

# COVID-19 Vaccines and Vaccine Hesitancy: Role of the Allergist-Immunologist in the Promotion of Vaccine Acceptance

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# Disclaimer

- Nothing to disclose

# Objectives

- To examine the current body of evidence that deals with the relationship of vaccine hesitancy to COVID-19 vaccines
- To provide a classification of adverse reactions to COVID-19 vaccines and its relationship to vaccine hesitancy
- To describe the role that the allergist-immunologist can play in educating the public regarding the importance of COVID-19 vaccines, in dispelling misinformation and in promoting vaccine acceptance

# Lecture Outline

- Introduction
- EUA and COVID-19 Vaccines
- Mechanism(s) of action of COVID-19 vaccines
- Why is there vaccine hesitancy?
- Adverse reactions to COVID-19 vaccines
- Role of the allergist-immunologist
- Conclusions

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# What is vaccine hesitancy?

- Vaccine hesitancy has been defined as a delay in acceptance or refusal of vaccines despite availability of vaccine services.
- In the past, despite an impressive record of vaccine effectiveness in the US, several factors have contributed to a decreased acceptance of vaccines, particularly in children, that has resulted in outbreaks of infectious diseases such as measles.
- More recently vaccine hesitancy has spread to COVID-19 vaccines. There are many causes of vaccine hesitancy such as misinformation, fallacies and myths

# Why is it important to address vaccine hesitancy?

- Vaccination is one of the greatest achievements of public health which has eliminated the scourge of infectious diseases throughout the world
- Vaccination is the only way COVID-19 will be eliminated or at least controlled today
- Vaccination will require sufficient herd immunity against COVID-19 so that a substantial proportion of the population needs to be vaccinated (about 80%) lowering the overall amount of virus able to spread in the whole population.
- In order to achieve herd immunity it is imperative to overcome vaccine hesitancy

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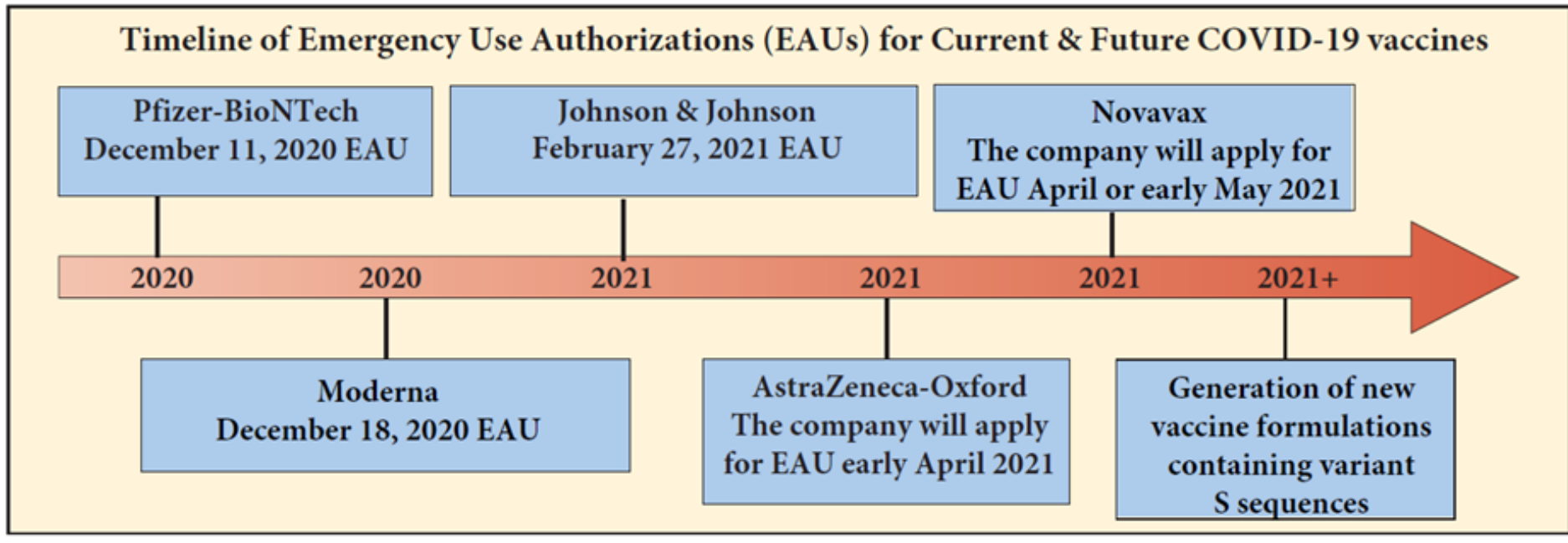
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# What is Emergency Use Authorization (EUA)

- Emergency Use Authorization (EUA) is a mechanism used by the FDA to facilitate the availability and use of medical countermeasures, including vaccines, during public health emergencies, such as the current COVID-19 pandemic.
- Under an EUA, FDA may allow the use of unapproved medical products, or unapproved uses of approved medical products in an emergency to diagnose, treat, or prevent serious or life-threatening diseases or conditions when there are no adequate, approved, and available alternatives.
- With input from the FDA, manufacturers decide whether and when to submit an EUA request to FDA.

# Landmarks of Currently Available EUA and Soon to be EUA Authorized COVID-19 vaccines



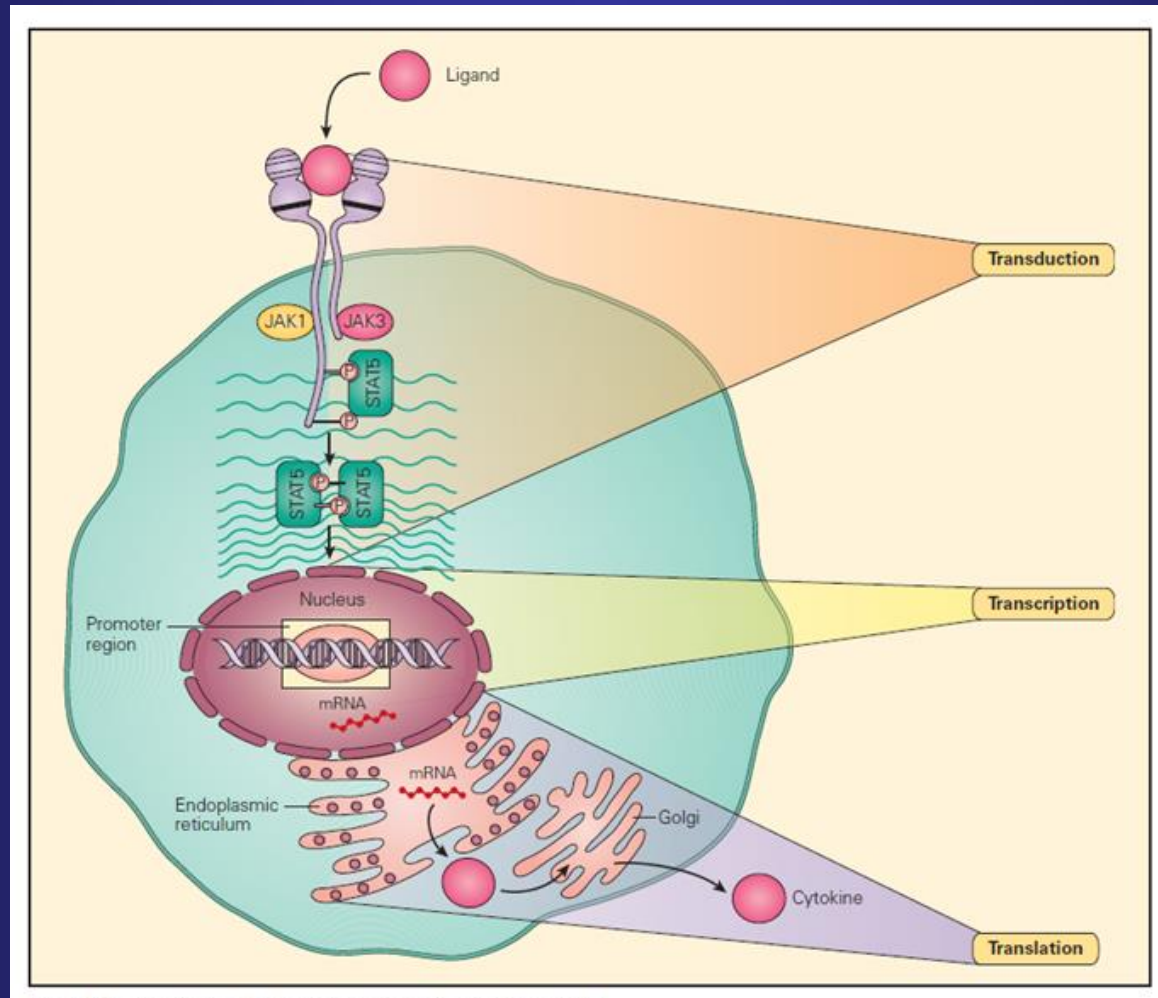
# Currently Available EUA and Soon to be EUA Authorized COVID-19 vaccines

Vaccine Brand Name	Technology	Who Can Get this Vaccine	How Many Shots You Will Need	Administration
Pfizer-BioNTech	mRNA	≥ 16 years	2 shots given 3 weeks (21 days) apart	Administered IM 30 µg 0.3 mL/dose q 21 days
Moderna	mRNA	> 18 years	2 shots given 4 weeks (28 days) apart	Administered IM 100 µg 0.5 mL/dose q 28 days
Johnson & Johnson's Janssen	Ad26.COV2.S	> 18 years	1 shot	Administered IM as a single dose (0.5 mL)
Oxford-AstraZeneca	ChAdOx1 nCoV-19	To be determined when EUA authorization received		
Novavax	NVX-CoV2373.	To be determined when EUA authorization received		

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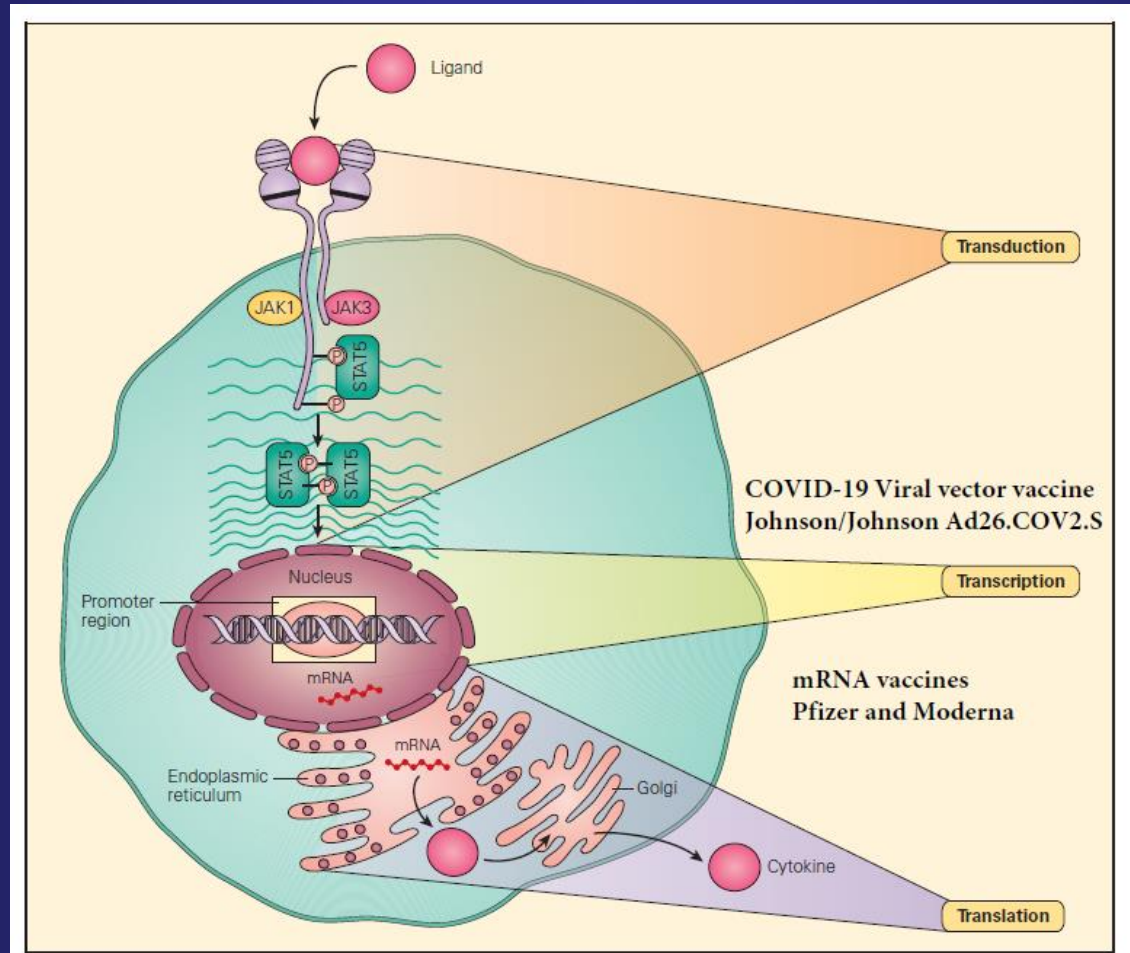
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# The "3 T's" transduction, transcription and translation



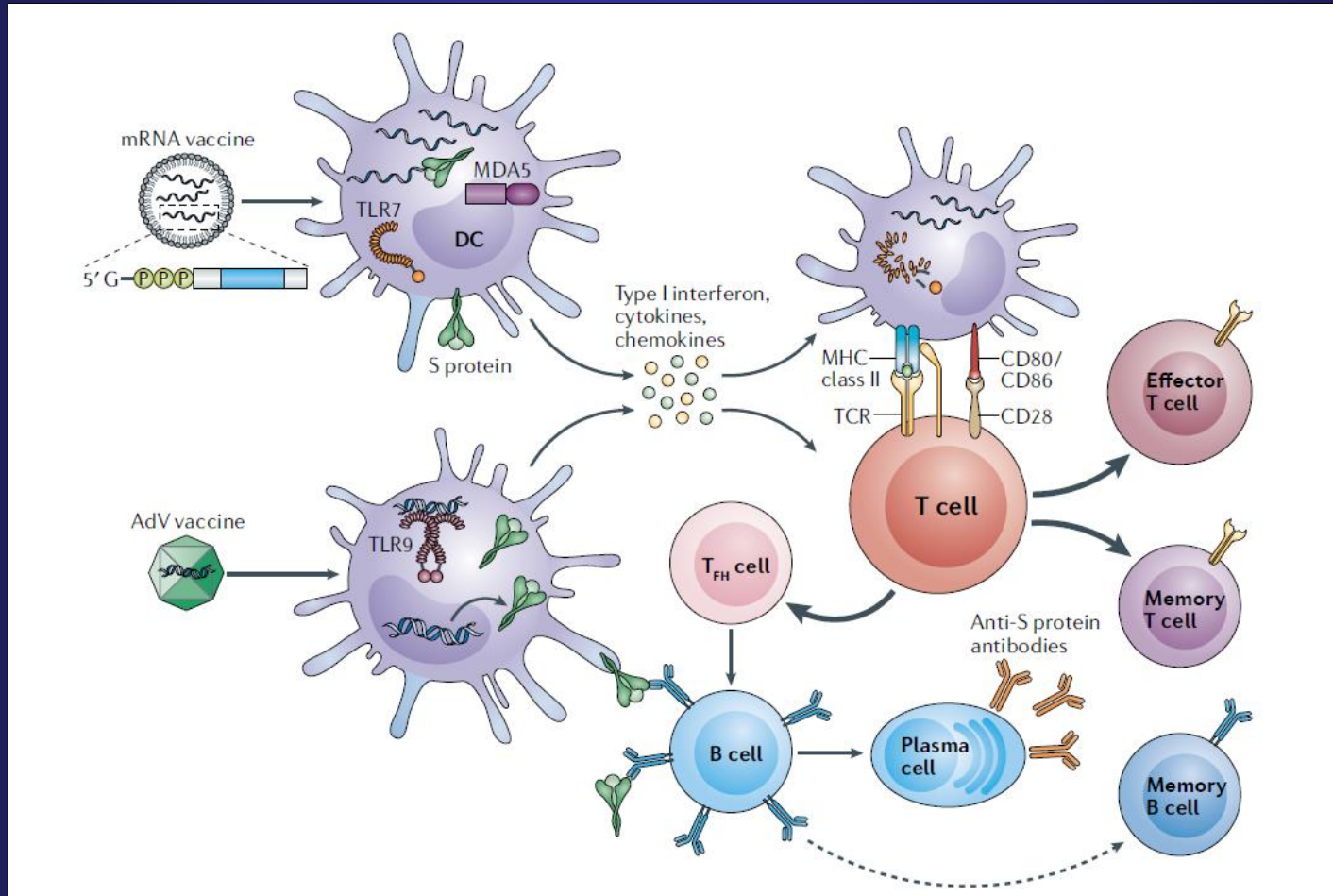
From Bellanti, JA: Immunology IV: (2012)

# How COVID-19 Viral Vector and m-RNA Vaccines Work



From Bellanti, JA: Immunology IV: (2012)

# How COVID-19 Viral Vector and m-RNA Vaccines Work



Teijaro JR, Farber DL. COVID-19 vaccines: modes of immune activation and future challenges. *Nat Rev Immunol*. 2021 Apr;21(4):195-197.

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# Why is there vaccine hesitancy?

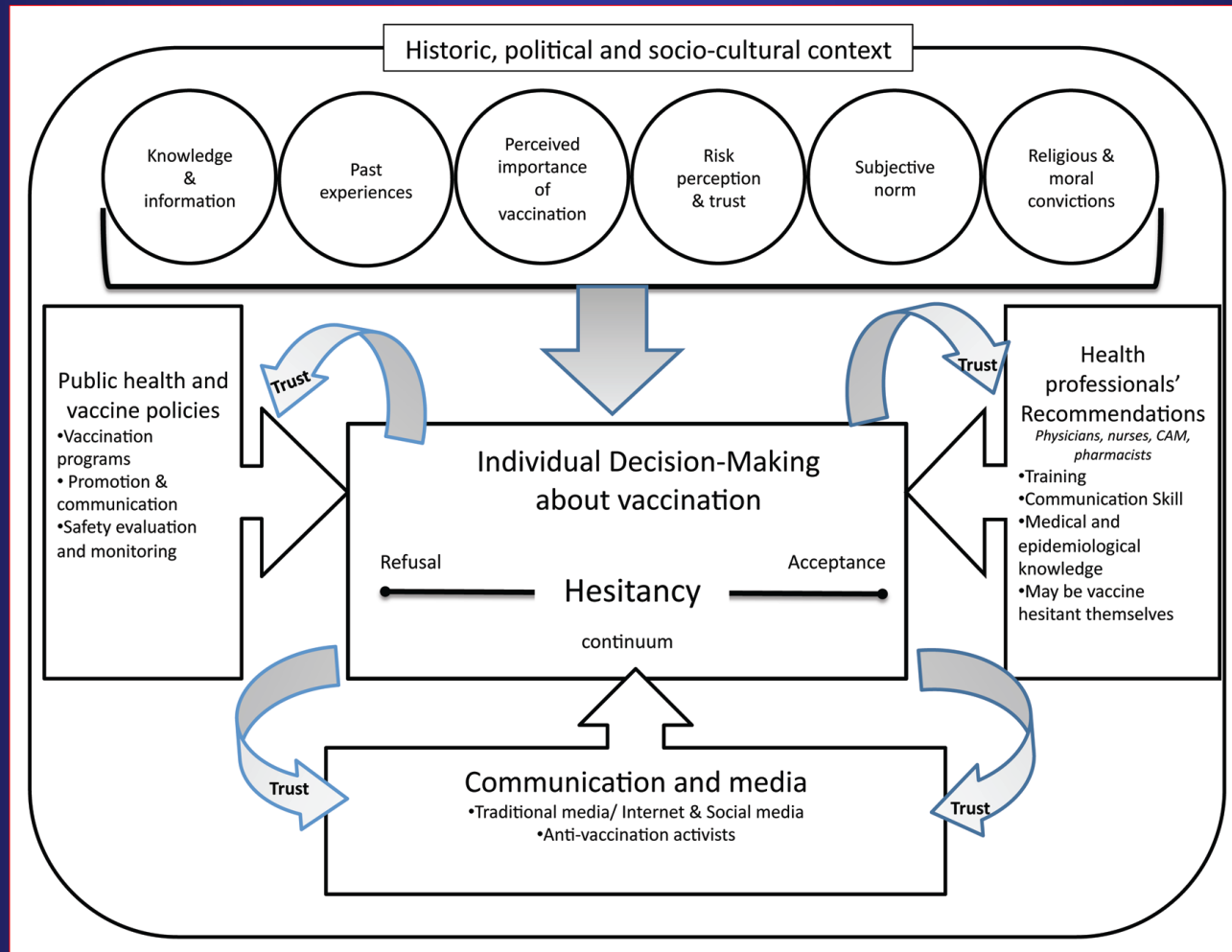
## The war on infectious diseases: COVID-19 vaccines and the public: Challenges and solutions

Joseph A. Bellanti, MD, Russell A. Settipane, MD

Allergy Asthma Proc. 2021 Jan 1;42(1):5-7

- We referred to vaccine hesitancy and the barriers of acceptance of COVID-19 vaccines
- The many causes of vaccine hesitancy not only include misinformation, fallacies and myths surrounding the vaccine
- But also, a diminished level of confidence and trust by segments of the public in the nation's leaders in government, medical and business communities—that those groups once enjoyed.

# Historic and Socio-cultural Basis of Vaccine Hesitancy



Dubé È, et al. Vaccine Hesitancy, Acceptance, and Anti-Vaccination: Trends and Future Prospects for Public Health. *Annu Rev Public Health*. 2021 Apr 1;42:175-191.

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# Adverse effects of smallpox vaccine

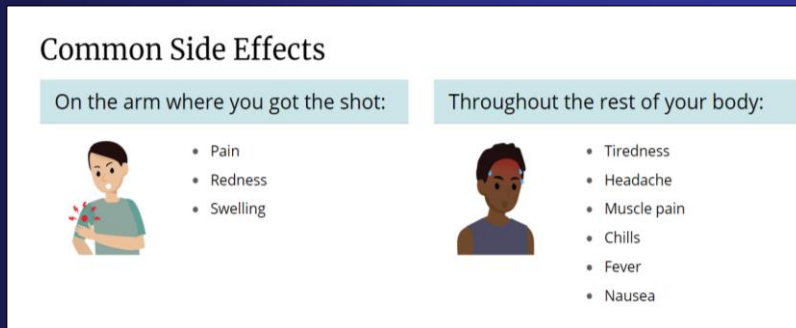


# Should You Get the COVID-19 Vaccine If You Have Allergies?

- What do we know so far about allergic reactions to COVID-19 vaccines?
  - Anaphylaxis after COVID-19 vaccination is rare and occurred in approximately 2 to 5/10<sup>6</sup> immunized people in the US based on events reported to VAERS.
- What ingredients are in the vaccines?
  - mRNA, Ad26.COV2.S, lipids, PEG, polysorbates
- What could be causing allergic reactions?
  - It is believed that PEG may be the cause whether some of the reactions are occurring via another mechanism is unclear at this time.

# Types of adverse reactions to COVID-19 vaccines

- COVID-19 vaccines are safe and effective
- Common Side Effects

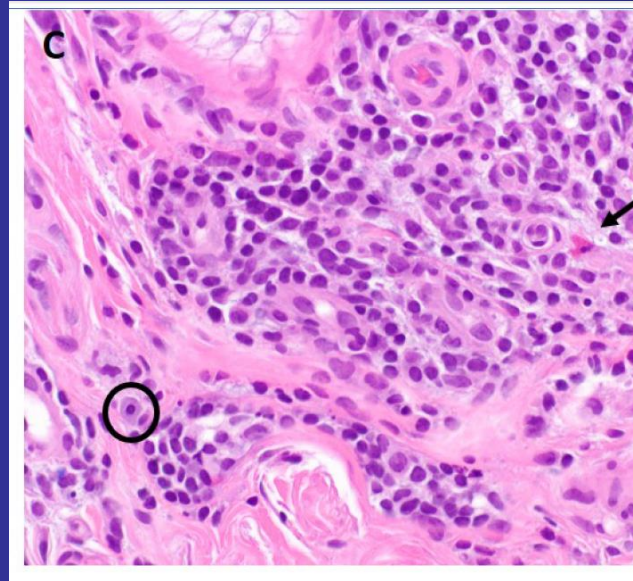


- Side effects of concern: **severe anaphylactic reactions**  
Anaphylaxis after COVID-19 vaccination is rare and occurred in approximately 2 to 5/10<sup>6</sup> immunized people in the US based on events reported to VAERS.
- If a serious allergic reaction or anaphylaxis occur after first shot of a COVID-19 vaccine, CDC recommends deferring a second shot

# Delayed adverse reactions to COVID-19 vaccines

Blumenthal KG, et al. Delayed Large Local Reactions to mRNA-1273 Vaccine against SARS-CoV-2. *N Engl J Med*. 2021 Apr 1;384(13):1273-1277.

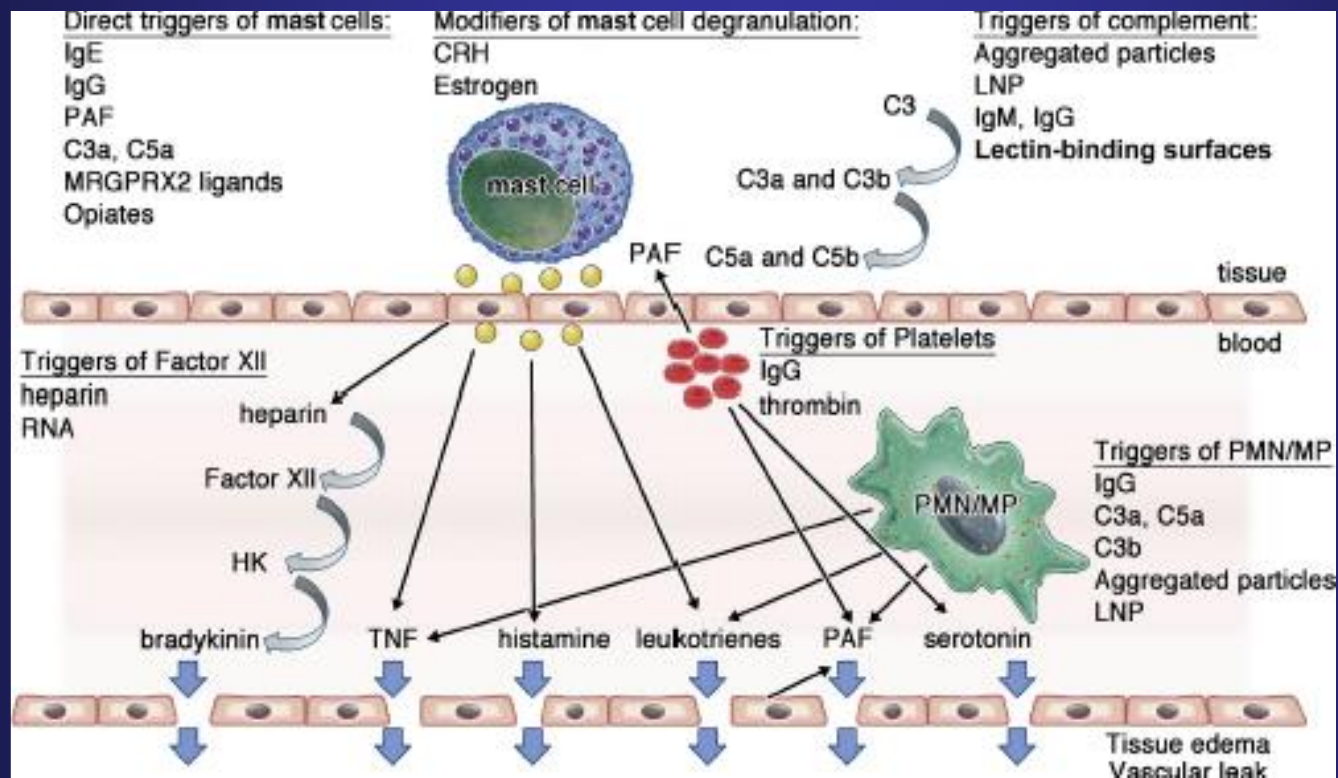
- Delayed large local reactions to the mRNA-1273 vaccine, with a median onset on day 8 (range, 4 to 11) after the first dose in 12 patients; 10/12 female; 8/12 past hx allergic reactions



# Mechanisms of adverse reactions to COVID-19 vaccines

## Potential mechanisms of anaphylaxis to COVID-19 mRNA vaccines

Kimberly A. Risma, MD, PhD,<sup>a</sup> Kathryn M. Edwards, MD,<sup>b</sup> Donna S. Hummell, MD,<sup>c</sup> Frederic F. Little, MD,<sup>d</sup>  
Allison E. Norton, MD,<sup>c</sup> Amy Stallings, MD,<sup>e</sup> Robert A. Wood, MD,<sup>f</sup> and Joshua D. Milner, MD<sup>g</sup> *Cincinnati, Ohio;*  
*Nashville, Tenn; Boston, Mass; Durham, NC; Baltimore, Md; and New York, NY*





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# Role of the allergist-immunologist

## The role of the allergist/immunologist in the COVID-19 pandemic: A Janus-faced presentation

Joseph A. Bellanti, M.D.

Allergy Asthma Proc. 2020 Nov 1;41(6):397-412.

- Although every specialty of medicine has been affected, the field of allergy/immunology holds a special place in the battle against COVID-19.
- Because of the specialized training in allergy, clinical immunology and inflammatory diseases, the allergist/immunologist is uniquely poised to play a major role in the delivery of specialized therapy
- But also in educating the public regarding the importance of COVID-19 vaccines, in dispelling misinformation and in promoting vaccine acceptance
- But in order to do so, the allergist-immunologist must be informed with the most accurate and current information

# Communication with the Public

- The public now has instant access to information (both good and bad) concerning COVID-19 through the news and social media and interest in medical research is soaring with the public
- Researchers and clinicians seldom receive training on how to best communicate with the public outside of their academic and clinical environments
- Traditional approaches to public communication lack meaningful engagement and need to move beyond the paternalistic views of communication
- Where professionals tend to talk at the public rather than listening to and engaging the public in an active dialog known as shared decision-making.

# Communication with the Public

- The traditional model of public education is counter-productive to effective messaging
- And can, at times, discourage public involvement and trust in research and public health endeavors
- Instead, professionals should be pursuing an ongoing dialog that empowers the public to be actively involved in science and medicine as key stakeholders rather than passive recipients

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# Conclusions

- COVID-19 vaccines are safe and effective
- Adverse reactions to COVID-19 vaccines are rare events and the allergist-immunologist will be called upon to make recommendations on appropriate usage
- Vaccination is the only way COVID-19 will be eliminated or at least controlled today and vaccine hesitancy is the potential nemesis
- The allergist-immunologist plays a major role in the delivery of specialized therapy of COVID-19 but also in educating the public regarding the importance of COVID-19 vaccines, in dispelling misinformation and in promoting vaccine acceptance
- But in order to do so, the allergist-immunologist must be informed with the most accurate and current information which is occurring at rapid speed

