Witness Name: Wendy Barclay
Statement No.: 1
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UK COVID-19 INQUIRY
MODULE 1

WITNESS STATEMENT OF PROFESSOR WENDY BARCLAY

I, Professor Wendy Barclay of Imperial College London Exhibition Rd, South Kensington, London SW7 2BX, will say as follows:

1. I make this statement in response to the letter of 20 January on behalf of Baroness Hallett, Chair of the UK Covid-19 Inquiry. I understand similar requests have been made of academics within, or connected to, Imperial College and it would be helpful to consider my response alongside these to put my role and matters into context.

Professional qualifications, career history and expertise

2. A link to my professional profile is set out here and I will not repeat details within the statement https://www.imperial.ac.uk/people/w.barclay.

Qualifications:

3. I have a MA (BA Hons) from University of Cambridge in Natural Sciences awarded 1985, and PhD in Virology from University of Reading awarded in 1988. The subject of my PhD thesis was The immune response to infection with the common cold virus, rhinovirus type 2. The studies were carried out at the Common Cold Unit in Salisbury where human volunteers were inoculated experimentally with cold viruses, in conjunction with Burroughs Wellcome who were considering developing vaccines against cold viruses.

Career history:

4. I spent a postdoctoral period 1988-1992 at the University of Reading learning molecular virology skills under the mentorship of Professor Jeffrey Almond where we studied RNA motifs that controlled the replication of picornaviruses including common colds and poliovirus. I spent a second postdoctoral appointment 1992-1995 at Mount Sinai Medical Centre New York under mentorship of Peter Palese learning the molecular virology of influenza viruses. I returned to the UK in 1996 to a junior lectureship at University of Reading to establish my own research group studying replication of influenza viruses. This developed into a focus on their pandemic potential and I moved my group to Imperial College London in 2007 to pursue those interests. I was appointed to a Chair in Influenza Virology in 2007 and took up the Action Medical Research Chair in Virology in 2015. I became Head of Department of Infectious Disease in 2019.

Professional Expertise:

5. I am an expert in RNA viruses especially those that transmit through the air and infect the respiratory tract. I oversee a programme of wet biological research, using a combination of in vitro and in vivo models that include human challenge studies and animal experiments. I am known for work in the area of assessing influenza pandemic potential, and have also published on antiviral drugs and resistance to them, vaccines, and the innate immune response to virus infection.

Major publications:

6. I have a total of 143 peer reviewed original papers. Those I consider most significant are:
    - Peacock TP, Goldhill DH, Zhou J, Baillon L, Frise R, Swann OC, Kugathasan R, Penn R, Brown JC, Sanchez-David RY, Luca Braga, Maia Kavanagh Williamson, Jack A. Hassard, Ecco Staller, Brian Hanley, Michael Osborn, Mauro Giacca, Andrew D. Davidson, David A. Matthews and W S Barclay. The furin cleavage site in the SARS-CoV-2 spike protein is required for transmission in ferrets.
    - Nature Microbiology. 2021 doi: 10.1038/s41564-021- 00908-w. *The second most highly cited Nature Microbiology paper of 2021. We propose that the SARS CoV-2 pandemic emerged as a result of the 4 amino acid insertion in the Spike protein that confers enhanced furin cleavage, activating the virus for*

cell surface entry. We show that this insertion enhances transmission in vivo and replication in primary human airway epithelium. The paper was a team effort by all members of my group who chose to keep working during COVID lock down to further our knowledge of the new coronavirus. The paper was featured on the Virology podcast, TWIV and is frequently cited in opinion pieces addressing the nature of SARS-CoV-2 emergence.

- Long JS, Giotis ES, Moncorgé O, Frise R, Mistry B, James J, Morisson M, Iqbal M, Vignal A, Skinner MA, Barclay WS. Species difference in ANP32A underlies influenza A virus polymerase host restriction. Nature. 2016; 529(7584):101-4. doi: 10.1038/nature16474. PMID: 26738596. *The big breakthrough of my career. We and others had been searching for decades for the host factor that accounted for the restriction of avian influenza viruses in mammals. Using a unique screen, we discovered it to be ANP32A. This discovery is now a classic text book inclusion. It paved the way for a Wellcome Trust Investigator Award to further investigate how the host factor supports Influenza virus polymerase activity. In collaboration with the Roslin Institute we have developed gene-edited chickens altered in this protein that may be resistant to influenza infection, as a novel means to prevent future bird flu outbreaks and future pandemics. I presented this concept at the World Economic Forum, Davos 2019. The paper identifying ANP32A was featured in Nature News and Views and on the Virology podcast TWIV.*

- W.S. Barclay and P. Palese. 1995. Influenza B viruses with site-specific mutations introduced into the HA gene. Journal of Virology 69: 1275-1279. *Working with my postdoctoral mentor, I developed the first system to generate recombinant influenza B viruses. Such systems are used today to generate the Live Attenuated Influenza Vaccines given to children in UK, and to understand the molecular genetics of these seasonal human respiratory pathogens.*

Previous involvement in governmental scientific advisory committees

7. I was a member of NERVTAG since its inception in 2014. To be a member of NERVTAG I had to apply and interview with the then chair Jonathan Van Tam.

Members of NERVTAG all underwent an annual appraisal with the chair. My membership was renewed, but will finish in 2023. Pre-2020 I attended eight meetings of NERVTAG.

8. I attended one meeting of SAGE Swine Flu in May 2009.
9. I sat on the DEFRA Scientific Advisory Council subgroup on exotic and emerging animal disease on 2018.

Overview, reflections and effectiveness of the above groups

10. NERVTAG was/is a standing group with a good mix of expertise drawn from across UK science. Most if not all members have extensive experience in their area of expertise, for example myself in virology, Neil Ferguson and John Edmunds in modelling, James Rubin in behavioural science, Peter Horby and Peter Openshaw in clinical medicine. I consider it a very strong group, and since we were all interviewed to be a part of this, I feel everyone had justified their position in the group. There was no one from outside UK- I do not feel that compromised our ability to provide advice. Several members held positions in international groupings including WHO.

11. I believe that 'commissions', or topics for discussion came through the DHSC. For example, when we considered the UK stockpile of antiviral agents, or the UKs pre pandemic and pandemic vaccines, there was scene setting from DHSC and/or PHE colleagues, and the agenda and invite list was set by them in conjunction with the NERVTAG secretariat. This seemed appropriate- NERVTAG is an advisory group whose remit is to consider the strategies being taken by HMG and check they are scientifically relevant and correct. If there were other matters that members considered should be discussed that weren't on the agenda, my sense was that we were free to raise those. I never saw this happen though.

12. Before COVID my recollection is that all NERVTAG meetings were in person but there was a dial-in option that was frequently used. The ease with which we all moved to online meetings from late January 2020 illustrates this was also possible, and had not previously impacted our ability to meet as a group.

13. NERVTAG was active the whole time since its inception, but usually met just once or twice each year. I attended 8 meetings between 2014 and 2019. This seemed appropriate at the time when there was not an ongoing outbreak. There were sometimes extraordinary meetings called.

14. I specifically applied to be a NERVTAG member and was interviewed for that purpose by the first chair, Jonathan Van Tam, and one other person. The application required me to state my expertise, and the requirements of public service including confidentiality were also impressed upon me at interview, which I felt appropriate since many academics do not have a lot of experience in this – our instinct and training is to share everything.

15. Resources provided were the relevant papers we might need to pre read and the scene setting by DHSC/PHE members as stated above. Gavin Dabrera from PHE would provide regular update of the situation being monitored; for example, reports of avian influenza or MERS across the globe and what was known about them. I trusted this information- it was as good as any I had through independent means.

16. I felt that advice and recommendations NERVTAG ended up with were most usually in line with what DHSC/PHE had already proposed. I suspect this is largely because the PHE/DHSC individuals had done a very good job in what they had prepared. However there was also robust discussion amongst the NERVTAG members that pressure tested the proposals.

17. NERVTAG worked alongside members of other groups such as JCVI, for example in the area of pre-pandemic influenza vaccines 2015, or focus group meetings for example H7N9 September 2018. This worked well in my opinion, as there is some overlap in remit of these committee and joint meetings allowed merging of specific expertise.

18. Much of the work was around preparing for an influenza pandemic with pre-pandemic and pandemic vaccine stockpiles or purchase orders and antivirals all of which would be specific for influenza. Our advice helped to endorse decision making around contracts, for example with vaccine manufacturers to ensure a supply of pandemic influenza vaccine in the event of a pandemic, by scoping the existing and emerging products. Coronaviruses (mainly MERS), were monitored

in the situation updates, but never reached a point at which the committee agreed the risk was high enough to justify further action. In any case, for vaccines and antivirals there was no further action to take, as licensed products to mitigate against coronavirus outbreaks did not exist. Epidemiologic models were not specific for influenza although the numbers they used were based on worst case scenarios informed by eg 1918 influenza pandemic.

19. Until COVID there were no long-term emergency situations. NERVTAG met once or twice each year with sometimes additional expert groups, and this was sustainable. Nonetheless I would point out that there was considerable preparatory reading to be done for each meeting, and sometimes follow up documents to read and approve in addition to the minutes. Once COVID began for many of us our lives were completely taken over by membership of these groups. As well as being asked to attend frequent online meetings, there were several subgroups formed tasked to write specific papers, and meetings were held at weekends as well as during the weekdays. Once the pandemic had begun the weight of group membership became apparent because the advice we were being asked to give based on rapidly emerging but uncertain evidence would have huge impact on everyone's lives.

20. Participation was entirely voluntary- it was an honour to be on these groups and also kept one's own research valid and on topic. There was no remuneration. For those who travelled some distance to attend travel was reimbursed but I work in London and never claimed that as all meetings were in London.

21. In my opinion, the UK had a relatively good level of preparedness, and I feel this opinion is endorsed by comparative assessments that had been made by outside bodies such as WHO. Our risk assessments had indicated that an influenza virus was the most likely to cause the next pandemic.

22. We had stockpiles of antiviral drugs for influenza, and purchasing arrangements for vaccines against pandemic influenza viruses.

23. In fact, the first pandemic to occur after NERVTAG's inception was caused by a coronavirus and the antivirals and vaccines we had though hard about and planned

for were of no use. So we relied on nonpharmaceutical interventions in the first wave.

24. NERVTAG had a subgroup that had considered eye protection, eg visors and the stockpiling of gowns and other PPE, but we had not spent a lot of time discussing this- it was seen as largely operational. We had not pre-empted some of the questions that needed to be addressed for most effective use of PPE or other forms of social distancing. We also had not spent a lot of time discussing testing or diagnostics- there had been one presentation about point of care tests and how they might be used at hospitals. But the concept of rolling out testing at large scale had not been considered at NERVTAG. With hindsight, I realize I had assumed, did not know, whether other groups were discussing these matters elsewhere. The way the committees were run we knew what we had been asked but I did not understand how this fitted in the wider picture of the totality of the pandemic response plan. Since my own expertise is not extensive in diagnostic or PPE, I assumed these matters were being discussed by others with greater expertise. At NERVTAG the agenda was set but there was little time set aside for over arching discussions to link all strands together, and there had not to my knowledge been a time when we had taken an overarching view.

25. My understanding is there was a protocol in place called the FF100 which intended to address important question around these issues of virus kinetics based on the first few hundred identified cases in the UK. In fact by the time such answers were forthcoming, modelling had shown that the epidemic was growing at such a rate that the only way to control it was by locking down and restricting interactions. During spring/summer 2020 NEVTAG did then spend considerable time discussing these matters.

26. The work on antiviral and vaccines for influenza were in place, but the outbreak of a coronavirus required a different perspective.

27. Preparations for mitigating an influenza outbreak were good. Because a) we had feasible products to use, vaccines and antivirals, and b) we had been asked extensively to consider their use.

28. We had not thought 'outside the box' enough. We had not expected a coronavirus pandemic and therefore had not spent enough time considering what would/could be done if there were no vaccines and no antivirals against the next emerging respiratory virus that caused a pandemic. I do not think this was due to complacency, but the number of meetings NERVTAG had were filled by the tasks we had been set, largely around influenza antivirals and vaccines. I do not think we had set enough time aside to consider the unexpected. As stated above we also did not know the 'whole picture'.

29. In my opinion, in the early days of the outbreak January 2020 we did not recognize fast enough that the virus was transmitting from people who were not symptomatic because previous experience of SARS CoV1 had shown that did not happen for a coronavirus.

30. Also in my opinion, the testing that was performed in the first few months of 2020 was too centralized. To my knowledge, testing was largely going through Colindale, and a small number of regional laboratories. I was aware that modellers needed mor information on numbers of infected people but we did not have the ability to detect cases and testing at the centralized labs was at capacity. I consider this partly because of limitations on staff numbers, and also reagents and infrastructure. I think they were trying to roll out a perfect test. I think a future pandemic plan needs to be able to utilize testing at scale, in the community even if there are some false positives, or false negatives in the tests used.

31. We did not spend enough time considering viruses other than influenza, nor considering the immediate responses such as testing at large scale.

32. With the benefit of hindsight into the UK's response to the Covid-19 pandemic, the decisions that I consider bodies such as NERVTAG could have advised government differently about as follows. Understanding that decentralizing testing would be critical. And having vision around self testing. Considering lockdowns, and what we needed to know for that at the coal face- ie how long is a person infectious for and whether people would 'behave' /adhere to self isolation without compensation.

33. My views as to any lessons that can be learned in terms of planning, preparedness and resilience for future high-consequence infectious diseases, epidemics, pandemics, as well as other whole-system civil emergencies are as follows. I think that groups like NERVTAG should spend time discussing items that have not been commissioned. Part of the problem is that we had not considered the unexpected. We had not challenged enough. This is not an issue of funding, NERVTAG members are not paid. It is an issue of making sure members of such committees understand the whole planned response and not just the parts they are asked to comment on at specific meetings. Perhaps this is a failure on my own part, and perhaps I should have sought out more information. I cannot say that other experts on the group or within PHE and DHSC had not thought these issues through. Bu I do feel that academics who sit on these groups could be asked to consider the wider response as well as answer the specific commissioned questions.

34. For example, we think we know now which viruses might cause a future respiratory virus pandemic but, do we understand why we think that? I might think that MERS uses a receptor DPP4 that is located largely in the lower respiratory tract, (the explanation used for avian influenza virus and its receptors) and so airborne transmission may happen less effectively.. but has that been challenged enough? do we understand why some viruses (eg paramyxoviruses, very understudied) spread through the air more readily than others. Do we understand why SARS CoV1 was only contagious during symptoms by SARS CoV2 transmits earlier? Do we know how best to use different test types- in future such as lateral flow tests vs PCR detections. And, beyond my expertise, but if we were to attempt to lock down again do we think individuals will comply, and will we need to give financial incentives? I also understand that the data linkage was inadequate early on during COVID such that it was difficult to link vaccine records with hospitalization, but I also understand this has been actively worked on an improved. I think it will be important to understand whether any other issues of data linage should be fixed.

Contributions to these groups

- NERVTAG Annual Report – 2014-15
- NERVTAG Annual Report – 2016
- NERVTAG Annual Report – 2017-18

- NERVTAG Annual Report – 2019
- NERVTAG Annual Report – 2020-21
- Supplementary note from 27 November 2015 NERVTAG relating to increasing stockpiles of pandemic influenza antivirals.
- Recommendations to the Department of Health on pandemic influenza antiviral stockpiles on behalf of NERVTAG, December 2015.
- House of Commons Science and Technology Committee emergency evidence session to explore scientific evidence regarding the new variant of covid-19 on 23 December 2020.
- House of Commons Science and Technology Committee on UK Science, Research and Technology Capability and Influence in Global Disease Outbreaks on 24 February 2021 and 16 June 2021.
- Cited as interviewee and peer reviewer for POSTnote Addressing COVID-19 in the long-term – the role of immunisation (Parliamentary Office for Science and Technology).
- Vaccines: a double dose with Professor Brian Cox (Royal Society).
- Quotes in an article on the BBC website about 'unpredictable pandemics' on 14 November 2013.

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.

Personal Data

Signed:

Dated: 06/03/23