



# Brain and Brainstem Basis of Long COVID (BBB-COV) Research summary report

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- Professor Kyle Pattinson, Consultant Anaesthetist and Associate Professor, Nuffield Department of Clinical Neurosciences<sup>2</sup>, University of Oxford.
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**Patient Representative:**

Nell Freeman-Romilly provides a link with patient groups that are essential to ensure that the study remains relevant to clinical care and improving outcomes for patients

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**Disclaimer:** The views expressed in this report are those of the authors, not necessarily Health and Care Research Wales. The Wales COVID-19 Evidence Centre and authors of this work declare that they have no conflict of interest.

## Table of Contents

1. LAY SUMMARY .....	4
2. SCIENTIFIC SUMMARY .....	5
2.1 FUTURE WORK .....	5
3. REFERENCES .....	5

# 1. Lay Summary

**AIM:** Long COVID results in a wide range of disabling symptoms which are unexplained by standard medical tests. There is an urgent need to understand what causes long COVID and to identify and develop better investigations that relate to the problems those with long COVID are experiencing. These may help with the diagnosis of different types of long COVID and to improve treatments and, ultimately, outcomes for those suffering with long COVID.

**BACKGROUND:** The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) responsible for COVID-19 can affect the brain and nerves, particularly those that regulate the heart and breathing. The brainstem is a key area which influences mood and thinking - the effect of the virus on this area may explain the diverse range of symptoms and contribute to the feeling of breathlessness experienced by many with long COVID. Unfortunately, the brainstem is not imaged or characterised by scans typically used in hospitals i.e. computerised tomography (CT) or conventional hospital magnetic resonance imaging (MRI). Therefore, this study will use a more powerful, specialised MRI (7T MRI) scanner to examine this area in more detail. This may help to identify areas of the brain contributing to symptoms in long COVID. Importantly, it may also provide information to guide development of treatments to reduce some of the symptoms experienced by people with long COVID.

**DESIGN AND METHODS:** The researchers will perform specialised 7T MRI scans of the brain, including the brainstem, in people with long COVID and in healthy controls. These scans will provide detailed images which will measure the brain's activity and look for evidence of damage. Information will also be collected through physical examination of participants and completion of questionnaires relating to symptoms, neurocognitive flexibility and daily function.

**PUBLIC INVOLVEMENT:** This study was designed in direct response to patients wanting to understand their symptoms. People living with long COVID have helped to determine the study question and clarify an acceptable study burden for people at a time when they are often feeling very unwell. Patient and public involvement has been built into the study design and will allow ongoing opportunities for study participants to share their experiences.

**RESULTS AND STUDY STATUS:** To date, fifty-one (51) participants, not including those recruited from Oxford, have been recruited from Cardiff. This includes 36 patients with long COVID and 15 control subjects (people who have had prior COVID infection but have no long COVID symptoms, matched by age and gender). The detailed analysis of results is ongoing. The researchers have secured additional funding to allow the recruitment of further 'control group' participants.

**DISSEMINATION:** Results will be shared via those with long COVID and their carers; through academic audiences at medical conferences, academic publications and using social media. Clinical professionals will share findings with colleagues in the NHS and biotechnology or pharmaceutical industries.

## 2. Scientific Summary

The Scientific summary is available on request from:  
[healthandcarevidence@cardiff.ac.uk](mailto:healthandcarevidence@cardiff.ac.uk)

### 2.1 FUTURE WORK

Analysis of results is ongoing. Continued support from the Oxford Biomedical Research Centre (BRC) has been secured. The Research Centre have agreed that an award to the Chief Investigator from the COVID-19 Research Response Fund (CRRF) can be extended to pay for additional 7T-MRI scans of control subjects in Cardiff. This extension, until November 30<sup>th</sup> 2023, will allow researchers to focus on achieving equity between the groups through a focused increase in the number of control subjects recruited.

## 3. REFERENCES

1. Cardiff University Brain Imaging Centre <https://www.cardiff.ac.uk/research-equipment/facilities/view/cubric>
2. Nuffield Department of Clinical Neuroscience, University of Oxford  
<https://www.ndcn.ox.ac.uk>

## The Wales COVID-19 Evidence Centre

Our dedicated teams worked together with Welsh Government, the NHs, social care, research institutions and the public to deliver vital research to tackle health and social care challenges facing Wales during the Covid-19 pandemic.

Funded by Welsh Government (April 2021 - March 2023), through Health and Care Research Wales, the Evidence Centre answered key COVID-19 related questions to improve health and social care policy and provisions across Wales and beyond.



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## The Health and Care Research Wales Evidence Centre

The **Health and Care Research Wales Evidence Centre** has been funded from April 2023 - March 2028. Along with our collaborating partners, we

conduct reviews of existing evidence and new research, to inform health and social care policy and practice needs, with a focus on ensuring real-world and public benefit that reaches everyone.



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