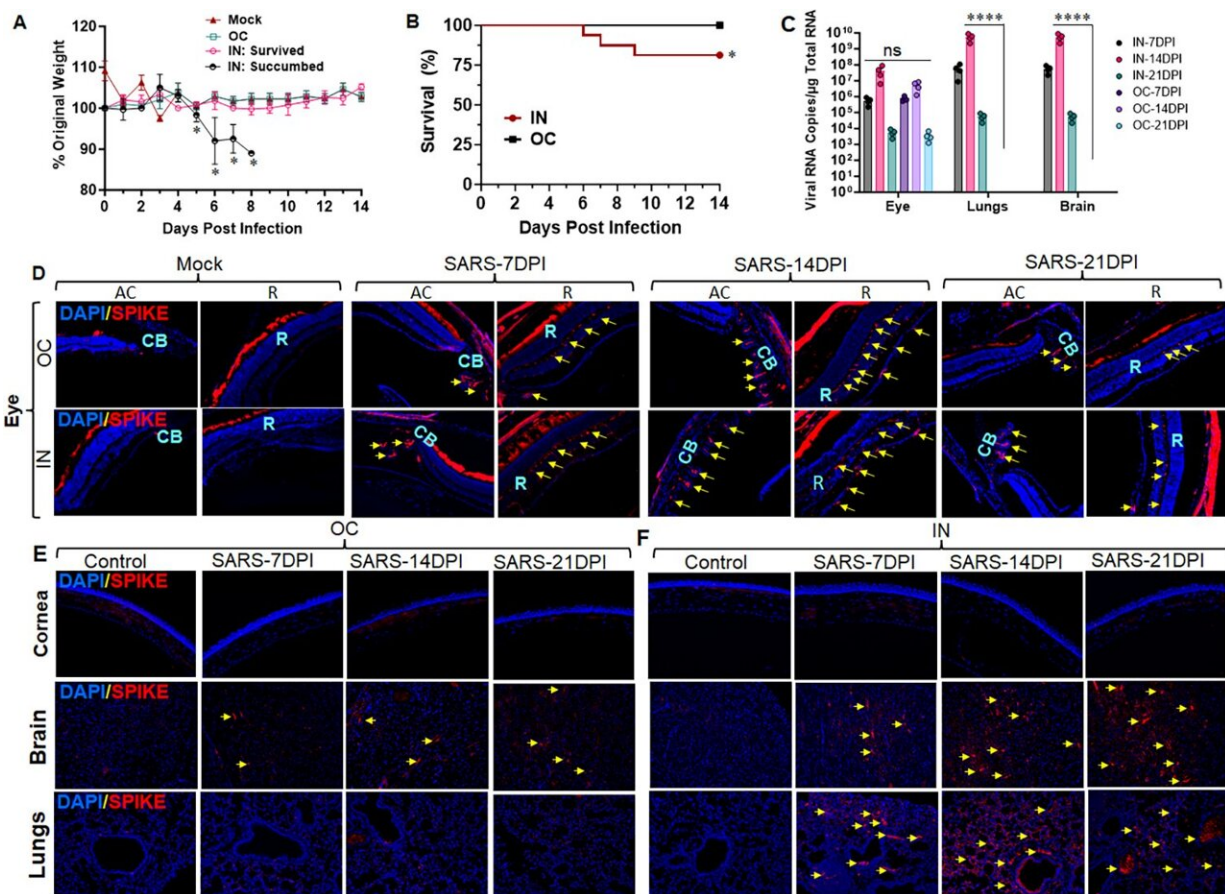


Study shows virus that causes COVID-19 can penetrate blood-retinal-barrier and could damage vision

May 14 2024



Intranasal exposure of SARS-CoV-2 exhibited ocular tropism to the eye, lungs, and brain, whereas ocular exposure failed to insemminate the virus to the lungs.

Credit: *PLOS Pathogens* (2024). DOI: 10.1371/journal.ppat.1012156

The blood-retinal barrier is designed to protect our vision from infections by preventing microbial pathogens from reaching the retina where they could trigger an inflammatory response with potential vision loss. But researchers at the University of Missouri School of Medicine have discovered the virus that causes COVID-19 can breach this protective retinal barrier with potential long-term consequences in the eye.

Pawan Kumar Singh, Ph.D., an assistant professor of ophthalmology, leads a team researching new ways to prevent and treat ocular infectious diseases. Using a humanized ACE2 mice model, the team found that SARS-CoV-2, the virus that causes COVID-19, can infect the inside of the eyes even when the virus doesn't enter the body through the surface of the eyes.

Instead, they found that when viruses enter the body through inhalation, it not only infects organs like lungs, but also reaches highly protected organs like eyes through the blood-retinal barrier by infecting the cells lining this barrier.

"This finding is important as we increase our understanding of the long-term effects of SARS-CoV-2 infection," said Singh. "Earlier, researchers were primarily focused on the ocular surface exposure of the virus. However, our findings reveal that SARS-CoV-2 not only reaches the eye during systemic infection but induces a hyperinflammatory response in the retina and causes [cell death](#) in the blood-retinal barrier. The longer viral remnants remain in the eye, the risk of damage to the retina and visual function increases."

Singh also discovered that extended presence of SARS-CoV-2 spike antigen can cause retinal microaneurysm, retinal artery and vein occlusion, and vascular leakage.

"For those who have been diagnosed with COVID-19, we recommend you ask your ophthalmologist to check for signs of pathological changes to the retina," Singh said. "Even those who were asymptomatic could suffer from damage in the eyes over time because of COVID-19 associated complications."

While viruses and bacteria have been found to breach the blood-retinal-barrier in immunocompromised people, this research is the first to suggest that the virus that causes COVID-19 could breach the barrier even in otherwise healthy individuals, leading to an infection that manifests inside the eye itself. Immunocompromised patients or those with hypertension or diabetes may experience worse outcomes if they remain undiagnosed for COVID-19 associated ocular symptoms.

"Now that we know the risk of COVID-19 to the retina, our goal is to better understand the cellular and [molecular mechanisms](#) of how this virus breaches the blood-retinal barrier and associated pathological consequences in hopes of informing development of therapies to prevent and treat COVID-19 induced eye complications before a patient's vision is compromised," Singh said.

This study, titled "SARS-CoV-2 infects cells lining the blood-retinal barrier and induces a hyperinflammatory immune response in the [retina](#) via systemic exposure," was recently [published](#) in *PLOS Pathogens*.

In addition to Singh, the research team from the University of Missouri School of Medicine included Vaishnavi Balendiran, MD, vitreoretinal surgery fellow; Monu Monu and Faraz Ahmad, post-doctoral fellows in the Department of Ophthalmology; and Rachel M. Olson, Ph.D., Chief Scientific Officer, Laboratory for Infectious Disease Research at the College of Veterinary Medicine.

More information: Monu Monu et al, SARS-CoV-2 infects cells

lining the blood-retinal barrier and induces a hyperinflammatory immune response in the retina via systemic exposure, *PLOS Pathogens* (2024). [DOI: 10.1371/journal.ppat.1012156](https://doi.org/10.1371/journal.ppat.1012156)

Provided by University of Missouri

Citation: Study shows virus that causes COVID-19 can penetrate blood-retinal-barrier and could damage vision (2024, May 14) retrieved 30 June 2024 from <https://medicalxpress.com/news/2024-05-virus-covid-penetrate-blood-retinal.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.