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Straylight from explanted intraocular lenses

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Abstract

Purpose : Several studies found that visual straylight does as a rule not return to the level normal for young eyes after cataract extraction and IOL implantation (J Cataract Refract Surg. 41(7):1406-15). Ten percent of pseudophakic patients suffer from disabling straylight elevation. The reason of the observed increase is unknown.

Although it has been reported that scattering of a new intraocular lens (IOL) is low, this

may change once the IOL is implanted in the eye. In the present study light scattering

expressed in term of straylight of explanted IOLs was evaluated.

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Methods : A total of 6 explanted IOLs were studied using a commercial straylight meter (C-Quant, Oculus) adapted for in-vitro analysis of scattering from IOLs (Biomed Opt Express. 19;6(11):4457-64). The adaptation involved exposure of the IOL to the C-Quant target, and observation of the test field by experienced observers. The eyes of the observers were not exposed to the straylight source of the C-Quant, so that only straylight caused by the IOL was evaluated (the eye acting as a detector only). To study whether large or small (compared to wavelength) particles predominate in light scattering of the explanted IOLs, interference filters (IF) were used of 468, 550, and 650 nm. This allows to analyze the particles' size by means of straylight-wavelength dependency. Because of the narrow bandwidth of the IFs (10 nm) a camera was used as light amplifier to enable the suprathreshold psychophysical test, as intended with the C-Quant. Additionally, the camera evaluation was done without the IFs (white light) and compared with results without camera use.

Results : A good correspondence between the straylight measurements with and without camera use was found ($R^2=0.98$). The mean \pm SD (range) straylight of the explanted IOLs was 0.37 ± 0.65 log(s) (-0.35 to 1.09 log(s)). As 3 of the analyzed IOLs showed very low straylight levels, they were excluded from spectral analysis. The spectral analysis of the other 3 IOLs showed rather weak spectral effects, much less than Rayleigh type scattering.

Conclusions : Although most of the explanted IOLs preserve their low scattering properties, some of the analyzed lenses showed increased straylight. This may result in elevated sensitivity to glare, and consequently lead to patient dissatisfaction. Particles larger than wavelength appear to dominate in light scattering from the explanted IOLs. The origin of these particles must be studied.

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