Docket #: S23-065

Coupling of Heterologous Antigens to Overcome Subtype Bias and Broaden Vaccine Efficacy

The low efficacy of multi-strain vaccines against rapidly evolving viruses, such as influenza, necessitates the development of novel methods to broaden the immune response in vaccinated individuals. The efficacy of the current seasonal influenza vaccine is typically ranges from 19% to 60%. We identified that the low efficacy is due to the phenomenon of subtype bias, which arises from limited CD4+ T cell 'help' across all strains. That is, even though the vaccine contains multiple strains, most individuals elicit a robust immune response to only one of the strains. This leaves individuals vulnerable to infection by other strains. Subtype bias occurs in approximately 65% of the vaccinated individuals which suggests that eliminating it may be a valid path to increase vaccine efficacy.

Stanford scientists have discovered that coupling of antigens from multiple influenza strains can overcome subtype bias by increasing CD4+ T cell help, thereby inducing a robust immune response to all strains included in the formulation. The antibody response against multiple strains was higher with the coupled antigen formulation in comparison to the seasonal inactivated influenza vaccine in a human organoid system, and a mouse model. Coupling of antigens can be a transformative method to eliminate subtype bias in multi-strain vaccine formulations needed against rapidly evolving pathogens, such as influenza and SARS-CoV-2.

Stage of Development
Preclinical – in vitro human organoid model and in vivo animal data

Applications

- Development of multi-strain vaccines against influenza and SARS-CoV-2.

- Elimination of response bias in vaccines formulated with multiple antigens.
- Increasing vaccine efficacy against rapidly evolving pathogens.

Advantages

- Broadens the immune response in individuals vaccinated with multi-strain formulations.
- Versatile coupling method that can be used to formulate vaccines against diverse pathogens.

Publications

- Vamsee Mallajosyula et al. Coupling antigens from multiple subtypes of influenza can broaden antibody and T cell responses. *Science* 386,1389-1395 (2024).

Patents

- Published Application: WO2024197156

Innovators

- Mark Davis
- Venkata Mallajosyula

Licensing Contact

Minxing Li

Licensing and Strategic Alliances Manager

Email