New development could increase flu vaccine supply

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(Medical Xpress) -- Scientists from the U.S. Food and Drug Administration and the pharmaceutical company Novartis announced today in the journal *Science Translational Medicine* that they have developed a new adjuvant, or compound that increases the immune response, to add to the current flu vaccines. This adjuvant will allow flu vaccine producers to cut the antigen needed in half and allow for more flu vaccines to be made. This adjuvant would aid in the effectiveness of the flu vaccine while also creating a way to double the U.S. flu vaccine supply.

Adjuvants have already been used for some time in Europe but the U.S. has been slow to adopt them. There is concern that they will receive similar criticism from groups opposed to vaccines as they did when the addition of thimersol, a preservative, was added to the vaccine. While there is already resistance to getting a vaccine, the U.S. didn't want to add to that possibility.

However, the new adjuvant, known as MF59, is made from squalene, a form of purified shark liver oil. Squalene is naturally produced in the human liver as well. Research has shown that the MF59 vaccine produced a stronger immune response that the current vaccine in use. Squalene has been used in vaccines in Europe since 1997 but this would be the first use of it in a U.S. vaccine.

The vaccine still needs to have the FDA review data and inspect the European production facilities, but it is possible the new vaccine could

be available in the fall of 2012.

More information: S. Khurana, N. Verma, J. W. Yewdell, A. K. Hilbert, F. Castellino, M. Lattanzi, G. Del Giudice, R. Rappuoli, H. Golding, MF59 Adjuvant Enhances Diversity and Affinity of Antibody-Mediated Immune Response to Pandemic Influenza Vaccines. Sci. Transl. Med. 3, 85ra48 (2011). DOI: 10.1126/scitranslmed.3002336

ABSTRACT
Oil-in-water adjuvants have been shown to improve immune responses against pandemic influenza vaccines as well as reduce the effective vaccine dose, increasing the number of doses available to meet global vaccine demand. Here, we use genome fragment phage display libraries and surface plasmon resonance to elucidate the effects of MF59 on the quantity, diversity, specificity, and affinity maturation of human antibody responses to the swine-origin H1N1 vaccine in different age groups. In adults and children, MF59 selectively enhanced antibody responses to the hemagglutinin 1 (HA1) globular head relative to the more conserved HA2 domain in terms of increased antibody titers as well as a more diverse antibody epitope repertoire. Antibody affinity, as inferred by greatly diminished (≥10-fold) off-rate constants, was significantly increased in toddlers and children who received the MF59-adjuvanted vaccine. Moreover, MF59 also improved antibody affinity maturation after each sequential vaccination against avian H5N1 in adults. For both pandemic influenza vaccines, there was a close correlation between serum antibody affinity and virus-neutralizing capacity. Thus, MF59 quantitatively and qualitatively enhances functional antibody responses to HA-based vaccines by improving both epitope breadth and binding affinity, demonstrating the added value of such adjuvants for influenza vaccines.