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CORRESPONDENCE

Comparison of S1 antibody titers between BNT162b2 and ChAdOx1 COVID-19 vaccination in cancer patients

Patients with cancer who develop SARS-CoV-2 infections are susceptible to severe outcomes and were prioritized during the COVID-19 vaccination strategy.[1] Low antibody responses have been reported after BNT162b2 vaccination in cancer patients, however, but still higher as compared with the ChadOx1 vaccination, consistent with the modestly reduced effectiveness of the ChadOx1 vaccine in the general population.[2,3] A 12-week extended interval, however, was used for BNT162b2. This study is the first to report differences in the humoral response 28 days post-booster dose in cancer patients vaccinated with either BNT162b2 (Pfizer-BioNTech, Puurs, Belgium) or ChAdOx1 (AstraZeneca, Seneffe, Belgium) following the vaccine interval recommendations of the World Health Organization.

Blood samples pre-priming and 28 days after the second dose were collected from patients included in the prospective B-VOICE (EudraCT 2021-000300-38) and Tri-VOICE plus (EudraCT 2021-003573-58) studies. Priming and booster dose were administered with an interval of 21 days $\pm$ 2 days for 95% and 24-27 days for 5% of the subjects for BNT162b2 (2 $\times$ 30 μg) and 12 weeks $\pm$ 10 days for 90% and 8-10 weeks for 10% of the subjects for ChAdOx1 vaccination (2 $\times$ 0.5 ml). Subjects with a solid tumor (77.7%) were divided into three treatment cohorts: chemotherapy, immunotherapy, and targeted/hormonal therapy. A differentiation for hematologic patients (19.7%) was made between patients receiving rituximab and patients who have undergone hematopoietic stem cell transplantation more than 1 year ago. Therapy cohorts were based on the type of antineoplastic treatment the patients received at the time of the priming dose. Anti-S1 antibody titers were tested using the Atellica IM SARS-CoV-2 IgG (sCOVG) assay (Siemens Healthineers, Erlangen, Germany) pre-priming and 28 days post-booster (Supplementary Table S1, available at https://doi.org/10.1016/j.esmoop.2022.100414). Log-transformed immunoglobulin G titers were compared using a *t*-test with Bonferonni multiple testing correction.

Significantly lower antibody titers were observed in oncohematological patients 28 days after the second dose of ChAdOx1 {$n = 159$; geometric mean titer (GMT) 6.46 U/ml [95% confidence interval (CI) 4.96-8.40 U/ml]} compared with BNT162b2 vaccination [$n = 186$; GMT 19.35 U/ml (95% CI 14.38-26.05 U/ml), $P < 0.05$] (Figure 1A, Supplementary Table S1, available at https://doi.org/10.1016/j.esmoop.2022.100414). The differences remained present after exclusion of 22 participants (6.4%) with detectable pre-priming antibody titers. Subanalysis showed significantly lower post-booster antibody titers after ChAdOx1 compared with BNT162b2 vaccination in patients receiving immunotherapy [5.28 U/ml (95% CI 2.58-10.82 U/ml) versus 35.0 4 U/ml (95% CI 13.82-88.86 U/ml), $P < 0.05$] and targeted/hormonal therapy [8.38 U/ml (95% CI 5.84-12.03 U/ml) versus 63.81 U/ml (95% CI 48.03-84.77 U/ml), $P < 0.05$]. In contrast, antibody titers were not significantly different between both vaccine types in patients receiving chemotherapy or in hematologic patients (Figure 1B).

While both BNT126b2 and ChAdOx1 vaccines elicit a clear antibody response, dual-dose BNT162b2 elicits higher anti-S1 antibody levels compared with dual-dose ChAdOx1 vaccination in our cancer population. This observation does not necessarily translate into reduced protection after ChAdOx1, however, as no correlate of protection has yet been defined. Significant differences between antibody responses after dual dose BNT162b2 and ChAdOx1 vaccination were seen in patients receiving targeted/hormonal therapy and immunotherapy, but not in other treatment cohorts. Hence, it is unsure how these differences might affect cellular immunity and neutralizing antibody titers against the Wuhan SARS-CoV-2 strain and the different occurring SARS-CoV-2 variants. Given the additional value of the administration of a third vaccination dose in cancer patients, however, as shown in recent studies, a third dose of BNT162b2 after full ChAdOx1 vaccination might be prioritized in cancer patients.[4,5]

P. A. van Dam[1,2†], Y. Debie[1,2†], L. Teuwen[1], L. Verbruggen[1], G. Vanhoutte[1], B. Peeters[3], L. Croes[2,4], C. Vulsteke[2,4], S. Anguille[1], T. Vandamme[1,2†] & M. Peeters[1,2†]*

[1]*Multidisciplinary Oncological Center Antwerp (MOCA), Antwerp University Hospital, Edegem;*
[2]*Center for Oncological Research (CORE), Integrated Personalized and Precision Oncology Network (IPPON), University of Antwerp and Antwerp University Hospital, Edegem;*
[3]*Department of Laboratory Medicine, Antwerp University Hospital, Edegem;*
[4]*GeIntegreerd Kankercentrum Gent (IKG), AZ Maria Middelares, Ghent, Belgium*
(*E-mail: marc.peeters@uza.be).
†Equally contributing.

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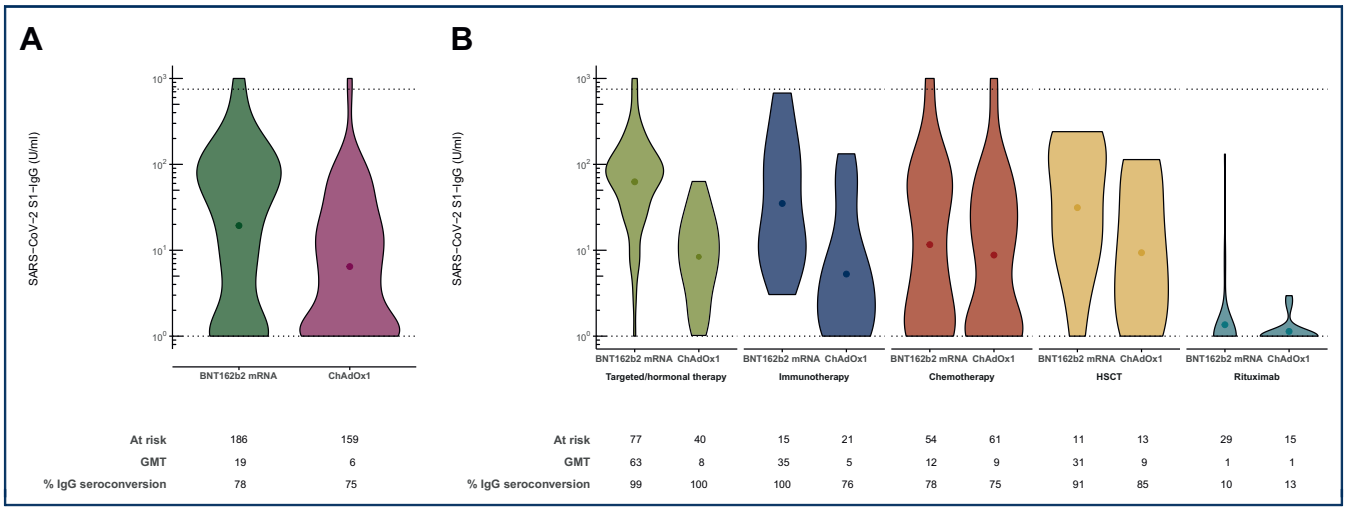

Figure 1. Humoral immune response 28 days post-booster dose in cancer patients vaccinated with the BNT162b2 or ChAdOx1 vaccine. Violin plots of log-transformed SARS-CoV-2 anti-S1 IgG antibody titers 28 days after booster dose in the entire study population (panel A) and in different treatment cohorts (panel B). Inside each violin plot, the geometric mean titer (GMT) is depicted as a point. Anti-S1 IgG-class antibody titers were quantified using a SARS-CoV-2 immunoassay, Siemens Healthineers Atellica IM SARS-CoV-2 IgG (sCOVG) assay for the detection of antibodies (units/ml). The measuring interval is 1.00-750.00 U/ml; values below this interval were imputed to 1.00 U/ml, values above this interval were imputed to 1000 U/ml with dotted lines indicating lower limit of quantitation (LLQ) and upper limit of quantitation (ULQ), respectively.
HSCT, hematopoietic stem cell transplantation; IgG, immunoglobulin G.

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DISCLOSURE

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