or diabetes)
5. A photograph of the back of the eyes
6. An assessment of the small blood vessels of the skin

If this assessment is split into two visits, these visits will be done within 14 days of each other.

Following this initial assessment, participants will be followed up using electronic health records to assess for clinical events (death and hospital admissions, medication prescribing).

Participants either without heart failure at baseline or with type 1 diabetes and heart failure at baseline will be recalled at 2 years for a follow-up study visit, where all of the above assessments will be repeated.

Intervention Type
Other

Primary outcome(s)
Stress myocardial blood flow measured in ml/g/min during adenosine stress cardiovascular magnetic resonance (CMR) at baseline and 2 years

Key secondary outcome(s)
1. Myocardial perfusion reserve (units) during adenosine stress CMR at baseline and 2 years.
2. Incidence of new heart failure diagnosis (percentage) at 2 years

Completion date
31/01/2031

Eligibility

Key inclusion criteria
All individuals must be aged ≥18 years. Seven groups of participants will be included:

Group 1 participants:
Documented diagnosis of Type 1 diabetes (T1D) and heart failure (HF).
Diagnosis of HF, regardless of left ventricular ejection fraction (LVEF), will be defined as one or more of the following:
1. Previous HF hospitalisation where HF was documented as the primary cause of hospitalisation and there was a requirement for loop diuretics.
2. Impaired left ventricular (LV) function (i.e. LVEF <50% by any imaging modality)
3. Symptoms and signs of heart failure with elevated N-terminal proBNP and any of the following:
3.1. Preserved LV systolic function (LVEF ≥50%) with left atrial enlargement (2-dimensional echocardiographic measurement of left atrial width ≥3.8cm or left atrial length ≥5.0 cm or left atrial area ≥20 cm2 or left atrial volume index >29 ml/m2)
3.2. Preserved LV systolic function (LVEF ≥50%) with left ventricular hypertrophy (2-dimensional echocardiographic measurement of end-diastolic interventricular septal diameter ≥1.2cm or end-diastolic left ventricular posterior wall diameter ≥1.2 cm).

3.3. Preserved LV systolic function (LVEF ≥50%) with echocardiographic diastolic dysfunction (septal e' <7 cm/sec or lateral e' <10 cm/sec or average E/e' ≥15).

Group 2 participants:
Documented diagnosis of Type 2 diabetes (T2D) and heart failure (HF) as defined for group 1.

Group 3 participants:
Diagnosis of HF as defined for group 1 without diabetes (type 1 or type 2).

Group 4 participants:
Diagnosis of Type 1 diabetes without heart failure.

Group 5 participants:
Diagnosis of Type 2 diabetes without heart failure.

Group 6 participants:
Documented diagnosis of hypertension on at least 2 anti-hypertensive drugs, without a diagnosis of heart failure or diabetes.

Group 7 participants:
Individuals with no prior diagnosis of cardiovascular disease, diabetes or hypertension.

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 Years

Upper age limit
90 Years

Sex
All

Key exclusion criteria
1. End-stage heart failure requiring left ventricular assist devices, intra-aortic balloon pump, or any type of mechanical support at the time of recruitment
2. Documented primary severe valvular heart disease, amyloidosis or hypertrophic cardiomyopathy as the principal cause of heart failure as judged by the investigator
3. Presence of malignancy with expected life expectancy <1 year at screening
4. Contraindications to MRI, including claustrophobia, metal implants in the body deemed not MRI safe
5. Severe asthma requiring admission to intensive care in the last 2 years
6. Unable/unwilling to give consent

Date of first enrolment
14/06/2025

Date of final enrolment
31/01/2030

Locations

Countries of recruitment
United Kingdom

Scotland

Study participating centre
Ninewells Hospital
Ninewells Avenue
Dundee
United Kingdom
DD1 9SY

Sponsor information

Organisation
University of Dundee

ROR
https://ror.org/03h2bxq36

Funder(s)

Funder type
Charity

Funder Name
British Heart Foundation

Alternative Name(s)
The British Heart Foundation, the_bhf, BHF

Funding Body Type
Private sector organisation

Funding Body Subtype
Trusts, charities, foundations (both public and private)

Location
United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan
The datasets generated during and/or analysed during the current study will be available upon request from Dr Ify Mordi (i.mordi@dundee.ac.uk). Anonymised (non-identifiable) data will be shared if participants have consented to do so.

IPD sharing plan summary
Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Participant information sheet	version 2.0	09/01/2025	22/05/2025	No	Yes