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Letter to the Editor

# Improved immunogenicity against SARS-CoV-2 in a solid-organ transplant recipient by switching vaccines

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*To the Editor*

Immunosuppressed individuals have been excluded from most pivotal vaccination trials. Recent studies by Boyarsky et al. and Rozen-Zvi et al. have shown that solid-organ transplant recipients show considerably less immunogenicity to currently available severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) mRNA vaccines (BNT162b2 and mRNA-1273 vaccines). Only 54% (Boyarsky et al.) and 36.4% (Rozen-Zvi et al.) of individuals produced detectable anti-spike antibodies after two doses of an mRNA vaccine compared to 100% seroconversion observed in pivotal vaccination trials. This lack of immunogenicity seems to be most pronounced for individuals taken anti-metabolite maintenance immunosuppression [1,2].

Improving the immune response by mixing different vaccines has recently been proposed [3]. Studies that are investigating a combination of different types of vaccines to improve the immune response are under way. However, these studies do not focus on immunosuppressed individuals or non-responders (CombivacS trial), or they even exclude immunosuppressed individuals (Com-COV and Com-COV2 studies), and the results are pending [3,4].

We report here the case of a female Austrian individual (47 years old) who received two kidney transplants (the first in 1989 and the second in 2005) due to systemic lupus erythematosus. She is under continuous stable therapy with sirolimus (1 mg), mycophenolate mofetil (500 mg twice daily) and prednisolone (2.5 mg). She received a first shot of the mRNA vaccine BNT162b2 on 12th January 2021 and the second shot on 2nd February with the same vaccine (Fig. 1). On 3rd March a neutralizing antibody test was conducted which was only slightly positive with an antibody titre of 1:10, and on 9th March, 5 weeks after the second vaccine shot, no antibodies could be detected with an anti-spike antibody test (SARS-CoV-2 IgG ELISA by Euroimmun).

Because of the lack of a marked antibody response, on 30th March one shot of the AZD1222 vaccine was administered. Remarkably, 28 days after this vaccination another anti-spike antibody test (SARS-CoV-2 spike antibody test by Roche) detected 1963 U/mL of antibodies, and a neutralizing antibody test conducted on 20th May showed an antibody titre of 1:160.

Evidence regarding correlates of protecting immunity against COVID-19 is scarce and inconclusive. However, the main body of evidence suggests that neutralizing antibodies correlate well with protective immunity [5]. Therefore, the low neutralization titre after the second dose of BNT162b2 indicates that protective immunity was not reached.

This remarkable case indicates that combining different SARS-CoV-2 vaccines might lead to an increased immune response in immunosuppressed and immunocompromised individuals. However, administration of a third booster dose, independent of the type of vaccine, might also explain the observed improved immune response.

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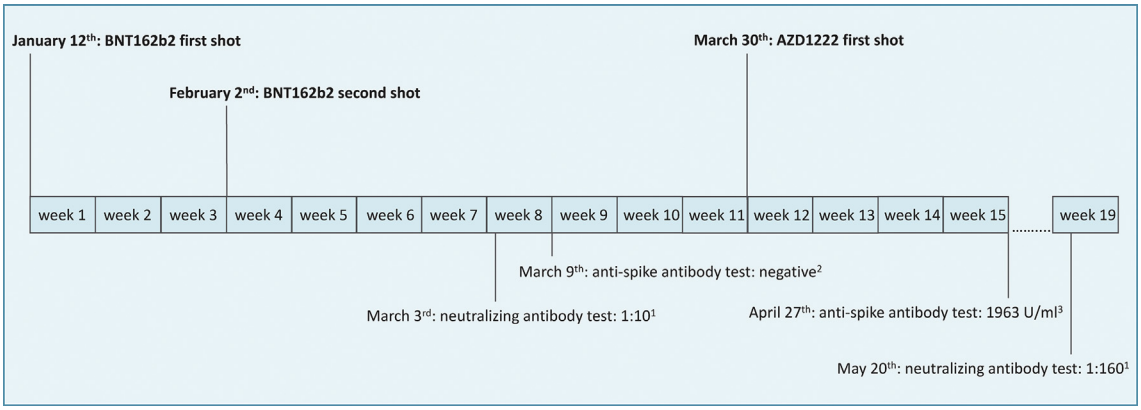


**Fig. 1.** Chronology of vaccinations and antibody testing.

Of note, detailed memory B-cell and T-cell responses were not studied. Systematic studies for mixing vaccines and evaluating immune response in this population are warranted.

## Author contributions

VaJ: writing—original draft, visualization. SS: resources, writing—review and editing. MZ: conceptualization, writing—review and editing, supervision.

## Transparency declaration

The authors have no conflict of interest to declare. No external funding was received for this work.

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