Novel approach for influenza vaccination shows promise in early animal testing

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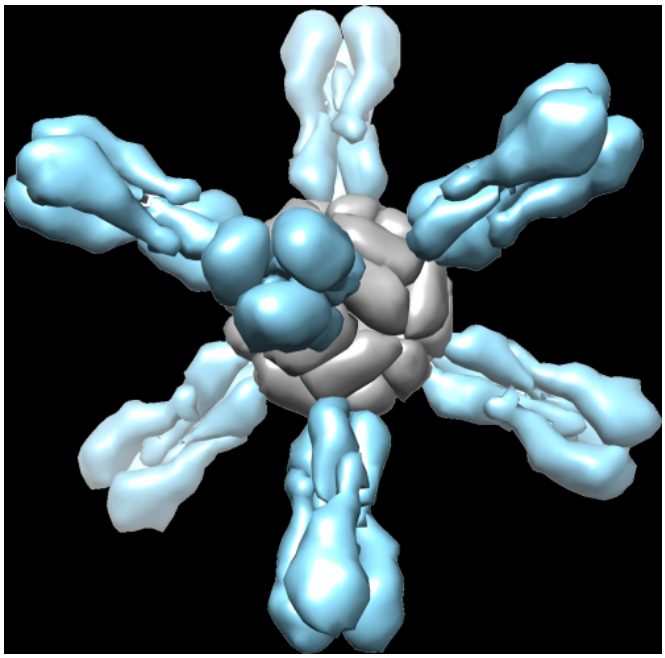

When ferritin (gray) is fused with the influenza protein hemagglutinin (blue), it self-assembles into a sphere with eight protruding spikes from its surface. Credit: NIAID

A new approach for immunizing against influenza elicited a more potent immune response and broader protection than the currently licensed seasonal influenza vaccines when tested in mice and ferrets. The vaccine concept, which was developed by scientists at the National Institute of Allergy and Infectious Diseases (NIAID), represents an important step forward in the quest to develop a universal influenza vaccine—one that would protect against most or all influenza strains without the need for an annual vaccination.

The scientists designed an experimental vaccine featuring the protein ferritin, which can self-assemble into microscopic pieces called nanoparticles, as a key component. Ferritin was fused genetically with hemagglutinin (HA), the protein found on the surface of the influenza virus, resulting in a nanoparticle with eight protruding viral spikes. Using this as the basis for the vaccine antigen, the researchers created an experimental vaccine using HA from a 1999 strain of H1N1 influenza virus and evaluated its ability to stimulate an immune response in mice. A single dose of the experimental vaccine both with and without the use of an adjuvant triggered an immune response in the mice comparable to two doses of the currently licensed seasonal influenza vaccine. The experimental vaccine was also active against a wider range of H1N1 influenza virus strains than the licensed vaccine.

The researchers also tested the experimental vaccine's ability to protect ferrets from infection with a 2007 strain of H1N1 influenza virus – a strain it had not been specifically designed to prevent. One day after exposure to the virus, ferrets that had received the experimental vaccine had significantly lower influenza virus levels than those that were not immunized. According to the study authors, the novel vaccine concept works by stimulating antibodies that hitch themselves to the parts of the influenza virus that stay consistent across different strains. Although further testing is needed, the HA-ferritin nanoparticle approach shows promise for development of more broadly protective vaccines for influenza as well as for other infectious diseases, the authors note.

More information: Kanekiyo M et al. Self-assembling influenza nanoparticle vaccines elicit broadly neutralizing H1N1 antibodies. *Nature*. DOI: 10.1038/nature12202

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