

Review of: "Evolution of new variants of SARS-CoV-2 during the pandemic: mutation-limited or selection-limited?"

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Potential competing interests: No potential competing interests to declare.

Review of <https://www.qeios.com/read/LLA6AO>

Evolution of new variants of SARS-CoV-2 during the pandemic: mutation-limited or selection-limited?

This manuscript raises some good questions and provides an opportunity to define what is meant by protection (immunity) and immune evasion.

We need to clarify what is meant by immunity evading: is it simply the escape of variants from neutralizing antibodies in vitro, or protection against asymptomatic reinfection, or protection against a severe disease?

Coronavirus variants are selected for their rapid multiplication in the upper respiratory tract (nose) and their ability to pass from nose to nose (their contagiousness)(see the work of Fantini team :<https://pubmed.ncbi.nlm.nih.gov/37052878/>) . These selected viruses therefore escape contact with antibodies circulating in the blood (whether induced by infection or vaccination). In fact, in many people who have been in contact with SARs-CoV-2 but have remained asymptomatic, there are no specific circulating antibodies (Banoun, [1], [2],[3]): these people have eliminated the virus thanks to their non-specific innate immunity and the cross-immunity provided by antibodies and T cells directed against common cold coronaviruses. It is therefore difficult to assert that the variants are selected by vaccination (which takes place intramuscularly, inducing predominantly IgG and IgM antibodies in the blood, the serum IgA induced being different from the mucosal IgA induced by infection with the virus (see Banoun).

In the emergence of new variants and epidemic waves, the interaction of the virus with the host immune system must be taken into account in the 2nd factor mentioned by the authors, selection.

In the case of SARS-CoV-2, which is extremely well adapted to humans (and animals of many species), it is illusory to claim to be limiting the number of mutations by reducing virus circulation: variants are increasingly contagious and capable of infecting many species (wild deer in Canadian forests are infected!).

We know that immunity (protection against reinfection) against coronaviruses is short-lived (6 months to 1 year maximum).

The 2 factors mentioned by the authors cannot be separated: the evolution of the virus depends entirely on interaction with the host's immune system; new variants appear because they have an evolutionary advantage over their predecessors: they replicate more rapidly in the upper respiratory tract. They are at the origin of new epidemic waves.

As one reviewer (Antoine Danchin) rightly points out, the SC2 mutation rate varied over the course of the pandemic (see Banoun, [2]) and cannot be considered stable.

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Hypothesis 2 in chapter A seems unacceptable for the above reasons.

Hypothesis 3: The correlation between SC2 protection and disease severity is completely unknown.

The expression "fully immune" makes no sense for a coronavirus: it doesn't exist.

We can't model an immunity titer, because protection against SC2 depends on many factors other than antibody levels (Banoun [3]), which I don't think we can model.

The variants last a few weeks and then disappear (see Pr Raoult's videos on his IHU channel, in french!

<https://www.youtube.com/@ifr48>).

Banoun,

[1]Cross-Immunity with Other Coronaviruses, Immunopathological Phenomena August 2020

<http://ssrn.com/abstract=3654264>

[2]Evolution of SARS-CoV-2: Review of Mutations, Role of the Host Immune System.

<https://pubmed.ncbi.nlm.nih.gov/33910211/>

3]Why are children and many adults not affected by COVID-19? Role of the host immune response

https://www.tmrjournals.com/article.html?J_num=4&a_id=2275