Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Seeking clarity on retinal findings in patients with COVID-19

Reading about Paula M Marinho and colleagues'[1] retinal findings in patients with COVID-19 was very interesting. Their Correspondence was the first to report on ocular findings, other than conjunctivitis, in patients with COVID-19, and the authors suggest that these retinal findings are probably associated with COVID-19.

To support their suggestion, Marinho and colleagues cite reports of retinitis and optic neuritis in animal models and one case report of meningitis and encephalitis in a patient with suspected COVID-19.[2,3] However, in these referenced animal models, the infective dose of murine coronavirus (5 µL of $1 \times 10^{5.5}$ median tissue culture infective dose per mL of JHM virus, a strain of mouse hepatitis coronavirus) was directly inoculated into the vitreous cavity, and the patient with meningitis and encephalitis had an atypical presentation with negative blood serology for COVID-19.

Marinho and colleagues[1] noted the presence of dyspnoea in all 12 patients, and the retinal lesions were bilateral and characteristically distributed in close relation to the nerve fibre layer. The nerve fibre layer is supplied and maintained by the radial peripapillary capillary plexus.[4] The radial peripapillary capillary plexus is one of the four retinal vascular plexuses and has unique characteristics.[4] Vessels in the radial peripapillary capillary plexus are long and straight with infrequent anastomoses, run in parallel with the nerve fibre layer, and are present only in the posterior retina.[5] The nerve fibre layer is prone to ischaemic damage. Hence, acute and transient ischaemia of the nerve fibre layer, owing to hypoxia-related autonomic dysregulation of the radial peripapillary capillary plexus, seems like another and more probable cause of the reported retinal lesions. Measurements of arterial blood gas and the partial pressure of oxygen and data on longitudinal follow-up would help to decipher the cause and pathogenesis of these lesions.

I declare no competing interests.

Pradeep Venkatesh
drpradeepvrao@aiims.edu

Department of Ophthalmology, Dr Rajendra Prasad Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi 110029, India

1 Marinho PM, Marcos AAA, Romano AC, Nascimento H, Belfort Jr R. Retinal findings in patients with COVID-19. *Lancet* 2020; **395:** 1610.
2 Wang Y, Detrick B, Yu ZX, Zhang J, Chesky L, Hooks JJ. The role of apoptosis within the retina of coronavirus-infected mice. *Invest Ophthalmol Vis Sci* 2000; **41:** 3011–18.
3 Moriguchi T, Harii N, Goto J, et al. A first case of meningitis/encephalitis associated with SARS-coronavirus-2. *Int J Infect Dis* 2020; **94:** 55–58.
4 Campbell JP, Zhang M, Hwang TS, et al. Detailed vascular anatomy of the human retina by projection-resolved optical coherence tomography angiography. *Sci Rep* 2017; **7:** 42201.
5 Jia Y, Simonett JM, Wang J, et al. Wide-field OCT angiography investigation of the relationship between radial peripapillary capillary plexus density and nerve fiber layer thickness. *Invest Ophthalmol Vis Sci* 2017; **58:** 5188–94.