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An investigation to explore the use of a type of MRI scan using an inhaled gas in identifying lung damage associated with long COVID sufferers

Submission date
06/04/2022

Recruitment status
No longer recruiting

Registration date
20/05/2022

Overall study status
Completed

Last Edited
12/12/2022

Condition category
Infections and Infestations

[_] Prospectively registered
[X] Protocol
[_] Statistical analysis plan
[_] Results
[_] Individual participant data
[_] Record updated in last year

Plain English summary of protocol

Background and study aims
Researchers wish to understand why some individuals with long COVID struggle with breathlessness on exertion (when active) and have a reduced ability to exercise. To do this, they will use MRI scanning and a special gas (hyperpolarised xenon) which is breathed in during the scan. The xenon gas is harmless in the quantity used. This technique shows the movement of xenon within the lungs and moving out of the lungs into the bloodstream, similar to how oxygen is absorbed. In patients hospitalised with COVID-19, xenon MRI scans several months after discharge showed lung damage, even when other tests were normal. Importantly, on follow-up imaging, some have remained abnormal. The aim of this study is to further the understanding of some of the factors that cause symptoms in long COVID and provide a much-needed explanation to individuals struggling with breathlessness. Learning more about the nature of damage within the lungs through xenon MRI may help with the future development of treatments, and provide a reliable way of measuring the treatment response over time.

Who can participate?
Adults aged 18 years and over with a past infection of COVID, diagnosis of long COVID or post-COVID syndrome

What does the study involve?
Participants must travel to one of the two main hospital sites in either Oxford or Sheffield. Assessments are carried out within one visit, and a small subset of participants will be asked to attend one or two follow up visits over the course of the study.

What are the possible benefits and risks of participating?
There are no direct benefits to participants.

Where is the study run from?
Oxford University (UK)

When is the study starting and how long is it expected to run for?
December 2021 to January 2024

Who is funding the study?
National Institute for Health and Care Research (NIHR) (UK)

Who is the main contact?
Fergus Gleeson
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Contact information

Type(s)
Principal investigator

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Additional identifiers

Integrated Research Application System (IRAS)
305846

Central Portfolio Management System (CPMS)
51331

Study information

Scientific Title
Hyperpolarised xenon magnetic resonance pulmonary imaging in patients with long COVID (EXPLAIN)

Acronym
EXPLAIN

Study objectives
Primary Objective:
To evaluate whether unexplained exertional dyspnoea in non-hospitalised long COVID (NHLC) is due to lung damage using hyperpolarised xenon magnetic resonance pulmonary imaging (HPX-pMRI).

Secondary Objective:
To determine if there are cardiac abnormalities associated with HPX-pMRI abnormalities or present alone as a cause for NHLC patient breathlessness.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 15/12/2021, South Central – Oxford C REC (Health Research Authority [Bristol], Ground Floor, Temple Quay House, 2 The Square, BS1 6PN, UK), ref: 21/SC/0398

Primary study design
Observational

Study design
Observational; Design type: Cohort study

Study type(s)
Diagnostic

Health condition(s) or problem(s) studied
Long COVID

Interventions
This is a multi-centre prospective, observational, cohort study comprising six patient groups. Cohort A consists of participants who were hospitalised with COVID-19, Cohort B consists of participants who had COVID-19 but were not hospitalised and Cohort C will be control participants. The study will recruit patients in Cohort A & B through hospital-based Long-COVID clinics and Cohort C will be recruited via advertising.

The participants will be invited to undertake their baseline study visit at one of the four recruiting centres, Oxford, Sheffield, Cardiff or Manchester. At the baseline visit participants provide consent (unless obtained prior to baseline visit), and their demographics, past medical history and smoking history will be collected. They will have their heart rate, blood pressure and oxygen saturations recorded. They will undertake lung function testing (unless testing has been performed within 6 weeks prior to baseline scan), a 6-minute walk test or a 1-minute sit to stand test, a low dose CT scan and HPX-pMRI Chest. They will also be asked to complete a set of questionnaires.

Following their baseline visit, all participants will be asked to complete up to two additional follow-up visits (from 3-12 months after their baseline visit). If an abnormality (a result outside the normal range) was found on the HPX-pMRI Chest scan at baseline the participant will be invited to have a repeat HPX-pMRI Chest and repeat all other study assessments. If no

abnormality is found on the baseline HPX-pMRI Chest scan, participants will not be asked to repeat study assessments and will instead complete the follow-up visit remotely where they will be asked to repeat only the study questionnaires electronically.

Intervention Type
Other

Primary outcome(s)
1. Diffusion and or perfusion defects detected using HPX-pMRI at baseline and if abnormal at 3 and 12 months
2. The determination of whether detected abnormalities correlate with symptoms of breathlessness measured using lung function tests and questionnaires at baseline and if the HPX-pMRI scans are abnormal at baseline, 3 and 12 months
3. The degree of pulmonary damage and change detected on follow up HPX-pMRI scanning at 3 and 12 months

Key secondary outcome(s)
Cardiac MRI abnormalities detected using a single cardiac MRI sequence at baseline, 3 and 12 months

Completion date
01/01/2024

Eligibility

Key inclusion criteria
1. Participant is willing and able to give informed consent for participation in the study
2. Aged 18 years or above
3. One of the following criteria:
3.1. Microbiological evidence of COVID-19 infection OR
3.2. Diagnosis of long COVID or 'post-COVID syndrome' (as defined by NICE 2020) made through specialised assessment at a designated long COVID clinic

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 Years

Sex
All

Key exclusion criteria

1. Participants who are pregnant, lactating or planning pregnancy during the course of the study
2. Known or identified chronic renal impairment, with EGFR below 60 ml/min – if necessary this renal function will be measured according to local hospital policy
3. Known prior contrast media reaction
4. Inability to lie flat for imaging
5. Contraindications to MRI examinations as locally determined
6. Any other reason, as determined by the study investigators, that renders the participant ineligible for the study

Date of first enrolment
15/04/2022

Date of final enrolment
13/08/2023

Locations

Countries of recruitment
United Kingdom

England

Wales

Study participating centre
University Hospital of Wales
Heath Park
Cardiff
United Kingdom
CF14 4XW

Study participating centre
Royal Hallamshire Hospital
Glossop Road
Sheffield
United Kingdom
S10 2JF

Study participating centre
Churchill Hospital
Churchill Hospital
Old Road
Headington
Oxford

United Kingdom
OX3 7LE

Study participating centre
Wythenshawe Hospital
Southmoor Road
Wythenshawe
Manchester
United Kingdom
M23 9LT

Sponsor information

Organisation
University of Oxford

ROR
https://ror.org/052gg0110

Funder(s)

Funder type
Government

Funder Name
National Institute for Health Research

Alternative Name(s)
National Institute for Health Research, NIHR Research, NIHRresearch, NIHR - National Institute for Health Research, NIHR (The National Institute for Health and Care Research), NIHR

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
United Kingdom

Funder Name
UK Research and Innovation

Alternative Name(s)
UKRI

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan
The data-sharing plans for the current study are unknown and will be made 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
Protocol file	version 3.0	13/04/2022	12/12/2022	No	No