Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the Editor

Mask-off policy in the shadow of emerging variants of SARS-COV-2

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To the editor,

From the beginning of the pandemic, several variants of SARS-CoV-2 have been identified with the significant capability of transmission rate relative to the wild-type virus. These emerging variants, raising concerns about their impact on infectivity and mortality, as well as the effectiveness of current vaccines. The emerging variants have been reported from different countries across the world including South Africa (variant B.1.351) [1], Brazil (variant P.1) [2], United Kingdom (variant B.1.1.7) [3], and lately India (variant B.1.617) [4], however, soon after of their detection, they have been reported in all other parts of the world. All these variants have mutations in different segments of their genomes relative to the wild type, however, the mutations in the spike receptor-binding domain (S-RBD) are a real challenge for the current vaccination program as many available vaccines are designed to produce neutralizing antibodies against S-RBD which react and block S-RBD interaction with human angiotensin-converting enzyme 2 (hACE-2) as virus receptor. Some variants have common mutations in their S-RBD. For example, N501Y mutation is shared between B.1.1.7, B.1.351, and P.1, or E484K mutation is sheared among B.1.351, and P.1. Some other variants have a different mutational signature in their S-RBD such as B.1.617 variant (E484Q, L452R, and P681R) [4], highlighting the adaptive evolution of SARS-CoV-2 to a human host in a different geographical area. Recently, we performed an in-silica analysis and found that new variants (B.1.1.7, B.1.351, B.1.617 and P.1) of SARS-CoV-2 have different sensitivity to the neutralizing antibody (CV30). We found that the affinity of CV30 to spike protein decrease 10% for B.1.1.7 variant relative to wild type virus, while the affinity would decrease more; up to 30% for B.1.351, P.1 and B.1.617 variants relative to wild type [5]. In line with our findings, Wang et al., reported a small but significantly reduced activity of Moderna (mRNA-1273) or Pfizer–BioNTech (BNT162b2) vaccines against SARS-CoV-2 variants that encode E484K-, N501Y- or K417N/E484K/N501-mutant [6]. Another study has also shown that the mutants carrying the N501Y mutation (such as B.1.1.7) are relatively resistant to a few mAbs targeting S-RBD and not more resistant to convalescent plasma or vaccinee sera, while B.1.351 variant is resistant to multiple mAbs targeting S-RBD and are markedly more resistant to neutralization by convalescent plasma (9.4 fold) and vaccine sera (10.3–12.4 fold) [7]. No information is available about the neutralization activity of Ad26.COV2.S (Johnson & Johnson) and Sputnik V (Gamaleya) vaccines against the new variants. There is also no information available regarding the neutralization activity of AZD1222 (AstraZeneca) and BBIBP-CorV (Sinopharm) vaccines against B.1.1.7 and P.1, however, neutralization decreased by <86 folds to complete escape for AZD1222 (AstraZeneca) and 1.6 folds for BBIBP-CorV (Sinopharm) vaccines against B.1.351 [8]. On the other hand, our forecast analysis (post-vaccination model), showing that the rate of B.1.1.7 will sharply decrease in North America in near future due to massive vaccination and higher sensitivity of this variant to neutralizing antibody (90%), but the frequency of B.1.351, B.1.617 and P.1 variants will gradually increase to 5% after herd immunity achieved [5]. May 16, 2021, CDC of the US announced that “fully vaccinated people can resume activities without wearing a mask or physically distancing, except where required by federal, state, local, tribal, or territorial laws, rules, and regulations, including local business and workplace guidance” (https://www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated.html; retrieved on May 19, 2021). CDC considers people who pass 2 weeks after their second dose of the Pfizer or Moderna vaccines, or 2 weeks after a single dose of Johnson & Johnson’s Janssen vaccine. Considering continues the adaptation of SARS-CoV-2 to transmission among humans, increasing the number of variants that can escape from neutralizing antibodies, different efficiency of current vaccines to neutralize the wild type and new variants and limited availability of vaccine supplies for many countries, we strongly believe to continue wearing a mask, practicing social distancing and following guidelines until at least 75% of population get vaccinated in many countries. The end of the pandemic is only possible when effective vaccines against circulating variants are distributed equitably across the world which would potentially eliminate virus transmission and more adaptation to humans. Some heavily populated countries such as India and Brazil are currently facing a strong wave of COVID-19 disease with high mortality

Abbreviations: COVID-19, Coronavirus Disease 2019; hACE-2, human angiotensin-converting enzyme 2; SARS-COV-2, Severe acute respiratory syndrome coronavirus 2; S-RBD, The spike receptor-binding domain.

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caused by new variants (able to escape neutralizing antibodies; up to 30%). Limited availability of vaccine supplies for many countries will increase the odds of evolving new variants of SARS-CoV-2 to start a new pandemic with vaccine-resistant lineages. We strongly suggest formulating new vaccines covering all variants with low affinity (<70%) to neutralizing antibodies as boosters as soon as possible to control new SARS-CoV-2 variants. Vaccinating children might also be necessary to eliminate the virus transmission and adaptation chain. On top of vaccination strategies, close monitoring and shearing the genomic information of the circulating SARS-CoV-2 variants in all countries are mandatory.

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Declaration of Competing Interest

No conflicts of interest exist for the specified authors.

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