Medical Xpress

Universal flu vaccine in the works

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Each year, scientists create an influenza (flu) vaccine that protects against a few specific influenza strains that researchers predict are going to be the most common during that year. Now, a new study shows that scientists may be able to create a 'universal' vaccine that can provide broad protection against numerous influenza strains, including those that could cause future pandemics. The study appears in *mBio*, the online open-access journal of the American Society for Microbiology.

"The reason researchers change the vaccine every year is that they want to specifically match the vaccine to the particular viruses that are circulating, such as H1N1. If the vaccine is just a little bit different to the target virus, it is not expected to offer much protection," said principal investigator of the study Jeffery Taubenberger, MD, PhD, Chief of Viral Pathogenesis and Evolution Section, Laboratory of Infectious Diseases, National Institute of Allergy and Infectious Diseases (NIAID). "What we have done is design a strategy where you don't have to think about matching the vaccine antigen to the virus at all."

In the new study, researchers at the NIAID used a virus-like particle vaccine cocktail that expressed a handful of different subtypes of a key surface protein of the influenza virus: hemagglutinin H1, H3, H5 and H7. "There are 16 different hemagglutinin subtypes that circulate in birds and are thought to be the basis for current and future influenza pandemics," said Dr. Taubenberger. "The hypothesis was that the presentation of these different viral proteins would stimulate the development of cross-protective immunity that would provide broader protection against multiple subtypes."

The researchers picked the H1 and H3 subtypes because they have been the major cause of human seasonal flu outbreaks since 1918. They chose the H5 and H7 subtypes because they have been the cause of recent bird flu outbreaks and have pandemic potential. This selection also provided a broad representation of hemagglutinins across the phylogenetic tree.

In a series of experiments, the researchers found that 95% of mice vaccinated with the investigational cocktail were protected against a lethal challenge with eight different influenza strains expressing seven different influenza A subtypes, compared to only 5% of mice who received mock vaccinations.

"Almost all of the animals that were vaccinated survived, including mice that were challenged with viruses that expressed hemagglutinin subtypes that were not in the vaccine at all, viruses that expressed H2, H6, H10, and H11," said Dr. Taubenberger. "What that suggests is that this approach really gives us broad spectrum protection, and could serve as a basis for an effective pre-pandemic vaccine."

Additional experiments showed that the vaccine was durable, effective for at least 6 months, and that it worked well in older mice. This is important given that elderly people are particularly susceptible to severe disease following influenza infection, and current vaccines are less efficacious in the elderly than in younger people.

"These initial findings are very positive and suggest a promising and practical strategy for developing a vaccine with amazing, broad protection," said Dr. Taubenberger.

Provided by American Society for Microbiology