

Witness Name: Helen Pain

Statement No.:

Exhibits:

Dated:

## UK COVID-19 INQUIRY

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### WITNESS STATEMENT OF HELEN PAIN MBE, CHIEF EXECUTIVE, ROYAL SOCIETY OF CHEMISTRY

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I, Helen Pain, will say as follows: -

#### **Background**

1. The Royal Society of Chemistry (**RSC**) is the professional body for chemists. Incorporated by Royal Charter and registered as a charity, our prescribed object is to advance chemical science and its application by disseminating chemical knowledge, upholding professional standards, serving the public interest, and advancing the objectives of our members in their practice of chemistry.
2. We have more than 60,000 members worldwide participating in professional development, accessing career support, and promoting the chemical sciences to a wide and varied audience.
3. Our internationally acclaimed not-for-profit scientific publishing business publishes over 50 leading journals that span the chemical sciences and last year we received more than 35,000 submitted articles from 168,000 researchers from 127 countries. We are known for rigorous peer review, fast publication times and publishing the best science, from original research articles to authoritative reviews. We are also a publisher of over 2,000 books authored by leading scientists and experts in their profession and own several high-quality chemical information databases.

4. We work across the wider science community in areas such as supporting teachers of chemistry, accrediting degree courses and apprenticeship programmes, advocating for the chemical sciences, influencing decision-makers, and driving changes to the culture of chemistry and its ethical practice.

### **Our expertise**

5. Members of the RSC and authors in our journals are active in research and innovation that is directly or indirectly related to epidemiology and pandemics, for example in relation to chemical understanding of diseases, as well as the chemistry associated with prevention, diagnostics and therapies. Our publishing output includes research, often interdisciplinary, in these and related fields.
6. Where useful and requested we can connect experts in our community to public bodies seeking chemistry expertise.
7. Through activities like our scientific member networks, conferences and publications we help researchers collaborate and share knowledge in specialist areas of chemical science.
8. Our policy team gathers scientific evidence, leverages our extensive network of experts, and facilitates dialogue to develop evidence-based policy recommendations. We draw on the knowledge of our community to shape our policy-relevant outputs and provide rapid responses, including contributions to government consultations. Our health policy portfolio covers key topics such as antimicrobial resistance, infectious diseases and environmental health. During the COVID-19 pandemic, we developed a series of graphical explainers [HP/01-INQ000546283] detailing the key contributions of the chemical sciences in addressing the pandemic, from developing diagnostic tests to tracking variants and supporting vaccine and drug development.
9. Our *Chemistry vs Covid* campaign illustrates the important and varied role chemistry and chemical scientists played in tackling the COVID-19 pandemic. Chemical scientists' work was crucial in developing an understanding of the virus and its transmission, developing vaccines, drugs and testing. The chemical sciences played a fundamental role in developing the technology and knowledge that enabled the test, trace, and isolate (TTI) system. The campaign further demonstrated that chemistry

underpins the development of diagnostic tools and techniques for identifying and understanding pathogens, as well as in the creation of treatments and vaccines. Advances in analytical chemistry, molecular biology, and materials science were essential in creating accurate and scalable testing methods, such as lateral flow tests.

10. Among the major challenges of COVID-19 were its rapid spread and the presence of asymptomatic cases, making early detection crucial. The development of lateral flow tests helped reduce transmission by identifying asymptomatic infections, enabling more infected individuals to self-isolate and limit the virus's spread [HP/02-INQ000546292]. Unlike gold-standard polymerase chain reaction (PCR) tests, lateral flow tests provided faster, more affordable, and lab-free results in approximately 30 minutes, making mass testing significantly easier and more accessible. The chemical sciences also played a key role in improving existing point-of-care diagnostics, enhancing reliability and effectiveness [HP/03-INQ000546293].
11. Beyond diagnostics, chemical research has deepened our understanding of virus transmission, particularly the role of airborne spread [HP/04-INQ000546294]. This included research examining the behaviour of droplets released when we breathe or cough, how droplets evaporate, their travel distance before settling, and the virus's survival under different conditions. Scientific research has also highlighted the critical role of ventilation in reducing airborne transmission and the effectiveness of filtration technologies in removing the virus in indoor spaces. Understanding how viruses spread is crucial for developing effective mitigation measures and reducing infection rates.
12. Chemistry was also central to the development of treatments [HP/05-INQ000546295], [HP/06-INQ000546296] and vaccines [HP/07-INQ000546297], ensuring a rapid and effective response to the pandemic. These innovations collectively strengthened pandemic management and response strategies.
13. Alongside other Scientific, Technical and Medical (STM) publishers, we published journal articles on coronavirus open access, making them freely available to help disseminate the latest scientific knowledge to the scientific community, policymakers and others, for example in relation to the development and evaluation of testing approaches. It seems likely that some of this publishing activity will have helped to

develop approaches to COVID-19 testing. We also published a freely available book on COVID-19 via our journalistic news publication *Chemistry World* on 'The Coronavirus Pandemic and the Future' by Dr Camille Ehre in 2021.

14. We played an important role in other ways during the pandemic, by highlighting the contributions of the chemical sciences, actively seeking to understand the challenges faced by RSC members and sharing this information with decision-makers. This included a survey of our UK-based membership in November 2020 to understand the impact of COVID-19 on their work, education and research, as well as the broader implications for the future of the chemical sciences [HP/08-INQ000546298].
15. Through our *Chemistry vs Covid* campaign, we showcased the key role of the chemical sciences in tackling the pandemic, including the development of diagnostics, transmission pathways, treatments, and vaccines. During this time, the RSC responded to three parliamentary committee inquiries on COVID-19 to share our evidence with decision-makers and shared the results of our COVID-19 member survey with Government and funders.
16. RSC members across academia and industry contributed to research and innovation in the development of analytical tools such as point-of-care diagnostics. This enabled the rapid identification of COVID-19 cases and facilitated mass testing. The chemical sciences also played a key role in improving existing point-of-care diagnostics, enhancing their reliability and effectiveness [HP/03-INQ000546293].
17. An example case study from the Research Excellence Framework (REF) 2021 assessment [HP/09-INQ000546299] highlighting the impact of chemistry in advancing COVID diagnostics included IMSPEX (Loughborough University). This company deployed its Breathspect Gas Chromatography–Ion Mobility Spectrometry (GC-IMS) breath analyser, developed from research conducted at Loughborough University's Centre for Analytical Science, across radiotherapy, emergency departments, and toxicity centres in Europe and Asia. At-patient systems allow *in situ* analysis, removing the need for sample isolation and transport to a laboratory. Testing is bio-secure and takes under a minute, so results are available to clinicians immediately. The system was tested in two large multi-national crisis exercises involving seven nations and 25 organisations, convincingly demonstrating its capabilities in breath sampling and

analysis. This led to the development of single-use bio-secure at-patient breath samplers for COVID-19 testing and improvements in instrument gas-management systems, meaning the units could be installed in in-community and in-ambulance settings, greatly increasing the accessibility of this testing. These systems were adopted worldwide in response to the need for COVID-19 testing. Orders increased 1100% in 2021.

### **Responding to the pandemic**

18. We have found no record of RSC employees being directly engaged on the development of TTI systems. We think it very likely that some of RSC members contributed, however we are unable to comment on their specific input into the TTI system.
19. We have not formally assessed the diversity of the RSC's membership during the relevant period in terms of the range of disciplines from which members were drawn and the extent to which the range of relevant expertise and knowledge contributed to the development and implementation of TTI systems across the UK. However, our membership is large and diverse in many different respects. It includes Qualified Persons in the pharmaceutical industry responsible for assuring the quality of medicines, NHS healthcare professionals, drug product development scientists, and academic researchers working in chemical biology and healthcare.
20. We have members in all four UK nations and internationally, so it is possible that some of our members worked collaboratively across the four nations in supporting the development, roll-out and implementation of their respective TTI systems, but we cannot comment on that activity.
21. To mitigate risks of the scientific community encountering obstacles in harnessing scientific understanding to tackle the COVID-19 pandemic, we, like other scientific publishers, ensured COVID-19 content was free to access. As set out above, the RSC published its journal articles on coronavirus as open access and freely available, to help disseminate scientific knowledge. Additionally, all stories related to the coronavirus pandemic are free to access on our *Chemistry World* website.

## Our engagement and advice on TTI

22. RSC employees do not appear to have directly engaged on the development of TTI systems or had a direct involvement in the input and/or development of the TTI strategy and policy across England and the devolved nations. It is likely some of our members were involved, but we are unable to comment on that activity.
23. We did, however, respond to several Government consultations regarding COVID-19 that are detailed below:
- a. Evidence submission to the House of Lords Science and Technology Select Committee - Written evidence (COV0031) [HP/03-INQ000546293], submitted in June 2020. This document presents an inexhaustive summary of where the chemical sciences are contributing to the science of COVID-19. Whilst this discusses detection and diagnostics, it discusses it more broadly and does not refer to the TTI strategy and policy.
  - b. Written evidence submitted by the RSC (C190064) [HP/10-INQ000546284] to the House of Commons Science and Technology Committee's inquiry: UK science, research and technology capability and influence in global disease, July 2020. This document details the contributions and challenges faced by our scientific community in responding to COVID-19. From this, it outlines recommendations and again whilst it discusses testing capacity in the UK in March and April 2020, it does not refer specifically to the TTI strategy and policy.
  - c. Written evidence submitted by the RSC (CLL0045) [HP/11-INQ000546285] to the House of Commons Science and Technology Committee on the 27 November 2020. This outlines the recommendations from the written evidence described above, with some additional examples. Again however, it does not refer to the TTI strategy and policy.
24. As detailed in the written evidence submitted by the RSC [HP/10-INQ000546284], the information conveyed to us by our community led us to make seven recommendations aimed at strengthening the UK's preparedness and response to future pandemics. These recommendations included the need for a coherent national and local diagnostic testing strategy, better understanding of civil service capacity and scientific skills to allow for appropriate coordination and greater transparency in how scientific

advice informs decision-making. We also made recommendations on improving UKRI's processes for urgent research funding, and continuing support for SMEs as essential to deliver long-term scientific solutions.

25. During the COVID-19 pandemic, one issue highlighted through engagement with our members was the integration of scientific advice into the operational aspects of the pandemic response, such as the practicalities of delivering diagnostic testing.

26. Whilst there was a strong public focus on the scientific input in relation to the Scientific Advisory Group for Emergencies (SAGE) in shaping the overall strategy, a few RSC members were concerned that scientific advice might not always be sufficiently considered in the procurement and operational delivery of testing strategies [HP/10-INQ000546284]. Paragraphs 27-29 set these out.

27. The urgent need to scale up testing capacity led to the rapid procurement of goods and services, often requiring the use of emergency procurement powers. This situation raised questions about the procurement process, particularly how scientific advice was incorporated into the decisions regarding which organisations were selected to manage diagnostic testing centres and the analysis of samples collected.

28. A few of our members raised concerns about i) the criteria for selecting providers not being always clearly defined, ii) how scientific input was weighted alongside other factors in making procurement decisions and iii) the role of scientific expertise at the official level and how this influenced the government response, particularly in areas like procurement.

29. Two of the recommendations made in our response at the time were based around the scientific advice to support the COVID-19 response as part of our written evidence submission from the RSC to Parliament:

- a. The government must explain how scientific advice informed relevant operational considerations during the pandemic, including procurement practices.
- b. The government should provide regular progress updates on the recommendations in the 'Raising our ambition on science' report by the Government Office for Science [HP/11a-[INQ000587574]. Particular attention

should be paid to progress made against the report's recommendation 'to ensure that the civil service as a whole has the scientific skills it needs and the mechanisms to deploy them effectively through the wider civil service functional agenda'. The government response to the pandemic has shown a renewed urgent need to prioritise ways to ensure that the civil service has the scientific skills that it needs.

30. Our consultation responses largely drew on the experiences of UK-based members. Whilst it is likely that some RSC members from outside the UK shared relevant knowledge through their scientific networks, we are not aware of the activity and cannot comment.
31. As the RSC did not have any direct involvement in implementation of the TTI system, we cannot respond regarding the existing knowledge, data or planning exercises concerning TTI systems in response to epidemics and pandemics.

### **Testing infrastructure and capacity**

32. We are unable to comment on the UK's testing infrastructure. We do not have a position on capacity pre-pandemic or relevant evidence in our consultation responses.
33. In the early stages of the COVID-19 pandemic, members of the RSC community actively offered support to expand testing capacity. Many volunteered equipment, reagents, skilled personnel, and laboratory space to aid diagnostic and serological testing efforts. However, despite their willingness and capability, some did report challenges around coordination and communication.
34. Support was offered to various stakeholders, including NHS trusts, Public Health England (PHE), and government departments. For example, one researcher we talked to at the time but whose details we are unable to identify engaged with their local NHS trust as early as mid-March 2020, offering category 3 laboratory facilities, trained personnel, and testing capabilities. This researcher reportedly went through a process of correspondence with different contacts within the NHS trust and received inconsistent responses on whether their support was needed. At one point, they were informed that their testing capacity was not required, only to later receive a separate

request from the same trust for available personnel, suggesting a lack of clarity in the testing approach during the early stages of the pandemic [HP/10-INQ000546284].

35. Others in our community experienced similar challenges. One member we talked to at the time but whose details we are unable to identify attempted to coordinate with PHE, the NHS, and the Government's Chief Medical Officer, as well as submitting online forms to offer lab space, trained scientists, and logistical support, including large car parking areas for testing. By late October 2020, they had yet to receive a response [HP/11-INQ000546285].

36. Beyond testing, RSC members also sought to contribute in other critical areas, such as sterilisation protocols for personal protection equipment (PPE) reuse and applying chemical safety procedures to antiviral settings. Some industrial sector members highlighted the untapped potential within UK manufacturing and supply chain networks.

37. A key lesson and recommendation from the RSC from these experiences is the need for better coordination and the ability to connect available scientific resources with urgent public health needs. One of our recommendations made in [HP/10-INQ000546284] was to include an evaluation of civil service capacity to undertake this level of national and local coordinated response, drawing together UK scientific capacity at such speed. This includes assessing scientific advice mechanisms and/or scientific skills needed to undertake rapid coordination.

38. Formal government guidance on testing support criteria was issued on 9 April 2020 [HP11b-INQ000587572]. Before this, some researchers struggled to navigate multiple government agencies, NHS trusts, and government departments, with no clear coordination mechanism. Centralised volunteer programmes led to delayed or no responses, while some local NHS trusts reached out independently for specific capabilities.

### **Scientific research and modelling**

39. There is no mention of epidemiological modelling for the TTI in our *Chemistry vs Covid* timeline or our consultation materials, and we are unable to comment on this.

40. We have not developed a position on the types of data required to build effective infectious disease models and are therefore unable to comment.
41. We had no specialist departments or teams responsible for using data and modelling to inform the TTI systems in the UK, either within or affiliated to the RSC.
42. We can only share details of our members' research, roles or involvement where we already have the information and their agreement to use it, for example where they have agreed to us using it in our consultation responses. We do not believe the RSC as an organisation was involved in other programmes on TTI.

## Testing

43. The chemical sciences, working alongside other disciplines, played a vital role in both diagnostic and serological testing during the COVID-19 pandemic. Contributions ranged from research and development of diagnostic tools and techniques for identifying and understanding pathogens, as well as in understanding the transmission pathways. Advances in analytical chemistry, molecular biology, and materials science were essential in creating accurate and scalable testing methods, such as lateral flow tests [HP/03-INQ000546293]. Contributions from scientific researchers also included the volunteering of laboratory space, equipment, skilled personnel, and reagents in the early stages of the crisis. Many of our members proactively reached out to NHS trusts and government agencies to offer resources and trained staff, but faced challenges in navigating coordination efforts, with some experiencing delays or a lack of response [HP/10-INQ000546284].
44. To our understanding and knowledge, the UK did not encounter significant issues in accessing the SARS-CoV-2 genetic sequence, which was critical for developing polymerase chain reaction (PCR) tests and point-of-care diagnostics [HP/12-INQ000546286]. The first sequence of the viral genome was made publicly available just three days after the novel coronavirus was identified in January 2020, thanks to scientists in China and Australia. This rapid data sharing enabled researchers worldwide, including in the UK, to begin developing testing protocols almost immediately.

45. Throughout the pandemic, open data sharing remained a key pillar of the scientific response. By December 2021, over six million SARS-CoV-2 genome sequences had been submitted to the Global Initiative on Sharing All Influenza Data (GISAID) database, allowing scientists to track emerging variants. This played a crucial role in identifying and responding to mutations, such as the Alpha variant (December 2020) [HP/13-INQ000546287] and the Omicron variant (November 2021), where researchers in South Africa quickly alerted the global community to its threat.
46. The UK successfully integrated genetic sequencing capacity into its diagnostic strategy through initiatives like the COVID-19 Genomics UK consortium (COG-UK), which helped track variants and improve testing effectiveness. The knowledge and mechanisms for how government can implement a coherent national and local diagnostic testing strategy should be retained to support any future response to a pandemic of this kind [HP/14-INQ000546288].
47. In our view, the chemical sciences played a crucial role in developing and improving the diagnostics for COVID-19. The polymerase chain reaction (PCR) test is the gold standard for COVID-19 detection due to its high sensitivity and accuracy in detecting the virus. However, the speed and accessibility limitations of PCR led to the development and widespread adoption of lateral flow tests for the rapid detection of the COVID-19 virus. Lateral flow tests played a crucial role in preventing transmission by detecting asymptomatic infections, enabling more infected individuals to self-isolate and reduce the spread of the virus. They were faster, more affordable, and did not require laboratory processing, delivering results in approximately 30 minutes. Their accessibility and ease of use also facilitated the rapid rollout of mass testing.
48. We do not have a position on how evolving understanding of the virus impacted on the testing strategies deployed across the UK and are unable to comment.
49. It is likely that some RSC members received funding from UK Research and Innovation for proposals in response to their call for 'ideas that address COVID-19' to carry out research in relation to COVID-19 testing. However, we have not found any member case studies to confirm this, and therefore we are unable to comment further. We are aware of a REF2021 impact case study that might be relevant. In May 2020,

Iceni diagnostics, a spin-out from the University of East Anglia and the John Innes Centre, was selected for the fast-track Innovate UK competition, which received over 8,600 applications to address COVID-19 challenges [HP/09-INQ000546299]. Their technology uses synthesised carbohydrates mimicking natural interactions between a host and pathogen to recognise infectious diseases – avoiding the issue of viral or bacterial mutation changing the pathogen beyond the recognition ability of other technologies – something traditional antibody or nucleic acid-based technologies are susceptible to. It is implemented in lateral flow devices that give a result at the point-of-test, meaning samples do not have to be taken to a laboratory for analysis. The company developed a combined SARS-CoV-2 and influenza lateral flow diagnostic test with BBI Solutions Ltd., an ISO13485-accredited manufacturer, producing the first 5,000 clinical batch devices. By December 2020, the diagnostic test was undergoing validation by Public Health England (PHE) for potential deployment.

50. Our news publication *Chemistry World* published an article on the use of wastewater monitoring programmes in epidemiology in the 21st century [HP/15-INQ000546289], including their application during the COVID-19 pandemic. Wastewater-Based Epidemiology (WBE) involves analysing sewage to monitor the health of populations. By detecting chemical and biological markers, for example pharmaceuticals and viruses, WBE provides insights into public health trends at the community-level. The impact of various national and international programmes is also covered in this article, as well as the technical aspects of chemical analysis involved in those studies.
51. The report also discusses ethical issues raised by such monitoring programmes, such as individual privacy. For example, when conducted on a large scale, WBE is typically anonymous, aggregating data across broad populations. However, when applied to smaller populations, such as schools, prisons or workplaces, there is a risk of potentially identifying individuals.
52. The report also explored experts' viewpoints on how they can and should be integrated as a part of broader public health initiatives and policies. For example, experts from the US National Wastewater Surveillance System highlighted that WBE was a valuable complementary public health tool. It has supported decisions about where to allocate resource, for example deploying mobile testing units or ensuring hospitals are adequately stocked.

53. The chemical sciences combined with other disciplines played a crucial role in expanding the testing capabilities during the COVID-19 pandemic, including in the implementation of wastewater-based epidemiology (WBE) as a surveillance tool [HP/14-INQ000546288]. WBE provided a cost-effective, community-wide monitoring system, enabling early detection of SARS-CoV-2 and tracking its spread at local, regional, and national levels. This multidisciplinary effort, involving government agencies, water companies, universities, and research institutes, led to significant investment in infrastructure, sampling methodologies, and data analysis tools.
54. The UK's wastewater surveillance programmes demonstrated the potential of WBE to enhance public health response strategies, offering a real-time assessment of infection levels within communities. The methodology developed for COVID-19 could now be expanded to detect other biological threats, such as antimicrobial resistance, supporting rapid response systems for future public health crises.

## Tracing

55. We did not have any involvement in the development, roll out and implementation of the tracing aspect of the TTI system in the UK. It is possible that some RSC members may have done so, but we are unable to comment on that.

## Isolation

56. We did not have any involvement in the development, roll out and implementation of the isolation aspect of the TTI system in the UK. It is possible that some RSC members may have done so, but we are unable to comment on that.

## Public Communications

57. The primary purposes of the *Chemistry vs Covid* campaign were to:
- highlight and celebrate the diverse roles played by chemical scientists in keeping the public safe during the pandemic (purpose 1); and
  - highlight and celebrate the direct roles and contributions of chemical scientists in global research and development efforts to overcome the pandemic (purpose 2).
58. For purpose 1, we profiled chemists across a range of sectors and disciplines, from more traditionally recognised roles in academia or innovation to technical or analytical roles that are often considered less visible. We also showed how many chemists were required to continue working to enable daily life to go on, for example those keeping water clean and power stations functioning. These articles were published on our website and promoted on social media, as well as being published in our quarterly magazine for RSC members, *Voice*.
59. For purpose 2, we commissioned graphics to illustrate key milestones in the timeline of global scientific efforts to overcome COVID-19 and published them at relevant points of the year, as well as a full timeline at the end of the project. We shared each of these across our social media accounts, where we heard from educators that the content was useful for communicating to students the vital role of chemistry in current events [HP/02-INQ000546292], [HP/04-INQ000546294], [HP/05-INQ000546295],

[HP/06-INQ000546296], [HP/07-INQ000546297], [HP/13-INQ000546287]. The *Chemistry vs Covid* campaign was complemented by a series of 40 profiles in our news publication *Chemistry World*. These profiles explored the various ways chemists were responding to the pandemic and how the pandemic was affecting their lives and work.

60. Our news publication *Chemistry World* published an article on testing technologies [HP/16-INQ000546290] to inform the public and address some common contemporaneous concerns regarding their use and availability. The article explains the technical aspects of how different testing technologies work, how the testing data is used to guide public health responses, the issue of shortages of COVID-19 tests and potential new forms of test that are in development.
61. In this article we outlined the two different types of tests, those that detect an active infection of the virus, and those that determine whether someone has previously been infected. The first type typically involves taking a throat swab and using polymerase chain reaction (PCR) techniques to detect the Sars-CoV-2 RNA. The second type looks for the antibodies produced by the immune system in response to the virus, which are found in the blood or serum.
62. The article also highlighted initial shortages of PCR reagents. However, experts quoted at the time of publication noted that these issues had largely been resolved in the UK. Subsequent challenges shifted towards ensuring test accuracy.
63. Additionally, the article introduced emerging tests based on the gene-editing tool Crispr. These tests use enzymes paired with RNA strands that bind to the viral RNA. When viral material is detected, this can cause colour changes on paper strips, offering a quickly and cost-effective way to identify infections.
64. We have found no record of RSC involvement (delivering or funding) in public engagement activity regarding TTI.
65. We have found no record of RSC providing advice regarding public communications about TTI.

## Lessons for the future

66. During the pandemic, open sharing and open access publishing of the genetic sequence of SARS-CoV-2 and of the spike protein enabled rapid work by scientists across the globe, informing testing and other responses. Peer review of new scientific knowledge also added value, ensuring dissemination of trusted and reliable scientific content to inform the pandemic response, including TTI.
67. Scientific practice is in essence an evolutionary process, which involves learning from past experiences. Undoubtedly the chemical sciences workforce will have learnt from what happened during the COVID-19 pandemic and will be able to deploy that new knowledge to combat any future pandemics. This would include helping to develop TTI systems if appropriate.
68. RSC and other publishers enabled knowledge and information sharing across borders by scientists, which helped the pandemic response. Future policy should enable open access publishing, with the funding and infrastructure to ensure it is trusted and reliable and enables global scientific collaboration.
69. Since rapid development of diagnostic testing during the pandemic relied on preceding research as well as flexibility to redirect research, we recommend that the Government reverses the real-terms decline in quality-related research (QR) funding. The Russell Group finds that in England, there has been a 16% drop in real-terms QR funding from 2010/11-2024/25 [HP16a-INQ000587573]. QR funding is a vital mechanism to support curiosity-driven research and can be used flexibly to drive new ideas and respond to emerging challenges. In England, QR funding is distributed by Research England (one of the UK Research and Innovation's (UKRI) councils) which receives its funding allocations from DSIT. In recent years, a combination of a drop in real-term QR funding as well as institutions needing it to cover the full-economic cost of research, has eroded the ability to use this resource to underpin innovations that might well save lives in the future.
70. Small and Medium Enterprises (SMEs) play a vital role in the research ecosystem and played a key role during the pandemic [HP/17-INQ000546291]. During COVID-19, SMEs in the chemical sciences demonstrated their agility by quickly pivoting to

support the pandemic response, such as producing antiviral PPE and contributing to diagnostics and therapeutics. Companies like Colorifix and Sphere Fluidics played key roles in antiviral research and vaccine development [HP/11-INQ000546285].

71. However, the experience of SMEs during the pandemic highlights several important lessons for future preparedness. First, government support for SMEs, such as financial packages and the ability to operate safely during lockdowns, was essential in stabilising these businesses in the short-term. Moving forward, it will be vital to maintain long-term monitoring of SMEs to ensure that any emerging challenges are addressed quickly, particularly in terms of business continuity and the retention of talent and innovation.
72. Furthermore, a major success has been the emphasis on information and data sharing, which has been a cornerstone of the global scientific response. For example, the sharing of viral genetic sequences enabled the rapid development of testing protocols and vaccines, as well as the tracking of mutations and variants, such as the emergence of the Omicron variant in November 2021. This level of global cooperation was crucial to the success of the response.
73. Moving forward, governments and professional bodies must continue to promote collaboration and open data sharing. Fostering a more connected and transparent research environment will ensure that future scientific efforts are more efficient, effective, and capable of quickly responding to evolving threats.

**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:** 16 May 2025