

# Thyroid-Associated Peripapillary Vascular Remodelling – A Novel Area for Research? [Letter]

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## Dear editor

We read the study on changes in the capillary and non-capillary peripapillary perfusion (NCP) in inactive thyroid eye disease (TED) without dysthyroid optic neuropathy (DON) using ocular coherence angiography (OCTA) for the radial peripapillary capillary (RPC) layer scans with great interest.<sup>1</sup>

The authors highlighted the importance of a separate assessment of retinal capillary and non-capillary (arteriole and venule) blood vessels in TED, citing structural differences in the two classes of blood vessels. Unlike the capillaries, the non-capillary vessels are larger in diameter, and the tunica media is composed of smooth muscle cells. These smooth muscle cells are hypothesized to proliferate in response to the upregulation of transforming growth factor (TGF)- $\beta$  in TED orbits, resulting in vessel wall thickening and decreased perfused luminal area. A significant reduction was noted in the NCP densities in all eight cases ( $15.4 \pm 2.9\%$ ) as compared to the healthy controls ( $21.5 \pm 3.1\%$ ). However, two of the study subjects with the lowest NCP densities 11.6% and 10.6%, had additional factors likely to affect the vascular perfusion, being on progesterone therapy and an active smoker, respectively.

Active smokers reportedly have a higher plasma concentration of the vasoconstrictor molecule, endothelin-1 (ET-1).<sup>2</sup> ET-1, a known mediator of endothelial dysfunction in inflammation, has been shown to induce retinal vasoconstriction and diminish the peripapillary perfusion.<sup>3</sup> Raised ET-1 levels have also been reported in cases with TED,<sup>4</sup> consistent with the reduction in optic nerve head perfusion.

The non-capillary peripapillary density has been shown to decrease with age in healthy individuals after 60 years of age, especially in inferior and superior quadrants.<sup>5</sup> The inclusion of a 69-year subject could have acted as a confounding variable.

The RPC layer supplies the retinal nerve fibers surrounding the optic nerve head and by virtue of the long parallel paths of the capillaries, is vulnerable to raised intraocular pressure (IOP). The IOP range mentioned in the study is from 15 to 26 mm of Hg, though individual values have not been described. The high IOP in some of the patients could have resulted in the reduction of NCP.

A larger sample size was thus desirable for conclusively deducing the occurrence of reduction of NCP densities in TED. A prospective study design is recommended for the implication of NCP density changes in the development of DON. Also, the proposed vascular remodeling theory in TED needs to be verified with histological and immunohistochemistry correlation in cadaveric eyes.

## Disclosure

The authors report no conflicts of interest in this communication.

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