

## HEALTH AND SCIENCE

# Coronavirus mutations: Here are the major Covid strains we know about

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## KEY POINTS

The new coronavirus has undergone several major mutations, and it's likely that more, significant variations will emerge.

Several variants have emerged recently, most notably in the U.K. and South Africa.

Japan reported a new mutation on Sunday.

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Most recently, strains have emerged in South Africa and the U.K. that have prompted some concerns about the [efficacy of coronavirus vaccines](#). There is [also a suspected new strain in the U.S.](#), with the White House coronavirus task force warning early in the new year [that there could be a new, more transmissible variant of the virus that evolved in the U.S.](#) and is driving spread, according to a document obtained by NBC News.

And on Sunday, [Japan's National Institute of Infectious Diseases said it had detected a new variant of the coronavirus in four travelers arriving from Brazil](#).

[Essentially, scientists worry about any major changes to the virus' so-called spike protein](#). This contains the receptor-binding domain, and is used by the virus to gain entry into cells within the body.

As such, mutations can not only make the virus more transmissible, they can mean that vaccines are rendered less powerful and require them to be updated.

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of concern, year 2020, month 12, variant 01”).

The variant was first detected in a patient in Kent, southeast England, in September. It then quickly spread to London. With infections surging in both regions, early analysis suggested it may be up to 70% more transmissible than the old variant that was circulating in the country.

News of the new variant prompted many countries to ban flights from the U.K. in a bid to keep the new strain out, and led the country’s government to scrap a planned relaxation of social restrictions over Christmas. Nonetheless, the mutation provoked a huge surge in infections, [with the number of new daily cases coming in above 50,000 since December 28](#).

The WHO notes that “how and where SARS-CoV-2 VOC 202012/01 originated is unclear,” although scientists are looking into whether the mutation [emerged in patients with weaker immune systems who had long-running coronavirus infections](#), giving the virus the opportunity and time to evolve in a way that enables it to spread faster.

## The ‘South Africa variant’

Hot on the heels of the news from the U.K., South Africa’s authorities announced on Dec. 18 the detection of a mutation that was rapidly spreading in Eastern Cape, Western Cape, and KwaZulu-Natal. It has now become the country’s dominant strain of the coronavirus.

South Africa named the variant “501Y.V2” because of [the N501Y mutation](#) found in the spike protein. This mutation, among others, was also found in the new U.K. strain and, as such, it is thought to be similarly more transmissible.

The South Africa strain does contain other mutations, and these have prompted some concerns that it could prove more resistant to coronavirus vaccines. However, most scientists expect the vaccines to work despite the mutation and vaccines are regularly adapted to new strains of viruses, like the common flu.

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Another coronavirus variant that emerged in Denmark last summer was linked to the country's large mink farming sector. Since June, 214 human cases of Covid-19 have been identified in Denmark with variants associated with farmed minks. Twelve of those cases were identified as having a unique variant that was reported to the WHO on Nov. 5.

The new strain was found in North Jutland in Denmark and was linked to [infections among farmed mink](#) that had subsequently been transmitted to humans.

**Minks are seen at a farm in Gjol, northern Denmark on October 9, 2020.**

*HENNING BAGGER | Ritzau Scanpix | AFP via Getty Images*

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“The variant, referred to as the ‘Cluster 5’ variant by Danish authorities, had a combination of mutations not previously observed,” the WHO noted. It added that these prompted concern that they could “result in reduced virus neutralization in humans, which could potentially decrease the extend and duration of immune protection following natural infection or vaccination.”

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MENU

[Centre for Disease Prevention and Control](#), and the WHO. Denmark took drastic action, culling 17 million farmed mink.

## Early mutation in China

The WHO notes that a variant of the coronavirus appeared early on in the pandemic (indeed, before it was even declared a global pandemic in March 2020), noting that a new strain with a mutation known as “D614G” emerged in late Jan. or early Feb. 2020.

After several months, this became the dominant strain of the virus we know today, the WHO said. “Over a period of several months, the D614G mutation replaced the initial SARS-CoV-2 strain identified in China and by June 2020 became the dominant form of the virus circulating globally.”

Studies in human respiratory cells and animal models demonstrated that compared to the initial virus strain, the newer strain had increased in infectivity and transmission. However, the new variant was not seen as causing “more severe illness or alter the effectiveness of existing laboratory diagnostics, therapeutics, vaccines, or public health preventive measures.”

## No blame-game

While variants are sometimes dubbed “the U.K. strain” or “Denmark mutation,” experts say it’s important to note that the origin of these viruses are ultimately difficult to prove and countries shouldn’t be “blamed” for different mutations.

Similarly, U.S. President Donald Trump has been criticized for calling Covid-19 “the China virus” — the coronavirus might have emerged in China, but we still don’t know its origins [and a team of WHO experts is traveling to China this week to investigate](#). For now, scientists mostly believe that the virus was transmitted to humans from an animal species, possibly from bats.

Many countries where variants have been discovered — including the U.K., Denmark

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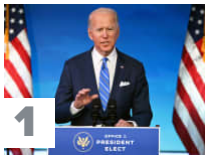


Prevention and EU’s ECDC, are kept up to date by scientists around the world as major variants emerge.

**VIDEO** 02:52

What new Covid strains mean for available vaccines and treatments

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