

Rates of retinal nerve fiber layer thinning in glaucoma suspect eyes

Miki A(1) , Medeiros FA(2) , Weinreb RN(2) , Jain S(3) , He F(3) , Sharpsten L(2) , Khachatryan N(2) , Hammel N(2) , Liebmann JM(4) , Girkin CA(5) , Sample PA(2) , Zangwill LM(6)

1 Hamilton Glaucoma Center, Department of Ophthalmology, University of California, San Diego, La Jolla, California; Department of Ophthalmology, Osaka University Graduate School of Medicine, Osaka, Japan.

2 Hamilton Glaucoma Center, Department of Ophthalmology, University of California, San Diego, La Jolla, California.

3 Department of Family and Preventive Medicine, University of California, San Diego, La Jolla, California.

4 Department of Ophthalmology, New York University School of Medicine, New York, New York; Department of Ophthalmology, Einhorn Clinical Research Center, New York Eye and Ear Infirmary, New York, New York.

5 Department of Ophthalmology, University of Alabama at Birmingham, Birmingham, Alabama.

6 Hamilton Glaucoma Center, Department of Ophthalmology, University of California, San Diego, La Jolla, California. Electronic address: lzangwill@ucsd.edu.

PURPOSE: To compare the rates of retinal nerve fiber layer (RNFL) loss in patients suspected of having glaucoma who developed visual field damage (VFD) with those who did not develop VFD and to determine whether the rate of RNFL loss can be used to predict the development of VFD.

DESIGN: Prospective, observational cohort study.

PARTICIPANTS: Glaucoma suspects, defined as having glaucomatous optic neuropathy or ocular hypertension (intraocular pressure, >21 mmHg) without repeatable VFD at baseline, from the Diagnostic Innovations in Glaucoma Study and the African Descent and Glaucoma Evaluation Study.

METHODS: Global and quadrant RNFL thickness (RNFLT) were measured with the Spectralis spectral-domain optical coherence tomography (SD-OCT; Spectralis HRA+OCT [Heidelberg Engineering, Heidelberg, Germany]). Visual field damage was defined as having 3 consecutive abnormal visual fields. The rate of RNFL loss in eyes developing VFD was compared to eyes not developing VFD using multivariate linear mixed-effects models. A joint longitudinal survival model used the estimated RNFLT slope to predict the risk of developing VFD, while adjusting for potential confounding variables.

MAIN OUTCOME MEASURES: The rate of RNFL thinning and the probability of developing VFD.

RESULTS: Four hundred fifty-four eyes of 294 glaucoma suspects were included. The average number of SD-OCT examinations was 4.6 (range, 2-9), with median follow-up of 2.2 years (0.4-4.1 years). Forty eyes (8.8%) developed VFD. The estimated mean rate of global RNFL loss was significantly faster in eyes that developed VFD compared with eyes that did not develop VFD (-2.02 $\mu\text{m}/\text{year}$ vs. -0.82 $\mu\text{m}/\text{year}$;

CONCLUSIONS: The rate of global RNFL loss was more than twice as fast in eyes that developed VFD compared with eyes that did not develop VFD. A joint longitudinal survival model showed that a 1- $\mu\text{m}/\text{year}$ faster rate of RNFLT loss corresponded to a 2.05-times higher risk of developing VFD. These results suggest that measuring the rate of SD-OCT RNFL loss may be a useful tool to help identify patients who are at a high

risk of developing visual field loss.

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