NEWS RELEASE
FOR IMMEDIATE RELEASE

Media contacts:
Eileen Leahy
Elsevier
+1 732 238 3628
aipmedia@elsevier.com

Chhavi Chauhan, PhD
Director of Scientific Outreach
The American Journal of Pathology
+1 240 283 9724
cchauhan@asip.org

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

These findings, reported in The American Journal of Pathology, are contrary to what is observed in other viral infections of the eye such as herpesvirus, where infection is typically associated with significant inflammation and tissue damage.

Philadelphia, October 10, 2023 – 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. The objective of this study was to evaluate changes and investigate 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, published by Elsevier.

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.

---

Notes for editors
The article is “Histopathology and SARS-CoV-2 Cellular Localization in Eye Tissues of COVID-19 Autopsies,” by H. Nida Sen, MD, MHSc, Kevin M. Vannella, PhD, Yujuan Wang, MD, Joon-Yong Chung, PhD, Shilpa Kodati,
The article is openly available at [https://ajp.amjpathol.org/article/S0002-9440(23)00086-X/fulltext](https://ajp.amjpathol.org/article/S0002-9440(23)00086-X/fulltext) and is part of a special themed issue entitled Microbiome and Ocular Health: Insights and Perspectives.

The study was supported by the Intramural Research Programs of the NIH Clinical Center, National Institute of Allergy and Infectious Diseases, National Eye Institute, and National Cancer Institute.

Full text of the article is also available to credentialed journalists upon request. Contact Eileen Leahy at +1 732 238 3628 or ajpmedia@elsevier.com to request a PDF of the article. To request an interview with the authors please contact C. Yvonne Hylton, Media Lead, NIH Clinical Center, Office of Communications and Media Relations, at +1 240 731 4843 (mobile) or yvonne.hylton@nih.gov.

**About The American Journal of Pathology**

*The American Journal of Pathology*, official journal of the American Society for Investigative Pathology, published by Elsevier, seeks high-quality original research reports, reviews, and commentaries related to the molecular and cellular basis of disease. The editors will consider basic, translational, and clinical investigations that directly address mechanisms of pathogenesis or provide a foundation for future mechanistic inquiries. Examples of such foundational investigations include data mining, identification of biomarkers, molecular pathology, and discovery research. High priority is given to studies of human disease and relevant experimental models using molecular, cellular, and organismal approaches. [https://ajp.amjpathol.org](https://ajp.amjpathol.org)

**About Elsevier**

As a global leader in information and analytics, Elsevier helps researchers and healthcare professionals advance science and improve health outcomes for the benefit of society. We do this by facilitating insights and critical decision-making for customers across the global research and health ecosystems.

In everything we publish, we uphold the highest standards of quality and integrity. We bring that same rigor to our information analytics solutions for researchers, academic leaders, funders, R&D-intensive corporations, doctors, and nurses.

Elsevier employs 9,000 people worldwide, including over 2,500 technologists. We have supported the work of our research and health partners for more than 140 years. Growing from our roots in publishing, we offer knowledge and valuable analytics that help our users make breakthroughs and drive societal progress. Digital solutions such as ScienceDirect, Scopus, SciVal, ClinicalKey and Sherpath support strategic research management, R&D performance, clinical decision support, and health education. Researchers and healthcare professionals rely on over 2,800 journals, including *The Lancet* and *Cell*; 46,000+ eBook titles; and iconic reference works, such as *Gray's Anatomy*. With the Elsevier Foundation and our external Inclusion & Diversity Advisory Board, we work in partnership with diverse stakeholders to advance inclusion and diversity in science, research and healthcare in developing countries and around the world.

Elsevier is part of RELX, a global provider of information-based analytics and decision tools for professional and business customers.