ISRCTN15670031 https://doi.org/10.1186/ISRCTN15670031

Using stool samples in the diagnosis of mitochondrial disease

Submission date
19/04/2022

Recruitment status
No longer recruiting

Registration date
16/05/2022

Overall study status
Completed

Last Edited
08/07/2024

Condition category
Genetic Diseases

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[X] Results
[ ] Individual participant data

Plain English Summary
Background and study aims
Mitochondria are the 'batteries' of the cell that generate the energy we need. When these batteries are faulty, it can cause conditions known as mitochondrial diseases. There are many different causes of mitochondrial diseases, and people affected experience a range of symptoms.
All cells contain genetic material called DNA. Mitochondria also contain their own separate type of DNA called mitochondrial DNA (mtDNA). Some mitochondrial diseases happen because of errors in mtDNA.

A way to diagnose some mitochondrial diseases is to look for mtDNA containing these errors. We look at how much mtDNA with errors we find compared to how much 'normal' mtDNA there is. We call this the 'mtDNA heteroplasmy' level.

Currently, to measure mtDNA heteroplasmy, we use samples of muscle or blood. This involves a muscle biopsy or blood sample and needs a visit to the hospital or clinic. It can also be painful or uncomfortable.

In this study, we will test whether we can use faecal samples (poo) to diagnose mitochondrial disease.
We will collect faecal samples from people we know have a certain type of mitochondrial disease. We will measure mtDNA heteroplasmy levels in these samples to check if they match levels previously recorded from other samples (e.g. muscle or blood).

Who can participate?
People with a certain type of mitochondrial disease (who have a m.3243A>G mutation) can take part. The study is open to adults and children of any age.
Participants must have a confirmed genetic diagnosis of mitochondrial disease. They must also be under the care of the Newcastle Mitochondrial Disease Clinic for Adults and Children.
Fifty people (30 adults and 20 children) will be included in the study.

What does the study involve?
Participants will complete a consent form (either online or on paper) and then provide a faecal

sample.
Collection of the samples will happen at home. Participants will send samples in by post.
Some participants will also attend a focus group or interview. We will ask them how they feel about using faecal samples to diagnose mitochondrial disease.
What are the possible benefits and risks of participating?
Participants will not directly benefit from the study. However, the results may help us develop a new, less invasive way to diagnose mitochondrial disease.
Collecting faecal samples may seem unpleasant, unhygienic or embarrassing. We will provide a special kit and gloves to make collection easy, clean and safe.

Where is the study run from?
This study is run by the Wellcome Centre for Mitochondrial Research, Newcastle University and The Newcastle upon Tyne Hospitals NHS Foundation Trust (UK)

When is the study starting and how long is it expected to run for?
March 2021 to October 2023

Who is funding the study?
Medical Research Council (UK)

Who is the main contact?
Professor Grainne Gorman
grainne.gorman@ncl.ac.uk

Contact information

Type(s)
Scientific

Contact name
Dr Charlotte Warren

Contact details
Wellcome Trust Centre for Mitochondrial Research
Newcastle University Translational and Clinical Research Institute (NUTCRI)
4th Floor Cookson Building
Medical School
Newcastle University
Newcastle-upon-Tyne
United Kingdom
NE2 4HH
-
Charlotte.warren@ncl.ac.uk

Type(s)
Principal Investigator

Contact name
Prof Gráinne Gorman

Contact details

Wellcome Trust Centre for Mitochondrial Research
Newcastle University
4th Floor Cookson Building
Medical School
Newcastle University
Newcastle-upon-Tyne
United Kingdom
NE2 4HH
-
grainne.gorman@newcastle.ac.uk

Additional identifiers

EudraCT/CTIS number
Nil known

IRAS number
295392

ClinicalTrials.gov number
Nil known

Secondary identifying numbers
CPMS 49933, MC_PC_19047, IRAS 295392

Study information

Scientific Title
A new non-invasive diagnostic method for detection of pathogenic mitochondrial DNA variants using faecal-derived DNA samples

Acronym
FiND

Study hypothesis
The aim of this study is to develop and validate the use of faecal tissue as a novel, non-invasive diagnostic tool for mitochondrial disease.
We hypothesise that faecal specimens will be comparable to other samples (such as muscle, blood, urine and buccal derived DNA) currently used in the diagnosis of mitochondrial disease.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 27/08/2021, East of Scotland Research Ethics Service REC 1 (Ninewells Hospital & Medical School, Tayside Medical Science Centre (TASC), Residency Block, Level 3, George Pirie Way, Dundee, DD1 9SY, UK; +44 (0)1382 383878; tay.eosres@nhs.scot), ref: 21/ES/0075

Study design
Observational

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

Condition
Detection of pathogenic mitochondrial DNA variants

Interventions
This study will involve the assessment of faecal samples from adult (n = 30) and paediatric patients (n = 20) with mitochondrial disease.

Patients will be identified for the study by the direct clinical care team at the Newcastle Mitochondrial Disease Clinic for Adults and Children through the screening of clinic lists and by interrogation of the Wellcome Centre for Mitochondrial Research Patient Cohort: A Natural History Study and Patient Registry. Interested patients or the parents/carers of paediatric patients will be provided with a copy of the relevant Participant Information Sheet (PIS) and provided with the opportunity to review the form and ask questions before consent will be taken. Once consent has been given, patients will be asked to provide a stool sample which will be sent to the Wellcome Centre for Mitochondrial Research via post. Study samples and data will be analysed within the Wellcome Centre for Mitochondrial Research. Once the study is complete any remaining tissue will be transferred to the Newcastle Mitochondrial Research Biobank (NMRB). This
study will also mitigate the need for patients to attend clinical appointments where appropriate, where patients will be able to collect and post samples from their home address, facilitating equity of access to diagnosis. All faecal samples will be sent to the laboratory for subsequent analysis.

Further to this, 10 participants (adults n = 5 and paediatrics n = 5) will be selected at random and invited to participate in giving feedback. This will be used to discuss current diagnostic approaches, and how the use of faecal samples may enhance this experience. This will be carried out remotely so no site visits are required.

Intervention Type
Other

Primary outcome measure

Mitochondrial DNA (mtDNA) heteroplasmy level (percentage heteroplasmy) detected from faecal samples at a single time-point, compared to mtDNA heteroplasmy levels reported from previous clinical samples.

Secondary outcome measures
1. Confirmation of whether mtDNA variants that may be present can be detected via whole genome sequencing of mtDNA extracted from faecal samples
2. Determination of whether faecal samples as a diagnostic approach are acceptable to patients via collection of participant feedback during focus group discussion.

Overall study start date
31/03/2021

Overall study end date
31/10/2023

Eligibility

Participant inclusion criteria
1. A genetically confirmed diagnosis of mitochondrial disease, specifically, the common m. 3243A> G variant.
2. Adults aged >=16 years old
3. Paediatrics aged <16 years old
4. Have ability, in the opinion of the recruiting investigator to undergo all study assessments and investigations.
5. Capable of providing informed consent

Participant type(s)
Patient

Age group
Mixed

Sex
Both

Target number of participants
Planned Sample Size: 50; UK Sample Size: 50

Total final enrolment
47

Participant exclusion criteria
1. Currently have a confirmed bowel obstruction
2. Received surgery on the gastrointestinal tract in last 12 months
3. New drug regime within the 3 months prior to providing a faecal sample
4. Participating in any study that may influence the gastrointestinal tract three months prior to study commencement.

Recruitment start date
01/05/2022

Recruitment end date
30/04/2023

Locations

Countries of recruitment
England

United Kingdom

Study participating centre
Freeman Road Hospital
Freeman Road
High Heaton
Newcastle upon Tyne
United Kingdom
NE7 7DN

Sponsor information

Organisation
Newcastle upon Tyne Hospitals NHS Foundation Trust

Sponsor details
Freeman Hospital
Freeman Road
High Heaton
Newcastle-upon-Tyne
England
United Kingdom
NE7 7DN
+44 191 2825490
Elaine.chapman4@nhs.net

Sponsor type
Hospital/treatment centre

Website
http://www.newcastle-hospitals.org.uk/

ROR
https://ror.org/05p40t847

Funder(s)

Funder type
Research council

Funder Name
Medical Research Council

Alternative Name(s)
Medical Research Council (United Kingdom), UK Medical Research Council, MRC

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
United Kingdom

Results and Publications

Publication and dissemination plan
Planned publication in a high-impact peer-reviewed journal

Intention to publish date
31/10/2024

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?
HRA research summary			28/06/2023	No	No
Basic results		08/07/2024	08/07/2024	No	No