

ORT_03 - Humoral immunological status after heterologous boosts with COVID -19 vaccines: neutralizing antibodies and IgG avidity against ancestral or variants of SARS-CoV-2

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Introduction: Heterologous vaccine regimens have been widely discussed to improve the immunogenicity of COVID-19 vaccines and reduce hospitalization and death from severe disease. The humoral response plays a critical role in providing protection. However, there is a real concern about variants of concern (VOC) of SARS- CoV-2 that may be able to evade antibodies and promote reinfection.

Objectives: This study aims to evaluate the humoral status of volunteers immunized against COVID-19 vaccines regarding the neutralizing antibodies (Nabs) levels, as well as, to measure the IgG avidity index (AI%) against the ancestral strain or its Delta and Omicron VOCs of SARS-CoV-2.

Methodology: Serum from 60 individuals who received a full immunization schedule from the Public Health of Brazil (5 doses) was tested for neutralizing antibodies (Nabs) against SARS-CoV-2. The individuals received two doses of the ChAdOx1 nCov-19 vaccine, followed by three heterologous boosters, with the last dose being the mRNA bivalent Pfizer vaccine. Nabs were quantified using PRNT using wild-type (WT), Delta, and Omicron BA.1 variants of SARS-CoV-2. The AI% was measured using an in-house ELISA, with S-recombinant protein from the same SARS-CoV-2 used here, and 8M of urea for 15'. Statistical analyses were performed using GraphPad Prism 5 software.

Results: The data showed a significant increase in Nab levels against both VOCs ($p < 0.0001$) when compared 2nd dose against bivalent booster. On the other hand, no differences were observed in Nab titers between WT and variants after last immunization. All individuals presented high IgG avidity against Delta and Omicron VOCs only after bivalent booster ($p < 0.0001$), but WT already rise AI% after 2nd vaccination ($p < 0.0001$). We observed positive correlations between Nab levels and AI% against WT ($p < 0.0001$; $r = 0.7436$) and Delta ($p < 0.0001$; $r = 0.7851$), however not against Omicron.

Conclusion: The bivalent vaccine booster significantly increased the immune response against WT, Delta and Omicron VOCs. There was a positive correlation between specific Nabs and avidity for all tested viruses, except for Omicron. This may be due to the majority of vaccinees not having natural immunity to Omicron, requiring more time or immunizations for IgG maturation.

Keywords: Omicron VOC; Neutralizing antibodies; Avidity