

'It could get significantly worse': Could even more dangerous variants follow delta?

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The delta variant is one of the most virulent coronavirus variants that have emerged over the course of the pandemic. As it causes surges in Covid-19 cases around the world, many public health experts are concerned it could "morph into something more formidable."

How coronavirus variants have mutated so far

When the coronavirus first began circulating, humans were a new host, which allowed it to easily pick up mutations, *STAT News* writes. These first mutations made the virus more transmissible, allowing it to spread beyond Wuhan, China, to other places all over the world.

Over time, as the coronavirus spread, it picked up more mutations, which led to the development of different variants of the original virus. "The longer the virus persists, the more opportunities it'll have to sample what makes it more fit," said Oliver Fregoso, a virologist at the **University of California-Los Angeles**.

For example, several independent research groups have found evidence suggesting variants can more easily arise in people with weak immune systems, *The Atlantic* reports. After being infected, some people with weak immune systems may have the virus in their bodies for months, which provides the virus time to mutate and eventually become strong enough to spread to other people.

In fact, scientists believe the alpha variant emerged from one immunocompromised individual who had a rare chronic Covid-19 infection, *STAT News* writes. In addition, *The Atlantic* reports that the alpha variant has "an unusual number of mutations," which may be a sign that it developed in one person.

But prolonged infections are not the only ways variants can develop. In contrast to the alpha variant, the delta variant has relatively few mutations, and it may have emerged from several brief infections that happened close together in one place instead.

The type of mutation a variant develops may also depend on what conditions were like where it emerged. For example, the beta and gamma variants have mutations that make them less recognizable to antibodies. They were first identified in South Africa and Brazil respectively, where a large part of the population may have already been infected by an older version of the virus.

The delta variant, on the other hand, was first identified in India, where Covid-19 cases surged later and fewer people have encountered the original virus. The delta variant's mutations increased its transmissibility, allowing it to beat other variants in the area before eventually spreading around the globe.

What future variants could develop?

"Delta is already a really strong competitor," Michal Tal, an immunologist at **Stanford University**, said. "It could get significantly worse."

According to *The Atlantic*, it is difficult to predict what variants might come after delta or what they will look like. In one situation, delta may continue to become more infectious, or it could be replaced by another super-infectious variant.

However, due to growing immunity among the global population, increased transmissibility will likely not be enough to sustain the coronavirus over time. As immunity increases, the virus will have to develop mutations that allow it to bypass immune protections instead.

"There's some sort of tipping point where immune evasion becomes a bigger fitness advantage than transmission," Stephen Goldstein, an evolutionary virologist at the **University of Utah**.

In the worst-case scenario, a variant could emerge that would "make it like the vaccines did not exist," Bill Hanage, an epidemiologist at the **Harvard School of Public Health**, said. However, Hanage said that "there is no such variant like that" now.

Moreover, it would be "extraordinarily difficult" for a variant like that to occur, according to *The Atlantic*. In fact, even the most evasive variants currently circulating have not been enough to "fully dup[e]" vaccinated immune systems.

While new variants could bypass some of the defenses provided by vaccines, the body's immune response should still be able to protect people from severe disease, *STAT News* writes.

"A virus just can't change a couple amino acids and completely evade the totality of the immune response," Angela Rasmussen, a virologist at the **University of Saskatchewan's Vaccine and Infectious Disease Organization**, said.

Separately, Florian Krammer of **Mount Sinai's Icahn School of Medicine**, said, "I don't think that we'll end up with variants that completely escape antibodies or vaccine-induced immunity."

In addition, a preprint study in *bioRxiv* found that even if a variant emerged that could escape immune protection—a scenario that Paul Bieniasz, one of the study's authors, said is "extremely unlikely to happen suddenly"—a booster shot could raise people's antibody levels high enough to combat the evolved virus.

"Even if the virus acquires those resistance mutations, it's possible to generate an immune response that'll cope with that," Bieniasz added.

How to protect against future variants

According to *The Atlantic*, the most powerful tool is vaccination. Vaccines can not only be altered to accommodate new variants—and boosters administered to increase immune response—but they can also be proactive interventions that help prevent the development of future variants.

Vaccination can reduce the number of chances for the virus to evolve, by reducing the opportunity for infection as well as the duration and intensity of any infections that do occur. The virus will have less time to mutate if it doesn't remain in a person's body for long, and any mutations will be less likely to be passed on.

"The pressure is there, but the opportunity is not," said Jeremy Kamil, a virologist at **Louisiana State University Health Shreveport**. "The virus has to replicate in order to mutate, but each virus doesn't get many lottery tickets in a vaccinated person who's infected."

In fact, a preprint study in *medRxiv* suggests that the coronavirus's mutation rate is lower in countries with high vaccination rates. But even highly vaccinated countries are struggling amid the spread of the highly contagious delta variant, which means that there will be more opportunities for the virus to mutate.

According to Jennifer Dien Bard, a clinical virologist at **Children's Hospital Los Angeles**, new variants will continue to emerge "until we get to the point where the virus is not allowed to replicate this often, or this quickly."

Ultimately, those who remain unvaccinated will, at some point, get infected, with a devastating cost to public health. Goldstein added, "There's no scenario we choose where we don't impose selective pressure on this virus. But are we going to do it while we prevent people from dying, or not?" (Joseph, *STAT News*, 8/20; Wu, *The Atlantic*, 8/24)

CDC: COVID-19 Vaccines 66% Effective against Delta Variant

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Vaccine effectiveness against COVID-19 infection **dropped from about 91% to 66%** once the Delta variant became the dominant strain in the U.S., according to a [new study](#) published Tuesday by the CDC.

The decline points to the **highly contagious nature of the Delta variant** and **underscores the importance of vaccination to prevent severe disease, hospitalization and death**, the study authors wrote.

"While we did see a reduction in the protection of the COVID-19 vaccine against the Delta variant, **it's still two-thirds reduction of risk**," Ashley Fowlkes, the lead author and an epidemiologist for the CDC's COVID-19 Emergency Response, [told CNN](#).

The latest update is part of an ongoing study that follows health care workers, first responders and essential workers who undergo weekly testing in eight locations across six states. The weekly testing helps researchers to better track the rates of people who develop mild or no symptoms and may be less likely to get tested overall, CNN reported.

Among the 4,217 participations, 3,483 — or 83% — were vaccinated. About 65% received the Pfizer vaccine, 33% received the Moderna doses and 2% received the Johnson & Johnson shot. Between December 2020 and April 2021, the vaccines were about 90% effective in preventing symptomatic and asymptomatic infections.

Between April and August, the Delta variant became more dominant and the efficacy began to drop, though there were still few infections. Researchers found 19 infections among 488 unvaccinated people, and about 95% were symptomatic. They also found 24 infections among 2,352 fully vaccinated people, and 75% were symptomatic. The study didn't include details about the type or severity of symptoms.

"It's still a very powerful vaccine," Fowlkes told CNN. "But we are also looking towards continuing to use masks for a little bit longer."

The Johnson & Johnson researchers also found that the booster shot increased the supply of immune cells in the body, which can attack the cells infected with the coronavirus. Those results are still being prepared for publication, the newspaper reported.

"We don't have long-term human studies, but my prediction would be that those responses should be maintained after the boost," Lynda Coughlan, a virologist at the University of Maryland School of Maryland who isn't involved with these studies, told *The New York Times*.

Take home message.....

- *while the efficacy of the vaccine has decreased (not unexpectedly) it is to a large extent due to the **very high infectious nature** and **transmission ability** of the delta variant.*
- *It is important to realize that 66% effectiveness is still **excellent** for a vaccine. Influenza vaccines each year are roughly that effective.*
- *More importantly, the decreased ability to prevent infection does not equate to a similar decrease in the ability to prevent severe disease and death.....**the vaccine continues to do a remarkable job in preventing hospitalization and death.***
- *We are seeing a tremendous increase in COVID admissions to the hospital in the last several weeks. The average number of cases in the hospital per day has increased from approximately 3-4 in late July.... to 40-50 as of August 31.... A greater than **10 fold increase.***
- *Even if you are vaccinated, it is vital to wear a mask in enclosed indoor public venues to prevent spreading of the delta virus.*
- *COVID variants can only develop when the virus is replicating in an infected host. The longer the person remains infected, the greater the likelihood of a new variant appearing.*
- ***The most effective way to prevent the rapidly increasing spread of the disease is through vaccination.***

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