

# Editorial



## Response to mutation and variants of the SARS-CoV-2 gene

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Since the onset of the COVID-19 pandemic, our society has come to understand that the cause is the corona virus (2019-nCoV) <sup>(1)</sup> or more popularly known as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).<sup>(2)</sup> Further developments showed that SARS-CoV-2 has mutated. It was reported in the UK on 18 December 2020 that SARS-CoV-2 gene mutations resulted in a new variant called B.1.1.7 or “variant under investigation, year 2020, month 12, variant 01” (VUI 202012/01).<sup>(3)</sup> The name B.1.1.7 is derived from its phylogenetic heritage. Since the new viral variants are under study, they are also called “variant under investigation” or “variant of concern”.<sup>(4)</sup> For this reason, the SARS-CoV-2 lineage variant B.1.1.7 is also referred to as “variant of concern 202012/01” (VOC-202012/01).<sup>(5)</sup> The B.1.1.7 variant of SARS-CoV-2 is also called 20I/501Y.V1.<sup>(6)</sup> Moreover, it has been demonstrated that line B.1.1.7 is associated with significant changes in the viral phenotype.<sup>(7)</sup>

The SARS-CoV-2 lineage variant B.1.1.7 is characterized by 8 gene mutations in the spike protein. For example, SARS-CoV-2 variant B.1.1.7 contains the mutations D614G and N501Y, that appear to increase the interaction between the spike protein and the angiotensin converting enzyme 2 (ACE2) receptor.<sup>(8)</sup> Other researchers have also stated that the new variant of SARS-CoV-2 has an N501Y mutation in the spike protein. The new variant “may be associated” with the recent rise in cases in southeast England. Even so it is stated that the new variant of SARS-CoV-2 which is more contagious does not necessarily makes it more dangerous. It is further stated that a number of new variants have been detected in the UK, for example the D614G variant. In more detail, it is

stated that the new variant VUI-202012/01 is defined by multiple spike protein mutations, including deletion 69-70, deletion 144, N501Y, A570D, D614G, P681H, T716I, S982A, D1118H. Subsequently it was reported that it was 14 days from 16<sup>th</sup> December 2020 there has been a spike in COVID-19 cases in South East England, UK.<sup>(9)</sup>

Apart from type B.1.1.7 / 20I / 501Y.V1 of SARS-CoV-2 which appeared in the UK there is a new SARS-CoV-2 lineage 501Y.V2 which was found in Southern Africa and which emerged after the first epidemic wave in a severely affected metropolitan area, Nelson Mandela Bay, located on the coast of the Eastern Cape Province. This lineage spread rapidly, becoming within weeks the dominant lineage in the Eastern Cape and Western Cape Provinces.<sup>(10)</sup> It was further stated that two of the substitutions in the 501Y.V2 lineage (E484K and N501Y) are within the receptor binding motif (RBM) associated with the function of binding with the human ACE2 (hACE2) receptor. Apart from the UK and South Africa, it has been reported that the B.1.1.7 variant of SARS-CoV-2 shows rapid transmission in the United States.<sup>(5)</sup> Furthermore, a new variant of SARS-CoV-2, namely B.1.429 (also known as CAL.20C or 452R.V1), has been identified in California, USA. This strain is characterized by the presence of 5 mutations, namely ORF1a: I4205V, ORF1b: D1183Y, S: S13I; W152C; L452R.<sup>(11)</sup>

In response to the new variants of SARS-CoV-2, various types of vaccines have been tested. At the community level, it is imperative that public health authorities communicate what the variants mean for people’s day-to-day risk and explain why masking and physical distancing remain the best strategy for preventing disease

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and viral evolution. To overcome the new variant of SARS-CoV-2 which is based on the substitution of N501Y on the spike protein, isogenic N501 and Y501 of SARS-CoV-2 have been made. The mRNA-based COVID-19 vaccine namely BNT162b2 has been tested and has a neutralizing titer that is equivalent to the N501 and Y501 viruses. It shows the neutralizing effect of the BNT162b2 vaccine for mutant N501Y of SARS-CoV-2. Neutralization of the SARS-CoV-2 N501Y mutant by BNT162b2 vaccine-elicited sera.<sup>(12)</sup> Apart from these vaccines, it has been reported that the adenoviral vector vaccine namely ChAdOx1 nCoV-19 (AZD1222) is clinically effective in neutralizing the activity of the B.1.1.7 and non B.1.1.7 variants of SARS-CoV-2. Moreover, it was stated that the vaccine decreased the viral load of both B.1.1.7 and non-B.1.1.7 variants of SARS-CoV-2.<sup>(13)</sup>

As the world works to vaccinate, isolate, and treat communities to choke off the transmission, the virus is working to evade our scientific arsenal. Coordinated international efforts in genomic surveillance and phenotypic characterization of new strains will be critical if we hope to stay one step ahead of the virus.

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