Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letters

Risk of allergic reaction in patients with atopic disease and recent coronavirus disease 2019 vaccination

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The number of cases of coronavirus disease 2019 (COVID-19) has exceeded 20 million in the United States as of January 3, 2021.[1] On December 11, 2020, an Emergency Use Authorization was issued by the Food and Drug Administration for the use of the Pfizer-BioNTech (Pfizer, Inc., New York, NY; and BioNTech SE, Germany) vaccine for the prevention of COVID-19.[1] The Moderna (Moderna, Inc., Cambridge, MA) COVID-19 vaccine became available by Emergency Use Authorization 1 week after, on December 18, 2021.[1] The Centers for Disease Control and Prevention (CDC) has since issued interim clinical considerations for the use of mRNA COVID-19 vaccines authorized in the United States and for potential management of anaphylaxis after vaccination for COVID-19.[2,3]

Vaccines are highly effective public health interventions, but they carry the risk of potentially serious adverse reactions.[4] Vaccine-associated hypersensitivity has been well reported in the literature.[4,5] All vaccines have the potential to trigger anaphylaxis, a life-threatening allergic reaction.[5,6] Fortunately, severe allergic reaction, including anaphylaxis, to vaccines is rare.[7]

In a recent vaccine safety update from the CDC COVID-19 Vaccine Task Force, data through January 18, 2021, reported 50 cases of anaphylaxis.[8] There was a total of 9,943,247 administered doses of the Pfizer-BioNTech vaccine (61% females, 36% males, and unknown sex in 3%). Of the 50 reported cases of anaphylaxis, most cases occurred in females (n = 47, 94%), and most occurred within 30 minutes of vaccination (n = 45, 90%). In addition, most cases occurred after the first dose of the vaccine (n = 42, 84%), and most patients had a documented history of allergies or allergic reactions to drugs or foods (n = 40, 80%).[8] From December 14, 2020, to January 18, 2021, the estimated rate of anaphylaxis reported to the Vaccine Adverse Event Reporting System after administration of Pfizer-BioNTech COVID-19 vaccines was 5.0 per million doses.[8] This is in contrast to the previously reported rate of 11.1 per million doses administered during the period of December 14, 2020, to December 23, 2020, in which 90% of cases occurred in females.[1,9]

In this single-center, retrospective cohort study, we describe a cohort of patients with a known history of atopic disease on subcutaneous immunotherapy (SCIT) receiving medical care at a large tertiary medical center and who received at least 1 dose of the Pfizer-BioNTech or Moderna COVID-19 vaccine. The aim of this study was to identify whether patients with a history of atopic disease on SCIT are at increased risk of allergic reaction to COVID-19 vaccine. Patients were selected from an internal database of consecutive patients on SCIT at Mayo Clinic, Rochester, Minnesota. We identified all patients with a history of atopic disease on maintenance or building SCIT, followed by an allergist within the Division of Allergic Diseases, and who had received at least 1 dose of either COVID-19 vaccine. Medical records were reviewed for each patient for collection of baseline demographic and clinical data. Allergy lists of all patients were reviewed, and all patients were asked on allergy to polyethylene glycol or vaccine allergy before receiving their first dose of the COVID-19 vaccine. The study protocol was approved by the Mayo Clinic Institutional Review Board.

Our cohort included a total of 68 patients (68% female sex) with a mean age of 44.1 years and known history of atopic disease who were on either maintenance or building SCIT at the time of this study (Table 1). Most patients had a history of allergic rhinitis (91%) and were receiving maintenance SCIT (87%) for animal allergens (75%), aeroallergens (71%), and/or stinging insect venom (12%). Of note, 47% of the patients had a documented history of drug allergy. No patient had a history of COVID-19 infection. Most patients received the Pfizer-BioNTech vaccine (97%), and 2 patients received the Moderna vaccine. Those who received the Moderna vaccine did so outside of the Mayo Clinic Health System.

The average shortest time interval between COVID-19 vaccination and SCIT administration was 5.5 days. There were 31% of the patients who received their COVID-19 vaccine within 48 hours of a SCIT dose, and 3 patients received their SCIT dose, followed by COVID-19 vaccination, on the same day. In our entire cohort, no patient had an allergic reaction, including anaphylaxis, to the COVID-19 vaccine or to SCIT after COVID-19 vaccination. Currently, at the Mayo Clinic, patients can receive both the COVID-19 vaccine and their SCIT dose on the same day, only if the COVID-19 vaccine is administered before SCIT. If a patient receives his or her SCIT dose first, then he or she must wait at least 48 hours before receiving the COVID-19 vaccine.

As previously reported, anaphylaxis to the COVID-19 vaccine is rare, and most cases occur in patients with a documented history of atopy. In our sample of patients with severe atopy as revealed by being treated with an SCIT, none had an allergic reaction. Although limited by a small sample size, atopy may not be a considerable risk factor for an immediate allergic reaction to the mRNA COVID-19 vaccines. Our current protocol at the Mayo Clinic allows for patients to receive the COVID-19 vaccine and immunotherapy on the same day if the vaccine is administered before an immunotherapy dose. Recent data reveal that 74% of cases of anaphylaxis occurred within 15 minutes of vaccine administration.[8,9] The CDC recommends a 30-minute observation period for any person with a history of immediate allergic reaction to a vaccine or other injectable therapy or history of anaphylaxis owing to any cause.[2] Recommendations regarding timing of administration of COVID-19 vaccination and SCIT requires further research. Although the 3 patients in our study received same-day administration of COVID-19 vaccine and maintenance SCIT without complication, this small sample size limits any generalizations. Our initial findings suggest that the 2 can potentially be given safely on the same day on the basis of our current protocol (COVID-19 vaccine followed by SCIT), but whether a patient can safely receive his or

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Table 1
Baseline Characteristics of Patients Who Received the COVID-19 Vaccine While on SCIT

Variables	Total (N = 68)	Maintenance IT (N = 59)			Building IT (N = 9)		
		COVID-19 vaccine within 24 h of SCIT[e]	COVID-19 vaccine within 24 to 48 h of SCIT[e]	COVID-19 vaccine >48 h from SCIT[e]	COVID-19 vaccine within 24 h of SCIT[e]	COVID-19 vaccine within 24 to 48 h of SCIT[e]	COVID-19 vaccine >48 h from SCIT[e]
Sex, n (%)							
Female	46 (68)	1 (2)	8 (14)	30 (51)	0	4 (44)	3 (33)
Male	22 (32)	1 (2)	5 (8)	14 (24)	1 (11)	1 (11)	0
Mean age, y (range)	44.1 (21-90)	38 (37-39)	41.3 (21-84)	47 (25-89)	29	39.1 (23-51)	30.3 (24-34)
Comorbidities, n (%)							
None	41 (60)	1 (2)	8 (14)	26 (44)	0	4 (44)	2 (22)
Obesity	17 (25)	1 (2)	3 (5)	12 (20)	0	0	1 (11)
Hyperlipidemia	14 (21)	1 (2)	2 (3)	9 (15)	0	1 (11)	1 (11)
Hypertension	10 (15)	1 (2)	1 (2)	8 (14)	0	0	0
Diabetes mellitus	2 (3)	0	0	2 (3)	0	0	0
Other[a]	2 (3)	1 (2)	0	0	1 (11)	0	0
Atopic history, n (%)							
Allergic rhinitis	62 (91)	2 (3)	12 (20)	40 (68)	1 (11)	4 (44)	3 (33)
Asthma	29 (43)	1 (2)	7 (12)	19 (32)	1 (11)	1 (11)	0
Food allergy	13 (19)	0	5 (8)	7 (12)	0	1 (11)	0
Stinging insect allergy	9 (13)	0	2 (3)	6 (10)	0	1 (11)	0
Urticaria	2 (3)	0	0	2 (3)	0	0	0
Contact dermatitis	1 (1)	0	0	1 (2)	0	0	0
Oral allergy syndrome	1 (1)	0	1 (2)	0	0	0	0
History of drug allergy, n (%)	32 (47)	2 (3)	6 (10)	20 (34)	0	2 (22)	2 (22)
Type of immunotherapy, n (%)							
Animal[b]	51 (75)	2 (3)	9 (15)	33 (56)	1 (11)	3 (33)	3 (33)
Aeroallergen[c]	48 (71)	2 (3)	10 (17)	30 (51)	1 (11)	3 (33)	2 (22)
Stinging insect[d]	8 (12)	0	2 (3)	5 (8)	0	1 (11)	0
Previous COVID-19 infection, n (%)	0	0	0	0	0	0	0
Brand of vaccine received, n (%)							
Pfizer-BioNTech	66 (97)	2 (3)	13 (22)	42 (71)	1 (11)	5 (56)	3 (33)
Moderna	2 (3)	0	0	2 (3)	0	0	0
Adverse reaction to COVID-19 vaccine, n	0	0	0	0	0	0	0
Adverse reaction to SCIT after COVID-19 vaccination, n	0	0	0	0	0	0	0

Abbreviations: COVID-19, coronavirus disease 2019; IT, immunotherapy; n, total number; SCIT, subcutaneous immunotherapy.
[a]Ulcerative colitis (1) and granulomatosis with polyangiitis (1).
[b]Cat, dog, horse, mixed animal, and mite.
[c]Grass, tree, weed, mold, and pollen.
[d]Wasp, yellow jacket, mixed vespid, and honey bee.
[e]Mean shortest time interval between COVID-19 vaccination (first or second dose) and any immunotherapy dose.

her SCIT dose followed by COVID-19 vaccine on the same day requires further evaluation and a larger sample size. Alternatively, a 24-hour waiting period between COVID-19 vaccination and SCIT dose may be a reasonable next step.

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