OPEN ACCESS
ARVO Annual Meeting Abstract | June 2017

A test of alternative models of early widespread glaucomatous damage

Rashmi Rajshekhar; Lynn Shi; Robert Ritch; Donald Hood

+ Author Affiliations & Notes

Investigative Ophthalmology & Visual Science June 2017, Vol.58, 5823. doi:

Abstract

Purpose : Widespread damage involving most, if not all, of the peripapillary retinal nerve fiber layer (pRNFL) is common early in the glaucomatous process. Here, we investigate various models to describe this damage.

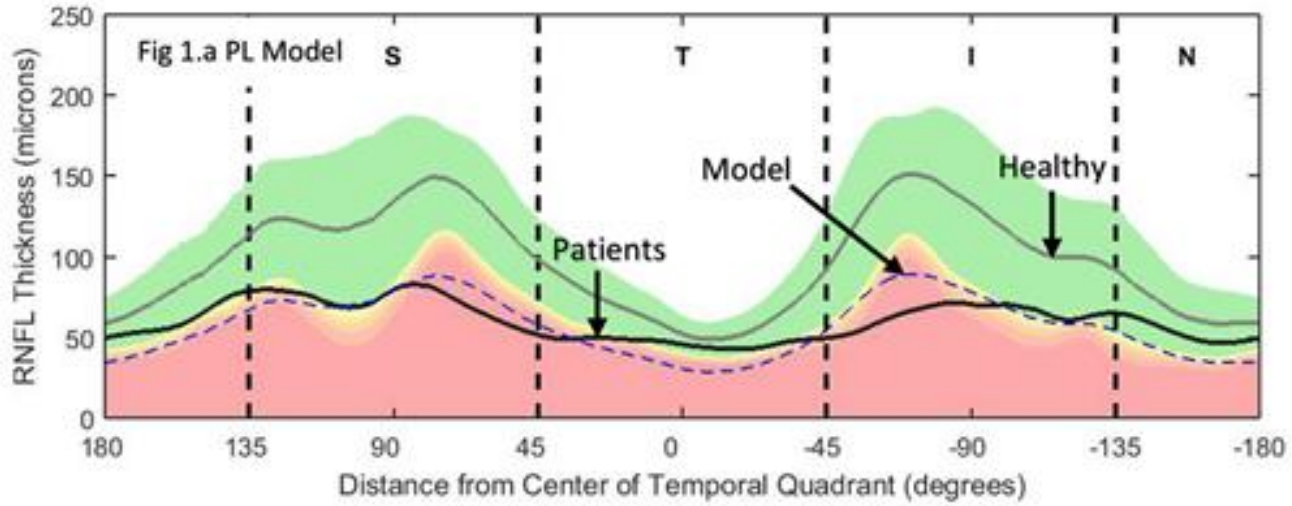
Methods : 41 eyes from 32 patients with widespread damage were selected from a larger group of 57 patients with at least one eye classified as having glaucoma, with a 24-2 mean deviation (MD) better than -6dB. The average MD was -6.24 dB (range: -0.38 to -21.34 dB). The pRNFL thickness plot was derived from the spectral-domain optical coherence tomography (OCT) cube scan of the disc (3D-OCT 2000, Topcon Inc.). An eye was considered to have widespread damage if a portion of the pRNFL thickness profile in the superior, temporal and inferior quadrants fell into the red (1%) region. The averaged, as well as individual, pRNFL thickness curves were fitted with 4 models. The general form of these models was R(i) = m*[H(i)]-b, where H is the pRNFL thickness of a group of 52 healthy controls and i indexes the 1024 points in the pRNFL thickness (R) curve. The models were: 1. Proportional Loss (PL: m varied, b=0); 2. Subtractive Loss (SL: b varied, m=1); 3. Constant Level (C: b varied, m=0); and 4. Proportional Loss with Minimum (PLwM: m varied, b set to the average of the lowest point on all pRNFL curves). The goodness-of-fit was evaluated using the Root Mean Squared Error (RMSE) for individuals as well as the averages.

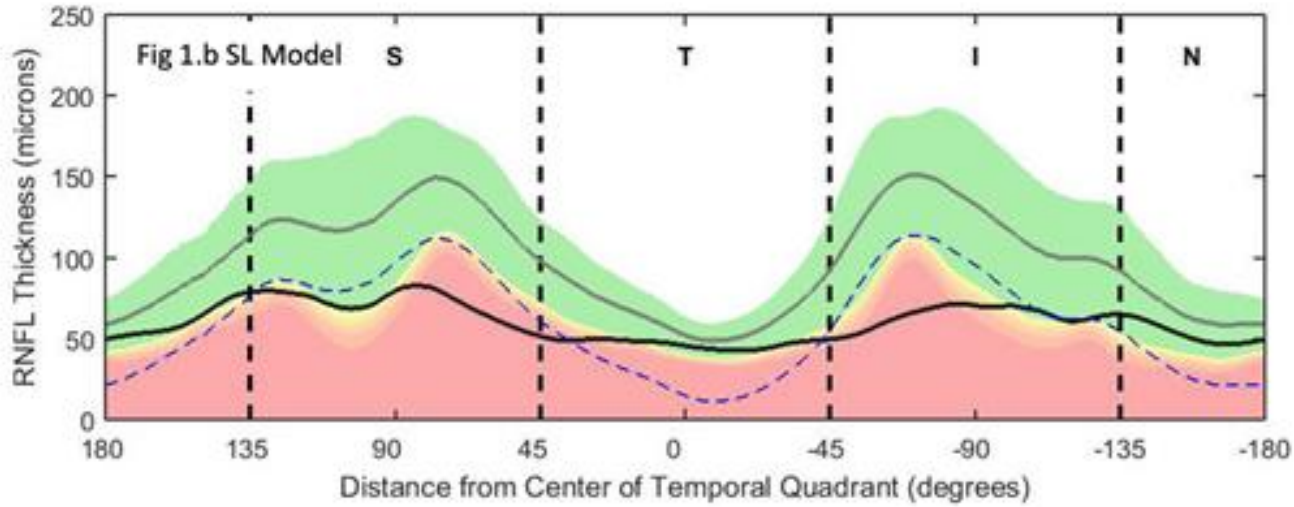
Results : Figure 1 shows the average pRNFL thickness for the 41 patients (black curves) along with the predicted curves (dashed curves) and the average pRNFL thickness for the healthy controls (gray curves). For the patients' averaged pRNFL thickness curves, the RMSE values were 11.0um (PL, m= 0.59), 22.2um (SL, b= 37.42), 11.7um (C, b= 60.05), and

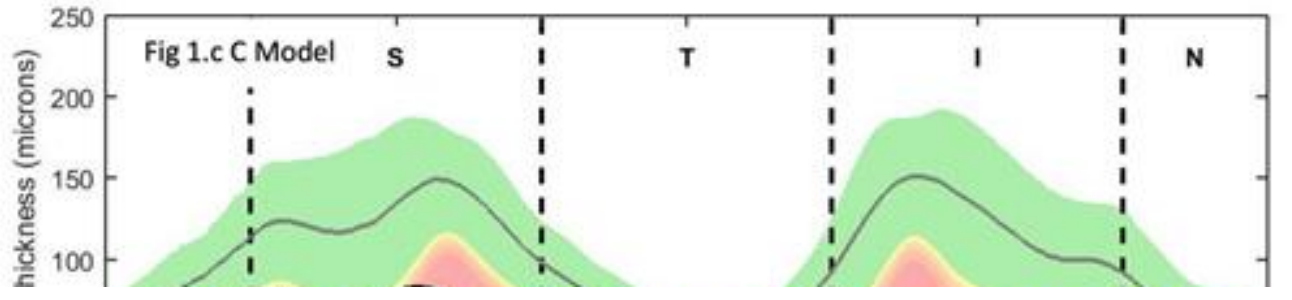
6.5um (PLwM, m= 0.32, b set to 28.5um). For the individual fits, the average RMSE values ± standard deviation were 19.9±6.31 (PL), 27.8±6.59 (SL), 20.6 ±5.95 (C), and 17.9±5.99 (PLwM). Of the 41 individual eyes, the PLwM model provided the best fit (lowest RMSE) in more eyes (28 eyes) than did the C (7 eyes), PL (6 eyes), or SL (0 eyes) models.

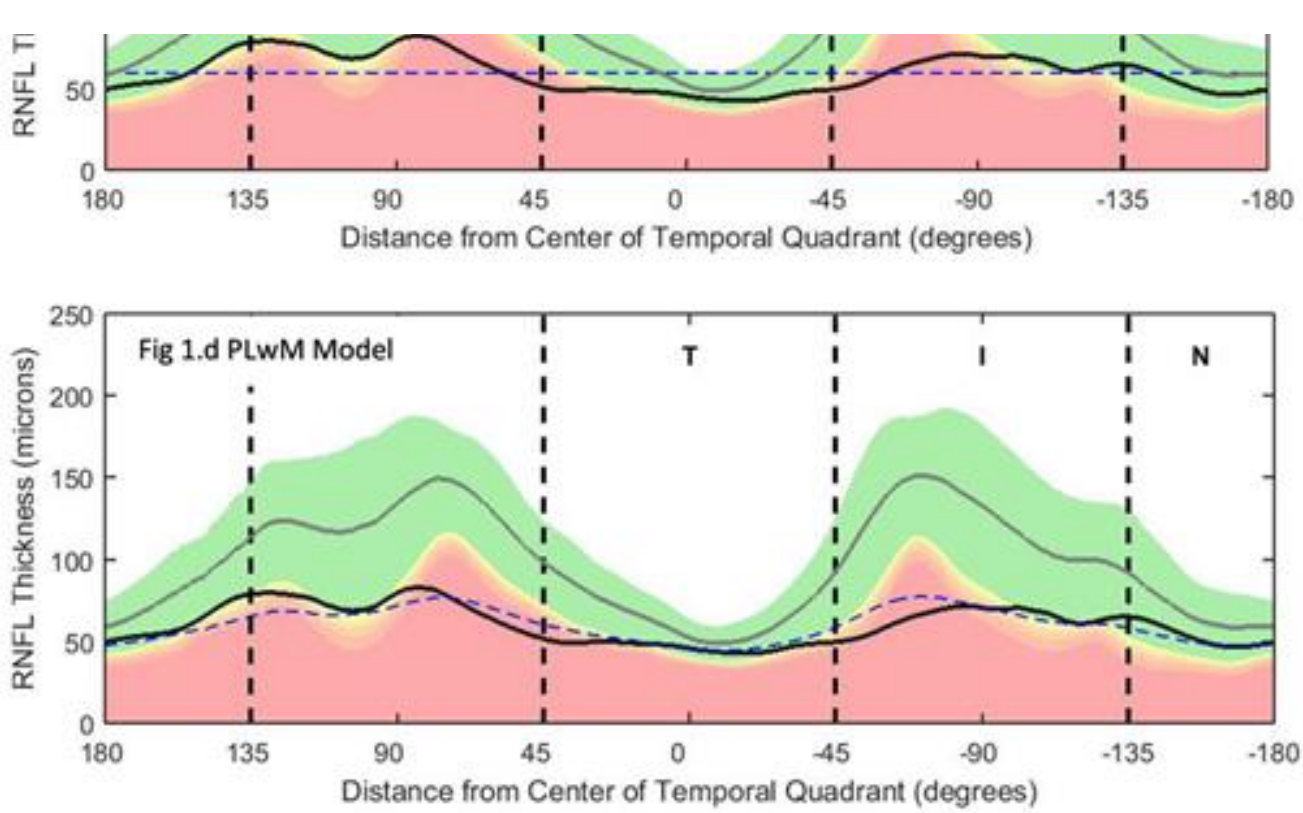
Conclusions : On average, widespread glaucomatous damage is best described by a model (PLwM) that assumes that pRNFL loss is proportional to the healthy value, but is limited by a floor or minimum level of about 30um.

This is an abstract that was submitted for the 2017 ARVO Annual Meeting, held in Baltimore, MD, May 7-11, 2017.









View Original Download Slide