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## Protection from H5N1 influenza virus challenge with a single dose HA subunit protein vaccine

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Subunit vaccines have much promise in solving unmet needs in vaccine development. There are many infectious diseases for which a killed pathogen is not practical, and yet for many infectious diseases, there is a single antigenic protein against which a protective immune response is made. For example, neutralizing antibodies against the hemagglutinin protein (HA) of influenza are sufficient to attenuate pathogenicity, and improve survival after virus exposure. HA protein vaccines have been tested as vaccine alternatives to kill virus made in eggs, however, most require multiple doses for protection against influenza challenge. We have used conjugation of monomeric HA protein to plant-derived Tobacco Mosaic virus (TMV) as a novel method of antigen delivery that profoundly improves HA subunit vaccine potency. TMV is easily produced at a large scale in tobacco plants and is safe, non-infectious, and provides excellent antigen delivery to dendritic cells and other important antigen presenting cells. We created TMV-HA pseudo-virus conjugates, using HA from either H1N1 or H5N1 influenza. After vaccination in mice, a single low dose of TMV-HA stimulates IgG responses and inhibits hemagglutinin and also protects 50% of mice from a lethal influenza virus challenge, suggesting that TMV itself confers adjuvant properties to the subunit protein vaccine. Two doses of TMV-HA or one dose with adjuvant confers 100% protection from either H1N1 or H5N1 challenge. Our strategy represents a significant advance in subunit vaccine formulation, and has the potential to expand the development of other subunit vaccines that currently lack sufficient protective potency.

### Biography

Alison McCormick completed her PhD at University of California, San Diego, and Post-doctoral studies from Stanford University School of Medicine. She has 15 years of industry experience in plant made vaccines and therapeutics, and is currently Professor of Biological and Pharmaceutical Sciences, College of Pharmacy, at Touro University California. She is considered as an expert in plant-made vaccines.

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