

# Macular optical coherence tomography angiography in ischemic optic neuropathy compared to glaucoma

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**PURPOSE:** Both primary open-angle glaucoma (POAG) and non-arteritic anterior ischemic optic neuropathy (NAION) cause damage to the retinal ganglion cell axons which are perfused by macular vessels. This study compares macular and parafoveal vasculature in patients with primary open angle glaucoma and atrophic NAION.

**METHODS:** Nineteen eyes with atrophic NAION, 28 eyes with moderate and advanced POAG, and 34 eyes of normal subjects were imaged using optical coherence tomography angiography (OCT-A). Macular ganglion cell complex (GCC) and peripapillary retinal nerve fiber layer (RNFL) thicknesses were measured in addition to macula choriocapillaries, macular and parafoveal superficial and deep vasculature after projection removal using custom software.

**RESULTS:**

Linear models showed that while averaged peripapillary RNFL were not different between NAION and POAG eyes, macular GCC were significantly thinner in NAION eye than glaucoma eye. Whole image macular superficial vessel density were significantly lower in NAION and glaucoma eye ( $P=0.003$  and  $<0.001$ , respectively) than normal eyes, with lower vessel density of glaucoma than NAION eyes ( $P=0.01$ ). In contrast, parafoveal superficial vasculature density values was significantly lower only in glaucoma eyes relative to control eyes ( $P=0.02$ ) without any significant difference between NAION eyes and control eyes ( $P=0.16$ ). Whole image and parafoveal deep macular vessels using Matlab software for projection removal in glaucoma eyes ( $17.7\% \pm 6.0\%$ ,  $31.7\% \pm 10.3\%$ ) were significantly lower than in control eyes ( $27.2\% \pm 8.4\%$ ,  $31.73\% \pm 10.3\%$ ) ( $P=0.001$  and  $P=0.008$ , respectively). No significant differences in deep macular and parafoveal vessels were observed between NAION and control eyes. All macular choriocapillary vessel

density values were not statistically different among NAION, glaucoma eyes and control eyes.

CONCLUSIONS: In NAION and POAG with similar RNFL and optic nerve damage, macular OCT-A shows sparing of parafoveal superficial and deep vascular plexus in NAION in contrast to POAG, which might provide comparative insight into the pathophysiology of these two diseases.