



Is Eye Immune-Privileged to COVID-19 Infection?

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Accepted: 18 December 2020 / Published online: 3 January 2021
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Keywords COVID-19 · Eye infection · Causality · Publishing

A novel coronavirus disease, which first emerged in December 2019 in Wuhan, China, has rapidly spread worldwide, affecting millions of people and caused the death to many of them.[1] The Coronavirus Working Group named this new type of coronavirus acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the disease it causes as coronavirus disease 2019 (COVID-19).[2] As with other exposed sites of entry of the coronavirus to the body, eye has been a focus of research in terms of potential extra-respiratory portals through which SARS-CoV-2 can enter the host as well as in terms of COVID-19 morbidity and visual sequelae.

Most cases of COVID-19-related eye disease have been described in patients during active or recent infection with SARS-CoV-2. Few studies provide a laboratory evidence but in majority of cases, this temporal association is the only connection between the two. Amongst inconsistencies in sample testing, the most frequently published cases include ocular surface symptoms such as conjunctivitis, tearing and foreign body sensation,[3] and most recently some retinal manifestations.[4] It is perhaps important to remember that conjunctivitis does not imply active viral infection and the detection of RNA on the ocular surface does not necessarily imply a live virus is present in tears.

It has been reported that the following receptors of transmembrane serine protease 2 (TMPRSS2), CD147, angiotensin-converting enzyme 2 (ACE2), and cathepsin L (CTSL) are necessary to be infected with SARS-CoV-2 for ocular disease.[5] Some have been found on the ocular surface but their exact intraocular presence and distribution is unknown and needs further investigation.[6] Without further knowledge on this, it is highly speculative to make causal relation between COVID-19 disease and eye infection or associated inflammation, especially intraocular

involvement. Naturally, intraocular fluids or tissue samples in most reported cases are not available and, therefore, a direct proof of COVID-19-related ocular pathology is missing. In spite of that, the reports on ocular infection with SARS-CoV-2 are emerging both in high-impact and less stringent scientific literature with hypersonic speed. The situation with COVID-19 represents a scientific opportunity for many and enthusiasm to publish a new observation as first is very high. This brings a true challenge for peer-review to filter out reports and to keep only the most scientific ones in the field that is new to all of us.

The increasing number of publications reveals controversies in their conclusions. An example would be a report demonstrating 13% prevalence of SARS-CoV-2 RNA in post-mortem human eyes[7] versus none in a different study using comparative methodology[8] as well as the very first report of retinal findings in COVID-19.[9, 10] Novel observations are being reported, such as non-specific retinopathy due to microangiopathy or retinal vascular occlusions. While the direct evidence of virus presence is lacking, the role of systemic factors such as inflammation and increased coagulopathy seem to represent a significant contributing factor in this group of patients. As such, the eye does not seem to be immune-privileged to COVID-19 but elucidation of exact mechanism of its involvement in tissue damage will require more work. Similarly, proving causality in COVID-19 ocular disease will need more evidence than currently available.

Compliance with Ethical Standards

Conflict of Interest The author declares that he has no conflict of interest.

Ethics Approval Not applicable.

Consent to Participate Not applicable.

Consent for Publication Yes

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