Graefe's Archive for Clinical and Experimental Ophthalmology (2022) 260:4021–4022
https://doi.org/10.1007/s00417-022-05781-9

LETTER TO THE EDITOR

Profile of a new extended range-of-vision IOL: comments on the laboratory study by Tognetto et al

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Received: 7 June 2022 / Revised: 7 June 2022 / Accepted: 19 July 2022 / Published online: 28 July 2022

Dear Editor,

We read with interest the recently published article by D. Tognetto et al. [1], in which the authors report experimental data on the surface profile of a new extended range-of-vision IOL: the DFT015 (AcrySof IQ Vivity; Alcon Laboratories, Inc.). In our opinion, this is an important contribution because technical data on this IOL are very scarce in the literature; and the good clinical results published with this lens [2] make it necessary for surgeons to learn more about the basic characteristics of the design in order to better understand how it works.

According to the manufacturers [3], the DFT015 IOL utilizes X-WAVE™ technology (wavefront shaping) to achieve extended range-of-vision. The wavefront shaping profile is placed on the anterior surface of the IOL covering the central 2.2 mm of the optical zone.

Tognetto et. al. [1] used a commercial profilometer with 50-nm lateral resolution and 10-nm vertical resolution to measure the anterior surface profile of the DFT015 IOL. To enhance differences from a spherical lens surface, the authors subtracted the best-fit circle to the measured profile. They confirmed that the profile of the DFT015 IOL has of two “altitudinal changes,” localized in the central portion of the optic.

Driven by the interest for obtaining more qualitative and quantitative information from the results presented by Tognetto et al., we have analyzed the profile of the DFT015 lens shown by the authors in Ref. [1] (Fig. 2). We have reproduced this profile in red line in Fig. 1, with a rescaling in both vertical and horizontal directions. Assuming that the profile is symmetrical around the center of the lens, only a radial profile is shown here. This new representation highlights some interesting aspects of the DFT015 IOL profile that the authors do not discuss in their work and that we feel are important to highlight:

First, the above mentioned “altitudinal changes” in the lens surface seems to have 3 different zones (see the blue dotted lines in blue superimposed to the experimental data in Fig. 1). From the center to the periphery, the first zone (zone 1) has an increasing constant slope, the second one has an almost constant height (zone 2), and the third zone presents a decreasing slope, but smoother than one in zone 1 (zone 3).

Second, the central zone also has a very smooth slope indicating that it is likely a consequence of the aspheric profile employed to obtain the negative spherical aberration of the anterior surface of the lens, since, otherwise, the IOL curvature (the best fit circle) subtracted from the raw data of the profilometer should have a constant (zero) value.

Third, the authors show results of the central 2.2 mm, but it would be interesting to see a profile with a greater extension, at least up to the central 4 mm (as they do with other IOLs in their Ref. [8]) to know if there is a phase difference between the center and the periphery of the optical zone.

Finally, a quantitative analysis of their results, which are not provided by the authors (except the approximated value of the altitude of the ring: ~1 µm), would be of great

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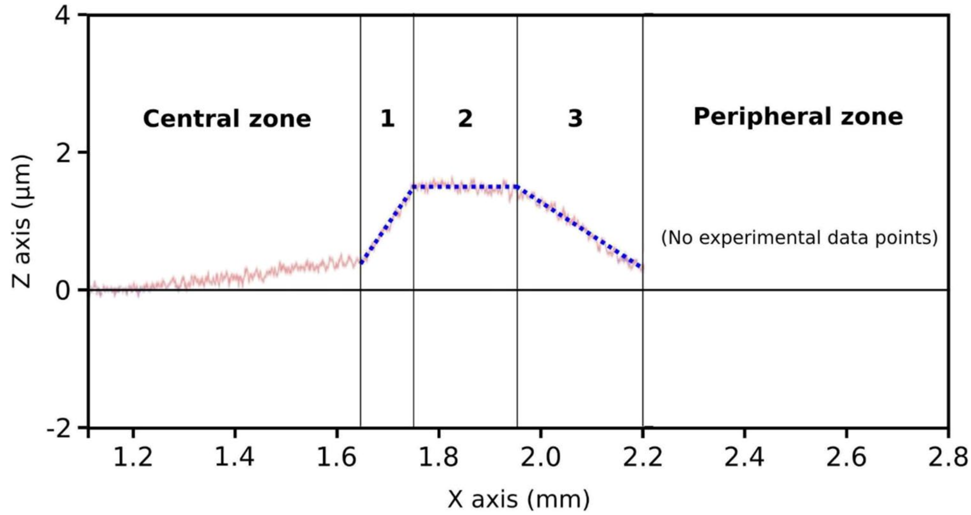

Fig. 1 Radial profile of the DDFT015 IOL (adapted from Fig. 2 Tognetto et al. [1].)

interest to be able to model the surface of the DFT015 IOL and, thus, to study its effect on the performance of the lens numerically [4] and even experimentally using an optical visual simulator [5]. For this purpose, in Fig. 2 of Ref. [1], a representation of mean values of several measurements instead of a single measurement would be more appropriate.

Funding This work was supported by Ministerio de Ciencia e Innovación, Spain [PID2019- 107391RB-I00] and by Generalitat Valenciana, Spain [PROMETEO/2019/048]. D. M.-M. also acknowledges the Margarita Salas grant from the Ministerio de Universidades, Spain, funded by the European Union-Next Generation EU.

Declarations

Conflict of interest The authors declare no competing interests.

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