Humoral and cellular responses to SARS-CoV-2 Omicron infection in vaccinated and antigen-naïve individuals

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Introduction

SARS-CoV-2 Omicron variants, which dominate the COVID-19 pandemic since early 2022, are B cell immune escape variants that elude the defence mechanisms induced by first-generation vaccines or infection with earlier variants. This study investigated the effect of Omicron infections on the humoral and cellular immunity in COVID-19-vaccinated versus antigen-naïve individuals.

Methods

Blood samples were collected from triple-vaccinated (ChAdOx1/BNT162b2/BNT162b2) individuals without (n = 13) or with (n = 12) vaccinated (ChAdOx1 / BNT162b2 / BNT162b2) versus antigen-naïve individuals.

Results

Omicron breakthrough infection and from unvaccinated individuals after Omicron (n = 15) or Wuhan infection (n = 15). Anti-spike IgG was measured using the EUROMMUN Anti-SARS-CoV-2 QuantVac ELISA and OMICRON ELISA, which are based on the S1 domain of the Wuhan and Omicron variant, respectively. Interferon-gamma (IFN-γ) release was quantified using the EUROMMUN Quan-T-Cell SARS-CoV-2 kit employing stimulation tubes with antigens derived from the Wuhan S1 protein, and compared to alternative stimulation tubes containing Omicron S1 antigen.

Conclusion

There are substantial differences in immunity after Omicron infection in vaccinated and unvaccinated individuals. Considering the gradual decrease in immunity over time, unvaccinated individuals post Omicron infection are likely to have poor cross-protection against existing and possibly emerging SARS-CoV-2 variants. The detection of Omicron-induced immune responses in primed and antigen-naïve individuals supports the use of Omicron-adapted COVID-19 vaccines.