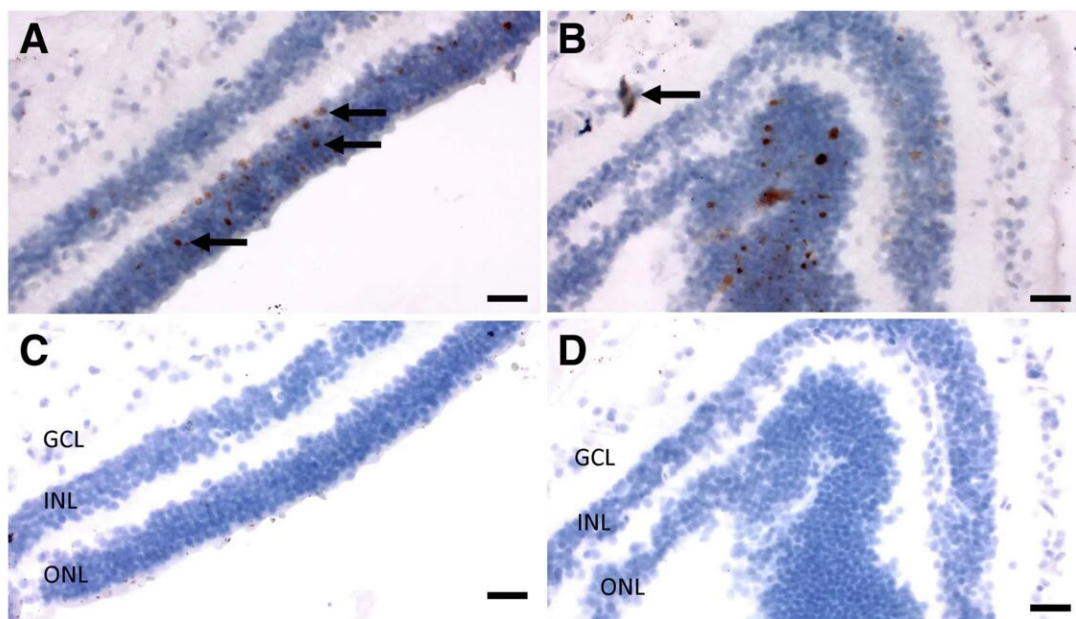


SARS-CoV-2 infects ocular tissue, but inflammation absent in the eyes of patients who died from COVID-19: Study

October 10 2023



Detection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) spike RNA by in situ hybridization (ISH) in the retina. A-D: ISH for SARS-CoV-2 spike RNA (brown dots) primarily located in the outer nuclear layer of the retina (arrows, A) in case E22. Fewer positive signals are noted in the inner nuclear layer (A and B) and a retinal ganglion cell in case E23 (arrow, B). Panels A and B are with the SARS-CoV-2 spike RNA probe, and panels C and D are negative control probe for DapB. Scale bars = 20 mm. GCL, ganglion cell layer; INL, inner nuclear layer; ONL, outer nuclear layer. Credit: *The American Journal of Pathology* (2023). DOI: 10.1016/j.ajpath.2023.02.016

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes coronavirus disease 2019 (COVID-19), infects tissues throughout the human body, including the eye. Now, a recent study has evaluated changes and investigated cellular localization of SARS-CoV-2 in ocular tissues at autopsy.

Investigators found a marked absence of inflammation despite evidence of SARS-CoV-2 infection in the eye, contrary to what is observed in other viral eye infections. The [results](#) appear in *The American Journal of Pathology*.

Ophthalmic manifestations and tissue tropism of SARS-CoV-2 have been reported in association with COVID-19, but the pathology and cellular localization of SARS-CoV-2 have not yet been well characterized.

Lead investigator Daniel S. Chertow, MD, MPH, Emerging Pathogens Section, Critical Care Medicine Department, Clinical Center, and Laboratory of Virology, National Institute of Allergy and Infectious Diseases, explains, "The eye is an immune-privileged site and so may serve as a location for viral infection and persistence. We therefore sought to determine if eye tissues become infected with SARS-CoV-2, and if they do, what damage might be associated with this infection."

Investigators evaluated eyes from 25 patients with COVID-19 at autopsy. Sections of ocular tissue from four patients were evaluated by in situ hybridization (ISH) to determine the cellular localization of SARS-CoV-2 spike gene RNA. Contralateral eyes from 21 patients were histopathologically examined. SARS-CoV-2 RNA was found in neuronal cells of the retina, [ganglion cells](#), corneal epithelia, scleral fibroblasts, and oligodendrocytes of the optic nerve in all 21 patients.

Common histopathological findings associated with infection included

cytoid bodies, vascular changes, and retinal edema. Although SARS-CoV-2 infected many cell types in the eye, there was minimal to no inflammation associated with the infection.

Dr. Chertow comments, "In conclusion, a range of common histopathologic alterations were identified within ocular tissue, and SARS-CoV-2 RNA was localized to multiple [cell types](#). What was surprising was the absence of inflammation, contrasting with what we have seen in other viral infections of the eye such as herpesvirus, where infection is typically associated with significant inflammation and [tissue damage](#)."

"The study shows important new insights into SARS-CoV-2 ocular pathogenesis. Specifically, this is the first report to definitively localize SARS-CoV-2 to the retinal inner and outer nuclear cells, [retinal ganglion cells](#), and ocular surface by ISH, validating previous studies that have exclusively used PCR-based methods."

This research highlights that the eye is a potential target of SARS-CoV-2 infection and supports the need to evaluate possible short- or longer-term ocular consequences of COVID-19.

More information: H. Nida Sen et al, Histopathology and SARS-CoV-2 Cellular Localization in Eye Tissues of COVID-19 Autopsies, *The American Journal of Pathology* (2023). [DOI: 10.1016/j.ajpath.2023.02.016](#)

Provided by Elsevier

Citation: SARS-CoV-2 infects ocular tissue, but inflammation absent in the eyes of patients who died from COVID-19: Study (2023, October 10) retrieved 28 April 2024 from

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