Accepted Manuscript

Glistening formation and light scattering in six hydrophobic-acrylic intraocular lenses

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PII: S0002-9394(18)30493-8

DOI: 10.1016/j.ajo.2018.08.032

Reference: AJOPHT 10650

To appear in: *American Journal of Ophthalmology*

Received Date: 30 May 2018

Revised Date: 16 August 2018

Accepted Date: 24 August 2018

Please cite this article as: Łabuz G, Knebel D, Auffarth GU, Fang H, van den Berg TJ, Yildirim TM, Son H-S, Khoramnia R, Glistening formation and light scattering in six hydrophobic-acrylic intraocular lenses, *American Journal of Ophthalmology* (2018), doi: 10.1016/j.ajo.2018.08.032.

Purpose: To study the glistening formation in various hydrophobic-acrylic intraocular lens (IOL) models. To evaluate the effect of glistenings on light scattering in these IOLs.

Design: Laboratory investigation.

Methods: The susceptibility of the hydrophobic-acrylic material to develop glistenings was evaluated in 6 IOL models. Accelerated-lens aging was induced by immersing the IOLs in a solution at 45℃ for 24 hours and cooled to 37℃ for 2.5 hours. Light microscopy and image acquisition were performed. Glistening statistics, i.e., microvacuoles' (MV) number and size, were derived from image analysis. Light scattering was measured using a clinical device featured with an adaptation for in vitro IOL assessment.

Results: The number of glistenings differed among the studied IOLs and ranged from 0 to 3532 MV/mm^2. In one model, glistenings were found only at the periphery with diffuse light scattering observed centrally despite the absence of microvacuoles. The mean size of glistenings ranged from 5.2 to 10.2µm. The mean straylight parameter of the IOLs increased from 0.6 to 5.0 deg^2/sr after accelerated aging. Straylight elevation demonstrated a proportional relationship with the glistening number.

Conclusions: We showed that hydrophobic-acrylic lenses differ in their resistance to glistenings, as one group proved to be glistening-free, but the other models revealed varying grades of glistenings. Moreover, we demonstrated that the presence of glistenings results in increased straylight, and that straylight proportionally depends on the glistenings number irrespective of the IOL model. However, more research is needed to confirm that the relationship we found holds for all hydrophobic-acrylic IOLs.