Possible Contributor to COVID-19 Neurologic Manifestations

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The study covered in this summary was published in bioRxiv.org as a preprint and has not yet been peer reviewed.

Key Takeaways

- ACE2 expression in human brain tissue is negligible, so an alternative cell receptor may be responsible for neuropathology in SARS-CoV-2–infected individuals.
- Neuropilin-1 (NRP1), an alternative host-cell entry receptor, can bind to a SARS-CoV-2 spike protein cleaved by furin, a host protease, and facilitate ACE2-mediated SARS-CoV-2 entry into host cells.

Why This Matters

- These findings could help explain the neurologic symptoms of COVID-19: loss of smell and taste, memory loss, and multiple psychiatric manifestations.
- Targeted therapeutic strategies for treating neuro-COVID could result if key mediators of SARS-CoV-2 entry into the brain cells are found.

Study Design

- Computer analysis of mRNA and protein expressions of ACE2, NRP1, TMPRSS2, and furin in human brain immune components was performed from data available in the Human Brain Atlas, a subsection of Human Protein Atlas (HPA).
- Deep sequencing of RNA and immunohistochemistry data was used to estimate mRNA expression and localization of human proteins.
- Transcriptomic data were collected from HPA, GTEx, and FANTOM5 databases. An annotated protein expression profile was created by matching the immunohistochemistry staining profile with mRNA expression data. Final results were then graphed and inferences made.

Key Results

- Olfactory and hippocampal neurogenesis may be disrupted by SARS-CoV-2 infection, as evidenced by high NRP1 and furin expression in these brain regions.
- This study makes a case for in vivo trials to elucidate the role of NRP1 and furin in SARS-CoV-2 infection.

Limitations

- Proteomic expression data were not available for certain brain regions to corroborate transcriptomic expressions of the studied markers.
- This was a computer-based analysis, and in situ/in vivo studies are needed for validation of findings.

Study Disclosures

- The authors have declared no competing interests.
- No substantial funding was obtained for this work.

This is a summary of a preprint research study,"NRP1 and Furin as Putative Mediators of SARS-CoV-2 Entry Into Human Brain Cells," by Ashutosh Kumar and colleagues from Etiologically Elusive Disorders Research Network (EEDRN) on bioRxiv, provided to you by Medscape. This study has not yet been peer reviewed. The full text of the study can be found on bioRxiv.org.

Credits:

Lead Image: Matthieuclouis/Dreamstime

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