

## Coronavirus Variants of Concern: An Insight

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### Abstract

The new coronavirus, SARS-CoV-2, which causes the disease COVID-19, has had a serious worldwide impact on human health. The virus was virtually unknown at the beginning of 2020. Since then, intense research efforts have resulted in sequencing the coronavirus genome, identifying the structures of its proteins, and creating a wide range of tools to search for effective vaccines and therapies. Also, there's a chance that the COVID-19 contraction rate could get higher than the COVID-19 vaccination rate. In other words, the virus continues to spread while very little people actually get vaccinated. This only makes the job of scientists even harder. In order to stop the spread of COVID-19, citizens must get vaccinated more frequently than citizens are contracting COVID-19. The coronavirus attacks and kills healthy cells, causing detrimental damage to the respiratory system and immune system. It was then discovered that COVID-19 can be terribly fatal for those with already fragile immune systems and preexisting health conditions.

Back in March, when COVID-19 was clearly becoming a critical threat to many countries around the world, the evidence indicated that the virus spreads from person to person through small respiratory droplets produced when people cough or sneeze, or even breathe. Surfaces can serve as an intermediary for the virus when looking for a host. Instead of contracting the virus directly from a person, it is possible to receive the virus from touching an object that an infected person sneezed on. It has been discovered that the virus can last up to three 3 days on a surface. Proceeding to rub one's eyes, mouth, or nose after such contact is also a mode of transmission.

**Keywords:** COVID-19; mutation; pandemic; sars-cov-2; vaccine; variant

### Introduction

COVID -19 is a respiratory disease caused by SARS-CoV-2. SARS-CoV2 is a large family of viruses called coronaviruses. Viruses are submicroscopic 'organisms' that require the DNA of the host organism's call to replicate it or transcribed into it into RNA which are then translated into proteins that help them carry out all their vital functions such as 'eating' and reproducing/ replicating; that is why they aren't considered living organisms. SARS-CoV-2 is the virus responsible for COVID-19. Like any other virus, SARS-CoV-2 spreads at alarming rates. Variants are a genetic subtype microorganism that is genetically distinct from a main strain, but not different enough to be termed a new distinct strain. This makes the introduction of variants plausible. In simple terms, a variant is a mutated gene. The mutation can affect how fast the virus spreads, how bad the body reacts to the virus, and its resistance to drugs. This can put a damper on the production of vaccines. The vaccine can become futile or less effective, while the variant spreads in a different mode than the original strand.

Depending on the location of the mutation, variants can have

different properties than the original virus. The varying properties include transmission and severity. The mutation cause decreased or increased transmission ability; the mutation can also cause decreased or increased severity. The virus can be transmitted more easily by having more modes of transmission. Additionally, the variant itself may be more susceptible to infecting/ finding a host than the original virus. Symptoms of COVID-19 include fever, cough, shortness of breath or trouble breathing, fatigue, chills (sometimes with shaking), body aches, headache, sore throat, congestion or a runny nose, loss of taste, loss of smell, nausea or vomiting, and diarrhea. With a new variant, this list of symptoms could become extensive. Usually, through evolution, the virus would become stronger and more resilient.

This is great for the virus, but not so much for the host as the virus is essentially tearing away at the body. The above information was discovered March of 2020, meaning some of the information can be a bit dated. With a year of duplicating, spreading, and infecting, the virus has had an ample amount of time to evolve. The rise of new variants could increase the transmission rate. Instead of lasting a mere 3 days on surfaces, the virus could last 5 days. Also, the virus was not deemed an airborne disease by

the WHO at the beginning of the global pandemic. Within a few seconds of remaining in the air, the virus would die. Because of the introduction of a new variant, however, scientists are no longer sure. In fact, in an open letter to WHO, more than 200 scientists have argued that there is enough evidence now to show that COVID-19 can spread as aerosols which they say could explain 'super spreader events' where an entire choir or restaurant has become infected at once (Gavi, 2020).

The coronavirus infects by attacking the immune system. While there are no COVID medications or immunity-boosting supplements that can cure or prevent coronavirus, there are steps you can take to make your defenses as strong as possible (D'adamo, 2020). In other words, there aren't any medications that can accurately stop a person from contracting COVID-19, however there are ways to boost up the immune system for COVID-19 prevention. Ways to boost the immune system include exercising regularly, eating a healthy, balanced diet, maintaining a healthy weight, getting quality sleep, reducing, quitting smoking (if applicable), drinking alcohol only in moderation, if at all, and taking steps to prevent infection. Immune supplements include Vitamin C, Vitamin D, Vitamin A, Zinc, Selenium, Raw honey, Garlic, and Probiotics.

The introduction of variants can change the effectiveness of vaccines. To produce a vaccine, a lot of research is conducted on the strain. The chemicals in the vaccine are specifically used to target and kill the virus. Depending on how much the virus evolves, the chemicals used in the vaccine will need to change as well. If not, the vaccine will slowly lose effectiveness and eventually become obsolete. The spread of COVID-19 would be more detrimental if it is indeed airborne. Also, all the evidence supports increased transmission rates from mutations. What about variants that cause decreased transmission rates? Well, the answer is simple, Charles Darwin's theory of evolution and natural selection. It is very possible that variants decreasing infection rates arose, however, they most likely died off. Darwin states evolution is guided by natural selection, the process of which organisms with favorable traits have high survival rates and organisms with less favorable traits tend to die off. A COVID-19 variant that is less successful with infection will not be as prevalent as a COVID-19 variant that is more successful. That's why scientists are highly concerned with the introduction of a more infectious variant that could supersede the originally severe virus (Callaway, 2021; Lauring and Hodcroft, 2021; McCormick et al., 2021). Therefore, the vaccine needed to be produced in a timely manner (AstraZeneca, 2020; Moderna, 2020; Pfizer, 2020; Sputnik, 2020). If the virus continues to spread, the chances of it evolving increases. This happens regardless of a vaccine. A huge fear is COVID-19 producing more variants than can be combatted by a vaccine. Additionally, the virus can build a certain tolerance to the vaccine via mutation. Soon, viruses with that mutation will spread at a faster rate than the original.

To discourage the rapid and increased spread of COVID-19, the government had to induce a social, economic shutdown. Thus, the practice of social distancing started. Social distancing means staying home and away from others as much as possible to help prevent spread of COVID-19. Because of COVID-19's primary mode of transmission the only logical course of prevention was social-distancing. Mechanisms such as the telephone and online video chat made the implementation of social distancing possible. Of course, an economic shutdown could not last forever, introducing the term physical distancing. Physical distancing is used to reinforce the need to stay at least 6 feet from others, as well as wearing face masks.

### Variant Plasticity

Viruses such as SARS-CoV-2 tend to evolve over time. When introduced to a host, viruses can replicate at substantial rates. During each replication, the virus is prone to change a little. The change experienced by the virus is called a mutation. A virus with at least one mutation is a variant. Fast

replication rates coupled with high infection rates produce viruses with an extreme likelihood to mutate. COVID-19 is the perfect example of this. COVID-19 was introduced to the World Health Organization on December 31, 2019, declared a global health emergency on January 30, 2020, and finally declared a global pandemic on March 11, 2020. This speaks volumes to the high replication and infection rate of SARS-CoV-2. Considering the coronavirus was able to spread globally in a matter of months, it was only inevitable for COVID-19 variants to arrive. Based on the recent epidemiological update by the WHO, as of June 22, 2021, four SARS-CoV-2 variants of concern have been identified since the beginning of the pandemic: (1) Alpha (B.1.1.7)- first variant of concern described in the United Kingdom (UK) in late December 2020, (2) Beta (B.1.351)- first reported in South Africa in December 2020, (3) Gamma(P.1)- first reported in Brazil in early January 2021, and (4) Delta (B.1.617.2)- first reported in India in December 2020. The WHO Weekly Epidemiological update on June 22, 2021, described seven variants of interest namely Epsilon (B.1.427 and B.1.429); Zeta (P.2); Eta (B.1.525); Theta (P.3); Iota (B.1.526); Kappa (B.1.617.1) and Lambda (C.37).

### Conclusion

The pandemic still worries the public as cases grow. More people are dying, not enough vaccinated. People vaccinated still catching the virus. COVID 19 has become the economy downfall as the COVID spreads and the effort to quarantine it. Social distancing, self-isolation and travel restrictions have led to a reduced workforce across all economic sectors and caused many jobs to be lost. Schools have closed, and the need for commodities and manufactured products has decreased. COVID-19 has had an impact on social mobility whereby schools are no longer able to provide free school meals for children from low-income families, social isolation, and school dropout rates. It has also had a significant impact on childcare costs for families with young children. Additionally, there exists a wide disparity amongst populations with a higher income who can access technology that can ensure education continues digitally during social isolation. Healthcare where the COVID-19 pandemic has caused a challenge for healthcare systems worldwide. As in the risk to healthcare workers is one of the greatest vulnerabilities of healthcare systems worldwide. Considering most healthcare workers are unable to work remotely, strategies including the early deployment of viral testing for asymptomatic and/or frontline healthcare staff is imperative. High healthcare costs, shortages of protective equipment including N95 face masks, and low numbers of ICU beds and ventilators have ultimately exposed weaknesses in the delivery of patient care. In various cities across China, tele-response bots powered by fifth-generation wireless networks are being utilized that allow health care staff to communicate with patients, monitor their health and deliver medical supplies. Drones that deliver medication and work-from-home apps are also being adopted. Automation of services has been a major goal for China. It takes a while for the world economy to recover from the contraction. It seems that this pandemic will lead to a permanent shift in the world and its politics, especially in health, security, trade, employment, agriculture, manufacturing goods production and science policies. This pandemic has severe adverse effects on the employees, customers, supply chains and financial markets, in brief, most probably it will cause a global economic recession. Nevertheless, due to the uncertainty of the end of this pandemic, both the length and scale of this contraction are not predictable.

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