Introduction

Coronavirus disease 2019 (**COVID-19**) is a contagious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first known case was identified in Wuhan, China, in December 2019. The disease has since spread worldwide, leading to an ongoing pandemic. Symptoms of COVID-19 are variable, but often include fever, cough, headache, fatigue, breathing difficulties, loss of smell, and loss of taste.

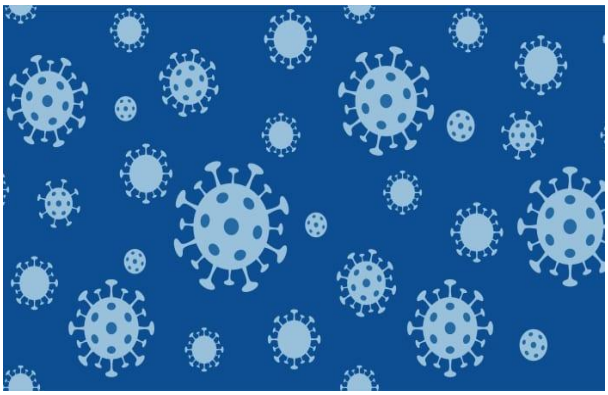
. COVID-19 transmits when people breathe in air contaminated by droplets and small airborne particles containing the virus. The risk of breathing these in is highest when people are in close proximity, but they can be inhaled over longer distances, particularly indoors. Transmission can also occur if splashed or sprayed with contaminated fluids in the eyes, nose or mouth, and, rarely, via contaminated surfaces. People remain contagious for up to 20 days, and can spread the virus even if they do not develop symptoms

Several COVID-19 vaccines have been approved and distributed in various countries, which have initiated mass vaccination campaigns. Other preventive measures include physical or social distancing, quarantining, and ventilation of indoor spaces, covering coughs and sneezes, hand washing, and keeping unwashed hands away from the face. The use of face masks or coverings has been recommended in public settings to minimize the risk of transmissions. While work is underway to develop

drugs that inhibit the virus, the primary treatment is symptomatic. Management involves the treatment of symptoms, supportive care, isolation, and experimental measures.

Variant :

Omicron



There’s still a lot to learn about Omicron (B.1.1.529), which became a "variant of concern" after it was identified in Botswana and South Africa in late November 2021. Cases quickly began to surface in other countries including the U.S., and countries have established travel bans in efforts to stop the spread. Based on early data from South Africa, the United Kingdom, and Denmark, Omicron is expected to outcompete Delta. (In mid-December, Omicron became the predominant strain in the U.S.)

Experts report that Omicron carries an abundance of mutations about 50 in all that have not been seen together before—but they don't yet know how those mutations might work together.

How contagious is it? Omicron is more transmissible than Delta and—as it did in the U.S.—it will likely become the predominant variant in most places. What is less known is what makes it more transmissible and how quickly it will rise to dominance around the world.

One concern is that more than 30 of Omicron's mutations are on the virus's spike protein, the part that attaches to human cells, and several of those are believed to increase the probability of infection. So, part of its enhanced transmissibility may come from its ability to evade some immune responses, especially in individuals who were previously infected but not vaccinated.

Very early reports from South Africa showed cases rising rapidly from 300 a day to 3,000 a day over a two-week period.

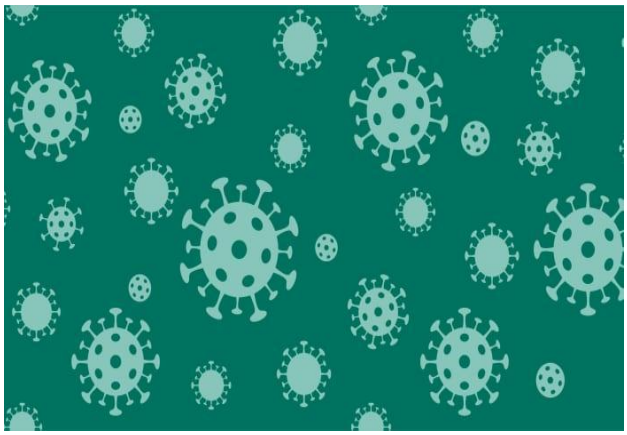
Severity: Not yet clear. Early cases identified among people in South Africa were mild, but most of the diagnoses were in young people.

Can vaccination prevent it? It is not yet clear how effective the vaccines in the U.S. will be against Omicron. The first person in the U.S. to be diagnosed with the variant was fully vaccinated, and the second had also received a booster shot. The Centers for Disease Control and Prevention (CDC) reports there is early

evidence that vaccinated people who are infected with Omicron will be able to spread it to others.

Some preliminary laboratory data shows that antibodies generated from vaccines are less effective at neutralizing Omicron, though booster shots help to restore some of that loss. It is expected that vaccine effectiveness against Omicron infections will decrease, though not completely, while effectiveness against severe disease will be better maintained. The companies that produce the three vaccines available in the U.S. are working on Omicron-specific ones to prepare in case they are needed.

Delta



Delta (B.1.617.2) is the variant that we've heard the most about at this point. First identified in India in late 2020, it soon spread throughout the world, becoming what was the predominant version of the coronavirus—until Omicron took its place in mid-December. But the Delta variant still exists, and it has been

concerning because evidence has shown the variant to be more infectious and to spread more rapidly than other variants, even in people who are vaccinated. It has more than a dozen mutations.

How contagious is it? It's estimated that Delta causes more than twice as many infections as previous variants—in Connecticut, it has been estimated to be 80 to 90% more transmissible than the Alpha variant. In the U.S., in June 2021, after a steady decline in COVID-19 cases and hospitalizations, the arrival of Delta coincided with a rapid reversal of that trend. In the fall of 2021, there have been surges even in the most vaccinated states, prompting experts to urge people to get their booster shots.

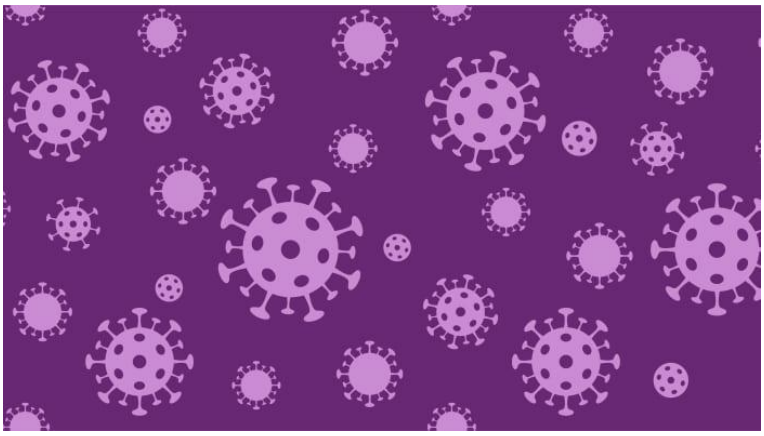
Severity: Delta may cause more severe disease than other variants in people who aren't vaccinated. Early studies from Scotland and Canada, both cited by the CDC, suggested Delta may be more likely to result in hospitalization in the unvaccinated. A report in the *Lancet* this past summer found that people in England had double the hospitalization risk with Delta than they did with Alpha, the previously dominant variant in that country.

Can vaccination prevent it? All three vaccines in the U.S. are considered highly effective against severe illness, hospitalizations, and death from Delta. No vaccine is 100% effective, and Delta has caused breakthrough infections in some fully vaccinated people. Also, infected vaccinated people can spread the virus to others, although likely they will be infectious

for a shorter time. (Whether vaccinated people who have the virus but no symptoms can spread it to others is still being assessed.)

Delta also prompted the CDC to recommend "layered prevention strategies" for both the vaccinated and the unvaccinated. That means that, in addition to staying up-to-date with their vaccines, people are advised to practice such strategies as washing hands, wearing masks, and maintaining a physical distance from one another, especially when indoors in places where there is substantial or high transmission.

Beta



This variant, or B.1.351, was identified in South Africa at the end of 2020 and spread to other countries. Experts had been concerned about its several mutations and its potential to evade antibodies. Beta has not been common in the U.S., and

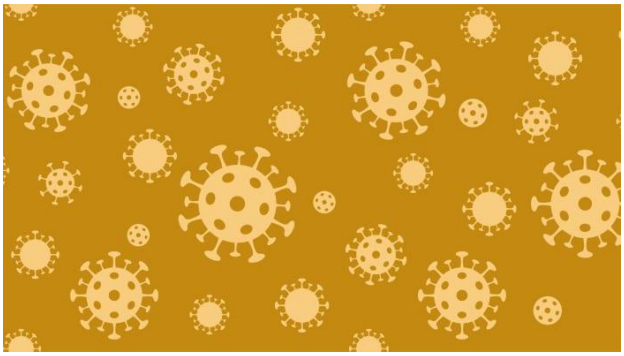
cases have decreased in other countries as the focus around the world has turned to the Delta and, later, the Omicron variant.

How contagious is it? The CDC has said Beta is about 50% more contagious than the original coronavirus strain.

Severity: There is evidence to suggest that Beta may be more likely than other variants to lead to hospitalization and death.

Can vaccination prevent it? South Africa stopped offering the AstraZeneca-Oxford vaccine (which is not available in the U.S.) early in 2021 after clinical trials showed it did not provide strong protection against mild and moderate disease from the Beta variant. Pfizer-BioNTech, Moderna, and Johnson & Johnson also reported less protection against Beta.

Alpha



Alpha (B.1.1.7) was the first of the highly publicized variants. Alpha first appeared in Great Britain in November 2020 and infections surged in December of that year. It soon surfaced around the world and became the dominant variant in the U.S.,

where the CDC classified it as a variant of concern. Then, Alpha faded away with the rise of the more aggressive Delta variant.

How contagious is it? Some mutations in Alpha's spike protein were thought to make it more infectious. The B.1.1.7 lineage was believed to be 30 to 50% more contagious than the original SARS-CoV-2 strain. In the U.S., in mid-April 2020—before Delta became predominant—Alpha comprised 66% of cases, according to a study released in June by the CDC.

Severity: Studies have suggested the B.1.1.7 lineage is more likely to land infected people in the hospital and is deadlier than the original virus.

Can vaccinations prevent it? Pfizer, Moderna, and Johnson & Johnson have said their vaccines are effective in preventing severe disease and hospitalization in Alpha cases.