THE BEST OF THE WEEK (20 mar – 27 mar 2023)

TomohiroTakano et al.

Heterologous SARS-CoV-2 spike protein booster elicits durable and broad antibody responses against the receptor-binding domain

Nature, March 2023; doi.org/10.1038/s41467-023-37128-1

Abstract

The immunogenicity of mRNA vaccines has not been well studied when compared to different vaccine modalities in the context of additional boosters. Here we show that longitudinal analysis reveals more sustained SARS-CoV-2 spike receptor-binding domain (RBD)-binding IgG titers with the breadth to antigenically distinct variants by the S-268019-b spike protein booster compared to the BNT162b2 mRNA homologous booster. The durability and breadth of RBD-angiotensin-converting enzyme 2 (ACE2) binding inhibitory antibodies are pronounced in the group without systemic adverse events (AEs) after the S-268019-b booster, leading to the elevated neutralizing activities against Omicron BA.1 and BA.5 variants in the stratified group. In contrast, BNT162b2 homologous booster elicited antibodies to spike N-terminal domain in proportion to the AE scores. High-dimensional immune profiling identifies early CD16+ natural killer cell dynamics with CCR3 upregulation, as one of the correlates for the distinct anti-RBD antibody responses by the S-268019-b booster. Our results illustrate the combinational effects of heterologous booster on the immune dynamics and the durability and breadth of recalled anti-RBD antibody responses against emerging virus variants.

VéroniqueBarateau et al.

Prior SARS-CoV-2 infection enhances and reshapes spike protein–specific memory induced by vaccination

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Abstract

The diversity of vaccination modalities and infection history are both variables that have an impact on the immune memory of individuals vaccinated against SARS-CoV-2. To gain more accurate knowledge of how these parameters imprint on immune memory, we conducted a long-term follow-up of SARS-CoV-2 spike protein–specific immune memory in unvaccinated and vaccinated COVID-19 convalescent individuals as well as in infection-naïve vaccinated individuals. Here, we report that individuals from the convalescent vaccinated (hybrid immunity) group have the highest concentrations of spike protein–specific antibodies at 6 months after vaccination. As compared with infection-naïve vaccinated individuals, they also display increased frequencies of an atypical mucosa-targeted memory B cell subset. These individuals also exhibited enhanced TH1 polarization of their SARS-CoV-2 spike protein–specific follicular T helper cell pool. Together, our data suggest that prior SARS-CoV-2 infection increases the titers of SARS-CoV-2 spike protein–specific antibody responses elicited by subsequent vaccination and induces modifications in the composition of the spike protein–specificmemory B cell pool that are compatible with enhanced functional protection at mucosal sites.