Immunogenicity of a BNT162b2 vaccine booster in health-care workers

The Pfizer-BioNTech mRNA COVID19 vaccine (BNT162b2) was found to be highly efficacious against symptomatic SARS-CoV-2 infection, with a vaccine efficacy of 94% in a randomised clinical trial[1] and an effectiveness of 94–95% in real-world studies in Israel.[2] Similar effectiveness rates (97% against symptomatic infection and 86% against asymptomatic infection) were found in health-care workers.[3] Waning vaccine effectiveness, concurrent with the spread of the delta (B.1.617.2) variant, prompted the Israeli Ministry of Health to recommend, in early August 2021, a booster dose for individuals aged 60 years or older who were administered a second dose of the vaccine at least 5 months earlier.

Herein, we report on the effect of a third dose of BNT162b2 on anti-SARS-CoV-2 IgG concentrations in employees of the Tel-Aviv Medical Center, vaccinated between Aug 1 and Aug 18, 2021. Anti-spike protein concentrations were established with the ADVIA Centaur SARS-CoV-2 IgG assay, which provides an index value up to 150·00, where an index equal to or greater than 1·00 is considered reactive (positive) for SARS-CoV-2 IgG antibodies. The study was approved by the Tel-Aviv Medical Center institutional review board (approval number TLV-21–0576).

A total of 346 health-care workers received a BNT162b2 booster dose. The median age was 67 years (IQR 64–73 years); 215 were women and 131 were men. The median time between the first and third vaccine doses was 32·0 weeks (IQR 31·7–32·1 weeks). All workers had their antibody concentrations measured at baseline, and a second sample was obtained approximately 10 days after the booster dose was administered (median 10 days, IQR 10–11 days). The median ADVIA Centaur SARS-CoV-2 IgG index at baseline was 3·67 (IQR 2·00–7·10), and increased to >150 (the upper limit of quantification) in 95·7% of vaccine recipients (appendix). Only two recipients were non-reactive after immunisation for reasons that are as of yet unknown (a follow-up study is ongoing). No serious adverse events were reported.

Some studies published over the past 4 months described the immunogenicity of a third dose of COVID-19 vaccines in immunosuppressed organ-transplantation recipients.[4,5] To the best of our knowledge, this work is the largest report of a third dose of BNT162b2 vaccine in health-care workers. Our results show high vaccine immunoreactivity in health-care workers, who are generally immunocompetent. Further follow-up is needed to ascertain the effect of a third dose on clinical outcomes such as symptomatic illness, hospitalisation, and death.

We declare no competing interests.

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1 Dagan N, Barda N, Kepten E, et al. BNT162b2 mRNA Covid-19 vaccine in a nationwide mass vaccination setting. *N Engl J Med* 2021; **384:** 1412–23.
2 Haas EJ, Angulo FJ, McLaughlin JM, et al. Impact and effectiveness of mRNA BNT162b2 vaccine against SARS-CoV-2 infections and COVID-19 cases, hospitalisations, and deaths following a nationwide vaccination campaign in Israel: an observational study using national surveillance data. *Lancet* 2021; **397:** 1819–29.
3 Angel Y, Spitzer A, Henig O, et al. Association between vaccination With BNT162b2 and incidence of symptomatic and asymptomatic SARS-CoV-2 infections among health care workers. *JAMA* 2021; **325:** 2457.
4 Hall VG, Ferreira VH, Ku T, et al. Randomized trial of a third dose of mRNA-1273 vaccine in transplant recipients. *N Engl J Med* 2021; **385:** 1244–46.
5 Kamar N, Abravanel F, Marion O, Couat C, Izopet J, Del Bello A. Three doses of an mRNA Covid-19 vaccine in solid-organ transplant recipients. *N Engl J Med* 2021; **385:** 661–62.

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See **Online** for appendix