



SCIENCE FOR THE BENEFIT OF HUMANITY

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Modified Immune Complexes Generate Broad Based Protection Against H1 Influenza

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Technology Summary

The trend in vaccine development by major pharmaceutical companies points towards vaccines with multiple attachment sites against a range of influenza virus strains, including those that recently emerged and those that persist over a period of time. Unfortunately, these recent efforts are not able to achieve high affinity and broad spectrum prevention. However, a promising technology from Dr. Jeffrey Ravetch's laboratory at the Rockefeller University could potentially shift the paradigm to a universal influenza vaccine applicable to a more comprehensive range of H1 influenza strains owing to its highly precise regulation with increased efficacy.

Immunoglobulin G (IgG) is the most common type of antibody found in circulation and is known to mediate both pro- and anti-inflammatory activities through interactions mediated by its Fragment Crystallizable (Fc) fragment (interacts with cell surface receptors and mediates immune response). Dr. Jeffrey Ravetch's group has determined that the composition of sugar groups on the Fc portion can shift an immune response from pro-inflammatory to anti-inflammatory. Interestingly, they determined that the influenza vaccine elicits high-affinity, neutralizing antibodies by promoting the addition of specific sugar moieties to the Fc region of IgG, which in turn promotes modulation in the affinity maturation pathway. Attachment of sugar at the Fc ultimately increases IgG affinity for the conserved stalk domain of the HA antigen in the influenza virus, leading to a highly efficacious immune response stimulated by the IgG-stalk complex. This finding is potentially a transformative strategy to generate broad spectrum protection against H1 influenza viruses through immunization with these modified immune complexes.

Advantage

Increased protection against multiple strains of the influenza virus, increase breadth of vaccine responses

Area of Application:

Vaccines against influenza, other viral diseases

Stage of Development:

Discovery in vivo; this variant has been tested in mouse models

Lead Inventor:

Dr. Jeffrey V. Ravetch

Patent Information:

U.S. patent pending

Reference

Wang T. T. et al, Anti-HA glycoforms drive B cell affinity selection and determine influenza vaccine efficacy; *Cell*.162(1):160-169 (2015).

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