# A perspective on neural tissue measurements in glaucoma

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Given the present advancement in the management of glaucoma, in comparison to retinal nerve fibre layer (RNFL), neural tissue parameters are much more reliable and accurate in discriminating glaucomatous and non-glaucomatous changes. Pertaining to the article titled *Retinal nerve fibre layer thickness measured by spectral domain optical coherence tomography amongst early primary open-angle glaucoma patients at Hospital Melaka*, published in Malaysian Journal of Ophthalmology issue 2-3, it was concluded that optical coherence tomography (OCT) of the RNFL is not suitable to be used as a diagnostic tool alone to detect early glaucomatous changes.

Here we would like to suggest the use of neural tissue parameters such as Bruch's membrane opening-minimum rim width (BMO-MRW) and prelaminar neural tissue thickness (PNTT) to assess these changes reliably (Fig. 1). As Bruch's membrane ends around the optic nerve head (ONH), it forms Bruch's membrane opening (BMO), *i.e.*, an aperture for the passage of retinal ganglion cells (RGC) as they exit
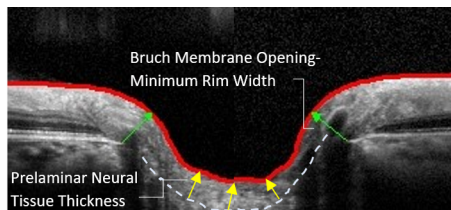


*Fig. 1.* Bruch's membrane opening-minimum rim width (green arrow) and prelaminar neural tissue thickness (yellow arrow).

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to pass through the choroidal and scleral openings to leave the orbit. Among the three openings, BMO is said to remain stable over time and is a more reliable area to be monitored in glaucoma compared to conventional ONH margin.[1] The prelaminar neural tissue, on the other hand, consists of neural components such as astrocytes and RGC axons with connective tissue (CT), including capillaries and extracellular matrix. [2,3]

In patients with glaucoma, increased intraocular pressure (IOP) results in stretch of Bruch's membrane, damaging the RGCs and astrocytes lining the ONH. The severity of this damage is dependent on both the properties of the peripapillary sclera and the dynamic changes within the lamina cribrosa (LC).[2] Due to alteration of the CT matrix and remodelling of the ONH, there is a reduction in blood supply to the axons and RGC death causing LC thinning, deepening, and widening.[2] Measurement of the RNFL in glaucoma may be affected by peripapillary atrophy, myopia, ONH drusen, congenital disc anomalies, oxidative damage, aging, or even inflammatory cascade, thus providing inaccurate readings.[3,4]

BMO-MRW is used to assess the neuroretinal rim thickness, and measures the shortest distance from the BMO to the internal limiting membrane.[4,5] Precise measurement of the BMO area highly correlates with visual field changes compared to RNFL.[5] Additionally, it may return to the previous value in subjects if the IOP is lowered, since it is dependent on the strain on RGC and acts as an anatomical measure of ONH compliance.[4]

PNTT on the other hand, can be affected by IOP, cup-to-disc ratio, depth of cup, and disc area.[3] It is measured from the anterior surface of the prelaminar neural tissue to the anterior border of the LC,[5] and is evaluated by quantifying the perpendicular distance between the anterior lamina border and BMO.[3] In a study conducted by Jung *et.al.*, three measurements for PNTT were obtained manually; central, nasal, and temporal, and the average was derived. Cup-to-disc ratio and glaucoma progression directly affect the thickness of the neural layer and results in reduction of PNTT.[3]

In conclusion, most dynamic alterations occur in the early stages of glaucoma; neural tissue measurements allow detection of the minute changes and effectively produce accurate data at different severities of glaucoma. These features make neural tissue parametersmore reliable than the conventional RNFL OCT in detecting early changes that may occur in a glaucomatous ONH.

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