

LETTER

## Erythroderma related with the first dose of Pfizer-BioNTech BNT16B2b2 COVID-19 mRNA vaccine in a patient with psoriasis

Dear Editor,

A 42-year-old man was referred to our dermatology outpatient clinic with a widespread rash. Dermatological examination showed widespread, near total-body erythema with desquamation, along with scaly erythematous plaques on the extremities. Additionally, he had severe palmoplantar hyperkeratosis and fissuring, along with mild erythematous silvery-white scaly patches on the scalp. Pitting and onycholysis were noted on his all fingernails. Detailed history revealed that the patient has suffered from plaque psoriasis and psoriatic arthritis for 20 years and undergone numerous therapies including acitretin, methotrexate, and adalimumab without significant improvement. Therefore, secukinumab was started 2 years ago and he achieved a Psoriasis area and Severity Index (PASI) 100 response during the last 2 years. Eight months ago, he had mildly symptomatic coronavirus disease 2019 (COVID-19) for which he was treated with oral favipiravir for 5 days with complete improvement. However, after 7 months of COVID-19 infection recovery, following 4 weeks after the first dose of COVID-19 Pfizer- BioNTech BNT16B2b2 mRNA vaccine, erythematous macules and scaly plaques appeared and gradually covered the entire skin.

A provisional diagnosis of erythrodermic psoriasis was made (PASI: 48.6, Body surface area: 95%, Figure 1A–D). The patient had itch, pain, malaise, and fatigue. Physical examination did not reveal tachycardia, hypothermia, hyperthermia, peripheral lymphadenopathy, and facial, pedal or pretibial edema. Laboratory investigation revealed neutrophilia, leukocytosis, and elevated serum C-reactive protein levels, while serum albumin and total protein levels were normal. Four-mm punch biopsy taken from the right lateral thigh revealed hyperkeratosis, parakeratosis, and small focus of neutrophil deposits in the stratum corneum. Additionally, focal spongiosis, regular acanthosis hypogranulosis, thinning of the suprapapillary plates, and lymphohistiocytic inflammatory infiltrate in the dermis were seen indicating psoriasis (Figure 1E). Oral prednisone was initiated with a dose of 50 mg daily, followed by 10 mg weekly dose reduction. While the prednisone dose was tapered, secukinumab treatment was switched to ixekizumab. Ixekizumab was administered according to the recommended dosing schedule. Subsequently, with oral prednisone and ixekizumab therapy, the patient's erythroderma was completely, and psoriatic plaques were partially resolved on the 3rd week of treatment. Based on the clinical and histopathological examination, we



**FIGURE 1** (A)–(D) Generalized erythema of the entire skin body area with associated desquamation, (E) Regular acanthosis, hypogranulosis, suprapapillary thinning and dermal mononuclear infiltrate. H.E.  $\times 100$  Inlet: Neutrophilic microabscess in the stratum corneum. H.E.  $\times 200$

**TABLE 1** Summary of psoriasis flares following COVID-19 vaccination

Reports in the literature	Patient number	Sex	Age	Vacc/dose	Days	Type of psoriasis flare	Treatment
The presented patient	1	M	42	Pfizer/1	28	Erythrodermic	PRED IXE
Krajewski PK et al. <sup>1</sup>	1	M	46	Pfizer/2	5	Plaque	?
Quattrini L et al. <sup>2</sup>	1	F	83	Pfizer/2	2	Palmoplantar Psoriatic arthritis	MTX PRED
Lehmann M et al. <sup>3</sup>	1	F	79	Pfizer/1	10	Guttate	Top. cal/beta nbUVB
Onsun N et al. <sup>4</sup>	1	M	72	Sinovac/1	4	Generalized pustular Psoriasis	IFX
Bostan E et al. <sup>5</sup>	1	M	51	Phizer/2	14	Plaque	?
	2	M	52	Sinovac/2	30	Plaque	?
Sotiriou E et al. <sup>6</sup>	1	F	69	AZ/2	8	Plaque	PUVA
	2	F	82	Moderna/2	10	Plaque	Top. cal/beta
	3	F	62	Pfizer/2	6	Plaque	Top. cal/beta
	4	M	73	Pfizer/2	7	Plaque	Top. cal/beta
	5	M	66	AZ/1	22	Plaque	RZB
	6	F	62	AZ/2	13	Plaque	APR
	7	F	78	Pfizer/2	5	Plaque	Top. cal/beta
	8	F	64	AZ/2	6	Plaque	PUVA
	9	M	69	AZ/1	32	Plaque	nbUVB
	10	M	83	Pfizer/2	9	Plaque	Top. cal/beta
	11	F	61	AZ/2	3	Guttate	nbUVB
	12	M	49	Pfizer/2	10	Plaque	IXE
	13	F	55	Pfizer/2	7	Plaque	CYC
	14	F	64	AZ/2	7	Plaque	GUSEL
Megna M et al. <sup>7</sup>	1	M	55	Pfizer/2	5	Plaque	MTX
	2	M	49	Pfizer/2	6	Plaque	ADA
	3	M	45	AZ/1	10	Plaque	SEC
	4	M	61	Pfizer/2	12	Plaque	IXE
	5	M	62	Moderna/2	8	Plaque	BRO
	6	M	47	Pfizer/2	9	Guttate	IXE
	7	F	70	Pfizer/2	8	Plaque	ADA
	8	F	39	AZ/2	7	Plaque	GUSEL
	9	M	58	Pfizer/2	5	Plaque	SEC
	10	F	55	AZ/2	10	Plaque	RZB
	11	M	59	Pfizer/1	14	Plaque	IXE

Abbreviations: ADA, adalimumab; APR, apremilast; AZ, AstraZeneca-Oxford AZD1222; BRO, brodalumab; CYC, cyclosporine; Dose, number of doses after which psoriasis flare occurred; F, female; GUSEL, guselkumab; IFX, infliximab; IXE, ixekizumab; M, male; Moderna, moderna mRNA-1273; nbUVB, narrow band ultraviolet B phototherapy; Pfizer, Pfizer-BioNTech BNT16B2b2 mRNA vaccine; PRED, prednisone; PUVA, psoralen and ultraviolet A phototherapy; RZB, risankizumab; SEC, secukinumab; Sinovac, Sinovac Biotech CoronaVac; Vacc, vaccine type; Top. cal/beta, topical calcipotriol/betamethasone.

speculated that psoriatic erythroderma might have been exacerbated due to Pfizer-BioNTech BNT16B2b2 mRNA vaccine in this patient.

Although psoriasis flare-up after COVID-19 vaccination was considered to be rare, patients with plaque, palmoplantar, guttate and pustular type psoriasis were reported to be flare-up after COVID-19

vaccine which were summarized in Table 1.<sup>1-8</sup> In most studies, duration between the vaccination and the flare of psoriasis is between 1 and 14 days, but there are also studies reporting the duration between the vaccination and the flare of psoriasis longer than 14 days, as in our case.<sup>6,7</sup> Biologic agents may strongly reduce but

not to completely undo the risk of psoriasis flare-up following vaccination. However, flare-up of psoriasis following COVID-19 vaccination have also been reported in the literature in patients undergoing biologics, as in our patient.<sup>7,8</sup> A study comparing the efficacy of secukinumab and ixekizumab in psoriasis patients showed higher rates of PASI-90 and PASI-100 responses at week 12 and 48 in the ixekizumab group as compared to secukinumab group.<sup>9</sup> Similarly in our patient, the flare-up of psoriasis after COVID-19 vaccine resolved with switching secukinumab to ixekizumab. Although the exact pathogenesis of psoriasis exacerbation after vaccination remains unclear, one hypothesis is that viral components and vaccine adjuvants may lead to the induction of immune dysregulation. Another theory is that mRNA vaccines might trigger a significant increase in IL-6 production and induce recruitment of Th17 cells which play an important role in the pathogenesis of psoriasis.<sup>1</sup> It may be speculated that the patient's previous COVID-19 infection may be a contributing factor to the immune dysregulation that was triggered by COVID-19 vaccination.

To the best of our knowledge, this is the first case of exacerbation of psoriasis with erythroderma in a psoriatic patient after the first dose of COVID-19 Pfizer-BioNTech BNT16B2b2 mRNA vaccine. It is important for dermatologists to be aware that mRNA COVID-19 vaccine may be associated with the development of erythroderma in psoriasis patients.

## CONFLICT OF INTEREST





The authors have no conflict of interest to declare.

## INFORMED CONSENT

Written informed consent for publication of medical images was taken from the patient.

## DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no new data generated, or the article describes entirely theoretical research.

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