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Immunogenicity of the mRNA-1273 SARS-CoV-2 vaccine in cancer patients receiving immunotherapy agents

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Background: Little is known about the influence of different antitumor caretters in the immunogenicity, efficacy, and safety of SARS-CoV-2 vaccines. Particularly, immunotherapy could increase the rate of response to COVID-19 vaccines, counteracting its immunosuppression and restoring T-cell competence.

Methods: We conducted an observational study to assess the immunogenicity of mRNA-1273 SARS-CoV-2 vaccination in patients with solid tumours treated with immunotherapy. Blood samples were collected to analyse the humoral (specific anti-spike IgG) and cellular response (IFN-g producing CD4+ and CD8+ T-cells after stimulation with structural viral proteins) at baseline (BL), after the first vaccine dose (1D) and after the second vaccine dose (2D). Patients with previous COVID-19 or positive serology were excluded.

Results: The characteristics of the 25 patients included were: median age 65.9 years (IQR 56.2 – 72.8); 48% female; 28% with genitourinary tumours, 20% melanoma, 16% lung cancer and 36% with other tumours; 92% stage IV, treatment with anti-PD1 in 64%, with anti-PD-L1 in 24% and with a combination of anti-CTLA4 plus anti-PD1/PD-L1 in 12%. Median anti-spike (S) IgG titres were 95 AU/ml (IQR 0.3 – 23.3) at BL, 544.2 IU/ml (IQR 239 – 995.5) after 1D and 1428.1 IU/ml (IQR 857.0 – 28717.9) after 2D. Humoral response (cut-off point = 50 AU/ml) was significantly improved reaching 94.4% after 1D and 100% after 2D (p < 0.001). Of note, cellular response at BL was found in 20% and 25% for CD4+ and CD8+ anti-S T-cells respectively, suggesting cross-reactivity. After 2D of vaccine, CD4+ and CD8+ T-cell response was observed in 58.4% (p < 0.01) and 64.7% (p < 0.03), respectively. Nevertheless, excluding patients with previous positive serology or and cross-reactive cellular response, only 41.7% and 58.3% had CD4+ or CD8+ anti-S T-cell response, respectively. Overall, there were no severe reactions to the vaccine.

Conclusions: Our study shows that patients with solid tumours treated with immunotherapy agents achieve a robust humoral response but, contrary to what was expected, no cross celler response against SARS-CoV-2 after full vaccination. Alternative treatment strategies are needed to improve the immunogenicity of SARS-CoV-2 vaccines for these patients.

Legal entity responsible for the study: Ramón y Cajal Institute for Health Research (IRCIS).

Funding: Ramón y Cajal Institute for Health Research (IRCIS).

Disclosure: All authors have declared no conflicts of interest.

https://doi.org/10.1016/j.annonc.2021.10.130