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Letter to the Editor

LETTER TO THE EDITOR

Low rates of humoral response to BNT162b2 SARS-CoV-2 vaccination in patients with immune-mediated kidney diseases treated with rituximab

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Patients receiving rituximab are at high risk for life-threatening coronavirus disease 2019 (COVID-19), stressing the need for effective prevention strategies [1]. A two-dose regimen of the BNT162b2 messenger RNA vaccine (Pfizer/BioNTech) confers 95% protection against COVID-19 and elicits a humoral response in 95.5% of the general population [2, 3]. Because rituximab depletes B cells and impairs response to influenza vaccination [4, 5], it is expected to alter immunization after COVID-19 vaccines.

Here we investigated for the first time the humoral response after two doses of BNT162b2 in patients with immune-mediated kidney disease treated with rituximab. Eleven consecutive patients were included (Table 1). The median age was 38 years [interquartile range (IQR) 36–61] and the last rituximab dose was administered 2.4 months (IQR 1.9–4.9) before the first vaccine dose. All patients were in disease remission under rituximab monotherapy.

Antibodies against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) receptor-binding domain (RBD) were measured using an electrochemiluminescent immunoassay (Roche Diagnostics, Basel, Switzerland) at baseline and 28 days after the second vaccine dose. Two patients had detectable baseline anti-RBD antibodies; after vaccination they maintained or increased their antibody levels. Of the nine remaining patients, only three (33%) mounted a serological response following vaccination. Two of them (66%) had detectable $CD19^+$ B cells versus only one among the six (17%) non-responders. One patient (no. 6) developed a flare of anti-neutrophil cytoplasmic antibody (ANCA)-associated vasculitis 2 days after the second vaccine dose and required steroids and cyclophosphamide on top of rituximab.

These data demonstrate a poor humoral response to BNT162b2 vaccination in patients with immune-mediated kidney disease receiving rituximab. Postponing vaccination $\geq$6 months after the last rituximab dose and/or after repopulation of $CD19^+$ lymphocytes may be considered to improve the immunization rate.

DATA AVAILABILITY STATEMENT

The data underlying this article are available upon reasonable request to the corresponding author.

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Table 1. Baseline characteristics and serologic response to BNT162b2 vaccine in patients with immune-mediated kidney disease receiving rituximab

Patient	Age (years)	Gender	Kidney disease	Disease duration before vaccine (months)	Last RTX dose (mg)	Time between last RTX dose and vaccine (months)	eGFR (mL/min/1.73 m^2)	UPCR (g/g)	sAlb (g/L)	IgG (g/L)	CD19$^+$ lymphocyte count before vaccination (μL^{-1})	Anti-RBD Ab level (U/mL)[a] before and 28 days after second vaccine dose	
												Before	After
1	36	M	AAV-PR3	77	500	1.9	46	0.2	46	10.5	0	4.7	>250.0
2	72	F	AAV-PR3	205	1000	6.8	47	0.3	40	8.5	0	1.9	2.2
3	46	F	MCD/FSGS	42	1000	3.4	59	1.0	39	4.1	0	<0.8	5.5
4	19	M	MCD/FSGS	177	1000	7.8	123	0.2	50	10.7	103	<0.8	>250.0
5	37	M	MN	108	1000	2.4	81	0.5	45	13.8	121	<0.8	>250.0
6	37	M	AAV-PR3	12	1000	4.9	67	2.0	40	7.4	0	<0.8	<0.8
7	36	F	AAV-PR3	42	1000	2.1	74	0.1	46	11.8	0	<0.8	<0.8
8	68	M	AAV-PR3	51	750	1.8	90	0.2	44	5.8	0	<0.8	<0.8
9	38	F	AAV-MPO	37	500	3.5	97	0.1	47	10.0	0	<0.8	<0.8
10	57	F	AAV-MPO	56	500	2.4	62	0.2	42	12.2	80	<0.8	<0.8
11	61	M	MCD/FSGS	118	500	0.7	46	0.4	43	7.8	0	<0.8	<0.8

RTX, rituximab; eGFR, estimated glomerular filtration rate determined by the Chronic Kidney Disease Epidemiology Collaboration equation; UPCR, urinary protein:creatinine ratio; sAlb, serum albumin; IgG, serum immunoglobulin G; Ab, antibodies; M, male; F, female; AAV, ANCA-associated vasculitis; MCD/FSGS, minimal change disease/focal and segmental glomerulosclerosis; MN, membranous nephropathy. [a]Positivity cut-off: 0.8 U/mL.

CONFLICT OF INTEREST STATEMENT

The results presented in this article have not been published previously in whole or part. The authors have no conflicts of interest relevant to this article.

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