



# HOMOLOGIES BETWEEN COVID-19 VACCINES AND COMMON ALLERGENS

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## PURPOSE

To investigate the potential for T cell-mediated responses after Covid-19 vaccination as a protective measure in allergic rhinitis and allergic asthma.

# OBJECTIVE

Our objective was to use common allergens indexed through two known and reputable databases to explore the potential overlap between each allergen and the COVID-19 vaccines from Pfizer and Moderna.

## METHODS

1. Explore the overlap between the COVID-19 mRNA vaccines from Pfizer-BioNTech and Moderna and known allergens.
2. Allergens were indexed through the University of Nebraska's FARRP Allergen Protein Database ([allergenonline.org](http://allergenonline.org)) and the FASTA tool.
3. This was accomplished using the BLOSUM 50 scoring matrix.
4. The Codex Alimentarius Commission recommendation likelihood of cross-reactivity criteria was used to establish the following:
  - Allergens with 35% (or greater) similarity over segments of 80 amino acids were reported. Known as "Criteria A."
  - Allergens with short identical matches (i.e. 8 or more amino acids) were also reported. Known as "Criteria B."

# RESULTS

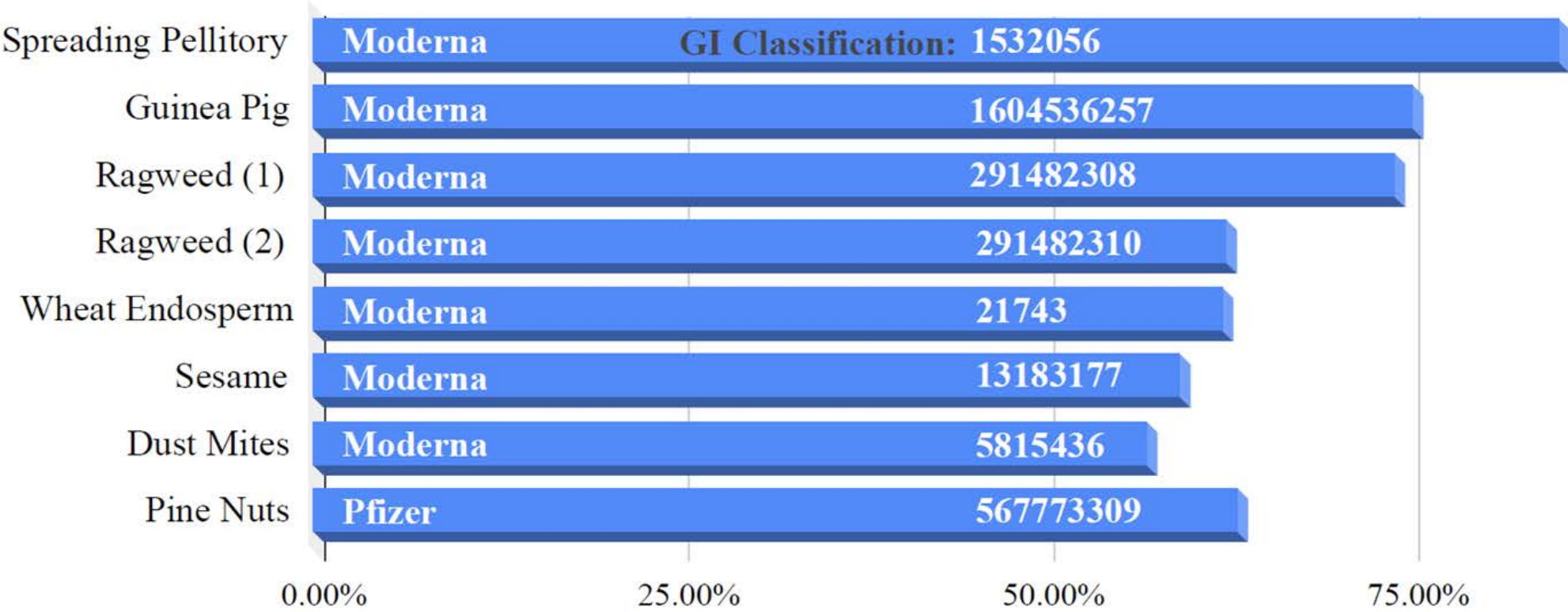
## Pfizer Vaccine

- Criteria A: 1 allergen (pine nuts)
- Criteria B: 6 allergens (perennial ryegrass, tufted grass, fungal allergens)
  - Including *Alternaria Alternata* – the most common fungal allergen associated with asthma.

## Moderna Vaccine

- Criteria A: 7 allergens (grass, lipocalin from guinea pigs, ragweed, wheat, sesame, and dust mites).
- Criteria B: 12 allergens (mold, hazel, Kentucky bluegrass, cat grass, timothy grass, Yorkshire fog grass, perennial ryegrass).

Figure 1. Allergens with 35% (or greater) similarity over segments of 80 amino acids (Criteria A)



<b>Table 1. Allergens with <math>\geq 8</math> sequential amino acids match (Criteria B)</b>	
<b>Common Allergen Name</b>	<b>GI Class</b>
<b><i>Moderna</i></b>	
Mold (Cheese)	371537645
Hazel	29170509
Perennial Ryegrass	4416516, 6634467
Timothy Grass	345108717
Kentucky Bluegrass (KBG 31, 60, 41, clone 7.2)	113560, 113562, 539056, 113561
Orchard Grass, Cat Grass	14423124, 18093971
Yorkshire Fog/Tufted Grass	2266625
<b><i>Pfizer</i></b>	
Perennial Ryegrass	4416516
Yorkshire Fog/Tufted Grass	2266625
Fungal Allergen	1850540, 1173071, 5777795
Soil-Borne Fungus	19879657

## DISCUSSION

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T-cell mediated antigen cross-reactivity between viruses and allergens is a relatively new area of study.

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Altered T cell-mediated immune response after vaccination in patients with allergic disease.

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“Old Friends” Hypothesis.



Established overlap of known allergens and the COVID-19 vaccines.

Altered T cell-mediated immune response may be observed in allergic asthma and allergic rhinitis after vaccination.

CONCLUSION

## SIGNIFICANCE OF FINDINGS

- These results suggest that vaccination with the Pfizer-BioNtech and Moderna COVID-19 vaccines may contribute to T-cell cross-reactivity with allergens that may positively impact allergic asthma and allergic rhinitis.
- Further research should assess the clinical implications of COVID-19 vaccination on the severity and symptomatology of allergic disease, in addition to natural viral infection.

## REFERENCES

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