New onset and exacerbation of psoriasis after COVID-19 vaccination

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INTRODUCTION
The messenger RNA (mRNA)-1273 (Moderna) and BNT162b2 (Pfizer-BioNTech) vaccines were granted emergency use authorization during the ongoing COVID-19 pandemic by the United States Food and Drug Administration in December 2020.1 An adeno-viral vector vaccine Ad26.COV2.S (Janssen) was similarly approved for use in February 2021.1 To date, over 168.4 million people in the United States of America have been fully vaccinated.2
Psoriasis is a chronic, inflammatory skin condition that an estimated 7.55 million adults live with nationwide.3 As patients on immunosuppressive therapy were excluded from vaccine clinical trials, there is no data on the efficacy and safety of the novel vaccines in this patient population. While uncommon, a potential association has previously been documented between new onset or exacerbation of psoriasis in response to vaccination against Bacillus Calmette-Guérin (BCG), influenza, tetanus-diphtheria, and pneumococcal polysaccharide.4-12 This response has been documented in inactivated, attenuated, toxoid, and polysaccharide types of vaccines but not in the novel mRNA vaccine clinical trial data.

We present a series of postvaccination exacerbation and new-onset psoriasis and review similar reports from publicly available nationwide Center for Disease Control (CDC) Vaccine Adverse Events Reporting System (VAERS) data. As vaccination against COVID-19 continues worldwide, it is essential to recognize and understand the possible adverse events in psoriasis patients.

METHODS
A retrospective case series study was performed at the Department of Dermatology at Mount Sinai Hospital in New York City to assess new-onset psoriasis or exacerbation of existing disease after COVID-19 vaccination. All patients were referred to the Mount Sinai Dermatology Service from March to August 2021. Patient demographic information, medical history, medications, allergies, vaccine manufacturer, latency, treatment, and outcomes were collected and reviewed.

A retrospective review of the CDC VAERS of all reports from December 2020 to August 2021 was conducted using the search terms “psoriasis,” “gut-tate psoriasis,” and “erythrodermic psoriasis.” Reports that were related to a non-COVID 19 vaccine, such as vaccines for herpes zoster or influenza, were excluded from the analysis. Reports that did not provide enough clinical information, such as the time to onset, clinical description, symptoms, or confirmation by laboratory findings, biopsy, or diagnosis by a physician, were excluded.

RESULTS
All 7 patients (median [range], 68 [27-89] years; 57.1% men) experienced new-onset or flares in
psoriasis after receiving COVID-19 vaccination. Six patients received the Moderna vaccine, while 1 received the Pfizer vaccine. The main characteristics of these patients are displayed in Table I. Only 1 patient had no history of psoriasis before vaccination. One patient reported a severe flare in psoriasis 7 days after the first dose of the vaccine and a second exacerbation 7 days after her second dose. All the other patients only experienced symptoms after the second dose. Five out of 7 patients tested positive for prior COVID-19 infection. The median latency for the onset of flare or new-onset psoriasis was 24 days following the administration of the second vaccine dose (range, 6-90 days).

The CDC VAERS database search revealed 79 patients (mean ± SD age, 56.2 ± 14.9 years; 53 [67.1%] women) who experienced new onset or exacerbation of psoriasis after the COVID-19 vaccines. The summary of demographics and clinical data from the CDC VAERS data review is described in Table II. A total of 57 (72.2%) patients had known psoriasis, and 22 (27.8%) reported new-onset psoriasis. Of the patients with newly diagnosed psoriasis, 6 were determined to be of the guttate subtype. Overall, the majority had received the Pfizer-BioNTech vaccine (38, 48.1%), followed by the Moderna (34, 43.0%) and the Janssen (7, 8.9%) vaccine.

The days to symptom onset ranged from 0 to 65 days after the first injection (median, 6 days). For the 7 recipients of the Janssen vaccine, the days to symptom onset ranged from 4 to 17 days. Of the 56 patients whose symptoms began after the first dose of the Pfizer-BioNTech or Moderna vaccines, 5 patients reported worsening psoriasis after the second dose as well. Fourteen (17.7%) of all patients reported onset of symptoms after the second dose of the Pfizer-BioNTech or Moderna vaccines only.

DISCUSSION

We report 7 patients who experienced an exacerbation of known psoriasis and one patient with new-onset psoriasis following vaccination against COVID-19 with the Pfizer and Moderna vaccines. Six of our patients presented with their symptoms after the second dose of the vaccine only, with 1 patient reporting flares after each dose. Most of our patients had previously tested positive for COVID-19 infection. While limited due to the self-reported nature of the database, the CDC VAERS data also reported numerous patients who experienced both new onset and worsening of known psoriasis following Moderna, Pfizer-BioNTech, and Janssen vaccines. Unlike our cohort, most of the CDC patients (60, 76%) experienced their symptoms after the first dose or within 28 days of the vaccine, with 5 who reported worsening after receiving a second dose.

Previous studies have reported influenza (H1N1), tetanus-diphtheria, BCG, and pneumococcal

| Patient no. | Age (y) | Sex | Vaccine | Onset | Psoriasis symptoms | Physical examination | Treatment | Outcome | Previous COVID-19 |
|-------------|---------|-----|---------|-------|--------------------|---------------------|-----------|---------|------------------|
| 1           | 76      | M   | Moderna | 62    | Flare              | Scalp, inner ears, chest, arms, legs, buttocks | Apremilast, NBUVB<sup>1</sup> phototherapy | Improved | Yes |
| 2           | 89      | M   | Moderna | 24    | New onset          | Scalp, torso, arms, legs | Ixekizumab Acitretin 25 mg |Resolved | No |
| 3           | 69      | M   | Moderna | 21    | Flare              | Face, torso, groin, arms, legs | Apremilast, tildrakizumab |Resolved | Yes |
| 4           | 68      | F   | Moderna | 6     | Flare              | Scalp, arms, legs, feet | Risankizumab | Unknown | No |
| 5           | 67      | M   | Moderna | 60    | Flare              | Scalp, trunk, arms, legs, feet | Tildrakizumab, clobetasol |Improved | Yes |
| 6           | 52      | F   | Moderna | 7<sup>z</sup> | Flare           | Scalp, face, trunk, arms | Risankizumab, clobetasol, mometasone, triamcinolone |Improved | Yes |
| 7           | 27      | F   | Pfizer  | 90    | Flare              | Scalp, elbow, thigh, knee | Clobetasol | Improved | Yes |

BSA, Body surface area; F, female; M, male.
*Days after second vaccination.
<sup>1</sup>Narrow-band ultraviolet B radiation.
<sup>z</sup>Patient experienced flare 7 days after the first vaccination, and a second flare 7 days after the second vaccination.
pneumonia vaccination as a triggering factor for new-onset or flare of psoriasis. To date, there is 1 published case report describing a psoriasis flare-up 5 days after the second dose of the Pfizer-BioNTech vaccine. Potential cutaneous adverse events following COVID-19 vaccination were described in a registry-based study of 414 cases and included delayed large local reactions, local injection-site reactions, urticarial eruptions, morbilliform reactions, pernio, cosmetic filler reactions, herpes zoster, herpes simplex flares, and pityriasis rosea-like reactions. However, only 2 psoriasis flares were recorded in this cohort, which the authors noted to be rare. Currently, there is no well-understood pathologic mechanism for new-onset or flares of psoriasis following vaccination. Previous studies have demonstrated a significant increase in interleukin 6 production and, in turn, T helper 17 (Th17) cell development after BCG, tetanus-diphtheria, and influenza vaccines. Additionally, elevated Th17 responses have been observed in patients with severe COVID-19 disease. As increasing evidence points to Th17 cells having a role in the pathogenesis of psoriatic disease, it can be hypothesized that perhaps the COVID-19 mRNA vaccines induce elevation of interleukin 6 and Th17 cells, which can contribute to the onset or flare of new psoriasis in a subset of patients.

To determine the incidence of flares or new-onset psoriasis for each COVID vaccine, we encourage health care professionals to submit cases to the American Academy of Dermatology registry (available at https://www.aad.org/member/practice/coronavirus/registry). As the world continues to undergo COVID-19 vaccination and booster vaccine shots in the near future, further studies should be carried out to investigate the potential association between new-onset and exacerbation of psoriasis and COVID-19 vaccines.

**LIMITATIONS**

The case series presented was from a small sample size in a single geographic location during a short period of time, which limits its generalizability. The CDC VAERS database collects self-reported symptoms from patients and physicians and is thus subject to reporting bias if they believe that the vaccine was the cause. The data may include incomplete, inaccurate, coincidental, and unverified information.

**Conflicts of interest**

Dr Lebwohl is an employee of Mount Sinai Dermatology, which receives research funds from Regeneron-Sanofi, Abbvie, Novartis, Amgen, Eli Lilly, UCB Inc, Janssen Research and Development, LLC, and Ortho Dermatologics. He has been the principal investigator for numerous clinical trials but has no personal financial gain. Authors Wei, Kresch, and Elbogen have no conflicts of interest to declare.

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