

Disagreement Between Theoretical and Actual Phorcidal Outcomes: Is Phorcidal Inferior to Treating on the Manifest Refraction? [Letter]

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Dear Editor

We read with interest “Topography-Guided Refractive Astigmatism Outcomes: Predictions Comparing Three Different Programming Methods.”¹ In the Manifest group, the calculated theoretical outcomes revealed an unexpectedly elevated postoperative refractive astigmatism average error of 0.56 ± 0.22 D.¹ This large amount of theoretical postoperative cylinder was not replicated in a recent real-world clinical study by the same authors, comparing actual topography-guided LASIK outcomes in Phorcidal versus manifest-treated eyes.² The reported empirical postoperative astigmatism error average in the Manifest group was as low as 0.15 D, fourfold better than that reported in the current theoretical outcomes study.¹

In the current theoretical study,¹ only 56% of Manifest eyes showed a refractive astigmatism error of 0.50 D or less, compared to 96% of eyes in the real-world clinical study.² In addition, 15% of Manifest eyes exhibited an “outlier” postoperative refractive astigmatism error of 1.00 D or greater, compared to only 1% in the real-world study.²

The real-world clinical study further revealed that the refractive astigmatism accuracy was statistically inferior in Phorcidal eyes that were matched to the FDA study criteria.² Surprisingly, this inferior postoperative SEQ and refractive astigmatism accuracy with Phorcidal was accompanied with a significantly better rate of postoperative 20/16 UDVA.² This clinical finding of having superior visual acuity despite inferior refractive accuracy is atypical and inconsistent with current laser vision correction literature.³

These conflicting results highlight that the current theoretical outcomes study¹ does not reflect real-world manifest-treated eyes outcomes, where manifest eyes are superior to Phorcidal eyes in terms of refractive astigmatism and SEQ accuracy.² What could explain the significant disagreement between these poor theoretical¹ versus excellent real-world² manifest-treatment outcomes?

In the theoretical study, vector analyses of postoperative cylindrical errors and programmed cylindrical laser treatment values were used to calculate expected outcomes that in theory may have been obtained using either Manifest, LYRA or Phorcidal treatment. Using this methodology, a successful plano postoperative eye treated using the Contoura-measured anterior corneal astigmatism (LYRA protocol) with 1.00 D of difference between manifest and topographical cylinder

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preoperatively, leads to a theoretical postoperative refractive astigmatism error of 1.00 D in the Manifest group. Such theoretical assumptions are invalid, since published clinical outcomes studies do not necessarily reveal differences in postoperative refractive astigmatism errors between treating the manifest astigmatism, the topographical astigmatism, or the vector planning approach.^{2,4,5}

Given that most eyes (~75%) were treated using the LYRA protocol prior to such theoretical calculations, and since the preoperative difference between refractive and anterior corneal astigmatism was large, with 73% of eyes having a difference greater than 0.50 D,¹ the Manifest group was significantly disadvantaged by the study design. This treatment bias, where most eyes were treated using the LYRA protocol and not the manifest, led to an over-estimated theoretical refractive astigmatism error in the Manifest group. This explains why the real-world clinical study outcomes do not reflect the current theoretical study outcomes.

In summary, the authors' statement that Phoricides and LYRA "will produce outcomes that are superior to those obtained when the Manifest refraction is entered as the treatment" is scientifically flawed considering: the bias related to treatment type being mostly LYRA, the selection bias introduced from doctors choosing treatment type with undetermined criteria and nomograms, and the same author real-world outcomes study showing superior refractive accuracy outcomes in Manifest eyes compared to Phoricides eyes. A review of over 150,000 of our

topography-guided treated eyes, where accurate manifest refraction data and an advanced big data nomogram were used, demonstrates that refractive outcomes of manifest-treated eyes are better than Phoricides,³ and LYRA.⁵

Disclosure

The authors have no conflict to disclose and no financial interest in the subject matter or materials presented herein in this letter to editor. The authors equally contributed to this letter.

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