Will you need a COVID-19 booster? What we know so far

July 28 2021, by Carrie MacMillan

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Is a booster shot for your COVID-19 vaccine in your future? While it seems like only yesterday that people were calculating the date they could feel fully protected by their vaccination, now there's talk that our safety may require another shot in the arm.

In recent weeks, doctors, scientists, government officials, and pharmaceutical companies have been debating whether or not additional COVID-19 shots—or boosters—should be recommended to offer continued protection against the virus. The conversation is gaining urgency as we watch the Delta variant surge among unvaccinated individuals and health officials around the country report low but growing numbers of breakthrough cases in fully vaccinated individuals which, though they tend to be asymptomatic or mild, are of growing concern.

The discussion was sparked when Pfizer-BioNTech announced it would seek approval from U.S. regulators to authorize a booster dose of its vaccine. According to Pfizer representatives, the request is based on evidence from Israel and its own studies showing reduced efficacy six months after vaccination. (The data from Israel has not yet been peer-reviewed and the studies from Pfizer haven't yet been released.)

But, at least for now, U.S. regulators aren't convinced this is necessary. Anthony Fauci, MD, director of the National Institute of Allergy and Infectious Diseases and President Biden's chief medical adviser for the COVID-19 pandemic, said in a recent interview that both the Centers for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA) want more data. "Given the data and the information we have, we do not need to give people a third shot, a boost, superimposed upon the two doses you get with the mRNA [Pfizer/BioNTech and Moderna vaccines] and the one dose you get with [Johnson & Johnson]," Dr. Fauci said.

In the meantime, a federal advisory panel has expressed preliminary support for additional doses of the vaccine for immuno-compromised people, but the panel is awaiting regulatory action before making a formal recommendation.

COVID-19 booster shots are not a new idea. Since the vaccines were first introduced last December, scientists have acknowledged that boosters may someday be needed. This would mean a third dose of vaccine from Pfizer-BioNTech or Moderna, or a second dose of Johnson & Johnson, which are the three approved vaccines in the U.S.

"The main question is how long the immunologic protection against SARS-CoV-2, which causes COVID-19, lasts," says Albert Shaw, MD, Ph.D., a Yale Medicine infectious disease specialist. "And since we are learning about COVID-19 in real time, this is hard to know."

For now, Dr. Shaw emphasizes that the most important thing any of us can do is get vaccinated. And if you are already vaccinated, know that the situation is being closely monitored by the scientific and public health communities.

"The booster question is being worked out as we speak," Dr. Shaw says, noting that the open possibility of the need for a booster shot doesn't represent a failure of the existing vaccines. "People get confused—or they think something is wrong—when guidance changes with COVID-19, but we have to remember that we are learning about this as we go. Right now, there is uncertainty about boosters. Is it possible you'll need one at some point? Sure, especially if more people don't get vaccinated and other variants emerge that are worse than what we have now and can possibly evade the protections of the current vaccines."

We compiled a list of booster-related questions to ask Dr. Shaw. His answers are below.

What is a booster?

"The simplest answer is that it's just another dose of a vaccine you received," Dr. Shaw explains. "The concept is to prolong protective

immunity, particularly if there is evidence that protection is waning after a period of time."

Most children receive routine vaccinations, including boosters, for illnesses such as chickenpox, tetanus, diphtheria, mumps, measles, and rubella—to name a few. "These vaccine series, as we call them, are recommended because you need the extra doses to get longer lasting protective immunity," Dr. Shaw says.

Why might we need a booster for COVID-19?

While a booster sometimes is an exact replica of the initial vaccine, it can also be tweaked. With COVID-19, this is key because the vaccine could then be tailored to target particular variants of the virus.

"The current vaccines are still effective against the variants we are now seeing, particularly for protecting against serious illness that would require hospitalization or cause death. But if the virus evolves further and there is a worse variant, the vaccine could be modified," Dr. Shaw says.

One of the great things about the mRNA technology, which the Pfizer and Moderna vaccines use, Dr. Shaw notes, is that it's easy to change them up to match variants, and they can be quickly produced at scale. "This is different from the manufacturing process for the most commonly used flu vaccines, which is a much slower process because influenza virus strains need to be grown in chicken eggs, from which a particular viral protein is purified and formulated into a vaccine," he says.

But what about the Johnson & Johnson vaccine? The company has reported that its vaccine is effective against the Delta variant, showing only a small drop in potency compared with its effectiveness against the

original strain of the virus. But one recent study, which has not yet been peer-reviewed or published in a scientific journal, suggests that the J&J vaccine is less effective against Delta. That has put some urgency on the question of boosters for those who have already received the J&J shot.

Studies are in progress to determine whether people who received the J&J vaccine can benefit from a booster shot of an mRNA vaccine, adds Dr. Shaw. "The J&J vaccine uses a specific virus called adenovirus 26, which is engineered to be unable to reproduce itself, to introduce a version of the SARS-CoV-2 spike protein—the target of the mRNA vaccines—into cells to generate a protective immune response," he says. "The possibility that an immune response against this 'carrier' adenovirus 26 during the first J&J vaccine could result in decreased effectiveness of a booster with the same J&J vaccine is also being addressed in ongoing clinical studies."

How will we know if we need a booster?

It is normal for virus-fighting antibodies—such as those that are stimulated by a COVID-19 vaccine—to wane over time. Monitoring antibody levels in the blood is one way to measure vaccine efficacy and research has found that protection remains high for six months after the second shot of a Pfizer or Moderna vaccine.

"You can certainly look at antibody levels, and that does offer some indication of how much protection lasts. But even if they have waned, that doesn't necessarily mean the body's capacity to respond to exposure is gone," Dr. Shaw says. "One of the most amazing parts of the immune system is immunologic memory of past infections or vaccines. If you are re-exposed to something [via a booster shot, that follows the original exposure by vaccination], the memory response is even more vigorous than the original. This memory response includes antibody responses, but also includes an additional arm of the immune system controlled by a

different group of white blood cells called T cells or T lymphocytes."

T cell immune responses are especially important for viral infections like those with SARS-CoV-2, but are more difficult to study than antibody responses outside of a research laboratory setting, adds Dr. Shaw. "However, T cell responses may prove to be just as important as antibody responses in protecting against infection or against serious disease requiring hospitalization," he says.

Should a booster shot only be for certain people?

When COVID-19 vaccines first became available, they were initially offered to the most vulnerable, including older adults. People who are immuno-compromised have also been given priority.

This may also be the case with boosters. "This is something that we need better studies on, as we want to identify people who have had poor responses to the vaccine. If we find that they would benefit from another go-around and that a booster vaccination is safe, then that is reasonable," Dr. Shaw says.

Could you mix and match vaccines in a booster?

So-called "mixing and matching" of vaccines (a first dose of Pfizer, followed by a second dose of Moderna, for example, to complete the mRNA two-dose series) has been used in Europe and other places, particularly when there were supply issues. And there have been recent studies suggesting this approach—with one dose of AstraZeneca's vaccine (which is not available in the U.S.) and one dose of Pfizer's vaccine—may even offer more vigorous protection. But here in the U.S., the current public health recommendations are that people should stick with one type of mRNA vaccine for both doses.

But what about for boosters—if they are recommended, should you stick with your original kind?

"That is being evaluated right now. The NIH [National Institutes of Health] is sponsoring a study that is ongoing and hopefully, we will have answers to that," Dr. Shaw says.

Could a booster cause more or worse side effects?

If you were among the unlucky recipients who felt really ill or had any of the rare but largely harmless reactions to your initial COVID-19 vaccination, you may be leery of the idea of a third dose, in case it causes a similar or worse reaction.

"Hopefully, we will have information from the ongoing studies on whether there is any change in rates of adverse effects with boosters," Dr. Shaw says. "It's reassuring that for the vast majority of individuals, the currently used vaccines have been safe, and if I had to guess, I would say rates of any problems would remain very low."

Should we first be vaccinating the world?

There is also a moral element to the question of booster shots, with some public health officials saying the focus should be on vaccinating more of the world's population first before giving supplementary doses to those who already have some protection.

Dr. Shaw says he understands this sentiment. "On this planet, we are all interdependent and we can see that many of these variants originated outside the U.S. That certainly speaks to the need to vaccinate the world, especially to drive down infection rates that support the emergence of

new variants," he says. "Ultimately, this is what needs to be done to end the pandemic."

Provided by Yale University