

# OMICRON-SPECIFIC VACCINES PROTECT AS MUCH AS CURRENT JABS

Updated COVID boosters have been approved in the United States and the United Kingdom.

By Ewen Callaway

**P**eople in the United States and the United Kingdom will soon be among the first to receive a new breed of COVID-19 vaccine. The hope was that these updated vaccines – based on Omicron variants of the virus SARS-CoV-2 – would offer substantially greater protection than the older vaccines based on the strain of the virus that emerged in 2019. But an analysis<sup>1</sup> suggests that the updated boosters offer much the same level of protection as an extra dose of the older vaccines does – particularly when it comes to keeping people out of hospital. The study was posted on the medRxiv preprint server on 26 August and has not been peer reviewed.

“This is not some kind of super-shield against infection compared to what you could have got two weeks ago or a month ago,” says John Moore, a vaccine scientist at Weill Cornell Medicine in New York City who was not involved in the modelling study. US and UK regulators should have taken the potential effectiveness of updated vaccines into account before authorizing them, Moore argues.

On 15 August, the United Kingdom became the first country to approve one of the new

‘bivalent’ vaccines, which is based on the Omicron BA.1 lineage and the sequence of the original SARS-CoV-2 identified in Wuhan, China, and will soon roll it out. And last week, the US government gave the green light to similar bivalent vaccines.

**“This is not some kind of super-shield against infection.”**

Large-scale efficacy trials showed that the first generation of COVID-19 vaccines reduced the risk of disease by more than 90% (refs 2,3). But such studies – which involved randomly assigning tens of thousands of people to receive either a vaccine or a placebo and then following these individuals to see who gets infected – are no longer practical, possible or ethical in 2022.

Updated COVID-19 vaccines have instead been trialled in smaller groups. To gauge their effectiveness, developers have typically measured participants’ immune responses, particularly levels of infection-blocking ‘neutralizing’ antibodies, and compared these with those of people who received another dose of the original vaccine.

Most of these trials found that the updated vaccines – based not only on Omicron, but also on older variants, including Beta – performed a bit better in terms of this measure than the original vaccines did. “This is a clearly superior booster,” Stephen Hoge, the president of pharmaceutical firm Moderna, based in Cambridge, Massachusetts, told investors on 8 June when touting such results from the company’s BA.1-based bivalent vaccine.

To try to make sense of results such as Moderna’s, researchers led by Deborah Cromer, a mathematical modeller at the University of New South Wales (UNSW) in Sydney, Australia, collected all of the updated vaccine-trial results they could find, as well as studies looking at the efficacy of fourth doses of the original vaccine.

Both vaccine types sent antibody levels skyrocketing, but the updated versions did so to levels that were, on average, 1.5-fold higher than those of older vaccines based on the original SARS-CoV-2 sequence. “We’re not talking about a step change,” Cromer says.

## Fewer hospitalizations

Studies suggest that higher levels of neutralizing antibodies equate to better protection against COVID-19. But it wasn’t clear from the updated vaccine trials how much more effective they might be.

To investigate this, Cromer’s team applied a model that she, UNSW immunologist Miles Davenport and their colleagues developed relating efficacy of the original COVID-19 vaccines to antibody levels<sup>4</sup>. The model found that most of the benefits provided by updated vaccines are conveyed by an extra dose of any vaccine.

For instance, in a population where half of people are already protected against a symptomatic SARS-CoV-2 infection through previous vaccination or infection, an updated vaccine booster bumped protection up to 90%, compared with 86% protection provided by an extra dose of the original jab. For protection against severe disease, however, the difference in protection was less than 1%.

At a population level, updated vaccines could make sense. Cromer’s team estimated that, for every 1,000 people, a booster campaign based on updated vaccines would result in 8 fewer hospitalizations, on average, than would one based on older vaccines. “If that translates to hospital beds saved and severe cases averted, that might be a sufficient level to warrant the recommendation for a variant-modified booster,” she says.

The relative benefits of variant-based boosters could grow stronger if pre-existing immunity is suddenly lowered by the appearance of a new variant. This occurred in December 2021, after the emergence of Omicron – and might happen again. In this scenario, an Omicron-based vaccine could provide better protection than older vaccines, says Cromer.

When the US booster campaign begins, it



COVID-19 booster jabs based on the Omicron coronavirus variant will soon be available.

is set to use Omicron vaccines different from the one approved by the United Kingdom. In June, an advisory committee to the US Food and Drug Administration (FDA) asked companies to develop bivalent vaccines that were based on the original strain and the BA.4 and BA.5 coronavirus variants – which have identical spike protein sequences – instead of the bivalent BA.1 vaccine that had been trialled by Moderna, Pfizer–BioNTech and others. The hope was that, by better matching circulating strains, the vaccines would prove more effective.

But Cromer's analysis suggests the differences might be paltry. Even updated vaccines based on the Beta and Delta variants should protect against BA.4 and BA.5 infections nearly as well as vaccines based on those variants. Similarly, bivalent vaccines that included the

original vaccine looked no more effective than vaccines based solely on a newer variant.

For these reasons, the FDA's decision to spurn a BA.1-based booster probably wasn't worth it, says Cromer, particularly given that SARS-CoV-2 continues to evolve. "It doesn't seem to suggest that it's going to give a dramatic improvement in the effectiveness of the booster vaccine to have that slight change."

Still, in the long run, it probably makes sense to develop variant-based vaccines, says Cromer. "The most important vaccine booster is the one that you actually get."

1. Khoury, D. S. et al. Preprint at medRxiv <https://doi.org/10.1101/2022.08.25.22279237> (2022).
2. Polack, F. P. et al. *N. Engl. J. Med.* **383**, 2603–2615 (2020).
3. Baden, L. R. et al. *N. Engl. J. Med.* **384**, 403–416 (2021).
4. Khoury, D. S. et al. *Nature Med.* **27**, 1205–1211 (2021).

# WELLCOME SAYS IT HAS PERPETUATED 'SYSTEMIC RACISM' IN SCIENCE

The research funder's admission has mostly been welcomed.

By Sarah Wild

**W**ellcome, one of the world's largest philanthropic funders of research, has allowed institutional racism to fester in the organization and is "perpetuating and exacerbating systemic racism" in the research sector, according to an independent evaluation of its efforts to become an anti-racist organization.

The report, published last month, comes after the March resignation of Wellcome's anti-racism expert group, whose members expressed their disappointment with the leadership's slow implementation of previously agreed anti-racism principles. It makes several recommendations for combating racism (see [go.nature.com/3rnxqcr](https://go.nature.com/3rnxqcr)).

"The issues encountered with Wellcome are not unusual," says Addy Adelaine, a specialist in making research inclusive who leads the non-profit organization Ladders4Action in Inverclyde, UK, which works for positive social change. "What's different is that Wellcome now seems to be embracing honest discussion and action," she says.

Responding to the findings, Wellcome director Jeremy Farrar announced a dedicated stream of research funding for people of colour, and said that when grant proposals have similar merit, the organization will favour funding researchers who increase the diversity

of its pool of grant recipients. "We have done too little to use this power to counter racial inequity in research," said Farrar in a press release announcing the report.

Wellcome – which spent £1.2 billion (US\$1.4 billion) on research in 2021 – will create a position on its executive leadership team dedicated to diversity, equity and inclusion (DEI).

**"We have done too little to use this power to counter racial inequity in research."**

The funder was one of several scientific organizations worldwide to make anti-racism pledges in the wake of the global Black Lives Matter protests in 2020. But diversity experts say that many organizations still need to take robust action on racism and equality.

"Unfortunately, most just stopped at commitments and proclamations," says Ngozi Erondu, an epidemiologist and public-health adviser at the policy institute Chatham House in London. Most universities and organizations have not done any follow-up to check whether there have been significant changes, she says.

DEI experts hope that Wellcome's actions will spur other global research organizations to review their own practices. Several UK

organizations, including the Royal Society of Chemistry in London and the prestigious London School of Hygiene & Tropical Medicine, have also published reports identifying racism in their ranks, and have pledged to revise their diversity and equity practices.

In many cases, students and researchers are pushing their organizations to acknowledge racism. "Black and global-majority researchers, inside and outside of academia, are using the power of the Internet as a platform for community organizing, holding organizations publicly accountable, making space for ourselves," says Erinma Ochu, a neuroscientist and immersive-media specialist who is joining the University of the West of England, Bristol, this month.

In 2020, ten Black women, including Adelaine, wrote an open letter to UK Research and Innovation (UKRI), Britain's central research funder, after a £4.3-million fund to explore COVID-19 and its disproportionate impact on Black, Asian and other minority-ethnic communities in the United Kingdom gave no grants to Black academics.

"We have already started implementing actions to bring about change, but we recognize we have more to do, and must move faster to tackle these long-standing structural and systemic inequalities," says Melanie Welham, UKRI's executive champion for DEI. A spokesperson pointed to the organization's efforts to create a DEI strategy, a draft of which is being revised after community consultation.

## Transatlantic efforts

The United States is facing a similar reckoning. An analysis published in July of funding rates at the US National Science Foundation (NSF) between 1996 and 2019 found that white principal investigators were more likely to get funded than were colleagues of colour (C. Y. Chen *et al.* Preprint at OSF <https://doi.org/h92r>; 2022). The NSF accepted the findings of the study, which was led by geochemist Christine Yifeng Chen at Lawrence Livermore National Laboratory in Livermore, California. Agency director Sethuraman Panchanathan "shares these concerns [about] systemic racial disparities in funding at the NSF and other federal agencies", *Science* reported (see [go.nature.com/3qais7z](https://go.nature.com/3qais7z)).

And in April this year, the Bill & Melinda Gates Foundation in Seattle, Washington, published its first report investigating DEI at the organization and its partners. The report, which considered employee surveys, interviews and data, found that although the foundation's staff had become more diverse, it still had several issues to address. These were notable in areas such as recruiting, management and performance assessment. "Foundation leaders expressed a strong commitment to DEI but often do not translate that into action," the report said.