Addressing Concerns About SARS-CoV-2 Variants

The Issue

SARS-CoV-2—the coronavirus that causes COVID-19—was first identified in China in December 2019. Since then, multiple variants of the virus (SARS-CoV-2) have been identified around the globe. Some people may be concerned about the ability of COVID-19 vaccines to protect against emerging variants. Others may view media reports of breakthrough infections as evidence of the limitations of COVID-19 vaccines and question the need to be vaccinated (i.e., an additional reason not to get a COVID-19 vaccine).

Sound Bites

- Many viruses—including SARS-CoV-2, the virus that causes COVID-19—change over time through repeated mutation. A virus with one or more new mutations is referred to as a "variant" of the original virus.
- As expected, multiple variants of SARS-CoV-2 have been documented throughout the COVID-19 pandemic.
- The best way to slow the emergence of new variants is to reduce transmission (i.e., slow the spread of infection). The best way to reduce transmission is to get vaccinated against COVID-19 and follow guidance for masking and physical distancing.
- Completing a primary series of COVID-19 vaccinations reduces your risk of severe illness, hospitalization, and death from COVID-19. Staying up to date on your COVID-19 vaccines—which includes getting booster doses when eligible—further improves your protection.
- The Omicron variant continues to spread throughout communities and can infect people who have been vaccinated or have previously had COVID-19.

What We Know

Many viruses evolve over time. SARS-CoV-2, the virus that causes COVID-19, is no exception.

Viruses constantly change through mutation when they replicate. A virus with one or more new mutations is referred to as a "variant" of the original virus. Virus variants are both expected and normal.

Many variants emerge and then disappear. In some cases, new variants persist; they survive better than, and can outcompete, the original virus. At this point in the pandemic, the original virus that caused the initial COVID-19 cases in December 2019 is no longer circulating. Some variants appear to spread more easily and quickly than other variants, which may lead to more cases of COVID-19.

The World Health Organization (WHO) has been working with its partners, expert networks, national authorities, institutions, and researchers since early 2020 to monitor and assess the evolution of SARS-CoV-2.1 Emerging variants are named using letters of the Greek alphabet to make public discussion easier. SARS-CoV-2 variants also may be referred to by their Pango names, such as B.1.1.7. Pango nomenclature is a rule-based system for naming SARS-CoV-2 genetic lineages.

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Both WHO and the U.S. government SARS-CoV-2 Interagency Group (SIG) use a variant classification scheme that defines three classes of SARS-CoV-2 variants[1,2]:

- Variants of Interest.
- Variants of Concern.
- Variants of High Consequence.

Variants are classified based on how easily they spread, how severe their symptoms are, and how they are treated (e.g., Are existing treatments and vaccines effective against the variant?). The U.S. government SIG classifications may differ from WHO classifications because the importance of variants may differ by location. The Centers for Disease Control and Prevention follows the changing frequency of variants in the United States.[2]

A SARS-CoV-2 Variant of Interest has specific genetic markers associated with changes to receptor binding, reduced neutralization by antibodies generated against previous infection or vaccination, reduced efficacy of treatments, potential diagnostic impact, or predicted increase in transmissibility or disease severity.

A SARS-CoV-2 Variant of Concern shows evidence of an increase in transmissibility, more severe disease (e.g., increased hospitalizations or deaths), a significant reduction in neutralization by antibodies generated during previous infection or vaccination, reduced effectiveness of treatments or vaccines, or diagnostic detection failures.

A SARS-CoV-2 Variant of High Consequence has clear evidence that prevention measures or medical countermeasures have significantly reduced effectiveness relative to previously circulating variants.

Two recent Variants of Concern in the United States—Delta and Omicron—illustrated how different variants could be. The Delta variant was highly contagious—more than twice as contagious as previous variants.[3] It caused a surge of COVID-19 infections in the United States in late summer 2021. Although breakthrough infections in fully vaccinated people were reported, the greatest risk of transmission was among unvaccinated people, and the highest incidence of cases and severe outcomes was in places with low vaccination rates.[4]

The Omicron variant was even more contagious than the Delta variant.[3] It contained more changes in the spike protein (the primary target of vaccine-induced immunity) than had been observed in other variants, including 15 in the receptor binding domain.[5] Omicron was responsible for a record number of cases early in 2022—a daily average of more than 806,000 cases at one point in January (compared with 164,000 daily cases during the Delta surge). Omicron also produced more breakthrough infections, including in fully vaccinated individuals who had received a booster dose. Although the risk of severe outcomes was substantially lower for Omicron than for Delta,[6] the sheer volume of cases led to a record number of hospitalizations (but not a record number of deaths).

Throughout these surges, the COVID-19 vaccines were highly effective in reducing the risk of severe illness, hospitalization, and death.[7] Data from Los Angeles County, California, showed that during both Delta and Omicron predominance, COVID-19 incidence and hospitalization rates were highest among unvaccinated persons and lowest among vaccinated persons with a booster.[8] The data for hospitalization were particularly striking. Unvaccinated persons were 23 times more likely to be hospitalized than fully vaccinated persons with a booster. They were 5.3 times more likely to be hospitalized than were vaccinated persons without a booster.

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On April 14, 2022, the U.S. government SIG downgraded Delta from a Variant of Concern to a Variant Being Monitored. This new classification was based on the following[9]:

- Significant and sustained reduction in its national and regional proportions over time.
- Evidence suggesting that Delta does not currently pose a significant risk to public health in the United States.

References

1. World Health Organization. Tracking SARS-CoV-2 variants. Updated March 22, 2022. Accessed March 25, 2022. https://www.who.int/en/activities/tracking-SARS-CoV-2-variants/
2. Centers for Disease Control and Prevention. SARS-CoV-2 variant classifications and definitions. Updated December 1, 2021. Accessed March 25, 2022. https://www.cdc.gov/coronavirus/2019-ncov/variants/variant-classifications.html
3. Centers for Disease Control and Prevention. Variants of the virus. Updated August 11, 2021. Accessed March 25, 2022. https://www.cdc.gov/coronavirus/2019-ncov/variants/about-variants.html
4. Katella K. 5 things to know about the Delta variant. Yale Medicine; March 1, 2022. Accessed March 25, 2022. https://www.yalemedicine.org/news/5-things-to-know-delta-variant-covid
5. Centers for Disease Control and Prevention. Science Brief: Omicron (B.1.1.529) variant. Updated December 2, 2021. Accessed March 25, 2022. https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/scientific-brief-omicron-variant.html
6. Nyberg T, Ferguson NM, Nash SG, et al. Comparative analysis of the risks of hospitalisation and death associated with SARS-CoV-2 omicron (B.1.1.529) and delta (B.1.617.2) variants in England: a cohort study. *Lancet.* 2022;399(10332):1303–1312. doi: 10.1016/S0140-6736(22)00462-7
7. Tenforde MW, Self WH, Gaglani M, et al. Effectiveness of mRNA vaccination in preventing COVID-19–associated invasive mechanical ventilation and death—United States, March 2021–January 2022. *MMWR Morb Mortal Wkly Rep.* 2022;71(12):459–465. doi: 10.15585/mmwr.mm7112e1
8. Danza P, Koo TH, Haddix M, et al. SARS-CoV-2 infection and hospitalization among adults aged ≥18 years, by vaccination status, before and during SARS-CoV-2 B.1.1.529 (Omicron) variant predominance—Los Angeles County, California, November 7, 2021–January 8, 2022. *MMWR Morb Mortal Wkly Rep.* 2022;71(5):177–181. doi: 10.15585/mmwr.mm7105e1
9. Centers for Disease Control and Prevention. SARS-CoV-2 variant classifications and definitions. Updated April 26, 2022. Accessed August 28, 2022. https://www.cdc.gov/coronavirus/2019-ncov/variants/variant-classifications.html

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