Review of: "The α7 Nicotinic Acetylcholine Receptor: a Key Molecule in Post-COVID Syndrome?"

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Potential competing interests: No potential competing interests to declare.

The manuscript “The α7 Nicotinic Acetylcholine Receptor: a Key Molecule in Post-COVID Syndrome?” by Maryna Skok is related with the involvement of α7 nicotinic acetylcholine receptors in COVID-19 pathogenesis and the development of post-acute sequelae of COVID-19 (PASC). The work suggests that the fragment 674-685 of SARS-Cov-2 Spike-protein, with a high homology with α7-specific ligands, stimulates immune mechanisms, that in turn stimulates the production of α7-specific antibodies, all this associated with PASC.

The subject of this review is interesting and clinically relevant.

The work is well documented and clear presented.

Specific comments to the manuscript:

Page 2, line 6; page 3, third paragraph: the composition of muscle nAChR contains "delta" (δ), the author put another symbol (ö). Please change.

Page 3, second paragraph: It is hard to state that “One of the most widely studied functions of α7 nAChRs is their ability to control the release of pro-inflammatory cytokines by the cells of monocyte origin…”. Taking in consideration that α7-containing nAChRs are the most ubiquitous nAChRs (see the previous paragraph of the manuscript).

In different parts of the manuscript, the fragment 674-685 of SARS-Cov-2 spike protein is mentioned by different forms: SARS-Cov-2 S-protein fragment 674-685, fragment 674-685, peptide 674-685, peptide Y674-R685, SARS(674-685) peptide, etc. This reviewer considers that it is better to consistently name the fragment in one way.

Page 3, first paragraph: although the properties of the peptide 674-685 on α7 nAChRs are interesting, how the fragment 674-685 is considered on this nicotinic receptor, as agonist, as a competitive inhibitor? What is its effect on α7 nAChRs when it is applied alone? In physiopathological situation, how the small fragment 647-685 of the large spike protein can interact with the α7 nAChR? Please discuss these features of the fragment 674-685 with more detail.

Page 3, penultimate paragraph: “SARS-Cov-2 S-protein possesses one more site capable to bind nAChRs, namely fragment 381-386, also with homology to a sequence of a snake venom toxin”. Last part of the sentence: “…with homology to a sequence of a snake venom toxin…” is some ambiguous. In addition, that this paragraph possibly is not in the context of the work.