Letters

Caveats to Obtaining Retinal Topography With Optical Coherence Tomography

We read with great interest the article by Oh et al.¹ on the assessment of retinal topography in myopic eyes using spectral domain optical coherence tomography (SD-OCT). In their article, the investigators described different characteristics of retinal topography to indicate variations in ocular shape in myopia (such as a retina sloped nasally versus temporally). Like similar prior studies using magnetic resonance imaging (MRI) to measure posterior eye shape in myopia, we agree this work in retinal topography provides important insight into classifying and risk stratifying myopic eyes.

However, we would like to highlight a misconception regarding the use of posterior segment SD-OCT images for absolute retinal topography measurements. In the Discussion section, it is stated that “The rainbow pseudo-colors in the topographic (RPE) layer image represent height from the coronal plane of the eye, with blue indicating low height and red indicating high height.” In OCT, the reference plane is not the coronal plane or any plane within the eye. Instead, the reference plane is a reference delay path length in the OCT device itself.² Axial distance (height) within an OCT image represents sample distances relative to that reference delay in optical path length. Therefore, because the reference is in the OCT device and not in the eye itself, how the eye is positioned relative to the OCT device affects the eye’s appearance in the OCT image. For example, all three distinct subtypes of retinal sloping described in the article (nasal, middle, and temporal) can be produced from the same eye simply by moving the OCT scan beam position in the pupil slightly relative to the pupil center (see Figure). The same effect also would occur if, conversely, the subject’s eye moved relative to the OCT device.

Further, OCT images of the posterior eye are distorted by scan geometry and optical artifacts as our group and others have described previously.^{3–5} The cumulative effect is that an OCT image of the posterior eye is not an exact spatial replica or digital “cast” of the eye itself. Hence, when using OCT to measure the absolute topography of the posterior eye, these imaging effects must be considered to separate them from actual topographic differences present in these myopic eyes.

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FIGURE. Creation of different retinal topography characteristics from the same myopic eye by displacement of the OCT scan beam position. The temporal (A), middle (B), and nasal (C) slope subtypes can be created from the same eye simply by slightly moving the OCT scan beam position within the pupil. The *green dot* denotes the pupil centroid position, and the *red dot* denotes the location of the OCT scan beam position. Note that the fovea is fairly centered, and there is excellent image quality in all three OCT images. (This subject had an uncorrected spherical equivalent refraction of -4.50 diopters in this eye and was consented under an institutional review board approved protocol before imaging.)

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