

*Invest Ophthalmol Vis Sci* 2007;48: E-Abstract 3822.

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**3822—B560**

## Quantifying Intraocular Scattering in Cataract Patients

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**Commerical Relationships:** E. Alcon, None; A. Benito, None;

G.M. Perez, None; A. De Casas, None; S. Abenza, None; S. Luque, None; J. Pujol, None; J.M. Marin, None; P. Artal, None.

**Support:** MEC\_FIS2004-2153 (Spain)

### Abstract

**Purpose:** To develop an objective technique to measure intraocular scattering in patients at different stages of cataract progression.

**Methods:** We combined double-pass retinal images and wave-front aberrations measurements to obtain an objective scatter index (OSI). Double-pass images were recorded using a clinical instrument (OQAS, Visiometrics SL, Spain) and aberrations were measured with a Hartmann-Shack sensor. For a defined pupil diameter, typically 4 mm, a synthetic double-pass image, only affected by the aberrations, was computed from the wavefront data. For each patient, two double-pass images were compared: the one directly measured, affected by aberrations and scatter, and the synthetic computed one, only including the impact of aberrations. A parameter was computed from the two double-pass images as the ratio of the light falling in an outer area as compared with the light in the central part of the image. The objective scatter index (OSI) was defined as the normalized difference of the two values from the real and computer generated double-pass images respectively.

**Results:** The procedure was applied in a group of 80 eyes: 20 normal young eyes as a reference and 60 cataract patients with different level of scatter, from mild to severe opacities. The scatter index OSI ranges from zero in an ideal, scatter-free eye, to 10 for an ideal eye fully affected by scatter. The normal young eyes present usually values below 1, early cataract eyes around 2 and in mature cataract eyes OSI was

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higher than 4

**Conclusions:** An objective index (OSI) to quantify intraocular scatter in cataract eyes has been proposed. The procedure is robust and discriminates well among eyes with different amount of scatter. The procedure can be easily applied in the clinic and provides a quick and robust indication of the overall amount of scatter.

**Keywords:** cataract • optical properties



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