Optimized second-generation mRNA vaccine demonstrates improved protection against COVID-19

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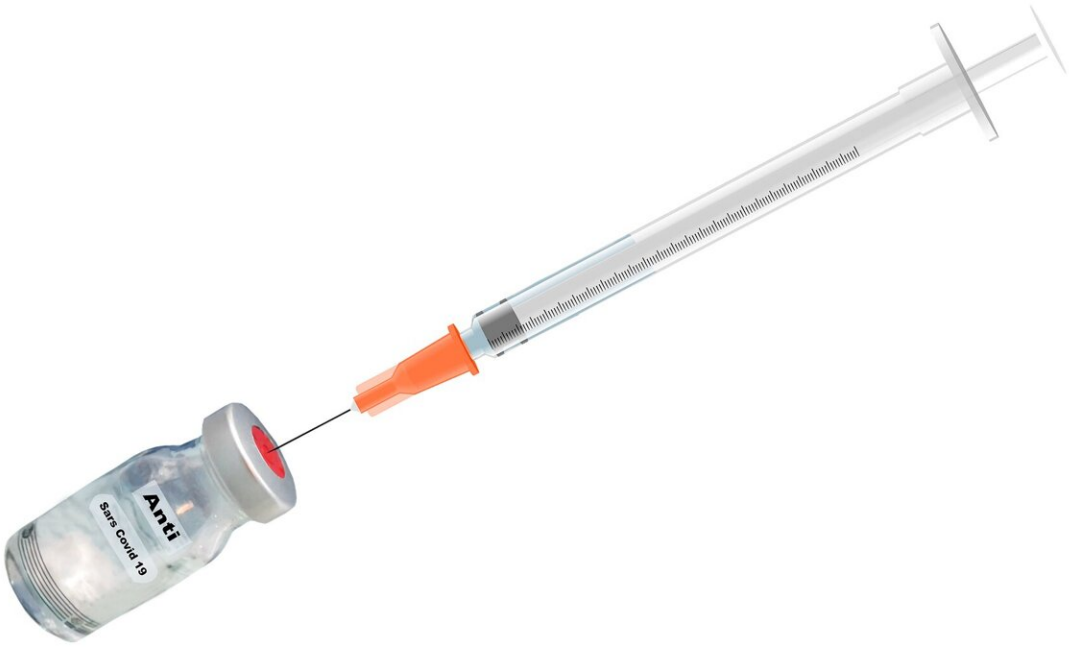

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In a recent phase 2b/3 clinical trial, a third mRNA vaccine against COVID-19—known as CVnCoV and developed by CureVac—reported

approximately 48 percent efficacy against symptomatic disease. CV2CoV is a second generation vaccine developed by CureVac with noncoding modifications to optimize the vaccine. Researchers at Beth Israel Deaconess Medical Center (BIDMC) conducted a head-to-head test of the second-generation vaccine CV2CoV compared with CVnCoV. The scientists assessed the vaccines' ability to provoke an immune response as well as their protective efficacy against COVID-19 in non-human primates. Their findings are published in *Nature*.

"We found that CV2CoV elicited substantially higher immune responses and provided significantly improved protective efficacy against SARS-CoV-2, the virus that causes COVID-19, compared with CVnCoV in macaques," said Dan H. Barouch, MD, Ph.D., director of the Center for Virology and Vaccine Research at BIDMC and professor of medicine at Harvard Medical School. "These data suggest that optimizing selected elements of the mRNA backbone can substantially improve the immunogenicity and protective efficacy of mRNA vaccines."

Barouch and colleagues' data revealed that, while CVnCoV provided only modest reduction in viral loads in immunized animals later challenged with SARS-CoV-2, CV2CoV induced ten-fold higher antibody responses and dramatically lowered viral loads. They also report that CV2CoV induced antigen-specific memory B cell responses and T cell responses. Moreover, CV2CoV raised similar antibody titers in macaques compared with the BNT162b2 vaccine developed by Pfizer.

"The improved characteristics of CV2CoV compared with CVnCoV may translate into increased efficacy in humans, and clinical trials of the second-generation vaccine are planned," said Barouch, who is also a member of the Ragon Institute of MGH, MIT and Harvard.

More information: Makda S. Gebre et al, Optimization of Non-Coding Regions for a Non-Modified mRNA COVID-19 Vaccine,

Nature (2021). DOI: 10.1038/s41586-021-04231-6