



## "Fourth Wave" of COVID-19 Pandemic around World

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The COVID-19 outbreak occurred for more than ten months. There were about 38 million people infected with COVID-19 worldwide and the death toll exceeded 1 million people. The World Health Organization (WHO) estimated that around a tenth of the world's population has been infected with COVID-19 and the epidemic is not over yet<sup>1</sup>.

When does the COVID-19 pandemic end? Will it stop in a short period? This seems to be impossible but several factors can decrease the rate of mortality for COVID-19 including (i) the development of a COVID-19 vaccine, (ii) cross-immunity, (iii) reducing the rate of transmission, and (iv) natural immunity<sup>2</sup>. What does it happen if COVID-19 continues? Will the coronavirus strains (SARS-CoV-2) being mutating?

In April 2020, Korber<sup>3</sup> reported that coronavirus strains (SARS-CoV-2) mutation appeared in the infected people with COVID-19. Spike (S) protein in the 614<sup>th</sup> amino acid position is glycine instead of aspartate. It's copied from the single-nucleotide of RNA code in the virus's 29,903-letter and called "D614G mutation". This latest virus strain has a stronger transmission rate than the original. The COVID-19 epidemic could worsen rapidly and make the "Fourth wave" of an epidemic arrive early.

Nevertheless, there is a serious question about when the coronavirus strains (SARS-CoV-2) mutated. It would affect the development of the vaccine because "D-strain" is an initial version of COVID-19. Vaccines are neutralized antibodies that targeted their specific spike protein. Currently, 85.0% of COVID-19 infection cases are those of "G-Strain".

Is this vaccine still suitable and shows a strong immune response against the coronavirus strains (SARS-CoV-2)<sup>4</sup>? There are more than 100 COVID-19 vaccine candidates under investigation and a few vaccines are going to the human trial phase. Time is required for vaccine development and probably at least half a year.

Besides, do many people have pre-existing immunity to COVID-19? Doshi<sup>5</sup> indicated that cross-immunity only has 20.0% to 50.0% of people with T cell reactivity against SARS-CoV-2 since the memory T cells are known for their ability to affect the clinical severity and susceptibility to future infection. Unfortunately, this remains below herd immunity thresholds, so it must be monitoring, testing, and contact tracing as essential public health strategies.

The government from different countries must be implemented suitable public policies during the COVID-19 pandemic like social distancing to reduce the rate of transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It's prohibiting crowds of people at non-essential businesses, limiting social gatherings to less than 4 people, ordering citizens to stay and work at home, as well as maintaining a 1.5 m distance from each other to prevent the virus transmission and infection between people<sup>6</sup>. The policy cures the symptoms but not COVID-19. This means that people would not build up herd immunity if it only suppressed the way of transmission.

Natural immunity is the best ideal for combating COVID-19. People self-produce antibodies after recovery. Up to the present, it has 0.1% of the

world's population is immune to COVID-19. Some microbiologists predicted that this number would be increased by 5.0% per year. The COVID-19 pandemic may fall and stop within five to ten years when 70.0% of people have antibodies against the virus infection because coronavirus disease-19 (COVID-19) becomes a common flu disease at that moment<sup>7</sup>.

Now-a-days, it can't identify that the "Fourth Wave" of COVID-19 pandemic whether reach or not. However, this must stay vigilant to cope with it including continuing to develop the vaccine and adopting a series of measures such as maintaining social distance between people, banning public gatherings, as well as staying and working at home for preventing the "Fourth Wave" of COVID-19 pandemic.

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