

Necessity of 2 Doses of the Pfizer and Moderna COVID-19 Vaccines

Two doses of the Pfizer and Moderna COVID-19 vaccines are necessary to confer adequate immunity.

The new vaccines for coronavirus disease 2019 (COVID-19) are highly effective, but controversy exists about whether a second dose should be delayed in order to immunize more people. The second dose is necessary and should be given.

How Do the COVID-19 Vaccines Work?

Messenger RNA (mRNA) is a highly unstable molecule that is used to create proteins in cells. mRNA can be synthesized in a laboratory and, when injected into cells, can cause pieces of proteins to be made. When these small pieces of protein (peptides) leave the cell, the body can develop an immune reaction to them. The 2 main vaccines in the US from Pfizer and Moderna use this approach to vaccinate people against COVID-19 infection.

Why Are 2 Vaccine Doses Needed?

When the vaccines were first tested, a relatively weak immune reaction was found within a few weeks after people received the first dose of vaccine, followed by a strong reaction when a second dose was given.

The next set of trials looked at the ability to prevent COVID-19 infection after receiving the 2 doses of vaccine. These vaccines were highly effective in preventing infections that cause symptoms after both the first and second doses. However, in these trials, a second dose was always given. It is not known how well the vaccine works if only 1 dose is given.

Controversy About the Need for a Second Vaccine Dose

Arguments have been made that because COVID-19 is such a serious disease that is rapidly spreading throughout the world and because vaccines can be made and delivered at a relatively slow rate, a first dose should be given and the second dose delayed until a large amount of the population receives the first dose.

It is known that the immune response to 1 dose of the vaccine is relatively weak, even though people who got their first dose had some protection against symptomatic COVID-19 infection. It is not known what will happen if people get only 1 dose.

It is possible that people who get only 1 dose will have only partial immunity to COVID-19 infection, resulting in a higher risk that vaccine-resistant variants of SARS-CoV-2, the virus that causes COVID-19, will develop. There is also concern that people who get

only 1 dose will think they have sufficient protection against COVID-19 infection and not get a second dose. There is no evidence that people who get only 1 dose have adequate long-term protection against COVID-19 infection.

When Should the Second Dose Be Given?

The Centers for Disease Control and Prevention (CDC) recommends that the second dose of the COVID-19 vaccine be given within 3 weeks of the first dose for the Pfizer vaccine and within 4 weeks for the Moderna vaccine. No more than 6 weeks should lapse between doses, although if the second dose is not given during these time frames, it can be given without the need to repeat the first dose. It is not recommended to give the second dose any earlier than stated above, but if a person needs to get the second dose earlier, giving the second dose up to 4 days ahead of schedule is allowed.

Do the New SARS-CoV-2 Variants Affect Vaccine Efficacy?

So far, the new variants seem to increase the ability of COVID-19 to spread but do not influence how sick someone gets from the disease. The current vaccines appear to work against the new variants. When vaccines are created, they are designed to create many different antibodies to differing parts of the virus so that even if one part of the virus mutates, the antibodies may recognize another part of the virus. It is possible that there will be a variant that reduces vaccine efficacy, and the companies that make vaccines are creating new ones that should work against new strains of SARS-CoV-2.

Where to Get Vaccinated

COVID-19 vaccines are being distributed by governmental agencies. Your primary care clinician most likely does not have access to the vaccine. Check online for instructions for how the vaccine is being given in your area. Most states have instructions for how to get the vaccine that can be found on the CDC's COVID-19 vaccine website (www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html).

FOR MORE INFORMATION

CDC Interim Clinical Considerations for Use of mRNA COVID-19 Vaccines Currently Authorized in the US

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Sources: *Understanding the new SARS-CoV-2 mutation found in England.* JAMA Clinical Reviews podcast. Published January 8, 2021.

COVID-19 vaccine safety—anaphylaxis and allergic reactions. JAMA Clinical Reviews podcast. Published January 6, 2021.

Lauring AS, Hodcroft EB. Genetic variants of SARS-CoV-2—what do they mean? *JAMA.*

Published online January 6, 2021. doi:10.1001/jama.2020.27124
Coronavirus vaccine update with Paul Offit and Robert Wachter. Conversations with Dr Bauchner podcast. Published January 21, 2021.

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