Defocus Curves Standardized Criteria on Visual Performance of a Small-Aperture IOL: First Comparison of Results After Contralateral and Bilateral Implantation

We read with interest the article in the January 2020 issue by Ang, who evaluated the visual properties of bilateral implantation of the small-aperture intraocular lens (IOL) (IC-8 IOL; AcuFocus) in comparison to contralateral implantation using defocus curves and contrast sensitivity testing. He found that contralateral and bilateral implantation of an IC-8 IOL provide excellent visual acuity across all tests.

We do not want to criticize his results because we find them interesting and novel. Instead, we would like to highlight the defocus curves methods description. The author stated: “The technician first defocused the image by placing a +5.00- [diopter] D lens in front of the eye, and then progressively changed the defocus lens in 0.50-D increments from +5.00 to -5.00 D using ETDRS lightbox at 4 m.” What is not reported is whether there was randomization in either the lens presentation order or in the letter sequences on the test chart to prevent learning effects.

Gupta et al found that it was necessary to randomize either the lens presentation order or the letter sequences on the test chart to prevent learning effects. Their research showed overestimated depth of focus of the Array multifocal IOL by using negative to positive lens progression with non-randomized letter sequences to measure their defocus curve. Buckhurst et al later settled area-of-focus measurements with defocus curves because conventional depth-of-focus metrics (relative or absolute criteria) provide a single value to quantify the useful range of vision. The conclusion of their study was that the defocus curve method and analysis need to be standardized so that results can be compared between studies.

Although these authors have established the need to seek common and standardized criteria for defocus curves to compare different IOLs, we still do not have standardized criteria. Cochener et al used defocus curves to compare the AcrySof IQ PanOptix (Alcon Laboratories, Inc), FineVision Micro F (PhysIOL SA), and Tecnis Symfony (Meditec, Inc) IOLs. However, despite it being a well-designed study, the methods section did not describe how they performed the defocus curves. This is similar to the study of Steinwender et al, who found that implantation of a monofocal spherical IOL resulted in an increased depth of focus without significant degradation of distance visual acuity or contrast sensitivity with no differences in the depth of focus between hyperopic eyes and emmetropic eyes. In that study, the authors stated in their methods that defocus curves were assessed by patients reading Early Treatment Diabetic Retinopathy Study logMAR visual acuity charts at 4 meters under photopic conditions induced with trial lenses (between -1.50 and 1.50 D in steps of 0.50 D). When we checked these steps, we found that the blur differs from that of other research and randomization was not reported.

Therefore, although the need to standardize defocus curves has long been established and it seems that the most recent studies are being standardized, in our opinion, standardized defocus curve criteria have not yet been definitively achieved and we continue to see studies creating their own criteria. We recommend to the scientific community that it would be important to try to reach a standard consensus when measuring defocus curves, perhaps using some device that could make the curves standard and fast, so that we could better understand and compare the published studies.

Carlos Rocha-de-Lossada, MD
José-María Sánchez-González, OD, PhD
Jorge Peraza-Nieves, MD
Barcelona, Spain

REFERENCES

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Editor’s Note: The authors declined to comment on this letter.