

Study confirms effectiveness of bivalent COVID-19 vaccine

April 25 2024, by Julia Moióli



The study showed that the bivalent vaccine was better at neutralizing more recent viral variants, such as omicron and its subvariants. Credit: Fábio Rodrigues-Pozzebom/Agência Brasil

A major bivalent COVID-19 vaccine induces production of neutralizing

antibodies against the coronavirus that circulated at the start of the pandemic as well as subvariants of omicron, albeit less abundantly, according to a Brazilian study [reported](#) in the *Journal of Medical Virology*.

The study confirmed the [vaccine](#)'s effectiveness and its importance to control of the disease, while also showing that more than three years after the first application of a COVID-19 vaccine in Brazil, the vaccination model should be similar to that adopted for influenza, with frequent adjustments to the formulation to prioritize more recent variants.

This was the first research project conducted to evaluate the immunity induced by the Pfizer-BioNTech bivalent vaccine (COMIRNATY Original/omicron BA.4-5) in a group of Brazilian subjects. The scientists investigated the antibody neutralization response against different variants of SARS-CoV-2 using serum samples from 93 [healthy volunteers](#) (31 males and 62 females) aged between 16 and 84 years and living in Barreiras, Bahia state.

Some of the volunteers had previously been given three or four doses of monovalent vaccines based only on the original strain of the virus first identified in Wuhan, China, such as Coronavac (Butantan Institute/Sinovac), Covishield (Oxford/AstraZeneca), or those of Janssen and Pfizer. Others were also given as an extra booster the bivalent vaccine containing components of the original strain as well as omicron subvariants BA.4 and BA.5.

Serum samples collected from the volunteers were submitted to antibody neutralization assays using different strains of SARS-CoV-2: the original strain from the start of the pandemic; omicron (BA.1), predominant in

2021; and omicron subvariants FE.1.2 and BQ.1.1, predominant in Brazil more recently.

The study showed that the bivalent vaccine administered as a booster reinforced the [immune response](#) and was more effective in neutralizing omicron and its subvariants than in volunteers given only four shots of a monovalent vaccine. However, its main focus was still the original strain that predominated at the start of the pandemic, and the resulting competition limited medium- to long-term immunity against more recent variants, which are now more important epidemiologically.

"This was expected because [immune memory](#) is based on cells capable of recognizing fractions of the virus and is reinforced by the number of contacts with the contaminant. The immune system will naturally react more against what it already knows, and the participants given the bivalent vaccine had already taken three or four doses of a monovalent vaccine," said Jaime Henrique Amorim, last author of the article. Amorim is a professor at the Federal University of Western Bahia (UFOB) and a visiting researcher at the University of São Paulo's Biomedical Sciences Institute (ICB-USP).

Model for the future

"Controlling a virus with the high transmission capacity of SARS-CoV-2 requires equally high vaccine coverage," said Luís Carlos de Souza Ferreira, head of ICB-USP's Vaccine Development Laboratory and a co-author of the article. "The results of the study show that bivalent vaccines are effective to achieve immunity against subvariants of [omicron](#) and that their administration has been fundamental to control novel variants."

According to the researchers, another conclusion to be drawn from the findings is that future planning of vaccination policy should take into

account the fact that the immune response induced by existing vaccines is mainly to the original strain, which has ceased circulating since 2020, and vaccines should have their formulation adjusted so that they no longer include these components.

"Forthcoming doses should be designed to combat the variants that are circulating now, instead of those that have disappeared, so that immunity is updated and reinforced in accordance with the current epidemiological situation, as it already is in the case of influenza vaccines," Amorim said.

The joint first authors of the article are Milena Silva Souza and Jéssica Pires Farias, researchers at UFOB. The other co-authors are affiliated with institutions in Brazil and the United States.

More information: Milena Silva Souza et al, Neutralizing antibody response after immunization with a COVID-19 bivalent vaccine: Insights to the future, *Journal of Medical Virology* (2024). [DOI: 10.1002/jmv.29416](https://doi.org/10.1002/jmv.29416)

Provided by FAPESP

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