

Why COVID booster shots turned out to be more complicated than vaccines

By MELISSA HEALY
Los Angeles Times

Just a few months ago, the protection offered by COVID-19 vaccines brought Americans joy and relief, allowing the fully immunized to ditch their masks and return to a semblance of pre-pandemic life. Now that protection seems more like an illusion.

What happened?

Has our vaccine-induced immune response really fizzled? Is the delta variant to blame for waning vaccine effectiveness? Is the resurgent dread of COVID-19 warranted? Will booster shots restore our protection — and the hope that came with it?

Both the Food and Drug Administration and the Centers for Disease Control and Protection grappled with these questions before giving the go-ahead to boosters in certain populations. If that guidance seemed disjointed or confused, it was largely because the science is still emerging.

Factor in the crosswinds of politics, fear, rampant misinformation and a vaccination campaign that has lost its momentum, and



Joseph Prezioso/AFP via Getty Images-TNS

Filled syringes loaded with the Pfizer-BioNTech COVID-19 vaccine.

things become even more fraught.

For instance, in declining to recommend that a third dose of the Pfizer-BioNTech vaccine be made available to all who got their second dose at least six months earlier, members of a CDC advisory panel made clear they did not want to undermine public confidence in COVID-19 vaccines when so many haven't even gotten their first dose.

How did we get here?

Let's start by acknowledging that vaccines were never perfect

Even in clinical trials, the Pfizer-BioNTech vaccine was reported to be 95% effective at preventing cases of COVID-19. That

means the risk of becoming sick after getting the shots was small but not zero — and it doesn't say anything about the vaccine's ability to thwart a coronavirus infection in the first place.

Moreover, that lofty figure was unlikely to hold under real-world conditions. In the United States, close to 3% of adults are immune-compromised and therefore unlikely to mount a strong protective response to a vaccine. Plus, new viral variants are continually being incubated domestically or imported from abroad.

Random mutations to the coronavirus's genome might alter it in ways that could make it more transmissible, or enhance its ability to make people seri-

ously ill. Another worry is that mutations may change the virus in ways that prevent vaccine-induced antibodies from recognizing it.

The rise of the delta variant shows that scientists are right to be worried. In chart after chart, FDA and the CDC experts cited research suggesting that the now-dominant strain has helped erode vaccines' effectiveness in myriad ways.

Vaccines affect the immune system in complex, and mysterious, ways

The first months following immunization are the heyday for antibodies: They're plentiful, recently trained to recognize their target virus, and varied enough to recognize several of its features. A virus looking to invade is unlikely to sneak past.

But as that initial spate of antibodies decays, the immune system can rely on its memory banks — the legions of white blood cells in which resides the battle plan for fighting a new infection. The appearance of a virus should prompt these specialized cells to swing into action. Helper T cells stimulate B cells to

produce a fresh crop of antibodies. They also prompt other T cells to hunt down cells that have been infected and kill them.

But this process isn't instantaneous, and if the coronavirus can establish itself in the nose and mouth quickly enough, the immune system may not respond fast enough to bar the gates. Infection happens.

For most people — but clearly not all — the cavalry will arrive in time to blunt an all-out invasion and head off severe disease. That may explain why researchers have found that the longer the time since vaccination, the greater the odds that inoculated people test positive for a coronavirus infection, even though the rate at which they're being hospitalized for COVID-19 has risen much less steeply.

This pattern has been observed in Israel, Qatar and the United States. In one study that focused on New York, the three available vaccines' combined ability to prevent infection fell from 92% in early May to about 77% in late August, and the decline was seen in all age groups. Yet during the same period, when age

was taken into account, the vaccines' effectiveness in preventing hospitalization held steady. (By mid-June, however, hospitalization rates among vaccinated adults over 65 did begin to climb).

When it comes to immunity, age matters

Immunity generally weakens as we get older, and so does our response to vaccines. Both of those facts have been key in the current pandemic.

Before vaccines became available, people 65 and older were by far most likely to die of COVID-19. So they were among the first Americans to get a vaccine — and particularly the Pfizer-BioNTech vaccine, which became available first.

That makes senior citizens the age group furthest out from vaccination. And with clear evidence that they're once again vulnerable to severe COVID-19, advisers to the FDA and CDC agreed that those 65 and up who received their second dose of the Pfizer-BioNTech vaccine at least six months earlier should have a booster shot of that vaccine made available to them.



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LIBRA (Sept. 23-Oct. 22) -- You have more to offer than you know, and today is the day to make it clear to those in charge that a pending agreement is a one-time deal!
SCORPIO (Oct. 23-Nov. 21) -- You may find that you have more time on your hands than expected today -- but you mustn't just fritter it away. You have things to get done.

SAGITTARIUS (Nov. 22-Dec. 21) -- The domestic scene isn't giving you precisely what you want right now, but that doesn't mean you can cut and run. Work it out!
CAPRICORN (Dec. 22-Jan. 19) -- Your needs are almost sure to clash with another's today, but you may realize that you have more in common than first meets the eye.
AQUARIUS (Jan. 20-Feb. 18) -- You're facing certain challenges today, but others are facing some of their own, putting you all in the same basic situation. Cooperate!
PISCES (Feb. 19-March 20) -- You know precisely what someone is asking of you today, even though they're not putting it directly. Cut through the nonsense quickly!
ARIES (March 21-April 19) -- Your confidence is impressive, but is it just a smoke-screen? Eventually you'll have to prove that you can do what you say you can.
TAURUS (April 20-May 20) -- Someone is trying to put one over on you, but you're aware of the scam and know just what to do to avoid being duped. Speak truth to power!
GEMINI (May 21-June 20) -- If you want to get where you're going in the time allotted, you're going to have to come up with a new way of getting there. Be creative.
CANCER (June 21-July 22) -- You've been rather shortsighted about a certain situation lately, but today that's likely to change -- just in time. You can prevail.
LEO (July 23-Aug. 22) -- You may not be able to transform another's complaints into satisfaction today, but you can surely address the situation and offer solace.
VIRGO (Aug. 23-Sept. 22) -- Interaction between you and a rival takes on renewed importance today as things heat up in a manner that takes you both very much by surprise.

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