Correspondence

Immune response to SARS-CoV-2 mRNA vaccine in patients with psoriasis treated with biologics

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Dear Editor,

The effect of psoriasis treatment with biologics on the efficacy of COVID-19 vaccines is largely unknown.[1] Biologics for psoriasis treatment represent one of the most significant therapeutic progresses in dermatology.[2] The four classes of biologics approved for the treatment of psoriasis include tumour necrosis factor (TNF) inhibitors, interleukin (IL)-12/23, IL-17 inhibitors and IL-23 inhibitors. Data show that treatment with TNF inhibitors, IL-12/23 inhibitors and IL-17 inhibitors is not associated with lower antibody response to vaccination against pneumococcus, meningococcus, influenza or tetanus; however, large prospective studies assessing immune response against different vaccines are warranted, and the data on IL-23 inhibitors are limited.[3] In this study, we aimed to evaluate antibody response against the SARS-CoV-2 virus following two doses of BNT162b2 (Pfizer/BioNTech) in patients with psoriasis receiving biologic monotherapy, and compare it with that of a healthy control (HC) group.

For this prospective observational study, we recruited patients from the Department of Dermatovenerology, University Medical Centre (UMC) Maribor. Patients with a history of prior SARS-CoV-2 infection and positive specific IgG antibodies to SARS-CoV-2 prior to vaccination were excluded. The HC group consisted of healthcare personnel from UMC Maribor.

Blood samples were collected before the initial vaccination and 4 weeks after the second dose (standard two-dose vaccine with a 3-week interval) without interruption in biologic therapy. An indirect chemiluminescence immunoassay (LIAISON® SARS-CoV-2 TrimericS; DiaSorin, Saluggia, Italy) for the detection of IgG antibodies to SARS-CoV-2 in human serum or plasma samples was performed in accordance with the manufacturer's instructions. Total IgG antibodies against SARS-CoV-2 spike protein were quantified and interpreted as positive [≥ 33.8 binding antibody units (BAU)/mL] or negative (< 33.8 BAU/mL).

Statistical analyses were performed using SPSS software (V28.0; IBM Corp., Armonk, NY, USA), and results were expressed as mean ± SD. Differences were analysed statistically by independent samples *t*-test, χ^2 test and one-way ANOVA. $P < 0.05$ was considered statistically significant.

In total, 32 patients and 22 controls were recruited. The mean age of patients was 55.9 years (range 34–75 years), and the mean age of controls was 46.0 years (range 24–76 years) ($P < 0.01$). Participants were matched for sex (Table 1), and all were of white ethnicity. The mean psoriasis duration was 24.5 years (range

Table 1 Characteristics of 32 patients and 22 controls.

Characteristic	Patients (*n* = 32)	Controls (*n* = 22)	*P*
Age, years; mean ± SD	55.9 ± 11.3	46.0 ± 13.1	< 0.01
Female, *n* (%)	14 (43.8)	13 (59.1)	0.27
Disease duration, years; mean ± SD	24.5 ± 16.5	NA	
Therapy duration, months; mean ± SD	41.1 ± 33	NA	
Psoriatic arthritis, *n* (%)	10 (31.3)	NA	
Number of responders, *n* (%)	32 (100)	21 (95.5)	0.22
Antibody titre, mean ± SD (BAU/mL)	1024.4 ± 870.3	3055.8 ± 2450.9	< 0.001
Age group, years; mean ± SD			
≤ 55 (16 of 32; 50.0%)	1150.7 ± 966.8	–	
> 55 (16 of 32; 50.0%)	898.1 ± 772.4	–	< 0.05
Drug class, mean ± SD			
TNF (7 of 32; 21.9%)	1044.7 ± 631.8	–	
IL-12/23 (11 of 32; 34.4%)	1357.7 ± 1147.6	–	
IL-17 (6 of 32; 8.8%)	841.8 ± 679.8	–	
IL-23 (8 of 32; 25%)	685.1 ± 682.2	–	0.11

BAU, binding antibody units; IL, interleukin; TNF, tumour necrosis factor.

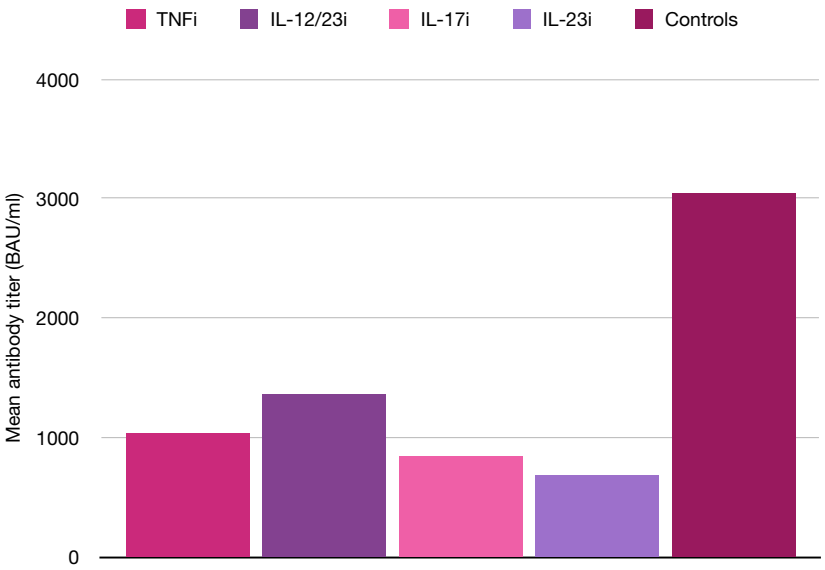

Figure 1 Comparison of antibody titres in patients with psoriasis receiving biologic therapy and healthy controls; column charts representing mean antibody titres in binding antibody units (BAU)/mL. Antibody titres were significantly lower in patients as compared with controls (1024.4 ± 870.3 vs. 3055.8 ± 2450.9 BAU/mL; $P < 0.001$). The difference in titres between different treatment groups [tumour necrosis factor inhibitors (TNFi), interleukin (IL)-12/23 inhibitors (IL-12/23i), IL-17 inhibitors (IL-17i) and IL-23 inhibitors (IL-23i)] was not significant ($P = 0.11$).

4–70), and the mean therapy duration was 41.1 months (range 1–114 months).

All patients (100%) had positive antibody response, and 1 of 22 HCs was interpreted as negative (4.5%), the difference not being statistically significant ($P = 0.22$). Antibody titres were significantly lower in patients than HCs (1024.4 ± 870.3 vs. 3055.8 ± 2450.9, $P < 0.001$). There was no significant difference in antibody titres in patients aged ≤ 55 years and patients aged > 55 years (1150.7 ± 966.8 vs. 898.1 ± 772.4, $P < 0.45$), or between different treatment groups ($P = 0.11$) (Table 1, Fig. 1).

A study of antibody titres to SARS-CoV-2 vaccine following an initial dose of either BNT 162b2 (Pfizer/BioNTech) or AZD1222 (AstraZeneca) in patients with psoriasis (107 of 120) and other immune-mediated inflammatory diseases receiving biologic and/or oral non-biologic immunomodulators showed that 15% of patients failed to mount a detectable antibody response; however, this study had no control group.[4] In a recent study of 26 patients with chronic inflammatory diseases (6 patients with psoriasis or psoriatic arthritis) and 42 HCs, antibody titres were assessed 7 days after the second dose of mRNA vaccine (Pfizer/BioNTech or Moderna).[5] There were no nonresponders (antibody titres below the cut-off); however, the patient group had significantly lower levels of IgG against SARS-CoV-2 (mean ± SD 2053 ± 1218 BAU/mL, range 98.2–3840 BAU/mL) compared with the control group (1102 ± 2685 BAU/mL; 793–3840 BAU/mL).[5]

Our data showed no difference in the rate of seroconversion, but significantly lower titres were observed in patients with psoriasis treated with biologic monotherapy, and there were no significant differences between the four treatment groups. These lower titres suggest the need for the recommended booster shot; however, the exact scheduling for patients with psoriasis on biologics has to be determined.

The limitations of our study include small number of participants, not testing cell-mediated immunity, and not matching patients and controls for age.[6] Further controlled studies including large number of participants, with longitudinal design, and assessing immunological and clinical efficacy simultaneously are needed.

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Conflict of interest: MM has served as a paid speaker and/or advisory board member for Janssen, Novartis, Boehringer Ingelheim, AbbVie, Amgen, Eli Lilly and Medi. The other authors declare that they have no conflict of interest.

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Ethics statement. The study was approved by UMC Maribor Ethics Committee. Patients provided informed consent for study participation.

Data availability: data are available on request from the corresponding author.

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