

# COVID-19 – The Infection Challenging the World: the conference programme

The annual scientific conference of the British Society for Microbial Technology was due to take place in May 2020, but had to be cancelled because of the ongoing epidemic. While the physical 2021 conference met a similar fate, all is not lost as the organisers will run a virtual conference in May on that most topical of themes: COVID-19. Here, Mark Wilks provides a preview of the upcoming webinar series on behalf of the BSMT.



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BRITISH SOCIETY FOR  
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One of the striking aspects of the COVID-19 pandemic is that we all became experts first on virology, then epidemiology and now vaccines. Possession of an armchair and a laptop seemed to be enough to allow anyone and everyone to pronounce authoritatively on the current pandemic.

The approach of the British Society for Microbial Technology (BSMT) is a bit different. The aim of this year's Annual Scientific Conference is to assemble acknowledged experts in their fields to give us authoritative overviews of their particular specialism and their contribution to controlling the pandemic. We have spread the meetings over four days, limiting the talks to two per day, allowing plenty of time for the presentations and discussion. We recognise that most people will not be able to listen at fixed times so the talks also will be available to view after the official online event.

## Testing times

It is inevitable that individuals and governments will have a national interest and focus in controlling the pandemic.

However, it is obvious that an international approach in all aspects of controlling the pandemic – diagnosis, treatment and the use of vaccines – will require a coordinated approach. Point scoring and looking at your country's position in league tables of cases, deaths and doses of vaccine administered is inevitable to some extent but will not control the pandemic. In this context, it is particularly appropriate that our first speaker should be Dr Michael Head (Senior Research Fellow in Global Health, University of Southampton) to give us a global perspective on the pandemic and how different countries have been affected. Michael has a particular interest

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in other infectious diseases, particularly those in third-world countries where treatment and research has been massively curtailed.

Probably the immediate impact BSMT audiences to this conference noticed was the sudden need to introduce large-scale testing for SARS-CoV-2. Two of our speakers will talk about their different experiences. Dr Catherine Moore (Consultant Clinical Scientist, Public Health Wales) will describe how her laboratory in Cardiff responded to the challenge of accommodating a massively increased demand for testing in Wales within an existing NHS framework. She has also used her expertise to help other laboratories set up testing. This work led to her recently being awarded an MBE in the Queen's Birthday Honours.

One entirely new aspect of the pandemic was the decision by the government to set up a whole new group of laboratories outside the existing structure of NHS and Public Health England (PHE) control. Setting up the Milton Keynes 'Lighthouse Lab' was a remarkable feat and a first for UK infectious disease diagnostics, increasing

the testing capacity of the UK virtually overnight. Our next speaker will be Professor Alan McNally (Director of the Institute of Microbiology and Infection, University of Birmingham), who was seconded to the Milton Keynes facility as Infectious Disease Lead. Launched on 9 April, the Milton Keynes laboratory was the first of three government 'mega-labs' to be set-up across the UK, vastly increasing testing capacity and allowing tens of thousands more patient samples to be processed each day. As well as high-volume testing, there was and still is a large research programme, mainly with clinical trial expertise of experts at the University of Oxford's Clinical Trial Service Unit. The laboratory brought together automated testing technology from the National Biosample Centre and the laboratory experience of some 70 volunteers from the worlds of academia and science.

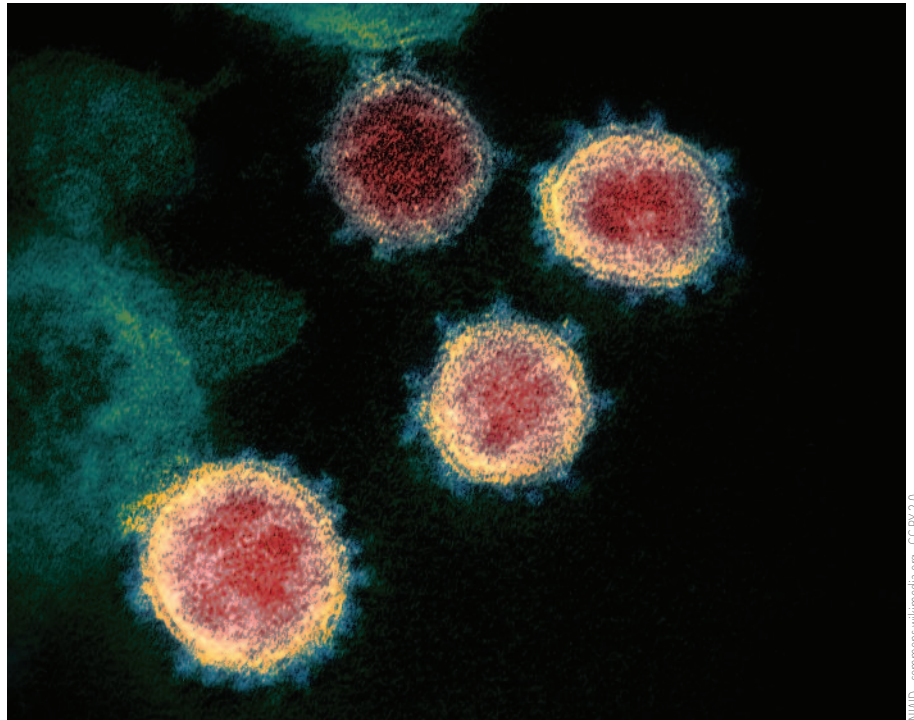
Setting up such an operation from scratch partially staffed by volunteers was inevitably accompanied by some teething troubles. For example, the need to work to ISO15189 standards and the need to make results readily accessible outside the usual LIMS systems presented the expected hurdles – how these were overcome will be discussed.

### Performance and sequencing

It soon became apparent that the actual interpretation of test results was controversial. Nearly all were provided by polymerase chain reaction (PCR) methods, with very little confirmation of positive results by viral culture, which is not possible on a large scale and in any case few laboratories have the necessary required expertise. This inevitably raised problems of test result interpretation. For example, at what Ct value should a test be considered positive?

This area has become even more problematic with the introduction of lateral-flow tests (LFTs). The convenience and cheapness of LFTs has thrown up its own problems. While most people can understand that a test may not be 100% sensitive, so cases may be missed, they find it much more difficult to understand that tests also throw up false-positive results. The idea that the number of false-positive results can be affected by the prevalence of a disease has caused particular problems as the epidemic declines and the use of LFTs in schools increases.

We are fortunate to have Professor Jonathan Deeks (University of Birmingham), a world expert on the evaluation of diagnostic tests, a field in which he has worked for over 20 years, to describe his work on test performance



The SARS-CoV-2 pandemic resulted in the sudden need to introduce large-scale testing.

evaluation. Many attendees at the conference will be familiar with his work with colleagues in the Royal Statistical Society, on television and in the newspapers, trying to explain the difference between sensitivity and specificity of the test, something with which politicians and commentators have considerable difficulty.

One area in which UK science has been genuinely 'world beating' is in sequencing of SARS-CoV-2 isolates. Indeed, at one time nearly half the sequences in the world had been obtained from sequencing UK isolates or isolates from other countries sequenced here.

Professor Nick Loman (Professor of Microbial Genomics and Bioinformatics, Institute for Microbiology and Infection, University of Birmingham) will be focusing on this. Nick spends much of his time tracking and implementing developments in new sequencing technologies, with the aim of applying them to the direct diagnosis of infectious disease and the detection of antibiotic resistance genes. Many will remember his exciting talk at the BSMT conference in 2016 where he spoke on his work during the Ebola outbreak in West Africa (2014–16) using

Oxford Nanopore sequencing. On this occasion he will be describing his work on the CLIMB COVID-19 project, led by the University of Birmingham and Cardiff University.

CLIMB COVID-19 is a big data project currently supporting the COVID-19 Genomics Consortium (COG-UK) set up to deliver large-scale, rapid sequencing of SARS-CoV-2 and enabling it to process and store genomic data on a global scale. Most of us are familiar with the idea that mutations in RNA virus replication occur at a high rate, but how important is this? When mutations occur and persist at a level that leads to them being called 'variants' or 'strains' is not always clear. How the development of the UK 'Kent' strain and other variants are detected and what this means for transmission and virulence will be discussed.

### Impact of bacterial superinfections

We will then move on to consider two related clinical aspects of COVID-19. From the beginning of the pandemic there was much concern about bacterial superinfections, especially among patients in intensive care (ICU). Abundant data show that the majority of deaths caused

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by influenza during the 1918 pandemic were attributable to secondary bacterial pneumonias. When a preceding viral infection such as influenza or coronavirus impairs the innate and adaptive antibacterial host defences, *Streptococcus pneumoniae*, *Staphylococcus aureus* and other colonising bacteria can exploit this temporary compromise of a physical and immunological barrier to cause secondary bacterial pneumonias.

The extent to which this has occurred will be reviewed by Professor Jonathan Edgeworth (Guy's and St Thomas's Hospital, London). These hospitals have some of the largest ICUs in the country and have been trying to track the extent of secondary infections by cultural and molecular methods. Diagnosing co-infections is complex at the best of times and because there is a desire to minimise the exposure of COVID-19 to healthcare workers, diagnosing potential bacterial superinfections during COVID-19 has been particularly challenging.

Inevitably this will have led to widespread use of empiric therapy especially in countries that do not have good access to laboratory diagnostic facilities. Again, it's inevitable that this therapy will have been broad-spectrum, whether or not this approach is wise. Dr Timothy Rawson (NIHR Clinical

Research Fellow, Imperial College London) will talk about the implications of this approach and how it will impact on the development of antibiotic resistance worldwide.

### Vaccine issues

The virtual conference will conclude with a talk on vaccines. There are a huge number of different areas to cover in this one topic. For example, the basic science behind the development of the vaccines, particularly the BioNTech/Pfizer mRNA vaccine, is astonishing (see *Reverse Engineering the source code of the BioNTech/Pfizer SARS-CoV-2 Vaccine* <https://berthub.eu/articles/posts/reverse-engineering-source-code-of-the-biontech-pfizer-vaccine>).

Although technically impressive, who could have foreseen that even one let alone a handful of highly effective vaccines would have been developed and shown to be effective in large trials within one year? Arguably, it was predictable that there would be competition between different countries for a limited number of doses, although it's fair to think that few would have guessed the form it has taken.

Indeed, at the time of writing this introduction, less than two months before the conference, it is unclear what the

situation will be in May. We will be looking at lessons to be learned from the development of vaccines, trial design and how to interpret the results of trials in real life.

One thing is clear, and it brings us back to the beginning of our conference, only a global approach to the distribution of vaccines will stop the pandemic.

### May 2021, and looking toward 2022

We hope that you will register for, listen to and enjoy the talks on COVID-19, whether in real time or at a time convenient to you (register at <https://attendee.gotowebinar.com/register/2106007183917197836>). We also hope that you will be able to join us again at the Royal Air Force Museum at Hendon on Thursday 12 May 2022 when the BSMT will be convening a more traditional conference once again – COVID or another pandemic permitting!



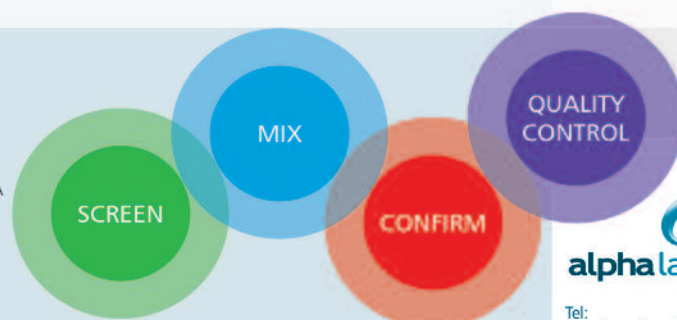
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For more information, visit the BSMT website ([www.bsmt.org.uk](http://www.bsmt.org.uk)) or email Valerie Bevan ([vbevan@bsmt.org.uk](mailto:vbevan@bsmt.org.uk)).

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