Witness Name: Julian Hiscox
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UK COVID-19 INQUIRY

WITNESS STATEMENT OF PROFESSOR JULIAN ALEXANDER HISCOX

I, Julian Hiscox, will say as follows: -

<u>Introduction</u>

1. I make this statement in response to a request from the UK COVID-19 Inquiry dated 11 November 2024 under Rule 9 of the Inquiry Rules 2006, asking for a witness statement relating to Module 7 of the Inquiry, which I understand covers the approach to testing, tracing and isolation adopted during the pandemic in England, Wales, Scotland and Northern Ireland from 1 January 2020 to 28 June 2022.

2. I have a BSc in Genetics from University College London (1991) and a PhD from the University of Reading (1995) in coronavirus replication. I was part of one of the groups that discovered fundamental aspects of how coronaviruses replicate their genetic material.

3. I was a post-doctoral researcher at the University of Alabama at Birmingham (USA) from 1994 to 1997 studying RNA virus entry and replication. I was a post-doctoral researcher at the Institute for Animal Health (now the Pirbright Institute) from 1997 to 1999 working on the avian coronavirus. I became an independent group leader (Lecturer) at the University of Reading initiating a research group on coronaviruses, initially on the avian coronaviruses, working on fundamental biology.

4. I moved from Reading to Leeds in 2002, still working on coronaviruses but branching into respiratory syncytial virus and Ebola virus (due to a lack of funding interest in human coronaviruses and coronaviruses in general by funders at the time).

5. In 2012 I took up a position at the University of Liverpool as Chair (Professor) in Infection and Global Health. I am now a Deputy Associate Pro-Vice Chancellor Research and Impact, and acting Executive Dean at the University of Liverpool. I am also the Director of the BBSRC/DEFRA funded UK-International Coronavirus Network.

6. I have run a research group on viruses for 25 years and have around 33 years expertise on coronaviruses and related viruses. I have published on porcine, avian and human coronaviruses including SARS-CoV, MERS-CoV and SARS-CoV-2. Work on MERS-CoV is with groups in Saudi Arabia. Work on SARS-CoV-2 is with groups in Singapore.

7. My current research group is mainly funded by a 5 year $8.9M contract from the US Food and Drug Administration (FDA) to investigate severe coronavirus infection in humans and animal models with relevance to medical countermeasures (MCMs) – diagnostics, vaccines and anti-virals. This was the largest research contract ever awarded by the FDA Office of Counterterrorism and Emerging Threats (OCET). The contract supports scientists at UKHSA, other UK Universities and in Saudi Arabia and Singapore. The contract focuses on SARS-CoV-2 and MERS-CoV and provides FDA with what is called regulatory science, i.e. information to help support the licensure of MCMs. I started writing the proposed contract/white paper to the FDA on 31st December 2019. At the very beginning of the pandemic, we were also given $500,000 (under our Ebola contract) to develop a sequencing strategy, an animal model and reverse genetics for SARS-CoV-2. As part of the main contract, my team at Liverpool focuses on understanding SARS-CoV-2 evolution and how people respond to infection by analyzing blood and tissue samples and how this relates to the severity of COVID-19. We are now analyzing samples from patients with long COVID. A team at the University of Bristol study SARS-CoV-2 and MERS-CoV genetics. A further team

at Liverpool, together with teams in Oxford and at A*STAR in Singapore, examine/examined the immunology related to SARS-CoV-2 and vaccination. My team, a team at King Fahad Medical City in Saudi Arabia and the team at UK-HSA focus on MERS-CoV. The major role of the UK-HSA team has been to develop and evaluate what are called microphysiological systems (or organ on a chip) as alternatives to using animal models in research. The COVID-19 pandemic highlighted supply chain issues in animals for research during a crisis and also that appropriate animal models are required (aged/obese animals) to replicate the disease in humans. Microphysiological systems will help move forward the goals of Replacement, Reduction and Refinement of animals in research. The contract provides money to all the partners to conduct the research, and we have regular monthly meetings. During the pandemic, we were able to leverage and pivot the funding to help answer questions relevant to organizations such as NERVTAG, the FDA and other international bodies. For example, we were able to assess the potential impact of new variants together with the MRC funded Genotype to Phenotype consortia (which my and the Bristol laboratory are part of). My research group consists of nine post-doctoral researchers and 4 PhD students. My other funding is from UKRI, the EU, and the Defence Science Technology Laboratory. We specialise in viral evolution, the host response to infection or exposure to biological and chemical threat agents.

8. I have published numerous publications as first, senior or consortium author on corona and other viruses including in the journals of Nature and Science. Five of the publications my group has been involved with may be especially relevant to Test, Trace and Isolate:

    a. Carroll MW, Matthews DA, Hiscox JA, et al. Temporal and spatial analysis of the 2014-2015 Ebola virus outbreak in West Africa. Nature. 2015;524(7563):97-101. doi:10.1038/nature14594 (PJH/01 – INQ000561515).
    b. Quick J, Loman NJ, Duraffour S, et al. Real-time, portable genome sequencing for Ebola surveillance. Nature. 2016;530(7589):228-232. doi:10.1038/nature16996 (PJH/02 – INQ000533745).

c. Dudas G, Carvalho LM, Bedford T, et al. Virus genomes reveal factors that spread and sustained the Ebola epidemic. Nature. 2017;544(7650):309-315. doi:10.1038/nature22040 (PJH/03 – INQ000533740).

d. Kafetzopoulou LE, Pullan ST, Lemey P, et al. Metagenomic sequencing at the epicenter of the Nigeria 2018 Lassa fever outbreak. Science. 2019;363(6422):74-77. doi:10.1126/science.aau9343 (PJH/04 – INQ000533746).

e. Chen H, Coote B, Attree S, Hiscox JA. Evaluation of a nucleoprotein-based enzyme-linked immunosorbent assay for the detection of antibodies against infectious bronchitis virus. Avian Pathol. 2003;32(5):519-526. doi:10.1080/0307945031000154125 (PJH/05 – INQ000533747).

<u>Membership of groups during period of January 2020 until 28 June 2022</u>

9. I was a co-opted member of NERVTAG for COVID-19, as such I was also a participant at SAGE when required due to my role on NERVTAG.

10. I was a co-opted member of NERVTAG from April 2020 and I am still a member of NERVTAG (PJH/06 – INQ000533742).

11. I was a member of the Testing Advisory Group (subsequently called Testing Advisory Group – Serology) from its first meeting in August 2020 until the group was stood down/concluded in May 2022 (PJH/07 – INQ000533743).

12. I was invited to join this group. The official invitation letter was sent on the 10th August 2020 from Dr. **Name Redacted** at the DHSC. The invitation described the setup of an independent group with a particular focus on testing chaired by Professor Sir Mike Ferguson.

13. We met regularly for almost two years; I think Mike did a great job leading and chairing. He was always very keen to hear and dissect opposing views, and yet generally come to a consensus view. I do not think we suffered from 'group think'.

14. I did not keep notes of the meetings. Items that we were particularly focused on included serological tests and correlates of protection with the vaccine(s)/naturally acquired immunity. These items were critical to discuss in terms of understanding the frequency of vaccination, the level and duration of protection, e.g. from severe disease etc. I remember early advice that I gave (as part of the wider team):

    a. That in the early days of PCR testing any positive result was seen as a person being infectious whereas in reality a Ct value of above 35 meant that no infectious virus was present. I remember that Prof. Maria Zambon (PHE/UK HSA) and myself and others also discussed this extensively at NERVTAG. In the case of SARS-CoV-2, Ct value is a proxy measure of the amount of virus in a sample. Ct value reflects the amount of genetic material of the virus that is present. Different testing kits and approaches can give different values for Ct, and perhaps a lesson learnt would be to have one uniform test kit with clearly defined parameters.

    b. Based on knowledge of seasonal human coronaviruses was that people would be reinfected with SARS-CoV-2 after several months (i.e. there would be no sterilising immunity and transmission would still occur) but there would be protection from severe disease.

    c. That the virus specific components of diagnostic assays would have to change, or we should be prepared to change them in the face of new variants.

15. I think as a group we pushed for PHE to be able to do large scale antibody measurements in populations. Profs. Rupert Beale and Paul Kellam particularly argued for this. (This capability is now in hand at the Porton Down laboratories). The importance of this is twofold – serosurveillance (i.e. what is the true level of infection) and antibody longevity. The numbers of people turning up for tests at any given time gives a rough indication of the level of infection in a country and the direction of travel i.e. is an infection wave on the way up or down. Serosurveillance takes a sample of the population and does antibody testing and therefore you know precisely who has been infected and who has not – and therefore planned carefully, you get a better idea of the level of exposure. For example, people who

were asymptomatic might not have been tested for SARS-CoV-19 by RT-PCR (nucleic acid test) but might be picked up by serology. Antibody longevity is important for what we call correlates of protection. I think it true to say (with my limited immunology) that both the level of antibodies in a person and T-cells provide protection against severe COVID-19 and immediately after infection and vaccination you have some protection against transmission. There were some fantastic studies in the UK put together around this including Real-time Assessment of Community Transmission (REACT) Study and the Protective Immunity from T cells to Covid-19 in Health workers" (PITCH) study.

16. We gave advice on vaccine 'boosters' and I think provided good 'steady as she goes' advice around emerging variants and whether the current vaccines/immunity at the time would still be effective. For that we relied on the excellent work of Prof. Ellie Barnes (who was a member of the group) and other colleagues and work from animal models of disease.

17. I think the 'End point review' document (PJH/08 – INQ000565786) really sums up the nearly two years of work of the group and provides a nice summary of lessons learnt in the remit of the group.

Professional expertise around Testing, Tracing and Isolation

18. My laboratory (located at the University of Liverpool) does not directly work on testing, tracing and isolation, especially around what might be classically considered as public health, nor would I consider this my main area of expertise.

19. However, my laboratory developed a commercially available serological test kit for the identification of the avian coronavirus. As part of the European Mobile Laboratory, we were one of the first groups in the world to use genetic sequencing to study the evolution and spread of a virus during an outbreak – the 2013-2016 West African Ebola virus outbreak. The work (in conjunction with many others) showed the effect of isolation/control strategies and how viruses spread and adapt (PJH/03 – INQ000533740; PJH/01 – INQ000561515).

20. Many of my laboratory team were deployed to Guinea with the European Mobile Laboratory and to Sierra Leone with Public Health England to conduct hands on testing (RT-PCR tests). I was more familiar with the efforts of the European Mobile Laboratory and its subsequent EU funded research program called EVIDENT - that we were also part of (PJH/09 – INQ000533744). I had an overview of both UK serological and nucleic acid-based testing through my membership of both NERVTAG and the Testing Advisory Group.

21. In my opinion one of the major lessons of the Ebola virus outbreak in 2013-2016 was that early diagnosis and rapid response was the most important factor in controlling and eliminating the outbreak. This relied on setting up isolation facilities to help prevent the spread of the virus (and to treat infected individuals). Coltart and colleagues best summarised this back in 2017, and I quote (PJH/10 – INQ000533732):

    '*Furthermore, constructing an ETC (Ebola treatment centre) and training the relevant staff is a timely process, at a crucial time when a single week can make a big difference to the disease burden. Therefore, future outbreak response should begin construction of required ETCs early to maximize impact*'.

22. This information was known by PHE and had been part of a Commons Enquiry in November 2015 (PJH/11 – INQ000178906) regarding UK lessons learnt from the Ebola outbreak which included sample management, rapid diagnosis, informing and isolating the patient, and control strategies.

Comments on Testing, Tracing and Isolation

Start of the outbreak/pandemic

23. I have based my thoughts on different phases of the COVID-19 pandemic as I saw them. Experience of SARS-CoV-1 in Singapore and MERS-CoV in Saudi Arabia showed that intensive/aggressive (for want of a better word) testing, tracing and isolation could bring a novel respiratory virus/pathogen under control and eradicate the problem. This was well known in virology, and I guess public health circles.

The 2013-2016 Ebola outbreak was a recent memory for many people and there were many publicly available 'lessons learnt' type publications.

24. However, I want to note an important difference in biology between SARS-CoV-1 and SARS-CoV-2. With SARS-CoV-1 people became ill and then spread the virus. Therefore, spread is related to clinical symptoms. This made it relatively easy to identify infected individuals, isolate and disrupt onward transmission. In contrast, SARS-CoV-2 is mainly spread pre-symptomatically or asymptomatically. This was established in January/February 2020 (PJH/12 – INQ000533733) and absolutely confirmed by data from Singapore published in early March 2020 and by others (PJH/13 – INQ000561510). Reports were also published in April/May 2020 (PJH/14 – INQ000561518; PJH/15 – INQ000533736; PJH/16 – INQ000563001). However, there was not just a UK problem in recognising this biological fact – the WHO also suggested that asymptomatic/pre-symptomatic transmission was very rare (PJH/17 – INQ000533730) and then went back on the comments (PJH/18 – INQ000533729). Just so as not to appear an 'armchair general', in an invited editorial in the British Medical Journal published on the 19th February 2020 (PJH/19 – INQ000533737), myself and a friend and colleague from Singapore (who developed the first nucleic acid tests for SARS-CoV-1), warned of asymptomatic transmission and the need to establish the true incidence of infection using serological assays.

25. My understanding was that all testing for SARS-CoV-2 at the beginning of the pandemic was centralised at PHE Collindale from January 2020 until the 13th March 2020. The criteria for testing was travel history – so no internal testing was done – i.e. for people who were in the UK and had no travel history to the affected regions. Then the 'official' PHE test was rolled out to PHE regional laboratories (Birmingham, Bristol, Manchester and Cambridge) and I think NHS collaborating laboratories. My understanding was that there was a problem with contamination of reagents during this time period that led to delays in fully rolling out testing. I surmise that part of the issues in this time period was perhaps a matter of logistics – i.e. trying not to be overwhelmed by testing. So, we were not community testing and therefore could not prevent spread of the virus – testing was restricted to patients admitted to hospital. To my knowledge certain NHS laboratories (I think

Sheffield NHS for sure) started setting up their own testing capability on their own initiative because they were seeing lots of people coming in fitting the clinical case definition and not the travel definition.

26. In the UK we moved out of a containment phase on the 12th March 2020 into a delay phase. People were asked to self-isolate based on two clinical symptoms: a high temperature and continuous cough. At this point trying to contain and eliminate the virus in the UK was an impossible goal as the virus was spread before people became ill. Many of my virology colleagues (and myself included) could not understand this strategy – if its purpose was meant to stop the spread of the virus. In fact, Professor Sir Jeremy Farrar, Head of the Wellcome Trust and member of SAGE at the time, retrospectively considered this a mistake (PJH/20 – INQ000533728).

27. Based on the experience of Singapore and other countries with SARS-CoV-1. A process adopted by these countries near the start of the outbreak/pandemic, was to restrict non-essential international travel and test and trace and isolate positive cases – first in hospital and then in a specialist setting (the Singapore Expo – a conference/trade venue - was converted for this task). Note that essential travel to do with the import of food and essential goods etc. was still permitted.

28. If our goal in the UK was to eliminate the virus at the beginning of the outbreak/pandemic during the so-called containment phase, I think we missed a window of opportunity to implement a testing, tracing and isolation strategy fit for purpose. The window obviously got much narrower the more time that passed, and the more unrestricted/non-essential travel and mixing that occurred.

29. I have heard several times that the UK lacked sufficient diagnostic capability to have achieved this aim, and that such testing was purely within the purview of Public Health England (PHE – now UK Health Security Agency). I was surprised (at the time) that we were not also using or considering using the diagnostic capabilities of other government or associated agencies. In Singapore disparate government agencies or their infrastructure were subsumed into one entity or controlled by one entity to prevent turf wars and better coordinate activity.

30. At the time of the start of the COVID-19 pandemic, the Animal and Plant Health Agency (APHA) had some recent knowledge of large outbreaks (Foot and Mouth Disease Virus etc.). In early 2019 APHA had the capability to run several thousand RT-PCR tests per week and to scale up/surge to around 20,000 tests per week - in a very short time. They also had the necessary infrastructure to receive and track large numbers of samples. This was a very well-known capability (I knew it and I don't work in this area). My understanding is that this capability was offered to Public Health England at the time, but not used. Other places that probably had sufficient infrastructure to run tests at scale were likely to have been the Pirbright Institute and the Defence Science Technology Laboratory. There may be good reasons as to why such support was not utilized.

31. One complication, that should be considered as a learning from this pandemic, is the balance between regulatory frameworks (i.e. to ensure accurate diagnostic testing) with agility to identify infected individuals.

32. The other learning is the multiplicity of different assays that can be used and how to standardise these. These may be and were, different across multiple agencies and private providers during the COVID-19 pandemic.

33. At NERVTAG we extensively discussed RT-PCR and what levels of viral load represented the presence of infectious virus or not. The need to have a standardised diagnostic test, with very clear parameters, is clearly a learning point, and one I sympathized greatly with PHE. We discussed this at NERVTAG and the Testing Advisory Group and advised about standardization of testing.

34. Of course, hand in hand with a diagnostic testing capability – if the goal is to eliminate or control an outbreak – is the tracing capability. Singapore employed hundreds of individuals in contact tracing using both the Singaporean Police Force and people within their Ministry of Health. I do not know the scale of this in early 2019 in the UK.

Moving into the pandemic proper.

35. The Lighthouse Labs provided significant upscaling and centralised diagnostic testing capability. From my perspective in NERVTAG it was great to have a detailed accurate as possible picture of the number of cases. This data clearly helped with advice on lock downs/movement restrictions and the effect of vaccination/everyone getting infected. I could clearly see this firsthand as my wife worked at a test and trace site and we would note with some gallows humour that she would see the actual upsurge in cases before I saw the data.

36. As lock downs were lifted more and more people would turn up for a test, as the vaccination effort gathered pace then less and less people had a test. My impression was that Prof. Sir Jeremy Farrar was in favour of a small number of centralised laboratories and that the British Army should have been used to gather the appropriate equipment from laboratories in the UK. Whereas Prof. Sir Paul Nurse believed smaller laboratories should be used. Subsequently, I have heard Sir Paul on The Rest is Politics Leading podcast say that small laboratories would have been better and more versatile. Perhaps at the beginning of an outbreak for sure.

37. Of course it is hard, even in hindsight, to say which strategy is best. Perhaps it is better to reflect on where we are now in 2025 and what would we do in April 2025 if Disease X popped up in March 2025. As someone with friends working at the coal face in diagnostic laboratories, my impression is that during the setup of the centralised laboratories, their PCR testing machines were taken away, were not used for a few months, and then they themselves went into the central laboratories to train the people employed by these testing labs (many had not worked in testing before) on their own machines that they recognised. So, this capability was lost for several months.

38. Several groups demonstrated how University laboratories could be turned into a robust testing site. A great example of this was work lead by Prof. Alan McNally at the University of Birmingham and colleagues setting up a site that could process

3,800 tests in 12 hours (PJH/21 – INQ000531134). The Crick Institute (directed by Sir Paul) did something similar (PJH/22 – INQ000533723).

39. In terms of isolation, I think we were not prepared to think about or implement more (apparently to us) Draconian style measures adopted by other countries (Australia, Singapore, New Zealand) that successfully flattened the curve (disease cases/hospital admissions). For me, there were several examples of this. Just before the Alpha variant wave hit (starting September/October 2020) cases of COVID-19 were on the upsurge anyhow, as I remember, due to people going aboard on summer holidays and likely students going back to university. This led to the lock down restrictions over Christmas 2020, when we started vaccinating the most vulnerable populations.

40. However, in March 2021 we did not learn the lessons of summer 2020 and international travel resulted in the Delta variant arriving in the UK from India.

41. In my opinion voluntary isolation did not to limit the spread from travelers coming back from countries with COVID-19. Either because people were not aware of how to isolate properly and/or willfully ignoring restrictions. There's a very succinct Hadith pointed out by a Saudi friend and colleague, 'If you hear that there is a plague in a land do not enter it; and if it (plague) visits a land while you are therein, do not go out of it'.

Learning to live with COVID-19 and moving out of the pandemic.

42. I think this comes under isolation. In my opinion we were right to move into learning to live with COVID-19 when we did. Once people in the appropriate groups had been vaccinated/offered the vaccination (and/or had been infected) then that is about as best as it will get. In Saudi Arabia, they had the Tawakkalna Emergency app. I really like this app and used it in Saudi Arabia myself. What I liked about it was that you could not access services such as transport or shopping without showing that you had been vaccinated.

43. In England and Wales, the NHS COVID-19 app was shown to be effective in reducing COVID-19 cases, hospitalisations and deaths (PJH/23 –

INQ000509696). Clearly the app was very useful and would have been of even more use if this had been rolled out earlier. I think this may have been hindered by a robust debate/dispute between the NHS and PHE on contact tracing apps – that was my impression based on my first meeting of NERVTAG (NERVTAG 15 – in April 2020), where such differences were robustly expressed (PJH/24 – INQ000325270; PJH/25 – INQ000120161; PJH/26 – INQ000120157; PJH/27 – INQ000120159; PJH/28 – INQ000533727; PJH/29 – INQ000533725).

44. A subgroup of us in NERVTAG wrote a paper on immunity certificates/vaccine passports – the idea being how to unlock society (NERVTAG meeting paper - Immunity Certification (PJH/30 – INQ000120387; PJH/31 – INQ000387102)). It was a good paper; we were providing background advice to help answer the question on whether immunity passports or equivalents were advisable.

45. This was based on knowledge of early data from vaccinations and what happens in seasonal human coronavirus infections. I think the adoption of such certificates might have allowed us as a country to return to work earlier than we did – i.e. move out of isolation. However, I think this then clashes with personal liberty and uptake of the vaccine in different communities – including healthcare workers, where there was also vaccine hesitancy.

46. The development of lateral flow tests was a game changer in handing responsibility to people for their own disease management, and from a psychological point of view perhaps giving empowerment to make decisions – can I or should I visit my elderly relative. We probably should have had more confidence that lateral flow tests would do the job – we know from the human challenge studies that positivity for SARS-CoV-2 roughly correlated with the presence of virus – i.e. someone was infectious. But I guess this was found out much later. The human challenge studies were the deliberate infection of healthy young volunteers with SARS-CoV-2 and sequential samples taken on a daily basis.

47. A lessons learnt would be the utility of lateral flow tests. I note with some irony that the COVID-19 lateral flow tests that I used were all made in China. I think onshoring end to end capability in the future would provide resilience.

Statement of Truth

I believe that the facts stated in this witness statement are true. I understand that proceedings may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief of its truth.

Signed: **Personal Data**

Dated: 26 February 2025