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.

Ann Allergy Asthma Immunol 126 (2021) 319–320

Contents lists available at ScienceDirect

Perspective

Insights from American College of Allergy, Asthma, and Immunology COVID-19 Vaccine Task Force: Allergic Reactions to mRNA SARS-CoV-2 Vaccines

Kevin R. Murphy, MD, FACAAI [*]; Niraj C. Patel, MD, MS, FACAAI [†]; Daniel Ein, MD, FACP, FACAAI [‡]; Mary Hudelson, MD, FACAAI [§]; Sangeetha Kodoth, MD, FACAAI [‖]; Gailen D. Marshall, Jr., MD, PhD, FACAAI [¶]; Purvi Parikh, MD, FACP, FACAAI [#]; Michael S. Blaiss, MD, FACAAI [**]

[*] Division of Allergy, Asthma and Pediatric Pulmonology, Department of Pediatrics, Boys Town National Research Hospital, Omaha, Nebraska
[†] Division of Infectious Disease and Immunology, Levine Children's Hospital, Atrium Health, Charlotte, North Carolina
[‡] Division of Allergy, Department of Medicine, George Washington University School of Health Care Sciences, Washington, District of Columbia
[§] Family Allergy and Asthma Care, Flower Mound, Texas
[‖] Allergy Specialists of Knoxville, Knoxville, Tennessee
[¶] Division of Allergy, Asthma and Clinical Immunology, Department of Medicine, The University of Mississippi Medical Center, Jackson, Mississippi
[#] Division of Infectious Disease and Immunology, Departments of Medicine and Pediatrics, New York University School of Medicine, New York University Langone Health, New York, New York
[**] Department of Pediatrics, Medical College of Georgia, Augusta University, Augusta, Georgia

ARTICLE INFO

Article history:
Received for publication January 12, 2021.
Accepted for publication January 13, 2021.

Allergic reactions to vaccines, in general, are rare, with the incidence of anaphylaxis estimated at 1.31 in 1 million doses given.[1] Recent immediate allergic reactions clinically compatible with anaphylaxis have occurred in recipients of both the Pfizer-BioNTech and Moderna mRNA vaccines against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). At present, the specific mechanisms and inciting antigen/agents have not been identified.

The January 6, 2021, Morbidity and Mortality Weekly Report[2] summarized the reported allergic reactions (including anaphylaxis) after receipt of the first dose of Pfizer-BioNTech coronavirus disease 2019 (COVID-19) vaccine in the United States from December 14, 2020, to December 23, 2020. During that period, monitoring by the Vaccine Adverse Event Reporting System detected 21 adverse events identified as anaphylaxis after administration of a reported 1,893,360 first doses of the Pfizer-BioNTech COVID-19 vaccine (11.1 cases per million doses); 71% of these occurred within 15 minutes of vaccination.

The Centers for Disease Control and Prevention (CDC) has recommended that the mRNA SARS-CoV-2 vaccines should not be administered to individuals with a known history of a severe allergic reaction to any component of the vaccine.[3] Although the specific vaccine component causing anaphylaxis has not been identified, polyethylene glycol (PEG) is one of the ingredients and has been known to cause anaphylaxis in other clinical settings. At present, there are no other vaccines that use PEG 2000, the vaccine component for both mRNA CoV-2 vaccines. In addition, polysorbate, an excipient found in medications and foods, can cross-react with PEG. Accordingly, patients with documented allergic reactions to polysorbate should not be immunized with the mRNA vaccines.

According to the CDC,[3] if a recipient experiences a severe allergic reaction or an immediate allergic reaction of any severity within 4 hours of receiving the first dose, that person should not receive the second dose. In addition, patients who experience an allergic reaction to the vaccine or who have questions related to the risk of an allergic reaction should be referred to a board-certified allergist/immunologist for further evaluation.

A recent review has summarized the current body of knowledge regarding immediate allergic reactions associated with the mRNA vaccines. These authors hypothesize a potential relationship between the lipid-PEG2000 component of the lipid nanoparticle mRNA carrier system and increased risk for anaphylactic reactions.[4]

Reprints: Michael S. Blaiss, MD, FACAAI, Department of Pediatrics, Medical College of Georgia at Augusta University, 1090 Windfaire Place, Roswell, GA 30076; E-mail: michael.blaiss@gmail.com.

Disclosures: Dr Parikh reports serving as a subinvestigator for Pfizer Inc and AstraZeneca coronavirus disease 2019 vaccine trials but receives no financial compensation from these companies. Dr Blaiss reports serving as a consultant for Pfizer Inc. The remaining authors have no conflicts of interest to report.

Funding: The authors have no funding sources to report.

https://doi.org/10.1016/j.anai.2021.01.017

Table 1
Screening Questions[a]

1. Do you have a history of a severe allergic reaction to an injectable medication (intravenous, intramuscular, or subcutaneous)?
2. Do you have a history of a severe allergic reaction to a previous vaccine?
3. Do you have a history of a severe allergic reaction to polyethylene glycol (PEG), a polysorbate, or polyoxyl 35 castor oil (eg, paclitaxel)?

[a]Modified from Banerji et al.[4]

The American College of Allergy, Asthma, and Immunology (ACAAI) does not currently endorse any testing protocol for PEG, polysorbate, or the mRNA COVID-19 vaccines. There are testing protocols for the above that have been published in medical literature.[4] However, at present, there are no established predictive values and safety data for the proposed skin testing procedures.

In those at higher risk for developing serious or fatal COVID-19 infections and who have previously experienced a suspected or confirmed severe allergic reaction to a COVID-19 vaccine or any of its components, a graded vaccine administration protocol could provide an option for administration. Guidance for the graded administration of a vaccine has previously been published: administer 0.05 mL of 1:10 dilution, and 10%, 20%, 30%, and 40% of the full dose incrementally in alternate arms at 15-minute intervals, followed by a minimum 30-minute observation period.[5] At present, there are no data yet to confirm the efficacy and safety of this approach, given that it is typically performed with other vaccines. Until such data are available, graded vaccine administration should be considered experimental and is not endorsed by the ACAAI.

The ACAAI COVID-19 Vaccine Task Force has provided guidance for physicians and other providers related to the risk of an allergic reaction (https://college.acaai.org/category/covid-19/). We recommend that all patients should be screened by asking several questions to determine the possible risk for an allergic reaction to the mRNA COVID-19 vaccines (Table 1). An affirmative response to any of these questions should prompt a referral to a board-certified allergist/immunologist for further evaluation before COVID-19 vaccination. The guidance underscores that a history of food, venom, inhalant, latex, or medication allergy should not preclude patients from receiving the vaccine. All patients should have a direct observation/waiting time of 15 minutes after vaccination—except for those with a history of systemic reactions to food, drugs, or venoms, who should wait for 30 minutes. All facilities administering the vaccine must be prepared to treat anaphylaxis. Caution should be exercised in patients with mast cell activation disorders/idiopathic anaphylaxis, as the risk in this group is not known.

Thus, the evaluation of at-risk patients should be individualized. As part of that evaluation, one should use shared decision-making surrounding the approach to testing and future vaccination. It is vital that patients understand the overall benefit of vaccination against SARS-CoV-2 in relation to the extremely low overall risk of an allergic reaction. Allergists/immunologists are uniquely qualified to guide their patients and educate the public during this extensive vaccine campaign and assist in bringing this pandemic to an end by achieving adequate herd immunity.

References

1. McNeil MM, Weintraub ES, Duffy J, et al. Risk of anaphylaxis after vaccination in children and adults. *J Allergy Clin Immunol*. 2016;137(3):868–878.
2. Centers for Disease Control and Prevention COVID-19 Response Team, Food and Drug Administration. Allergic reactions including anaphylaxis after receipt of the first dose of Pfizer-BioNTech COVID-19 vaccine—United States from December 14-23, 2020. *MMWR Morb Mortal Wkly Rep*. 2021;70(2):46–51.
3. Centers for Disease Control and Prevention. Interim clinical considerations for use of mRNA COVID-19 vaccines currently authorized in the United States. Available at: https://www.cdc.gov/vaccines/covid-19/info-by-product/clinical-considerations.html. Accessed December 30, 2020.
4. Banerji A, Wickner PG, Saff R, et al. mRNA vaccines to prevent COVID-19 disease and reported allergic reactions: current evidence and approach [e-pub ahead of print]. *J Allergy Clin Immunol Pract*. https://doi.org/10.1016/j.jaip.2020.12.047, accessed January 29, 2021.
5. Kelso JM, Greenhawt MJ, Li JT, et al. Adverse reactions to vaccines practice parameter 2012 update. *J Allergy Clin Immunol*. 2012;130(1):25–43.