

「What do we know about the new COVID-19 variant in UK?」

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On 14 December 2020, authorities of the United Kingdom of Great Britain and Northern Ireland reported to WHO that a new SARS-CoV-2 variant was identified through viral genomic sequencing. An analysis of the strain of the virus published on 18 December reveals that the earliest samples of this variant were found in Kent on 20 September and London on 21 September. [1] Preliminary reports by the United Kingdom are that this variant is more transmissible than previous circulating viruses, with an estimated increase of between 40% and 70% in transmissibility (adding 0.4 to the basic reproduction number R_0 , bringing it to a range of 1.5 to 1.7). [2]

At present, the variant is referred to as “SARS-CoV-2 VOC 202012/01” (Variant of Concern 202012/01), or SARS-CoV-2 VUI (Variant Under Investigation in December 2020) or “B.1.1.7.” The new variant caused alarm because it involved 23 separate mutations, 17 of which were linked to the building blocks of proteins that form the virus. It's unusual for so many mutations to appear all at once. This variant has a most important mutation in the receptor binding domain (RBD) of the spike protein at position 501, where amino acid asparagine (N) has been replaced with tyrosine (Y). The shorthand for this mutation is N501Y, makes the virus bind more tightly to human cells. This mutation has also appeared, independently, in a rapidly spreading variant in South Africa. This variant carries many other mutations, notably including:

- 69/70 deletion: this double deletion has occurred spontaneously many times, and likely leads to a change in the shape of (i.e., a conformational change in) the spike protein.
- P681H: near the S1/S2 furin cleavage site, a site with high variability in coronaviruses. This mutation has also emerged spontaneously multiple times.
- ORF8 stop codon (Q27stop): This mutation is not in the spike protein but in a different gene (in open reading frame 8), the function of which is unknown. Similar mutations have occurred in the past. In Singapore, one strain with this type of mutation emerged and disappeared. [2, 3]

SARS-CoV-2 mutates regularly, acquiring about one new mutation in its genome every two weeks. The virus that was first detected in Wuhan, China, is not the same one you will find in most corners of the world. The D614G mutation emerged in Europe in February and became the globally dominant form of the virus. Another, called A222V, spread across Europe and was linked to people's summer holidays in Spain. According to WHO's risk assessment, there is no evidence that VOC 202012/01 produces more severe illness than other SARS-CoV-2 variants. People don't need to panic now. However, WHO would also like to draw attention to the concern that this new variant virus may evade detection of some current diagnostic tests. Most commercial polymerase chain reaction (PCR) tests have multiple targets to detect the virus, such that even if a mutation impacts one of the targets, the other PCR targets will still work. [1-3]

One more issue concerned is that if this virus may evade vaccine-induced immunity. There is no evidence that this is occurring, and most experts believe escape mutants are unlikely to emerge because of the nature of the virus. Moreover, FDA-authorized vaccines are usually “polyclonal,” producing antibodies that target several parts of the spike protein. The virus would likely need to accumulate multiple mutations in the spike protein to evade immunity induced by vaccines or by natural infection. [2, 4]

Further laboratory investigations are required to more fully understand the impact of specific mutation on viral properties and the effectiveness of diagnostics, therapeutics and vaccines. These investigations are complex and require time and collaboration amongst different research groups. The sharing of full genome sequences is facilitating detailed analyses by partners. The WHO SARS-CoV-2 Virus Evolution Working Group is working with colleagues from the United Kingdom to better understand the available results and support further studies. [1]

Reference:

1. 21 Dec 2020. "SARS-CoV-2 Variant - United Kingdom of Great Britain and Northern Ireland" *WHO Disease Outbreak News*
2. 22 Dec 2020. "Implications of the Emerging SARS-CoV-2 Variant VOC 202012/01" *CDC News Release*
3. 22 Dec 2020. "Covid: New variant found 'due to hard work of UK scientists'" *BBC News*
4. 22 Dec 2020. "What We Know About The New U.K. Variant Of Coronavirus - And What We Need To Find Out" *npr News release*.

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