

Second shot of COVID-19 vaccine may not be necessary in previously infected individuals: study

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A single shot of one of the currently authorized COVID-19 vaccines may be sufficient to provide immunity to individuals who have previously been infected by the virus, thus eliminating the need for a second dose and helping to stretch severely limited vaccine supplies, a study from Mount Sinai has found. Such a change in public health policy could also spare these individuals the unnecessary side effects of a second dose of vaccine, which researchers found to be significantly greater in individuals with pre-existing immunity to SARS-CoV-2, the virus that causes COVID-19. A letter to the editor was published today in the *New England Journal of Medicine* detailing the study.

"We showed that the antibody response to the first [vaccine](#) dose in people with pre-existing immunity is equal to or even exceeds the response in uninfected people after the second dose," says co-author Viviana Simon, MD, Ph.D., Professor in the Departments of Microbiology and Medicine (Infectious Diseases) in the Icahn School of Medicine at Mount Sinai. "For that reason, we believe that a single dose of vaccine is sufficient for people who have already been infected by SARS-CoV-2 to reach immunity."

Two COVID-19 vaccines (Pfizer-BioNTech and Moderna) received emergency use authorization by the U.S. Food and Drug Administration (FDA) in December 2020, and have been administered to millions of people throughout the country. In Phase 3 trials, both vaccines reported high efficacy in preventing symptomatic COVID-19 infections after two doses given three to four weeks apart. Both vaccines are also well tolerated with few side effects requiring additional medical attention.

In their study of 109 individuals with and without previous SARS-CoV-2 immunity, Mount Sinai researchers, led by Dr. Simon and co-author Florian Krammer, Ph.D., Professor of Vaccinology in the Department of Microbiology, found that the former group developed antibodies within days of the first dose of vaccine at a rate 10 to 20 times higher than

those who were uninfected, and at a more than tenfold rate after the second dose. "These findings suggest that a single dose of vaccine elicits a very rapid immune response in individuals who have tested positive for COVID-19," says Dr. Krammer. "In fact, that first dose immunologically resembles the booster (second) dose in people who have not been infected."

The team also investigated systemic reactions after the first dose of vaccine in a second group of 231 individuals, 83 of whom had tested positive for COVID-19, and 148 who had not. While the vaccines were generally well tolerated, injection site symptoms—including pain, swelling, and reddening of the skin—were found in both sub-groups. In recipients with pre-existing immunity, however, side effects occurred with a significantly higher frequency, including fatigue, headache, chills, fever, and muscle or joint pain.

The intensity of the response to the first dose in people previously infected appears to be similar to the response from people not previously infected after the second dose. The reason for the stronger response in both groups is likely due to the fact the body has already been "primed," meaning the [immune cells](#) have learned how to recognize the spike protein of the virus—the antigen that forms the basis for vaccination. These cells thus respond more vigorously, leading to stronger reactions to the vaccine.

If the infection history of an individual is unknown, Dr. Simon suggests using a serological assay to detect antibodies that might exist to the spike protein. "If the [screening process](#) determines the presence of antibodies due to previous infection, then a second shot of the coronavirus vaccine may not be necessary for the individual," she concludes. "And if that approach were to translate into [public health policy](#), it could not only expand limited [vaccine supplies](#), but control the more frequent and pronounced reactions to those vaccines experienced by COVID-19

survivors."

Provided by The Mount Sinai Hospital

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