

# Omicron (B.1.1.529) variant: Development, dissemination, and dominance

Since late November, a new wave of uncertainty and panic has spread across the world, as the number of coronavirus disease 2019 (COVID-19) cases raised dramatically, especially in the southern part of Africa. A new SARS-CoV-2 variant, B.1.1.529, was designated by the World Health Organization as a variant of concern and named Omicron.<sup>1</sup> Since then, many questions have been raised to understand how severe, immune escape, and infectious it can be. Besides this, the question of how and where it might have emerged, How far it might have already been spread, and can Omicron dominate the previous variants of concern, remains to be answered.

It is not clear whether Omicron has evolved in South Africa or not. However, Gao et al. suggested it might have evolved in a large immunocompromised population with a lower vaccination rate, where public health infrastructures are relatively weaker than other nations.<sup>2</sup> African nations have the highest rate of HIV infection, while the vaccination rates are relatively lower than other countries.<sup>3</sup> As the immune system of HIV patients cannot correctly detect or vanish the pathogens, it will give the coronavirus a valuable opportunity to endure, multiply, and possibly, mutate as the course of the disease continues.<sup>4</sup> In another theory, SARS-CoV-2 might have been hidden in an animal reservoir, possibly rodents, evolved for a while, and returned to the human population with a relatively new genomic sequence, now known as Omicron.<sup>5</sup> Whether it emerged in a human population or developed in other species, it is still too early to exclude any theory about the origin of the Omicron or to identify where it actually evolved.

During the past 2 years, COVID-19 has shown surprisingly rapid dissemination across the globe, and now, as of December 27, 89 countries are officially reported Omicron from their genome sequences.<sup>6</sup> As the highest mutated SARS-CoV-2 variant, Omicron may potentially spread faster, have higher infectivity, and escape more from immunity than previous variants of concern.<sup>7</sup> Besides this, sequencing technology is not as convenient as other testing methods to provide communities with fast and valid data collecting about the variant. Considering the challenging process of vaccine manufacturing and delivery time, Omicron may be passed every border before the next suitable vaccine is ready. This could trigger an alarm for national authorities and populations to advocate and follow protective recommendations even more than before.<sup>8</sup>

When the original SARS-CoV-2 has emerged in Wuhan, China, no one would expect a global pandemic will happen. The pattern of

infection, transmissibility, and immune evasion was so impulsive that soon after the detection, the new coronavirus scattered all across the world. After almost 1 year, Alpha, a new variant of concern, has emerged in the United Kingdom and raised a new wave of reported cases and hospital admissions with COVID-19 globally. Up to early 2021, Alpha cases were slightly replaced with Beta and Gamma, which have been first detected in South Africa and Brazil, respectively.<sup>9</sup> Delta, the current dominant SARS-CoV-2 variant, was first documented from India in October 2020, and not so far, disseminated all over the world. With a reproductive number (R0) of 5.08, Delta is far more transmissible and immune escape than the original coronavirus.<sup>10</sup> Now with Omicron, there is a concern about another wave of infection and hospitalization as it spreads much faster than previous variants of concern. A recent study suggests Omicron may probably be more transmissible and cause more infection than Delta and Delta-plus variants since large mutations modulate the affinity of the Spike protein to the ACE-2 receptor.<sup>11</sup> Preliminary data also indicated more vaccine evasion and a higher rate of reinfection with Omicron compared to previous variants of concern.<sup>12</sup>

Through relatively new mutations, Omicron may have been evolved to a more transmissible and immune escape variant. Given the rapidly increasing number of COVID-19 cases and the rise in hospitalizations, healthcare systems may become quickly overwhelmed as we approach 2022. By now, we have to wait for further results to see how effective current preventive and therapeutic methods are against the Omicron. If the symptoms of the new cases continue to be mild, Omicron may provide us with global herd immunity, and hopefully, end the pandemic. Conversely, if the pathogenesis of the Omicron is as extensive as its capability to spread or escape from immunity, this can be the most challenging coronavirus to deal with, and the world will face a drastic wave of the COVID-19 again.

## CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

## AUTHOR CONTRIBUTIONS

Shayan Rahmani conceptualized the title, collected data, and prepared the first draft of the manuscript. Nima Rezaei critically revised the manuscript, edited and finalized the draft, and supervised the study. All of the authors have read and approved the final draft of the manuscript.

## DATA AVAILABILITY STATEMENT

Not applicable.

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