



THE YEAR THAT BEAT THE PANDEMIC?

With the end of 2020 approaching, we asked six experts what they expect to happen with coronavirus next year.

Back in March, the cover of the *Biomedical Scientist* magazine featured a science fiction-inspired image of coronavirus particles hurtling through space towards the earth, alongside the words “Global catastrophe?”

At the time of writing, there had only been two recorded deaths outside China due to COVID-19 – one in Hong Kong and one in the Philippines. Coronavirus was still an epidemic in its infancy.

We asked a group of experts if they believed a virus could cause global catastrophe. The broad consensus was it is certainly possible, but medical and social advances meant it was by no means inevitable.

Nine months on and the number of recorded global cases has topped 50 million, with more than 1.2 million deaths from COVID-19 (and the actual number of cases expected to be far, far higher).

As we near the end of the year, coronavirus is still raging around the world, with no sign of death and infection rates abating, but promising news of vaccine developments offers a faint glimmer of hope on the distant horizon.

It is against the backdrop of this bleak year, in which science fiction has become science fact, that we asked six immunology and virology experts what the next 12 months hold.

DAVID WELLS

Head of Pathology
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This year has been one like no other; the pandemic has changed the very way the world operates and has changed everyone’s lives in ways that would previously have been unthinkable in this country. To think that 2021 will be much different is perhaps being too optimistic currently, despite the news around the current performance of possible vaccines. The hard work that laboratory teams have experienced throughout 2020 will continue, as will the need for our teams to demonstrate their skills in innovating and adopting new techniques to ensure that we provide the scale of testing needed by our patients, staff and the wider community to tackle the virus. Different to 2020 is the optimism we will see as 2021 passes, as Professor Chris Whitty says, the number of shots on goal will take us forward in the fight. More and better public health approaches will see lockdowns far more nuanced allowing us to live more familiar lives, treatments will be more effective, and finally vaccines will begin the major shift in the global fight against the virus.

Next year will teach us resilience, as although we should be optimistic,

January and February are going to be tough as we go through winter and the second wave.

Spring will give us respite and time to regroup in our laboratory teams, it will also give us time to reflect on the



past 12 months, recognising our personal contributions, our teams’ efforts and also mourning those we have lost on the journey. The rest of the year will see our profession demonstrate how we

create a sustainable future, starting to put into place an infrastructure that allows us to scale a response to future pandemics. Next year will end feeling closer to the end of 2019, but different as we move into a new future forever changed by our exposure to COVID-19.

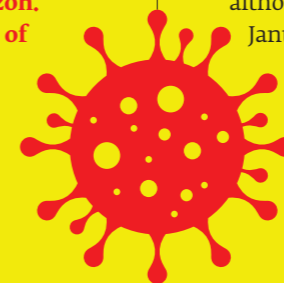
SALLY CUTLER

Professor of Medical Microbiology
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As the notable and somewhat bizarre year of 2020 draws to a close, our thoughts might wander towards the forthcoming year and how the current COVID-19 pandemic will influence our year ahead. For me, this falls into several categories:

- 1) Control of community viral spread where restrictions and compliance have been largely instrumental.
- 2) Addressing knowledge gaps in protective immunity that are key for the success of vaccination strategies and our on-going future of living with COVID-19.
- 3) Elucidating the pathogenesis of COVID-19 to understand the scientific basis for risks and bias according to human race, gender, age and vertebrate susceptibility factors for other species.
- 4) Living with the legacy of COVID-19 and defining “the new normal”.

The differential compliance to guidelines





made to reduce community transmission has been an eye-opener, and I am sure we are set to see more examples of flaunting rules in the year to come. Introducing behavioural change is challenging at the best of times, but many do not appear to comprehend the gravity or reasoning underpinning many of the efforts to reduce transmission. This has not been helped by differential rules in different places and the changes almost week by week. I strongly suspect that this will be an on-going concern as we enter 2021.

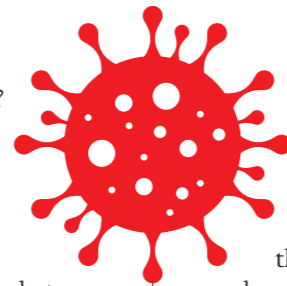
We have much still to learn from SARS-CoV-2, particularly regarding “immunity”, if this is indeed achievable. During 2021 we are likely to see the unveiling of various new vaccines that have been produced at an unprecedented speed, but the efficacy of these will probably not be realised until the new year. It is becoming increasingly apparent that natural infection does not necessarily generate a lasting immunity, with growing reports of re-infection.

Furthermore, we are beginning to realise that detection of antibodies does not equate to neutralising antibodies, and that antibody responses post-infection are highly variable and appear to wane rapidly. What is the cross-protection between the diversifying evolutionary

viral genotypes? Is sterile immunity an achievable goal? Will all vaccine recipients respond in a standard way when the response to natural infection is so highly varied? Indeed, if there are adverse consequences to vaccination, what will be the impact of this on vaccination not just against COVID-19, but other infectious diseases? At this point in time, we have the questions, but not the answers, with these likely to become more apparent in the forthcoming year.

Observational studies have revealed a huge disparity amongst those developing more severe infection consequences. The underpinning reasons for these findings require considerable research to further elucidate the pathogenesis of this virus and understand why immune dysregulation is seen in some cases but not others. Immense research funding is being ring-fenced for COVID-19-based research, with 2021 and beyond likely to unveil deeper understanding of these pathological mechanisms.

Lastly, 2021 is unlikely to see us put the lid back onto the “Pandora’s box”, but will need to see us adapt to a co-existence to our life living with SARS-CoV-2. I hope that with continuing community



transmission and the roll-out of vaccines the huge waves of infection we currently are enduring will be reduced to ripples, but suspect that this infection will be a lasting legacy that will co-exist with the human race throughout our time.

PHILLIPA BURNS Higher Scientific Specialist Trainee in Microbiology Hull University Teaching Hospitals

Just as I was putting pen to paper, the news broke that the Pfizer COVID-19 vaccine has proven efficacy and will be imminently presented to the FDA for approval, changing the entire content of my answer.

My optimism is cautious, a vaccine will not be a panacea, and is still some way off, but it is clearly a leap forward from our current position and a great day for science and humankind.

A vaccine offers us hope for the future, a chance to reconnect with families and friends, an end to lockdowns and restrictions and an end to unrelenting work pressures. And, at this point, many

of us need to know that there is a finish line, even if it is some way into the future.

In the year ahead, we will see some major studies report their findings and we will finally start to understand our new foe. I am looking forward to the results of SIREN, one of the few studies solely recruiting healthcare workers to establish if we, the frontline, develop immunity, even when we have mild or asymptomatic infection, and if immunity prevents re-infection. These are crucial questions for the safety of all healthcare workers.

So many COVID-19 treatment myths have been debunked this year, notably hydroxychloroquine. I hope we continue to challenge hypotheses through multicentre studies to ensure patient safety and to restore the public faith in experts.

We have made real progress in vaccine and drug development, necessity remaining the mother of invention, with the rising specialism of vaccinology, now firmly planted between infection and immunity, pushing us to re-write the rules of vaccine creation. I expect the advances made in the creation of the COVID-19 vaccine to

prompt research into other infectious agents that we believed were unbeatable.

We have learned to work in different ways, sharing early data and assay verifications, pushing the boundaries of our local networks to support services in need and bring testing parity for patients. I hope the rapid adoption of new technology and the sharing of resources continues in the year ahead, as I don’t think we have the reserves in the tank to cope with a difficult flu season.

I am sure in the year ahead there will be many commentaries and lessons to be learnt, reflection being the first step in planning for the future, but we need to remain proud of the leaps our profession has made in this short time frame. I hope that we will build on the professional momentum brought by the pandemic and that we inspire the future generations of aspiring scientists to pursue careers in biomedical science.

BAMIDELE FARINRE Senior Biomedical Scientist and STEM Ambassador London

Without an iota of doubt, the current pandemic has affected the whole world in a manner that means our lives will never be the same again. It has impacted our social behaviour – in our daily interactions, how we work, and learn. Furthermore, social distancing and lockdown measures have led to a more cautious existence, professionally and personally.

2021: A vaccine offers us hope for the future, a chance to reconnect with families and friends and an end to lockdowns

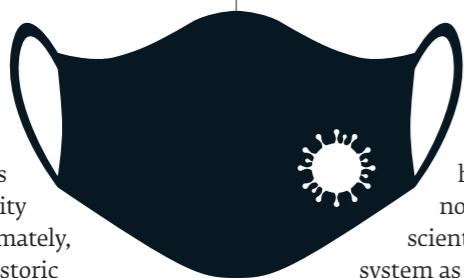
There's a surge in mental health issues as a result of COVID-19 affecting all age groups. The uncertainty surrounding how and when we can see our loved ones, when we can go on holidays and the inability to plan ahead is overwhelming.

Looking ahead into 2021, infection control measures and mitigating efforts will need to continue to avert a possible second major outbreak, especially in the winter months, which have been noted as a high transmission period. This is because people are more likely to stay indoors, where virus transmission through droplets is a bigger risk.

There's no clear-cut criterion that determines when the pandemic will be over and normalcy regained. With intermittent lockdowns, the future is full of unknowns; questions remain about how long we continue to wear masks and practise social distancing and whether rapid COVID-19 tests become widely available and properly deployed. Additionally, it depends on the arrival of a vaccine, and on how long the immune system stays protective after vaccination or recovery from infection.

In spite of all the advances in our healthcare system – including ambulance services, intensive care units, antiviral drugs, supportive care, epidemiology, global surveillance systems and the number of developments we've seen in the twentieth century – surprisingly we've still had to fall back on the sorts of measures that were proven to be effective in 1918 during the flu pandemic; these include good clinical care for victims, quarantine, social isolation and basic measures, such as masks and hand hygiene.

Importantly, some questions remain unanswered – whether people will develop lasting immunity to the virus and whether seasonality affects its spread. Ultimately, evidence from past historic



pandemics suggests that COVID-19 may have permanent cultural, economic and political effects. In conclusion, it is highly possible that personal behavioural changes – such as hand-washing and wearing masks – continue beyond strict lockdown, helping to curtail the tide of infections.

ELAINE CLOUTMAN-GREEN

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The Magic 8 Ball Says the Future = Outlook Not So Good.”

This may have been as it was happening as Boris Johnson announced a further lockdown and so the realities of this virus were very real again for everyone. Despite that, I believe there will be some positives that come out of the pandemic in 2021, so I thought I'd break it down so we can see some of the progress as well as continued issues.

The Good: Healthcare for a long time has been designed with the doctor or healthcare professional in mind, mostly because of the historical legacy of the NHS. This has often presented barriers to patients and also led to very set ways of working across the system, which often hasn't considered laboratory services. The pandemic has caused a rapid shift in delivery of services, both within and external to the laboratories. This has led to a breaking down of professional boundaries and silos. It has also led to the rapid implementation of technologies

that would have taken decades to introduce otherwise. This will be a new legacy, which, if harnessed, will benefit not only healthcare scientists but also the system as a whole.

The Bad: 2021 will not be a return to normal. I said to friends at the start of the pandemic that I thought we were in this for at least 18 months and now I think that was conservative. The vaccine, if and when it comes, will only be for sub-groups of the wider population. That means the virus will continue to circulate and the winter of 2021 is still likely to be challenging, if not as challenging as what we are currently facing in 2020. This means that there will continue to be high levels of workload and pressure upon laboratory staff and so it will be really important to find ways to support staff during this time.

The Ugly: The issues with testing that are undertaken by pillar 2 are still in the media being linked (mistakenly) with hospital testing. As the frustration with testing provision increases within the general population, it's going to be really crucial that we try to get the message out there about the wonderful work being done by our workforce. I hope that the knowledge and experience of the registered workforce will be harnessed to address some of the issues, but I worry that they won't.

SARAH PITT

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In the 21st century there have been a number of zoonotic viral infections leading to epidemics and pandemics. Examples include SARS-CoV, Influenza A H1 N1 (Swine 'flu) and Ebola, as well as SARS-CoV-2. The experience so far suggests that it takes humans 18 months to two years to catch up with the emerging virus and bring the infection under control. SARS-CoV was first identified towards the end of 2002 and the last cases of the infection were diagnosed in May 2004. There are big differences in the epidemiology of SARS-CoV-2, notably the role of asymptomatic patients in transmission, which has allowed the virus to spread globally. However, it is still likely that we will experience more infrequent and localised outbreaks of COVID-19

during 2021, rather than the large “waves” we have experienced during 2020.

Kit-manufacturing companies responded quickly to bring out a variety of tests for SARS-CoV-2. Prospective evaluation of assays is effectively going on in “real time” as they are being used for diagnosis. Over the next few months, we should develop a better understanding of which tests perform best in particular contexts. Also, how the tests for viral RNA, antigen and antibody each fit in to diagnostic algorithms will become clearer. It will also be important to evaluate which biochemical and haematological markers are useful in assessing and managing patients with serious COVID-19 infection.

The prospects for safe, effective vaccines



are looking promising. This will be one tool in the suite of measures to control SARS-CoV-2 and it will be important for IBMS members to explain the benefits of vaccination whenever the opportunity arises. Uptake for other vaccinations, such as MMR, might have been reduced during the middle of 2020, so there might be outbreaks of other infections for laboratories to diagnose. Since screening for cancers and other conditions was scaled back during the first lockdown, the volume of laboratory work related to those programmes might increase into 2021. People who have delayed seeking medical advice or treatment may need more intensive interventions, which will again involve clinical laboratories' various inputs in diagnosis and monitoring of their condition.

So biomedical and clinical scientists and their work will probably stay in the news for a while yet. We will probably have to continue with public health measures, such as social distancing and wearing masks in enclosed public spaces, for some months to come. However, let's hope that SARS-CoV-2 follows the same pattern of the other 21st century epidemic viruses and is more or less under control by mid-2021. It will be nice to get to a point where a small outbreak of COVID-19 in one town is in the news, but it is no longer the main headline. 