

Does optic nerve head surface topography change prior to loss of retinal nerve fiber layer thickness: a test of the site of injury hypothesis in experimental glaucoma

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PURPOSE: To test the hypothesis that optic nerve head (ONH) deformation manifesting as changes in its mean surface height precedes thinning of the peripapillary retinal nerve fiber layer (RNFL) in experimental glaucoma (EG) .

METHODS: 68 rhesus macaque monkeys each had three or more baseline imaging sessions under manometric intraocular pressure (IOP) control to obtain average RNFL thickness (RNFLT) and the ONH surface topography parameter mean position of the disc (MPD) . Laser photocoagulation was then applied to the trabecular meshwork of one eye to induce chronic, mild-to-moderate IOP elevation and bi-weekly imaging continued. Event analysis was applied to determine for each parameter when an 'endpoint' occurred (significant change from baseline) for eight different endpoint criteria. Specificity was assessed in the group of 68 fellow control eyes. Classical signal detection theory and survival analysis were used to compare MPD with RNFLT.

RESULTS: Regardless of the endpoint criterion, endpoints were always more frequent for MPD than for RNFLT. The discriminability index (d') was 2.7 ± 0.2 for MPD and 1.9 ± 0.2 for RNFLT (p<0.05).
CONCLUSIONS: This study demonstrates that the average surface height of the ONH changes prior to any detectable loss of average peripapillary RNFL thickness in non-human primate eyes with experimental glaucoma.

PLoS One. 2013 Oct 25;8(10) :e77831. doi: 10.1371/journal.pone.0077831.

PMID: 24204989

<http://www.ncbi.nlm.nih.gov/pubmed/24204989>