Article DOI: https://doi.org/10.3201/eid2804.211907

# Diminishing Immune Responses against Variants of Concern in Dialysis Patients 4 Months after SARS-CoV-2 mRNA Vaccination

## Appendix

**Appendix Table 1.** Therapeutic indication for hemodialysis*

| Diagnosis | No. patients (%) in hemodialysis group |
|---|---|
| Total | 76 (100) |
| Autosomal dominant polycystic kidney disease | 11 (14.47) |
| Chronic glomerulonephritis | 6 (7.90) |
| Diabetic nephropathy | 11 (14.47) |
| Focal segmental glomerulosclerosis | 5 (6.59) |
| IgA nephropathy | 8 (10.53) |
| Interstitial nephropathy | 6 (7.90) |
| Nephrosclerosis | 16 (21.05) |
| Acute toxic tubular epithelial damage syndrome | 1 (1.32) |
| Primary amyloidosis | 1 (1.32) |
| ANCA-associated vasculitis | 1 (1.32) |
| Cardiorenal syndrome | 2 (2.64) |
| Medullary cystic kidney disease | 1 (1.32) |
| Membranous glomerulonephritis | 1 (1.32) |
| Kidney dysplasia | 1 (1.32) |
| Obstructive nephropathy | 1 (1.32) |
| Reflux nephropathy | 1 (1.32) |
| Septic organ failure | 1 (1.32) |
| Cystic kidney disease | 1 (1.32) |
| Cyclosporin intoxication | 1 (1.32) |

*ANCA, antineutrophilic cytoplasmic autoantibody.

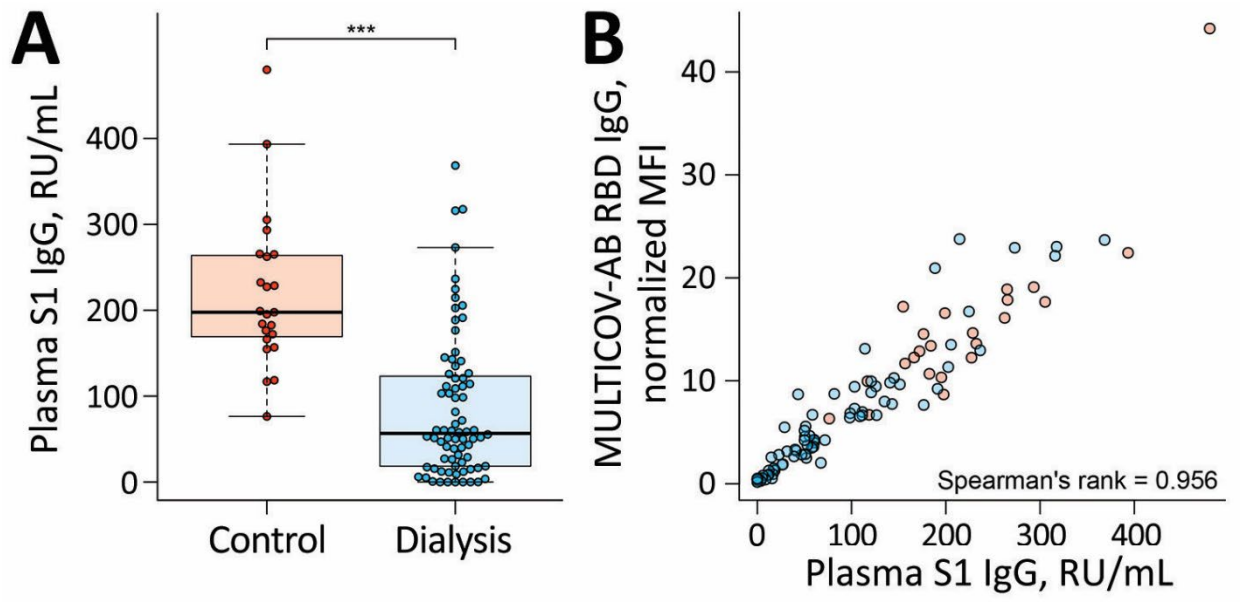
**Appendix Table 2.** Medication of vaccination cohort

| | No. (%) | |
|---|---|---|
| Medication | Nondialysis control group | Hemodialysis group |
| Total | 23 (100) | 76 (100) |
| Angiotensin-converting enzyme inhibitors | 2 (8.70) | 22 (28.95) |
| Statins | 0 (0) | 45 (59.21) |
| Angiotensin II Receptor Blockers | 5 (21.74) | 25 (32.89) |
| Vitamin D Supplements | 12 (52.17) | 75 (98.68) |
| Immunosuppressants (dosing range per day)* | | |
| Prednisolone (2–7.5 mg) | 0 | 5 (6.59) |
| Prednisolone (50 mg) day 6–14 post 2nd vaccination | 0 | 1 (1.32) |
| Prednisolone (5 mg), Tacrolimus (0.5–2 mg) | 0 | 2 (2.64) |
| Prednisolone (5 mg), Tacrolimus (12 mg), Mycophenolatmofetil (500 mg) | 0 | 1 (1.32) |
| Hydrocortisone (20 mg) | 0 | 1 (1.32) |

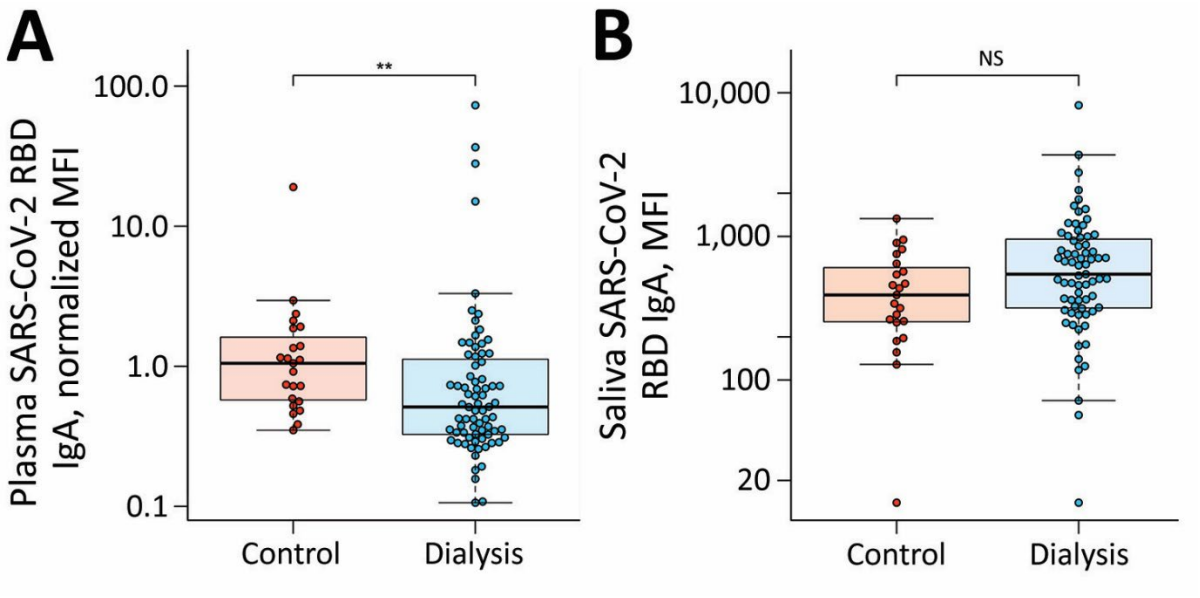
*Therapeutic indication for immunosuppression were in four patients a kidney transplant (one had received an additional liver transplant), polymyositis, polyarthritis, vasculitis and chronic obstructive pulmonary disease.

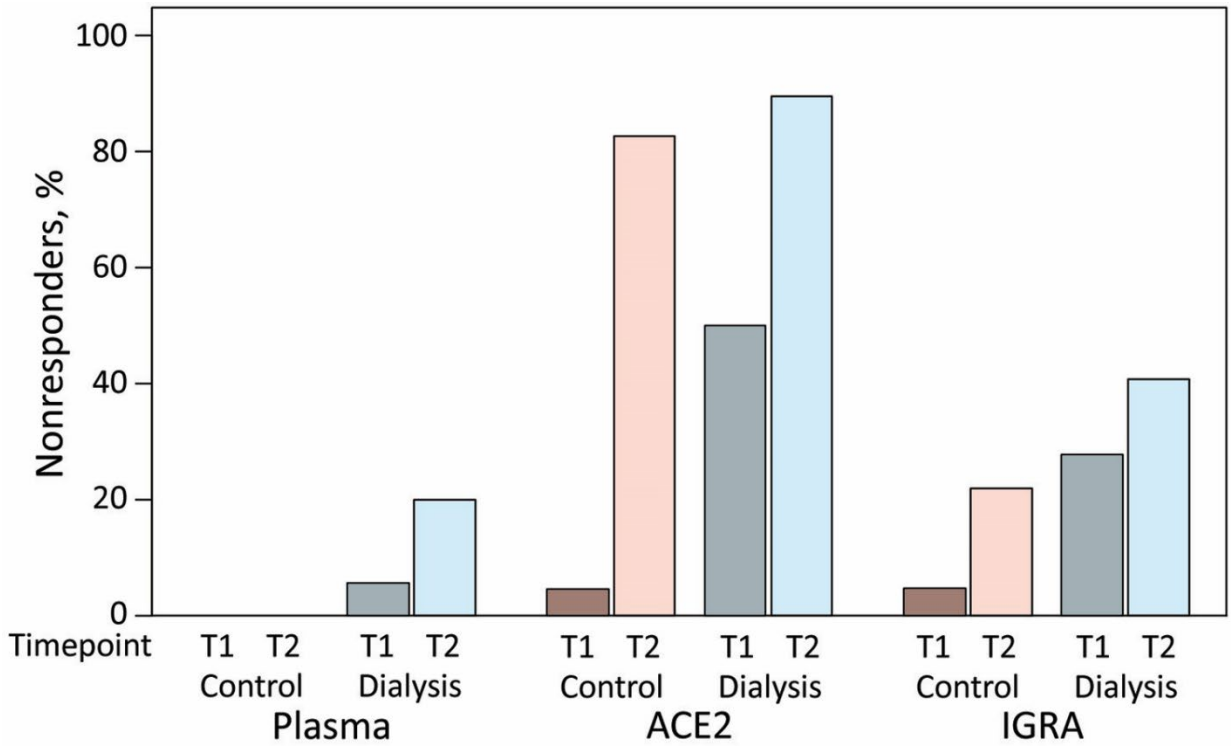
**Appendix Table 3.** MULTICOV-AB antigen panel

| Virus | Antigen | Manufacturer | Product number |
|---|---|---|---|
| SARS-CoV-2 | Spike Trimer | NMI | – |
| SARS-CoV-2 | RBD B.1 (wild-type) | NMI | – |
| SARS-CoV-2 | Nucleocapsid | Aalto | 6404–b |
| SARS-CoV-2 | S1 domain | NMI | – |
| SARS-CoV-2 | S2 domain | NMI | – |
| SARS-CoV-2 | RBD B.1.1.7 (Alpha) | NMI | – |
| SARS-CoV-2 | RBD B.1.351 (Beta) | NMI | – |
| SARS-CoV-2 | RBD P.3 (Gamma) | NMI | – |
| SARS-CoV-2 | RBD B.1.617.2 (Delta) | NMI | – |
| hCoV-OC43 | S1 domain | NMI | – |
| hCoV-OC43 | Nucleocapsid | NMI | – |
| hCoV-HKU1 | S1 domain | NMI | – |
| hCoV-HKU1 | Nucleocapsid | NMI | – |
| hCoV-NL63 | S1 domain | NMI | – |
| hCoV-NL63 | Nucleocapsid | NMI | – |
| hCoV-229E | S1 domain | NMI | – |
| hCoV-229E | Nucleocapsid | NMI | – |




**Appendix Figure 1.** Quantitative plasma IgG titers 16 weeks after vaccination with Pfizer BNT162b2. A) Spike S1-specific plasma IgG (RU/mL) from control group (red, n = 23) and dialysis group (blue, n = 76) were analyzed 16 weeks post-second dose of Pfizer BNT162b2 using the QuantiVac-ELISA (Euroimmun). Samples above upper or below the ELISA's limits of detection are shown at the corresponding limit. Boxes represent the median, 25$^{th}$ and 75$^{th}$ percentiles, whiskers show the largest and smallest non-outlier values. Outliers were determined by 1.5 times IQR. Statistical significance was calculated by two-sided Mann-Whitney-U test. Significance was defined as ***<0.001. B) Correlation of MULTICOV-AB wild-type RBD B.1-IgG and QuantiVac Spike S1-IgG across the study population. Spearman's rank was used for correlation analysis.


A
Plasma SARS-CoV-2 RBD IgA, normalized MFI
100.0
10.0
1.0
0.1
**
Control
Dialysis
B
Saliva SARS-CoV-2 RBD IgA, MFI
10,000
1,000
100
20
NS
Control
Dialysis




**Reference**

1. Strengert M, Becker M, Ramos GM, Dulovic A, Gruber J, Juengling J, et al. Cellular and humoral immunogenicity of a SARS-CoV-2 mRNA vaccine in patients on haemodialysis. EBioMedicine. 2021;70:103524. PubMed https://doi.org/10.1016/j.ebiom.2021.103524