

# 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

<b>Submission date</b> 06/04/2022	<b>Recruitment status</b> No longer recruiting	<input type="checkbox"/> Prospectively registered <input checked="" type="checkbox"/> Protocol
<b>Registration date</b> 20/05/2022	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 12/12/2022	<b>Condition category</b> Infections and Infestations	<input type="checkbox"/> Individual participant data <input type="checkbox"/> 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  
fergus.gleeson@ouh.nhs.uk

## Contact information

### Type(s)

Principal investigator

### Contact name

Prof Fergus Gleeson

### ORCID ID

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### Contact details

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## Additional identifiers

### Clinical Trials Information System (CTIS)

Nil known

### Integrated Research Application System (IRAS)

305846

### Protocol serial number

CPMS 51331, IRAS 305846

## 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

## **Study design**

Observational; Design type: Cohort study

## **Primary study design**

Observational

## **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?
<a href="#">HRA research summary</a>			28/06/2023	No	No
<a href="#">Protocol file</a>	version 3.0	13/04/2022	12/12/2022	No	No