

Why your 2nd dose of COVID vaccine is likely to feel worse

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His second COVID-19 vaccine shot wiped Dr. Greg Poland out.

Poland, 65, said he suffered five hours of shaking chills, fever up to 101 degrees, [severe headache](#), nausea, ringing in his ears and a sore arm after getting his booster dose of the Moderna vaccine.

"I've never had a reaction to a vaccine like that," said Poland, director of the Mayo Clinic's Vaccine Research Group. "Ironic that it would happen to me."

The second dose of the two COVID-19 vaccines has gained a reputation—initially from clinical trial data and now from the personal experience of millions—that it tends to cause harsher side effects than the first dose.

That's because the second dose is amplifying the lessons of the first dose, which taught your body how to recognize the [coronavirus](#) as an enemy, Poland explained.

"We should stress it doesn't mean that anything's going wrong or that something bad is happening. It is an expected reaction to the vaccine, and it will be different between different people," Poland said.

"It is evidence of a really vigorous immune response, which doesn't mean that people who have less of a response are not developing an immune response. They are," Poland added. "But for some of us, for whatever reason, our immune system sees this and really reacts to it."

By the time you get the second dose, your body has used the first dose to line up a host of immune cells that are ready to react to a COVID-19 infection, Poland said.

"When you get that first dose, consider it a training dose. You're training your body to recognize that this is a foreign invader and it looks like coronavirus," Poland said. "Now what happens? You get a second dose, and your immune system is shouting through that megaphone to say, 'OK, the foreign invader is here! It's here! It's here! Kill it!'"

"Would take it again"

In their approval applications to the U.S. Food and Drug Administration, both Moderna and Pfizer noted a more intense reaction to the second dose in their volunteers. Moderna specifically noted that "Grade 3" side effects—swelling, pain, body aches, headache and fever—were more frequently reported after the second dose than the first.

Poland knew full well what he was in for, but that knowledge didn't make the side effects any easier to endure.

"You go into it knowing that's a likelihood, based on what we're seeing in the phase III clinical trials," Poland said. "I know the data inside and out, so I took the precaution of not scheduling anything for

the afternoon yesterday, or really much of anything today other than e-mail."

Poland got the [vaccine](#) around 10:30 a.m., and by 10 p.m. he was in bed, where he remained until 11 a.m. the next day.

"And then very rapidly got better. Got up around 11, felt kind of shaky, but very rapidly better," Poland said. "And, of course, I would take it again."

The second dose is necessary because it provides critical amplification for the immune response prompted by the first, Poland said.

"By giving a training dose and then amplifying that with the second dose, we have in essence recruited an army of soldiers at the ready," Poland said.

"When you give the first training dose, it's a little bit like boot camp. Then you give the second dose, it's a little bit like a war game. So then you're prepared when the actual invasion comes."

Protection against new variants

This amplification not only makes the immune response more effective, but also helps it last longer.

"Let's say you need an antibody level of 100 to fight this off. We are, with some of these vaccines, inducing [antibody levels](#) of 3,000 and 4,000. So we really are developing just a huge antibody response," Poland said.

"That accounts for some of these off-target effects, but there's also a positive to that," he continued. "Antibody wanes over time, so the higher you start out, the longer you have a protective level of antibody present."

By driving up antibody levels, the booster also makes your body more capable of responding to COVID-19 mutations like the variants from the United Kingdom and South Africa, said Dr. Anthony Fauci, director of the U.S. National Institute of Allergy and Infectious Diseases.

"As you get to that level of antibody, you get a greater breadth of response. By breadth of

response, we mean it covers not only the wild-type and currently circulating virus, but also the variants that we see circulating," Fauci said during a Monday media briefing of the White House COVID-19 Response Team. "It's not just a matter of potency. It's a matter of the breadth of what you can cover."

One interesting fact to keep in mind, Poland said, is that—because people's [immune response](#) tends to wind down as they age—younger and middle-aged folks will be more likely to have a severe second-shot [response](#) than seniors.

"Generally speaking, the older you are, the tendency toward being so immunologically reactive goes down," Poland said.

More information: The U.S. Centers for Disease Control and Prevention has more about [COVID-19 vaccine side effects](#).

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