COVID-19 Vaccine AstraZeneca
Understanding variants of concern

Latest data released

Summary of the variant data for *COVID-19 Vaccine* AstraZeneca

It is well known that viruses constantly change through mutation, which can lead to the emergence of new variants. Only those that demonstrate increased transmission or virulence are considered variants of concern. Globally, according to the WHO, there are currently four such variants [1]:

- **Alpha,** also known as **B.1.1.7**
- **Gamma**, also known as **P.1**
- **Beta,** also known as **B.1.351**
- **Delta**, also known as **B.1.617.2**

We now have data – from non-clinical, pre-clinical, and clinical studies, as well as real-world evidence – that demonstrate the effectiveness of *COVID-19 Vaccine* AstraZeneca against these new variants.

No variants have emerged that significantly undermine the effectiveness of our vaccine against severe disease and hospitalisation:

- A clinical study confirmed the vaccine is effective against the Alpha variant, with comparable efficacy to the predominant global strain (the Victoria strain) (VE: 74.6%; CI: 41.6% to 88.9%).[2]
- Real-world data from UK and Canada shows *COVID-19 Vaccine* AstraZeneca offers a high level of protection against the SARS-CoV-2 virus and current variants of concern:
  - A real-world study in Canada, demonstrated that, in those who received at least a first dose (n=3,005), *COVID-19 Vaccine* AstraZeneca was 82% effective against hospitalisation or death 21 days after the first dose caused by the Beta/Gamma variants (n=780).[3]
  - The Canadian study also showed, after a first dose of *COVID-19 Vaccine* AstraZeneca, vaccine effectiveness against symptomatic disease was 50% against the Beta/Gamma variants, and 70% and 72% against the Delta and Alpha variants, respectively after 21 days post first vaccine dose.[3]
  - In the UK RWE study including 14,019 symptomatic patients with Delta variant, and including 166 patients who were hospitalised, the vaccine also showed a high level of effectiveness against the Delta and Alpha variants with a 92% and 86% reduction of hospitalisations from two doses, respectively.[4]
- According to data from three large, real-world studies with over seven million individuals who received at least one dose from the UK[5] and Spain[6,7], *COVID-19 Vaccine* AstraZeneca and mRNA COVID-19 vaccines showed similar safety profiles.
  - Rates of rare blood clotting events after the first dose of the vaccine were in line with what would be expected in the general population and lower than in those diagnosed with COVID-19.[6,7]
    - Rates of any venous thromboembolism associated with thrombocytopenia (VTE+TCP) were 45 times higher after a diagnosis of COVID-19 compared with the expected rate[7] [21-day incidence of VTE+TCP was 3.8 (95% CI 3.4-4.1) per million in the background (2019) reference population and 173.1 (95% CI 123.1-243.5) per million in those diagnosed with COVID-19].

The World Health Organization's Strategic Advisory Group of Experts on Immunization (SAGE) of the SARS-CoV-2 virus has recommended *COVID-19 Vaccine* AstraZeneca in countries where new variants, including the Beta variant, are prevalent.[9]

The best way to decrease the risk of more new variants emerging is to immunise the majority of the population across the world as quickly as possible. Experts agree that it is essential that current vaccines continue to be administered to as many people as possible. This is because currently available data suggest that the protection offered by the vaccines far outweighs the risk of vaccine escape from potential new variants.

COVID-19 variants – the cause

When a virus enters the body – like the one that causes COVID-19, SARS-CoV-2 – it invades human 'host cells' and uses them to produce even more of the virus. Viruses survive through this process of replication (making more copies of itself using a host cell) and by spreading between people.

When a virus makes copies of itself, it sometimes changes a bit. These changes are called **mutations**. A virus that has mutated is referred to as a **variant**, meaning it's a different form of the original virus.[10] Sometimes it's called a **genetic variant**, because it's the virus's genetic material that has changed.[11]

Mutations and variants are very normal for any virus. *All* viruses are constantly changing and evolving over time – including the virus that causes COVID-19.[12]

The impact of virus variants

When a virus is circulating widely in a population, it has a greater opportunity to replicate. With this, the likelihood that the virus will change a bit, or that variants will appear, also increases.[8]

Most of the time, variants don't impact how a virus works, or its ability to cause infection and disease.[8] Sometimes however, variants can:

- make the virus spread more easily
- effect how well a person responds to treatment for the virus
- impact testing for the virus and how well it is picked-up
- reduce the effect of vaccines against the virus
- cause more severe illness from the virus

A **variant of concern** is the name given to any variant of the COVID-19 virus that has any of the characteristics above.[10]

Some variants can also have positive effects e.g. reducing a virus's ability to spread. Variants can also disappear over time.

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What do we know about the SARS-CoV-2 virus variants that causes COVID-19?

Scientists and experts around the world are closely monitoring for new variants of the SARS-CoV-2 virus and are carefully assessing their impact. This monitoring is conducted using genomic surveillance, laboratory studies and epidemiological investigations looking at how the virus is spreading and why.[12]

> The SARS-CoV-2 virus has a low rate of change, or mutation – approximately four times slower than the flu virus.[13] However, as the virus is so widespread, numerous variants have developed and are spreading quickly across the world, with more expected to develop.

Currently, there are four variants of concern, the Alpha, Beta, Gamma and Delta variants. Each of these variants has mutations which are thought to make them more transmissible. Early data also suggest that the Alpha variant is associated with an increased risk of death.[14]

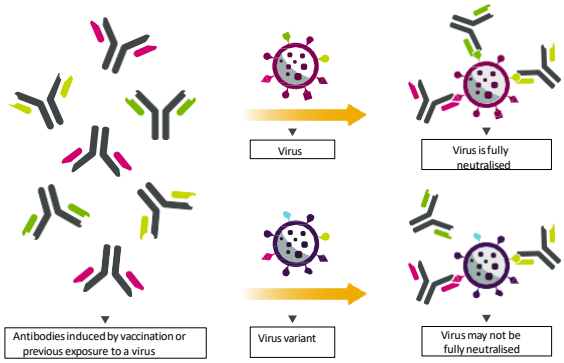
How can we protect against SARS-CoV-2 variants?

The current vaccines for COVID-19 have been designed to give broad protection against the virus, offering a certain level of protection against different variants.[12]

The most effective strategy against variants is to prevent the spread of COVID-19.[11] Variants thrive when virus transmission levels are high, so we need to bring these levels down. Current measures to reduce transmission work e.g. hand washing, good ventilation, distancing, mask wearing and preventative treatments, such as vaccines.

According to the World Health Organization, rolling out vaccines as quickly and widely as possible is also critical to protect people from the virus and risk of new variants.[12]

As part of the immune system response to the virus or following a vaccination, antibodies are produced to recognise the spike protein on the exterior of the SARS-CoV-2 virus. It is believed that the current vaccines will maintain some protection against new variants.



The binding of neutralising antibodies to a virus variant may differ from their binding to the original virus

Future strategies to protect against variants

In time, it is anticipated that different vaccine strategies will be employed to overcome new variants as they arise. This might include changing the vaccine dose, additional booster vaccinations, combination vaccines or adapting the vaccines themselves to target variants. Scientists are already working on 'next generation' vaccines and strategies to achieve the best protection.

As our knowledge of the COVID-19 virus continues to grow – including how it's transmitted, how it mutates and the impact of variants – we're working hard to predict changes and prepare for future challenges.

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