ISRCTN54053617 https://doi.org/10.1186/ISRCTN54053617

Defining the composition of the outer surface of the coronavirus

Submission date 03/11/2021	**Recruitment status** No longer recruiting	[X] Prospectively registered [_] Protocol [_] Statistical analysis plan [_] Results [_] Individual participant data [_] Record updated in last year
Registration date 15/11/2021	**Overall study status** Completed	
Last Edited 08/08/2024	**Condition category** Infections and Infestations	

Plain English summary of protocol

Background and study aims:
Coronavirus (COVID-19) is a virus that can affect the lungs and lead to breathing difficulties. Salivary spit from the mouth and throat of coronavirus patients contains a large amount of virus in early infection. The spread of virus by contaminated saliva is a major risk for healthcare workers caring for these patients. Coronaviruses are surrounded by a “fatty” coating, which can be damaged by agents like hand gels and soaps, which is why regular hand washing is recommended to kill the virus and prevent the spread of the disease. Our research and that of other groups has suggested that not only, may the “make-up” of the viral envelope be changed, but this may make it susceptible to other types of therapy and explain some of the problems we see clinically in patients (such as clotting and stimulation of the immune system). We need and want to understand more about the viral envelope and will do this by isolating the virus from the saliva of patients with COVID-19.
Understanding more of the lipid composition of the viral envelope may enable us to improve our understanding of the role of the envelope in the disease process in patients.

Who can participate?
Adults (at least 18 years old) who have PCR-positive testing for COVID-19 in the last 5-days, who are able to provide written informed consent.

What does the study involve?
People testing positive for the coronavirus (COVID-19) will be asked to spit a sample of saliva into a pot. Samples will be taken to the laboratory at Cardiff University to study the virus in your saliva. Personal details will not be used and only stored at the local Health Board to link anonymise the saliva samples, which will be disposed of after testing. Participants will not know the results of the test.

What are the possible benefits and risks of participating?
There are no benefits or risks to the participant.

Where is the study run from?
This study will be carried out by R&D teams in NHS Organisations in Wales.

When is the study starting and how long is it expected to run for?
August 2021 to September 2022

Who is funding the study?
Biotechnology and Biological Sciences Research Council (UK)

Who is the main contact?
Professor David Thomas, ThomasDW2@cardiff.ac.uk

Contact information

Type(s)
Scientific

Contact name
Prof David Thomas

ORCID ID
https://orcid.org/0000-0001-7319-5820

Contact details
Advanced Therapies Group
Cardiff University School of Dentistry.
Heath Park
Cardiff
United Kingdom
CF14 4XY
+44 (0) 2920 744252
ThomasDW2@cardiff.ac.uk

Additional identifiers

Integrated Research Application System (IRAS)
299479

Central Portfolio Management System (CPMS)
52107

Study information

Scientific Title
Mapping the lipid envelope composition of SARS-CoV2 for reducing transmission, thrombosis, and inflammation

Acronym
AVECO

Study objectives

We want to study how the fatty outer coat of SARS-CoV-2 (the virus that causes COVID-19) may result in the transmission of the virus, inflammation and blood clotting seen in patients with the disease. We will study this in the laboratory, using virus collected from the saliva of patients with COVID-19. The impact of this work may be significant in understanding and eventually managing patients with COVID-19 and in other enveloped viruses.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 29/10/2021, London- Fulham Research Ethics Committee (Barlow House, 3rd Floor, 4 Minshull Street, Manchester, M1 3DZ, UK; +44 (0)207 104 8084; fulham.rec@hra.nhs.uk), ref: 21 /PR/1189

Primary study design
Observational

Study design
Observational cohort study

Study type(s)
Other

Health condition(s) or problem(s) studied
COVID-19 (SARS-CoV-2 infection)

Interventions
Eligible participants will be identified in screening programmes undertaken routinely by Public Health Wales (PHW). PHW will only share positive PCR results of patients in the population of HB involved in the study. Their name, hospital number and date of positive PCR result will be reported to the HB's R&D team who are named on the delegation log for processing such information. These individuals can use their own Health Board medical system/records to obtain up-to-date contact details to make contact to see if they are interested in taking part in the study. Identification of positive covid-19 patients to the R&D dept will be via contacts in PHW who routinely process PCR tests for Hospitals and community settings. PHW will provide patient name and hospital for a member of the research team, to make contact with the potential participant, and they will be given the opportunity to ask questions about the study.

The participants can either choose a hospital setting ("Red Zone" or "drive-in" testing centre) or their own home for sample collection. A designated member of the research team will go through the PIS, answer any questions before obtaining face-to-face consent and collecting the saliva sample.

All saliva samples should be collected as soon as possible or within 5 days of the positive PCR result. Participants will be given a minimum of 30-minutes to decide but they can have more time if they wish, permitting the saliva sample is collected in line with the study protocol timeframe from 5 days of the positive PCR test result. Those who wish to take part will be required to complete the written Consent Form (see attached) and saliva will be collected by "spitting" into a sterile tube and collected by the staff ideally collecting 3-5mL of saliva (taking approximately 2 minutes). Once the sample has been provided, there is no follow-up of the

patient. The containers will be dipped in 70% (v/v) alcohol, enclosed in 2 sterile ziplock bags ("double-bagged"), treated with alcohol and transported to HB, HTA designated freezers in rigid HPA-approved containment. At each UHB, they will be stored in an HTA approved -80 freezer.

Following documentation samples will then be transferred to the virology laboratories at Cardiff University where they will be stored until analysed at the approved CAT2 facility.

Viral envelope analysis in salivary samples: Harvest of virus particles and lipid extraction for lipidomics profiling SARS-CoV2 will be isolated from saliva and grown as described (Stanton et al., e-Life submitted). At 96h post-infection, supernatants are harvested, the virus pelleted and resuspended in PBS. Preparations are analysed for purity and abundance by Nanoparticle tracking analysis using Nanocyte® (Malvern Panalytical). For PS externalisation samples are used immediately. For lipidomic profiling they were used immediately or stored for a few days at -80 ° as pellets.

Targeted LC/MS/MS analysis of lipid categories and classes: Targeted assays will be performed on 3 separate preparations of SARS-CoV2 virus. HILIC LC-MS/MS is used for PLs and sphingolipids (SL) on a Nexera liquid chromatography system. PLs and ceramides will be quantified using an external calibration. PC’s, PE’s, PI’s, PG’s Lyso PG’s, Lyso PI’s, Lyso PE’s and Lyso PC’s are quantified from standard curves. Ceramides are calculated from a standard curve generated by serially diluting the internal standard. Phosphatidylserine (PS) will be analysed using a shotgun method to generate bulk species data. LC-MS/MS for free cholesterol and cholesterol esters (CE) and LC-MS analysis of triacylglycerides (TG) is performed on a Nexera liquid chromatography system, coupled to an API 4000 qTrap mass spectrometer. Cholesterol and CEs are quantified using external calibration with CE standards.

Untargeted lipidomics is conducted on a Waters iClass liquid chromatography system coupled to a Synapt XS QTOF. Feature analysis is carried out using the HPLC/QTOF parameters in XCMS online.

Identification and quantitation of external facing PE and PS on the surface of SARS-CoV2. Total and external PE and PS will be derivatised and analysed using LC/MS/MS.

Intervention Type
Other

Primary outcome(s)
SARS-CoV2 envelope characterisation, within 5 days of a positive PCR test (time Zero) , analysed using Mass Spectrometry Lipidomics following collection at a single timepoint

Key secondary outcome(s)
There are no secondary outcome measures

Completion date
08/09/2022

Eligibility

Key inclusion criteria
Adults (≥18 years old) who have PCR-positive testing for COVID-19 in the last 5-days, who are able to provide written informed consent.

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 Years

Sex
All

Total final enrolment
130

Key exclusion criteria
Does not meet inclusion criteria

Date of first enrolment
01/12/2021

Date of final enrolment
08/09/2022

Locations

Countries of recruitment
United Kingdom

Wales

Study participating centre
Royal Glamorgan Hospital
Cwm Taf Morgannwg University Health Board
Ynysmaerdy
Llantrisant
Rhondda Cynon Taf
Llantrisant
United Kingdom
CF72 8XR

Sponsor information

Organisation
Cardiff University

ROR
https://ror.org/03kk7td41

Funder(s)

Funder type
Research council

Funder Name
Biotechnology and Biological Sciences Research Council

Alternative Name(s)
UKRI - Biotechnology And Biological Sciences Research Council, Agricultural and Food Research Council, Biotechnology & Biological Sciences Research Council, BBSRC, BBSRC UK, AFRC

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan
Individual participant data that underlie the results of the study, after deidentification will be made available to researchers and anyone who wishes to access the data, beginning at 3 months after and ending 3 years following any publication.
Professor Valerie O'Donnell (O-DonnellVB@cardiff.ac.uk) is the corresponding author and will likely upload any data onto the lipid open-source sites they have established.
Consent from participants will be obtained and the information collected about the participants may be shared anonymously with other researchers.

IPD sharing plan summary
Available on request, Other

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
HRA research summary			28/06/2023	No	No