

**Cutaneous reactions following booster dose administration of COVID-19 mRNA vaccine: A first look from the American Academy of Dermatology/International League of Dermatologic Societies registry**



*To the Editor:* Booster doses for COVID-19 messenger RNA (mRNA) vaccines  $\geq 6$  months after the completion of a patient's primary vaccine series are now in use across the globe.<sup>1,2</sup> Although cutaneous reactions have been widely reported in response to the original series of mRNA vaccines,<sup>3-5</sup> little is known about adverse cutaneous reactions to the administration of booster doses. We sought to evaluate cutaneous side effects after mRNA

COVID-19 booster to (1) describe reaction sequences after first, second and booster doses, and (2) characterize cutaneous reaction morphology following vaccine booster administration.

The American Academy of Dermatology and International League of Dermatologic Societies COVID-19 Dermatology Registry was established in April 2020 for dermatologic manifestations associated with SARS-CoV-2 infection; the details of reactions to these vaccines were added to the registry in December 2020. In September 2021, the registry was adapted to include reactions to COVID-19 booster doses as either new cases or updates to the existing entries in the registry. The entry of cases was open to health care professionals only; data reported to the registry were deidentified.

**Table I.** Morphologies of cutaneous booster reactions to COVID-19 vaccines reported to the American Academy of Dermatology/International League of Dermatologic Societies registry

| Morphology*                      | Number of total booster reactions, regardless of whether patients reacted to prior vaccine doses (Total individuals = 36, total number of distinct reactions = 93) |                      |         |                      |        |                      | Subset analysis: number of booster reactions, limited to patients who only reacted to the booster dose and not to prior vaccine doses (Total individuals = 26, total number of distinct reactions = 71) |   |
|----------------------------------|--|----------------------|---------|----------------------|--------|----------------------|---|---|
|                                  | Total  |                      | Moderna |                      | Pfizer |                      | Total   |   |
|                                  | n  | % of total reactions | n       | % of total reactions | n      | % of total reactions | n   | % of total reactions (restricted to individuals who only reacted to the booster dose) |
| Urticaria                        | 14   | 15.1                 | 10      | 10.8                 | 2      | 2.2                  | 12  | 16.9  |
| Localized swelling               | 11   | 11.8                 | 7       | 7.5                  | 2      | 2.2                  | 9   | 12.7  |
| Localized redness                | 13   | 14.0                 | 9       | 9.7                  | 2      | 2.2                  | 11  | 15.5  |
| Localized pain                   | 11   | 11.8                 | 7       | 7.5                  | 2      | 2.2                  | 9   | 12.7  |
| Pruritus                         | 10   | 10.8                 | 8       | 8.6                  | 2      | 2.2                  | 7   | 9.9   |
| Delayed hypersensitivity         | 9  | 9.7                  | 8       | 8.6                  | 1      | 1.1                  | 6   | 8.5   |
| Morbilliform                     | 3  | 3.2                  | 1       | 1.1                  | 2      | 2.2                  | 2   | 2.8   |
| Vesicular                        | 3  | 3.2                  | 2       | 2.2                  | 1      | 1.1                  | 2   | 2.8   |
| Erythromelalgia                  | 3  | 3.2                  | 3       | 3.2                  | 0      | 0.0                  | 2   | 2.8   |
| Contact dermatitis               | 2  | 2.2                  | 1       | 1.1                  | 1      | 1.1                  | 1   | 1.1   |
| Angioedema                       | 2  | 2.2                  | 1       | 1.1                  | 1      | 1.1                  | 2   | 2.8   |
| Pernio/chilblains                | 1  | 1.1                  | 0       | 0.0                  | 1      | 1.1                  | 0   | 0.0   |
| Livedo reticularis               | 1  | 1.1                  | 1       | 1.1                  | 0      | 0.0                  | 1   | 1.1   |
| Erythema multiforme              | 1  | 1.1                  | 1       | 1.1                  | 0      | 0.0                  | 1   | 1.1   |
| Pityriasis rosea                 | 1  | 1.1                  | 0       | 0.0                  | 1      | 1.1                  | 1   | 1.1   |
| Flareup of an existing condition | 1  | 1.1                  | 1       | 1.1                  | 0      | 0.0                  | 0   | 0.0   |
| Other                            | 7  | 7.5                  | 3       | 3.2                  | 2      | 2.2                  | 5   | 7.0   |

\*Listed as the number of reactions. Individual person may have >1 reaction.

From December 24, 2020, to January 23, 2022, 1000 individual cases of cutaneous reactions to COVID-19 vaccines were entered into the registry, of which 49 records included data about the presence or absence of a cutaneous reaction following the administration of a booster dose. Of the 49 records, cutaneous reaction(s) to the booster dose developed in 36 patients (73%) and cutaneous reaction(s) to the first and/or second doses, but not the booster dose, developed in 13 patients (27%). Of the 36 patients in whom a cutaneous reaction to the booster dose developed, 26 reacted to the booster dose alone, 1 reacted to the first and booster doses alone, 4 reacted to the second and booster doses alone, and 5 reacted to all 3 vaccine doses.

Among the 36 individuals with reactions to the booster dose, a total of 93 distinct cutaneous reactions were reported, primarily to Moderna (n = 63) or Pfizer (n = 20) mRNA vaccines. The most common morphologies among all cutaneous reactions to the booster dose were urticaria (n = 14); reactions at the local injection site (swelling [n = 11], redness [n = 13], and pain [n = 11]); delayed, large, local reaction (n = 9); erythromelalgia (n = 3); and vesicular reactions (n = 3) (Table 1). Only 1 patient who originally received the Pfizer vaccine series and switched to a Moderna booster dose had a reaction to the booster dose, and 1 patient who originally received the Moderna vaccine series and then received a Pfizer booster dose had a reaction to the booster dose. There were no reported reactions to the booster dose in patients who received the Johnson & Johnson vaccine for their original vaccine series and then switched to an mRNA vaccine for their booster dose.

Of all cases of reactions to COVID-19 vaccines in the AAD/ILDS registry, reactions to the booster dose only represent a small portion. Several reasons may exist for the relatively infrequent reporting: physicians may not have seen the patient during follow-up, reporter fatigue, slow uptake of the booster dose, and/or reactions to the booster dose may have truly been less frequent than reactions to the first and second doses. Dermatologists should be aware that cutaneous reactions to booster shots are possible, even when reactions to the first and second doses did not occur. Even with a bias toward the reporting of notable reactions, most reactions were mild, and none of the reactions seen were life-threatening. These data provide additional reassurance about the safety profile of booster vaccines.

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#### Conflicts of interest

Drs Freeman, Hruza, Rosenbach, and Fox are members of the American Academy of Dermatology COVID-19 Ad Hoc Task Force. Dr Freeman is an Editor for *BJD*.

Dr French is the President and Dr Lim is a board member of the International League of Dermatological Societies. Dr Freeman is an author of COVID-19 dermatology for *UpToDate*. Dr Blumenthal and Authors Prasad, Ali, Singh, and Tyagi have no conflicts of interest to declare.

#### REFERENCES

1. Israel becomes first country in the world to give COVID boosters to over-50s. Times of Israel. Accessed January 20, 2021. <https://www.timesofisrael.com/israel-becomes-first-country-in-world-to-offer-covid-boosters-to-over-50s/>
2. FDA authorizes booster dose of Pfizer-BionTech COVID-19 vaccine for certain populations. U.S. Food and Drug Administration. Accessed January 20, 2021. <https://www.fda.gov/news-events/press-announcements/fda-authorizes-booster-dose-pfizer-biontech-covid-19-vaccine-certain-populations>
3. McMahon DE, Amerson E, Rosenbach M, et al. Cutaneous reactions reported after Moderna and Pfizer COVID-19 vaccination: a registry-based study of 414 cases. *J Am Acad Dermatol*. 2021;85(1):46-55.
4. Robinson LB, Fu X, Hashimoto D, et al. Incidence of cutaneous reactions after messenger RNA COVID-19 vaccines. *JAMA Dermatol*. 2021;157(8):1000-1002. <https://doi.org/10.1001/jamadermatol.2021.2114>
5. Blumenthal KG, Freeman EE, Saff RR, et al. Delayed large local reactions to mRNA-1273 vaccine against SARS-CoV-2. *N Engl J Med*. 2021;384(13):1273-1277. <https://doi.org/10.1056/NEJMc2102131>

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