

dendritic cells, which are also involved in the development of early psoriasis lesions. IFN- α has an important role in neutrophil recruitment and chemotaxis, and is increased in biopsies from both APF and PPP lesions compared with healthy skin biopsies.^{7,8} This evidence indicates APF as an autoinflammatory disease.

Systemic corticosteroids are the first-line treatment. Recently, there have been cases described with good response to ustekinumab.^{7,9} Details of our patients' treatments are shown in Table 1.

Although our patients did not meet the requirements for a history of autoimmune disease, the fact of APF developing in the context of IBD in anti-TNF treatment, as already described in other cases, leads us to speculate that this is an incomplete form of APF. Therefore, we propose that APF should be considered among the paradoxical manifestations produced by TNF- α inhibitors.

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COVID-19 vaccination and exanthema-like eruption

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Dear Editor,

We read with interest the paper by Lim and Wylie¹ published recently in *Clinical and Experimental Dermatology*, in which they proposed a possible association between an exanthema-like eruption of the skin and the administration of the ChAdOx1 nCoV-19 (AstraZeneca-Oxford) COVID-19 vaccine.

Adverse skin reaction to any drug or vaccine is possible. Regarding the new COVID-19 vaccine, the pathomechanism is interesting. It is questionable whether there is any other possible cause of exanthema such as co-infection by other viruses. Regarding this proposed adverse effect of the vaccine, a possible mechanism is the increase in blood viscosity after vaccination.² Exanthema-like lesion is a possible uncommon clinical presentation of hyperviscosity.^{3,4}

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- 3 Anonymous. [Management of treatment-related complications in patients with multiple myeloma: diarrhea, constipation, and rash.] (in Japanese). *Nihon Rinsho* 2016; **74** (Suppl): 447–51.
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Accuracy of popular online symptom checkers for dermatological diagnoses

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Online symptom checkers (OSCs) use proprietary computer algorithms and patient self-reported symptoms to generate a differential diagnosis and provide medical recommendations. Despite their popularity among patients as free and easily accessible resources,¹ a previous non-dermatological study demonstrated only 34% accuracy for the primary diagnosis.² However, there is a lack of research assessing their validity in dermatology in spite of their increasing use for cutaneous conditions.³ We performed a study on the accuracy of two OSCs for dermatological conditions.

The study was exempted from institutional review board by the University of Connecticut Health Center.

This was a cross-sectional analysis, which was performed in June 2021 for two popular OSCs: WebMD[®] and Symptomate[®]. The clinical vignettes (Table S1), representing 15 dermatological conditions, were reviewed by a board-certified dermatologist while 30 blinded

nondermatologist participants (Table S2) were randomly assigned to six vignettes. Participants were instructed to input data into both OSCs and to record the first five diagnoses listed by each platform.

Of the 360 inputs into the two OSCs, 27.2% received the correct condition as the first diagnosis, and 47.2% within the top five diagnoses. Symptomate was more accurate than WebMD for both first responses (38.3% vs. 16.1%) and top five differential diagnoses (53.9% vs. 40.6%). The most accurately identified condition across both OSCs was seborrhoeic dermatitis (first response 75.0% and top five 95.8%) while acne, onychomycosis and scabies were also correctly identified at least 50% of the time on the first response (Table 1). Stevens–Johnson syndrome/toxic epidermal necrolysis had no correct responses from either platform. Additionally, angio-oedema, basal cell carcinoma, cellulitis and psoriasis were all correctly identified < 10% of the time on the first response. The largest difference in OSC accuracy was acne, with Symptomate correctly identifying the condition 100% of the time compared with 0% for WebMD for the primary diagnosis. When expanded to the top five differential diagnoses, WebMD only identified acne in 16.7% of responses. Another condition with notable difference was warts, which was more accurately identified by Symptomate in the top five differential diagnoses (91.7%) compared with WebMD (0%).

These findings highlight the limitations of WebMD and Symptomate for dermatological conditions. In particular, the most emergent conditions, SJS/TEN and angio-oedema, had particularly poor accuracy, which may delay medical care and increase morbidity and mortality. OSCs may be less suitable for dermatology because these software programs rely on patient history, which may

Table 1 Accuracy of online symptom checkers by condition.

Clinical vignette	Correct, first response			Correct, within top five responses		
	Total, n (%)	Symptomate, n (%)	WebMD, n (%)	Total, n (%)	Symptomate, n (%)	WebMD, n (%)
Acne	12 (50.0)	12 (100)	0 (0.0)	14 (58.3)	12 (100.0)	2 (16.7)
Angio-oedema	2 (8.3)	2 (16.7)	0 (0.0)	5 (20.8)	5 (41.7)	0 (0.0)
Basal cell carcinoma	1 (4.2)	1 (8.3)	0 (0.0)	5 (20.8)	2 (16.7)	3 (25.0)
Cellulitis	1 (4.2)	0 (0.0)	1 (8.3)	6 (25.0)	0 (0.0)	6 (50.0)
Contact dermatitis	6 (25.0)	3 (25.0)	3 (25.0)	15 (62.5)	9 (75.0)	6 (50.0)
Herpes zoster	8 (33.3)	5 (41.7)	3 (25.0)	11 (45.8)	7 (58.3)	4 (33.3)
Melanoma	10 (41.7)	4 (33.3)	6 (50.0)	14 (58.3)	8 (66.7)	6 (50.0)
Onychomycosis	15 (62.5)	10 (83.3)	5 (41.7)	17 (70.8)	11 (91.7)	6 (50.0)
Psoriasis	2 (8.3)	1 (8.3)	1 (8.3)	12 (50.0)	5 (41.7)	7 (58.3)
Scabies	12 (50.0)	9 (75.0)	3 (25.0)	23 (95.8)	12 (100.0)	11 (91.7)
SD	18 (75.0)	12 (100.0)	6 (50.0)	23 (95.8)	12 (100.0)	11 (91.7)
SJS/TEN	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Urticaria	3 (12.5)	2 (16.7)	1 (8.3)	9 (37.5)	3 (25.0)	6 (50.0)
Wart	8 (33.3)	8 (66.7)	0 (0.0)	11 (45.8)	11 (91.7)	0 (0.0)

SD, seborrhoeic dermatitis; SJS, Stevens–Johnson syndrome; TEN, toxic epidermal necrolysis.