Two new Epstein-Barr virus vaccines induce neutralizing antibodies in mice

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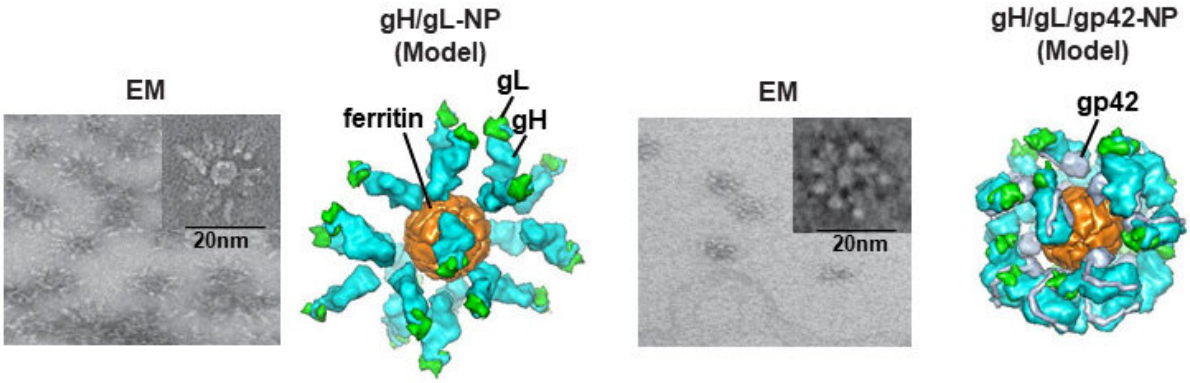

Close-up images and structural models of the gH/GL and gH/gL/gp42 nanoparticles from the two vaccines. Credit: *Science Translational Medicine* (2022). DOI: 10.1126/scitranslmed.abf3685

A team of researchers from the French health care company Sanofi, working with the National Institutes of Health and the National Cancer Institute in the U.S., has developed two new vaccines against Epstein-Barr infections. In their paper published in the journal *Science Translational Medicine*, the group describes attributes of the two vaccines and their effectiveness in mouse models.

Epstein-Barr viral infections are known to cause mononucleosis and have also been associated with several other conditions including certain

cancers. In January, it was found to be a likely cause of multiple sclerosis. Prior research has shown that approximately 95% of adults in the world today have been infected by the virus. For that reason, researchers have been working on a vaccine to protect people from infection, but thus far, none have worked as hoped. In this new effort, the researchers working on these two new vaccines believe they have made a breakthrough.

The work involved developing nanoparticle-based vaccines that target the glycoproteins that mediate entry of the virus into both B cells and epithelial cells. The idea is that this will help the immune system target the viruses and kill them. The vaccines are called gH/gL+gp350D$_{123}$ and gH/gL/gp42+gp350D$_{123}$. More specifically, the researchers developed single chain-chain proteins that would fuse to bacterial ferritin and, in the process, would self-assemble into nanoparticles.

The vaccines were proven effective in eliciting an immune response in nonhuman primates, mice and ferrets. That led to more extensive testing, during which the researchers vaccinated mice engineered to have a human-like immune system. Only one such mouse was found to have detectable amounts of virus in its body, while all of the control mice were infected. The researchers allowed the mice to grow older and none of them developed any of the types of cancers that have been associated with Epstein-Barr viral infections.

The researchers suggest their vaccines represent a promising candidate for further research. Clinical trials have been scheduled for next year.

More information: Chih-Jen Wei et al, A bivalent Epstein-Barr virus vaccine induces neutralizing antibodies that block infection and confer immunity in humanized mice, *Science Translational Medicine* (2022). DOI: 10.1126/scitranslmed.abf3685