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FDA Authorizes 'Traditional' Novavax COVID Vaccine, But Critics Question Safety Claims

The U.S. Food and Drug Administration (FDA) today granted Emergency Use Authorization to the Novavax COVID-19 vaccine. Portrayed as a more "traditional" vaccine that could sway the unvaxxed, some experts said it's not as "safe" as FDA claims.

By Julie Comber, Ph.D.

The U.S. Food and Drug Administration (FDA) today granted Emergency Use Authorization (EUA) for the Novavax COVID-19 vaccine for adults 18 and over.

The EUA is for the two-dose primary series targeting the original Wuhan SARS-CoV-2 virus — limiting the vaccine's use, as about two-thirds of Americans already have completed a primary series of either the Pfizer, Moderna or Johnson & Johnson vaccines.

The Centers for Disease Control and Prevention (CDC) still needs to sign off on the Novavax vaccine before pharmacies and other healthcare providers can start administering shots.

The vaccine maker's stock rose 3% earlier today, after Politico reported yesterday that the FDA would likely announce the decision today.

The Biden administration on Monday announced a deal with Novavax to purchase 3.2 million doses of the vaccine.

Under the taxpayer-funded deal — which the U.S. Department of Health and Human Services said was contingent on the vaccine receiving EUA and formal recommendation by the Centers for Disease Control and Prevention — the U.S. government will provide the vaccine to states, jurisdictions, federal pharmacy partners and federally qualified health centers.

Advisors to the FDA last month recommended the agency accept Novavax's EUA application, but the agency delayed issuing the authorization pending FDA review of the Maryland-based company's manufacturing process.

Novavax already is available in other countries, including Canada and Australia, under the name Nuvaxovid.

The Novavax vaccine relies on a protein-based technology used for decades, leading some media outlets to portray it as a "traditional" vaccine compared with other COVID-19 vaccines that use newer technologies.

Politico reported last month that FDA committee members expressed interest in making available a vaccine that uses a different technology than the mRNA vaccines widely used in the U.S., "in hopes of convincing unvaccinated holdouts to change their minds."

According to Politico, Novavax "may appeal to the sliver of the population allergic to components of the messenger RNA vaccines developed by Pfizer-BioNTech and Moderna, or who are skeptical of those shots' newer technology."

But according to Dr. Meryl Nass, an internist with a special interest in vaccine-induced illnesses, chronic fatigue syndrome and toxicology, the media's portrayal of Novavax as a more traditional vaccine is not accurate.

Nass, a member of the Children's Health Defense (CHD) scientific advisory committee, pointed out that the Novavax shot contains a novel adjuvant, Matrix-M, "so it is not really an old-fashioned shot."

Nass raised safety concerns specific to the adjuvant, while others voiced concerns about Novavax being linked to heart inflammation and blood clots, and the fact that the vaccine was designed for use against the original Wuhan strain of SARS-CoV-2 — not the various Omicron variants that are dominant today.

How does Novavax differ from other COVID vaccines used in U.S.?

Novavax is a subunit protein vaccine. It uses the spike protein, which it delivers directly to the host cell, from the viral coat of the SARS-CoV-2 virus, as the antigen — the part of the vaccine that provokes an immune response.

The mRNA-based shots — Pfizer and Moderna — use a lipid nanoparticle to encapsulate the mRNA and usher it into the host cell. Then the host cell's own machinery produces the spike protein.

"Unlike mRNA vaccines, the spike protein is already premade in the Novavax vaccine, said Dr. Diana Florescu, who led the Novavax clinical trial. "It's a shortcut. All the synthesis happens outside the body and we just give the end product: the spike protein."

Johnson & Johnson's Janssen COVID-19 shot is a viral vector vaccine. It also causes cells to produce the spike protein, but in a different way than the mRNA shots. It uses a virus called adenovirus, familiar as a common cause of respiratory infections.

The DNA in the adenovirus is modified so that when it enters the host cell, it causes the cell's own machinery to produce the spike protein.

The adenovirus is also modified so it cannot replicate itself, which is why it is called a replication-defective recombinant adenoviral vector vaccine.

Adjuvant used in Novavax linked to autoimmune disease

Because Novavax is a protein subunit vaccine, it uses just the spike protein as the antigen rather than the whole pathogen (an inactivated or attenuated virus). Using the whole pathogen would expose the host to the virus' entire protein coat instead of just one protein.

Protein subunit vaccines are often less immunogenic (less likely to provoke the immune system) than vaccines that use whole pathogens as the antigen, and may not generate a strong enough immune response.

That's why they require the use of an adjuvant — in this case, Matrix-M — in addition to the antigen to get a stronger immune response.

However, few adjuvants are both potent and non-toxic enough for clinical use.

The proposed primary series for Novavax is two intramuscular injections 21 days apart at the dose level of 5 µg of the recombinant spike protein and 50 µg of the Matrix-M adjuvant.

Matrix-M, originally called QS-21, was one of the saponins derived from Quillaja saponaria, which is the soap bark tree native to Chile.

Some reports point out that the Matrix-M adjuvant — unlike the polyethylene glycol (PEG) lipid used in mRNA vaccines — is not linked to anaphylaxis (a severe allergic reaction), making it more attractive to people who are allergic to PEG.

But according to Nass, while it's true that Matrix-M — which is not found in any other vaccines in the U.S. — isn't linked to anaphylaxis, it is linked to autoimmune diseases.

"While touted as a replacement for the PEG lipid found in the mRNA vaccine, Matrix-M is less likely to cause anaphylaxis but more likely to cause autoimmune diseases," Nass said.

Nass voiced other safety concerns about Novavax technology, including the use of moth cells.

According to the University of Nebraska Medical Center, where Novavax Phase 3 clinical trials were conducted, the Novavax vaccine uses moth cells to create a nanotechnology version of the COVID-19 spike protein.

Nass said insect cells can be used to grow proteins rapidly. "There is one flu vaccine made the same way: Flublok," Nass said. Flublok is one of two egg-free flu vaccines licensed for use in the U.S.

"How many insect and viral proteins or other molecules are being injected into you when you get the Novavax vaccine — which is a function of how purified the vaccine is — is unknown," Nass said.

Novavax still uses the spike protein

The SARS-CoV-2 virus encodes 29 proteins, but Novavax — like Pfizer, Moderna and Johnson & Johnson — chose to target only the spike protein.

As previously reported in The Defender, it is not known if the spike protein itself is safe.

"We have known for a long time that the spike protein is a pathogenic protein," said Byram Bridle, Ph.D., assistant professor of immunology at the University of Guelph, Ontario. "It is a toxin. It can cause damage to our body if it gets into circulation."

According to Brian Hooker, Ph.D., CHD's chief scientific officer, "If you wanted to pick the most toxic protein, you know what represents the highest virulence, the highest amount of damage on the COVID-19 virus? You would pick the spike protein."

The spike protein "has been consistently shown to create clotting issues in the blood," Hooker said.

Novavax downplays link to heart issues

According to the briefing document for the Vaccines and Related Biological Products Advisory Committee meeting on June 7, severe local adverse events occurred in 1.2 to 7.2% of Novavax recipients, and systemic adverse events occurred in 2.4% to 12.1% of Novavax recipients.

These adverse events were more frequent after the second dose than after the first dose.

As previously reported in The Defender, there are concerns that Novavax is associated with myocarditis and pericarditis, just like the mRNA vaccines.

Reuters reported that the FDA asked Novavax to "flag" myocarditis and pericarditis as an "important identified risk" in its materials accompanying the vaccine. It is not known if the vaccine maker agreed to do so.

Novavax denied the connection between its vaccine and the reported cases of heart inflammation, claiming that "natural background events" of myocarditis can be expected in any large database.

"Based on our interpretation of all the clinical data supporting NVX-CoV2373 [Novavax]... we believe there is insufficient evidence to establish a causal relationship," Novavax stated.

Does it work against the Omicron variant?

Like the other COVID-19 vaccines available in the U.S., Novavax's vaccine was developed against the ancestral Wuhan strain of SARS-CoV-2.

In the FDA's June 7 briefing document on the vaccine's efficacy and safety, the FDA stated:

> "The study enrollment and efficacy follow-up occurred during December 27, 2020, to September 27, 2021, and mainly when the Alpha variant of SARS-CoV-2 was predominant and prior to the emergence of Delta and Omicron variants.
>
> "Relevant data to assess effectiveness of NVX-CoV2373 [Novavax] against the Omicron variant and sublineages, including observational data from use in other countries where the vaccine has been deployed, are currently unavailable; however, based on the efficacy estimate in the clinical trial of this vaccine, it is more likely than not that the vaccine will provide some meaningful level of protection against COVID-19 due to Omicron, in particular against more severe disease."

The FDA briefing document also stated that due to the limited length of follow-up, "it is not currently possible to assess sustained efficacy over a period longer than 2 months."

Bruce Gellin, chief of global public health strategy at the Rockefeller Foundation, was the lone abstaining vote on the FDA committee that voted to recommend Novavax on June 7.

Gellin said he abstained because the committee wasn't given data on how the vaccine performs against the current Omicron variants, or for how many months its protection lasts.

Will Novavax convince the unvaxxed?

CNET last month reported that more than two years into the pandemic, a majority of Americans (about 67%) are fully vaccinated against COVID-19, and many have been boosted.

A Kaiser Family Foundation poll found 75% of adult Americans self-report that they are already vaccinated.

Meanwhile, those hesitant or opposed to COVID-19 vaccination seem to be firm and consistent in their opinion, according to the Kaiser poll.

Kaiser has tracked the "public's attitudes and experiences with COVID-19 vaccinations" since December 2020. During that time, the percentage of American adults who answered the poll and said they would "definitely not" get vaccinated ranged from 12% to 17%.

In April, the most recent month reported, 17% of those polled said they would "definitely not" get vaccinated against COVID-19.

Millions of Americans have already been infected with COVID-19 and recovered. As of February 2022, the overall seroprevalence rate (indicating previous COVID-19 infection) in the U.S., determined by random antibody testing, was 57%.

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