Medical Xpress

DNA vaccines for COVID-19 effective in mice, hamsters

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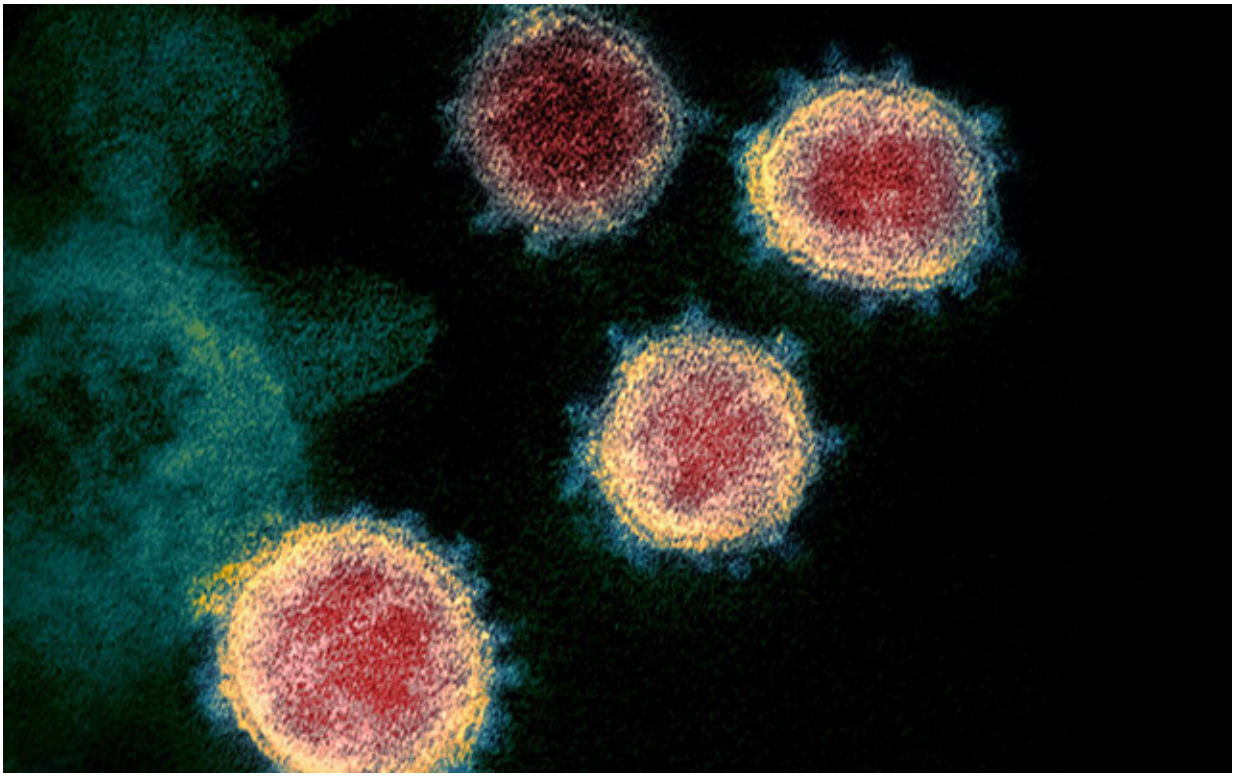

A colorized scanning electron micrograph of the SARS-CoV-2 virus. Credit: NIAID

Currently available COVID-19 vaccines rely on mRNA strands to teach the human immune system to recognize the SARS-CoV-2 virus. Now, researchers reporting in *PLOS Neglected Tropical Diseases* have reported

the successful development of a vaccine that instead uses DNA encoding the virus' spike protein.

While both DNA and mRNA vaccines use genetic material encoding part of a virus to elicit an immune response, DNA vaccines can often be produced more quickly and at lower cost and transported without the requirement of cold temperatures. Recent clinical trials have indicated that DNA vaccines are safe and effective in treating infections including HIV-1, Zika virus, Ebola virus and influenza viruses.

In the new work, Shih-Jen Liu and Hsin-Wei Chen of the National Health Research Institutes, Taiwain, and colleagues developed a vaccine that uses DNA encoding the SARS-CoV-2 spike protein. To overcome the poor delivery of DNA into cells often seen with DNA vaccines, the team coupled electroporation with the delivery of the DNA vaccination.

The researchers showed that mice and hamsters immunized with the new DNA vaccine developed long-lasting antibodies against the SARS-CoV-2 spike protein. Those antibodies peaked at 8 weeks post-immunization but levels remained relatively high at week 20. Hamsters that received two immunizations at a 3-week interval and were exposed to COVID-19 after 7 weeks were protected from the virus, showing no loss of body weight and less viral RNA in their lungs compared to animals that were not immunized.

"The DNA vaccine is thermal stable which is no cold chain-needed and can induce high level of long-lasting neutralizing antibody titers against SARS-CoV-2," the authors add. "The DNA vaccine confers protective efficacy against SARS-CoV-2 infection in Syrian hamsters which is a severe COVID-19 disease animal model."

More information: Chai KM, Tzeng T-T, Shen K-Y, Liao H-C, Lin J-J, Chen M-Y, et al. (2021) DNA vaccination induced protective

immunity against SARS CoV-2 infection in hamsterss. *PLoS Negl Trop Dis* 15(5): e0009374. doi.org/10.1371/journal.pntd.0009374