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LETTER TO THE EDITOR

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# Is the brain a reservoir organ for SARS-CoV2?

To the Editor,

We have read with great interest the case report of a patient with Parkinson's disease and COVID-19 infection who underwent brain histopathological analysis for the presence of the virus.[1] The images presented in the article are very interesting, although limited to an unknown part of the frontal lobe. We would like to ask the authors about the presence of inflammation around the virus. From our perspective, and according to the images presented by the authors, it does not seem that the SARS-CoV2 generated an inflammatory response, as can be detected in the lung or other organs. The SARS-CoV2 appears in neurons isolated in the cytoplasm and in vesicles. In our opinion, this is a remarkable finding that deserves a comprehensive analysis.

This observation is only a case report and should be considered preliminary. However, it may be relevant and may support the hypothesis that SARS2-CoV could use the CNS as a reservoir.[2] This is an issue that was found in the previous coronavirus.[3] We may hypothesize that the SARS-CoV2, like other coronaviruses, has the ability to enter into the cell, but probably without the accelerated replication observed in other organs. This might be explained by the low presence of ACE2 receptors in the brain. In this regard, although the frequency of neurological complications during the active infection is low, according to data from Wuhan,[4] it has been suggested that the access to the CNS by SARS-CoV2 could be high.[5] Thus, a higher percentage of patients could have SARS-CoV2 in the central nervous system. The distribution of ACE2 receptors in the central nervous system is not homogeneous, and areas such as the frontal lobe seem to express a moderate quantity of ACE2 receptors.[6] This may suggest that a less expression of ACE2 receptors would raise the chance of the cells to generate defense mechanisms, including vacuolization or vesicles generation to isolate the virus, a finding also observed in other coronavirus.[7] In addition, low expression of TMPRSS2 protease in the central nervous system[8] could also imply a lower entry.

In conclusion, additional knowledge about the effects of the presence of the SARS-CoV2 in the case report presented by the authors may be of great interest to know the potential consequences of COVID-19 in the central nervous system.[1] The recent description of a new case with similar images reinforces the hypothesis that the brain could be a reservoir site for SARS-CoV2.[9] This case raises questions about the role of the central nervous system as a SARS-CoV2 reservoir or a potential contribution of the SARS-CoV2 to the future development of neurodegenerative diseases by a mechanism similar to the protein misfolding, as has been recently suggested.[10]

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