Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the Editor

Seroconversion after SARS-CoV-2 mRNA booster vaccine in cancer patients

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In the SINFONIA-V study published in the December 2021 edition of the *European Journal of Cancer*, we sowed that a 5.8% fraction of patients with solid tumours undergoing anticancer treatment do not achieve seroconversion after primary (two doses) SARS-CoV-2 messenger RNA (mRNA) vaccination with BNT162b2 or mRNA-1273 (10/171 individuals); this was significantly different compared with 0.2% of controls without cancer ($P < 0.001$) [1,2]. We report here updated data with the analysis of post-booster serological status in these patients (n = 10). Interestingly, we found that among 6 evaluable individuals with pre-boosting confirmed seronegativity, 2 (33%) developed anti-spike antibodies after boosting, whereas the remaining showed persistent seronegative status (Table 1). The median follow-up from booster to sampling was 21 days [8–35]. A percentage of rescue by boosting has been demonstrated in other studies, but with higher incidence [3]. Indeed, Ligumsky *et al.* recently reported that in patients with solid tumours who lacked immunisation after primary SARS-CoV-2 vaccination, seroconversion took place after booster in 85% of 20 initially seronegative patients [3]. It should be acknowledged that no conclusions can be drawn based on such limited sample size. However, as the two cohorts were similar in terms of cancer type (100% solid tumours), median primary-to-booster time (200 versus 210 days), proportion receiving anticancer treatment (83% versus 100%), and prevalence of cytotoxic drugs in therapeutic regimens (67% versus 63%), we estimated the probability of seroconversion after booster in the pooled vaccine-refractory solid tumour population. In particular, our study leads to an estimate of 35.7% of seroconversion probability (95% confidence interval [CI] 7.7–71.4%), whereas combined data with Ligumsky as a prior show a final estimate posterior of 73.1% (95% CI 54.9–87.9%). In light of the few data available, such seroconversion probability has a wide uncertainty. However, both studies point in the same direction, showing an additional, although incomplete, efficacy of booster

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Table 1
Post-booster serologic status of cancer patients lacking immunisation after primary SARS-CoV-2 vaccination (SINFONIA-V study) [1].

Patients	Serology status after boosting	Age	Gender	Comorbidities	ECOG PS	Primary tumour	Stage	Cancer therapy at the time of primary vaccination	Cancer therapy at the time of boosting	Booster vaccine type
1	Negative	65	Female	No	0	Breast	Resected	Doxorubicin + cyclophosphamide	No therapy	mRNA-1273
2	Negative	73	Female	Endocrine, autoimmune	1	Breast	Metastatic	Everolimus + exemestane	Everolimus + exemestane	mRNA-1273
3	Negative	60	Male	No	3	Colorectal	Metastatic	FOLFOX + panitumumab	FU/FA + panitumumab	BNT162b2
4	Negative	75	Female	Cardiovascular, diabetes, endocrine	2	Colorectal	Metastatic	FOLFOX + panitumumab	FU/FA + panitumumab	BNT162b2
5	Positive	65	Female	Cardiovascular	1	Colorectal	Metastatic	FOLFOX + bevacizumab	FU/FA + bevacizumab	BNT162b2
6	Positive	53	Male	No	2	NSCLC	Metastatic	Carboplatin + pemetrexed	Docetaxel	BNT162b2

ECOG = Eastern Cooperative Oncology Group; FOLFOX = 5-fluorouracil, leucovorin, oxaliplatin; FU/FA = fluorouracil and leucovorin; NSCLC = non–small cell lung cancer; PS = performance status.

vaccination in this population. Furthermore, such data are consistent with another recently published report in a mixed onco-haematologic population, showing 56% seroconversion [4]. In conclusion, although a variable percentage of patients with solid tumours display immunisation after booster despite seronegativity after previous primary vaccine, there is a subpopulation who persistently fails to achieve seroconversion (roughly one-third of those who remained seronegative after primary vaccination) [1,3,4]. This finding is concerning, as boosters are the leading strategy to enhance immunisation. Further investigation is warranted in this population. In particular, pooling data into consortium efforts would allow to better characterise immune response in patients with cancer since individual analyses are underpowered to assess patient and treatment subgroups in detail. This would also support the sharing of knowledge and resources on immunological and computational analyses to better dissect this vulnerable population.

Conflict of interest statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

[1] Amatu A, et al. Impaired seroconversion after SARS-CoV-2 mRNA vaccines in patients with solid tumours receiving anti-cancer treatment. Eur. J. Cancer Oxf. Engl. 1990 2021;163:16–25.
[2] Pani A, et al. Antibody response to BNT162b vaccine is almost universal in health care workers. Results from the RENAISSANCE study: REsponse to BNT162b2 COVID-19 vacciNe - short and long term Immune reSponSe evAluatioN in healthCare workErs. Mayo Clin Proc 2021. https://doi.org/10.1016/j.mayocp.2021.08.013.
[3] Ligumsky H, et al. Immunogenicity and safety of BNT162b2 mRNA vaccine booster in actively treated patients with cancer. Lancet Oncol 2021;S1470-2045(21)00715–4. https://doi.org/10.1016/S1470-2045(21)00715-4.
[4] Shapiro LC, et al. Efficacy of booster doses in augmenting waning immune responses to COVID-19 vaccine in patients with cancer. Cancer Cell 2022;40:3–5.