

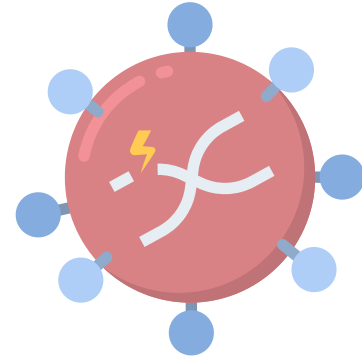


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SARS-CoV-2 viral mutations



The first case of a community COVID-19 variant was reported in Hong Kong. The preliminary genetic sequencing revealed that it was the N501Y variant virus strain, which was originally discovered in South Africa. Since the beginning of the epidemic, the new coronavirus has been mutating, and most of the variants will not pose a threat to humans. After epidemiological analysis, it was found that **some variants will increase the risk of transmission and mortality**. These virus strains that have the opportunity to spread on a larger scale have attracted the attention of scientists and need to be closely and continuously monitored. This issue of Health Express will delve into the SARS-CoV-2 variants that are circulating globally.



What is a virus mutation?

Viruses usually mutate in two main ways, including **antigenic drift** and **antigenic shift**. The antigen on the surface of the virus trigger a reaction in our body's immune system. Once the antigen changes significantly, the body's original antibodies can no longer recognize the virus.

1. Antigenic drift

- The virus replicates once it has infected the patient.
- When there is a gene duplication error (i.e. gene mutation), the proteins and antigens on the virus will be changed to derive new virus strains.



2. Antigenic shift

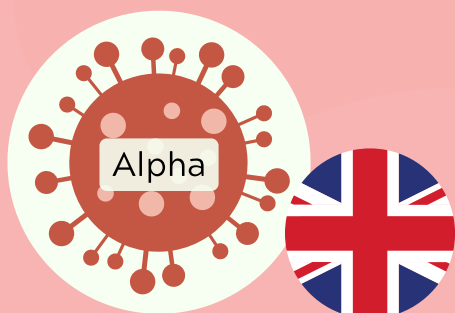
- Viral genetic recombination (major change)
- When two different viruses infect the same host cell at the same time, the **genome fragments of the two viruses recombine to produce a new virus species**.
- Relatively, this mutation is more severe, and humans have limited immunity to this new virus. It usually evolves into a widespread epidemic disease.

COVID-19 in South Asia

Since April 2021, the epidemic has deteriorated significantly in India. The cumulative number of cases has exceeded 24 million, most of which belong to the local "double mutation" virus strain B.1.617. Recently, a "triple mutation" variant virus strain has been reported. The "triple mutation" refers to the presence of three mutations in a single virus strain. Preliminary studies have shown that the mutated virus strains are more transmissible and have spread to nearby countries such as Nepal, Bangladesh and Pakistan. The number of cases and mortality rate in various South Asian countries have reached new highs, threatening the lives of tens of thousands of people.

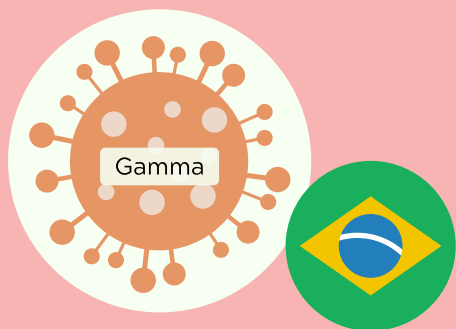
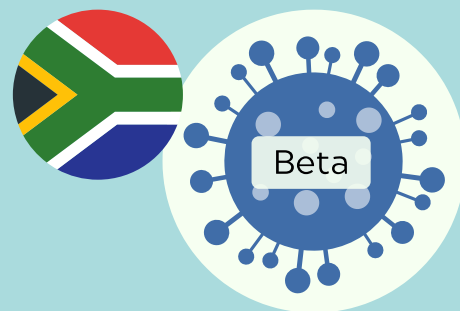


The World Health Organization is paying close attention to at least 10 new coronavirus variants around the world. Four of them are in the category of “**variant of concern**”. They are considered to be more infectious, more deadly, and more resistant to current vaccines and treatments:



Name: 20I/501Y.V1
Lineage: B.1.1.7
Country first detected: United Kingdom (Sep 2020)
Characteristic: 50% increased transmission, potential increased severity based on hospitalizations and case fatality rates

Name: 20I/501Y.V2
Lineage: B.1.351
Country first detected: South Africa (Oct 2020)
Characteristic: 50% increased transmission, potential increased severity based on hospitalizations and case fatality rates, reduced vaccine-induced protection



Name: 20I/501Y.V3
Lineage: P.1
Country first detected: Brazil (Dec 2020)
Characteristic: 50% increased transmission, potential increased severity based on hospitalizations and case fatality rates, reduced vaccine-induced protection

Name: 20A
Lineage: B.1.617
Country first detected: India (Dec 2020)
Characteristic: increased transmission, potential reduced vaccine-induced protection

