

## COVID-19 Infection: From the Beginning to Now

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The coronavirus disease 2019 (COVID-19) is a highly contagious infectious respiratory disease caused by the human coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (1, 2). The first case of COVID-19 infection was reported from Wuhan, China, in December 2019. The disease spread worldwide so quickly leading to a pandemic in March 2020 (1). To date, SARS-CoV-2 has affected more than 675 million individuals and caused more than 6.5 million deaths worldwide (<https://www.worldometers.info/coronavirus/>).

Coronaviruses are single-stranded, enveloped ribonucleic acid (RNA) viruses with a 120–80 nanometre diameter which belong to the Coronaviridae family (3). Coronaviruses are divided into four groups including alpha, beta, gamma and delta coronaviruses (3, 4). SARS-CoV-2 is a member of the beta-corona virus genus (3, 4). SARS-CoV-2 encodes four structural proteins consisting of the spike (S), membrane (M), envelope (E) and nucleocapsid (N) proteins (5). The SARS-CoV-2 replication cycle begins following SARS-CoV-2 binding to cellular surface receptor angiotensin-converting enzyme-2 (ACE2) of airway epithelial and vascular endothelial host cells through protein S, leading to the remaining steps of viral replication including viral assembly, maturation and virus release (6).

People infected with SARS-CoV-2 manifest a wide range of symptoms, from no symptoms to severe illness. They can present symptoms of mild upper respiratory tract infection, or moderate to severe lower respiratory tract infection with respiratory failure or multi-organ failure and death (7). Male individuals aged  $\geq 65$  years with underlying conditions including chronic lung, liver and kidney diseases, cardiovascular disease, hypertension, diabetes mellitus, cancer, immunosuppressant condition, cigarette smoking and obesity are predisposed to progression to a more severe COVID-19 clinical course (8).

Since the COVID-19 outbreak, the SARS-CoV-2 has changed constantly and various variants have been found that differ in receptor binding affinity, antibody neutralization, efficacy of public health measures and treatment, and/or disease transmissibility and severity (9). To date, the World Health Organization (WHO) has declared five SARS-CoV-2 variants (Alpha, Beta, Gamma, Delta and Omicron) as variants of concern (<https://www.who.int/activities/tracking-SARS-CoV-2-variants>). The

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currently circulating dominant variant, Omicron, is so far the most transmissible strain of the virus. It also can escape immune system causing breakthrough infections in fully vaccinated individuals as well as previously infected cases (10), nevertheless, the Centers for Disease Control and Prevention (CDC) suggests getting vaccinated and staying up to date with the vaccine and the latest booster shot as the best protection against this variant (<https://www.cdc.gov/media/releases/2021/s1227-isolation-quarantine-guidance.html>).

SARS-CoV-2 probably will keep evolving. Meanwhile, staying up to date with all recommended vaccine doses and a booster dose whenever required along with public health measures such as hand hygiene, wearing masks, and physical distancing particularly in places with high transmission and lockdowns during the COVID-19 surge are the best ways to prevention of COVID-19 spread.

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