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Six Month Antibody Kinetics and Durability in SARS-Cov-2 mRNA Vaccinated Solid Organ Transplant Recipients

Jennifer L. Alejo, MD¹, Jonathan Mitchell, MBBS¹, Teresa P-Y. Chiang, MD, MPH¹, Aura T. Abedon, BS¹, Carolyn N. Sidoti, BS¹, Brian J. Boyarsky, MD PhD¹, Robin K. Avery, MD², Aaron A.R. Tobian, MD, PhD³, Macey L. Levan, JD, PhD^{1,4}, Daniel S. Warren, PhD¹, Allan B. Massie, PhD MHS^{1,5}, Jacqueline M. Garonzik-Wang, MD, PhD⁶, Dorry L. Segev, MD PhD^{1,5}, William A. Werbel, MD²

⁽¹⁾Department of Surgery, Johns Hopkins University School of Medicine, Baltimore, MD.

⁽²⁾Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, MD.

⁽³⁾Department of Pathology, Johns Hopkins University School of Medicine, Baltimore, MD.

⁽⁴⁾Department of Acute and Chronic Care, Johns Hopkins University School of Nursing, Baltimore, MD.

⁽⁵⁾Department of Epidemiology, Johns Hopkins School of Public Health, Baltimore, MD.

⁽⁶⁾Department of Surgery, University of Wisconsin School of Medicine & Public Health, Madison, WI.

We previously reported overall stability of SARS-CoV-2 anti-spike antibodies in vaccinated solid organ transplant recipients (SOTRs) three months after receiving two doses of BNT162b2 or mRNA-1237 vaccines ¹. In the interim, the FDA fully authorized the BNT162b2 vaccine for people 16 years and older and expanded Emergency Use Authorization to allow for a third dose in immunocompromised individuals ². The CDC currently recommends an additional dose for mild to moderately immunocompromised patients at least 28 days following mRNA dose two, but optimal timing for booster doses in SOTRs has not been determined ³. Declines in SARS-CoV-2 antibodies over time were observed three months post-vaccination in the general population ⁴, but antibody longevity in SOTRs is unknown. We measured anti-spike antibody titers in SOTRs for 6 months

Correspondence Dorry Segev, M.D., Ph.D., Associate Vice-Chair of Research, Department of Surgery, Johns Hopkins Medical Institutions, Director, Epidemiology Research Group in Organ Transplantation, 2000 E. Monument Street, Baltimore, MD 21205, 410-502-6115 (tel) 410-614-2079 (fax), dorry@jhmi.edu.

AUTHORSHIP STATEMENT

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work: JLA, JM, TPC, ATA, CNS, BJB, RKA, AAT, MLL, DSW, ABM, JMG, DLS, WAW.

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DISCLOSURE

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after completing a two-dose mRNA series. The assays, (previously described) (1), were performed 1, 3, and 6 months after dose two. Participants provided informed consent, and this study was approved by the Johns Hopkins Institutional Review Board (IRB00248540).

312 SOTRs received a second mRNA vaccine between January 6th, 2021, and April 14th, 2021. None reported a third dose during the study period. Median (interquartile range, IQR) age was 62 (48, 69) years, 65% were female, and 92% were white. 156 (50%) were kidney transplant recipients, median time from transplant was 7.2 (3.3, 14.3) years. Regarding immunosuppression, 224 (72%) were taking an anti-metabolite, 250/312 (80%) tacrolimus, and 169/312 (54%) steroids. At median 29 (28-32) days after dose 2, 198/312 (63%) patients had positive titers; at median 91 (89, 94) days post-dose 2, 178/246 (72%) had positive titers, and at 181 (174, 186) days after dose 2, 227/312 (72%) had positive titers. 43/114 (38%) patients with negative 1-month titers developed positive titers by 6 months; 12/43 had high-positive titer levels at 6 months. Among 198 patients with positive titers at 1 month, 14 (7.1%) fell below the threshold of positivity at 6 months (Table 1). The 4 patients whose titers fell from high-positive to negative experienced this by 3 months.

In this study of SARS-CoV-2 antibody kinetics and durability, 73% of SOTRs had positive antibody titers 6 months following mRNA vaccination; titers increased in 27% over 6 months, decreased in 12%, and remained stable in 61% of patients over 6 months. This differs from healthy individuals, who had overall stability of antibody positivity over 6 months⁵. It is unknown what degree of antibody titer decline confers increased risk of breakthrough infection.

This study is limited by the lack of an immunocompetent control group, unknown correlation with neutralizing antibody, and absence of anti-nucleocapsid testing, prohibiting analysis of asymptomatic exposure. The presence of COVID infection would likely increase antibody levels.

In conclusion, anti-spike antibody levels against SARS-CoV-2 in SOTRs are relatively stable 6 months after receipt of the second vaccine. Further investigation into the effect of booster vaccination on antibody titers, as well as understanding B and T cell responses against emerging variants of concern, are needed to better inform timing of booster vaccination.

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ABBREVIATIONS

CDC	Centers for Disease Control and Prevention
FDA	U.S. Food & Drug Administration
mRNA	messenger RNA
J&J	Johnson and Johnson/Janssen viral vector vaccine
SOTRs	Solid Organ Transplant Recipients

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Table 1.

Anti-spike antibody sero-response 6 months after receiving second mRNA SARS-CoV-2 vaccine, stratified by antibody response 1 month after receiving second mRNA vaccine. N (%)

		Sero-response after 6 months			Totals (1 month)
		Negative	Low-Positive	High-Positive	
Sero-response after 1 month	Negative	71 (62.3)	31 (27.2)	12 (10.5)	114 (36.5)
	Low-Positive	9 (12.0)	24 (32.0)	42 (56.0)	75 (24.0)
	High-Positive	5 (4.1)	23 (18.7)	95 (77.2)	123 (39.4)
	Totals (6 month)	85 (27.2)	77 (25.6)	140 (46.5)	312 (100)

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