



Session 3-A: Cataract: IOLs

Title: Effect of Misalignments on IOLs That Correct Spherical Aberration

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Purpose: To evaluate how misalignments affects the optical quality in eyes implanted with different types of intraocular lenses (IOLs) correcting or not the corneal spherical aberration (SA).

Methods: We measured corneal and ocular aberrations in seven eyes implanted with two types of IOLs: Tecnis Z9000 (negative SA) and Ceeon 911A (positive SA). We also estimated misalignments (IOL tilt and decentration and ocular angle kappa) with a new instrument we developed based on recording Purkinje images. These experimental data were used in a personalized computational eye model to simulate the effects of misalignments on the retinal image quality. Three different types of IOL were evaluated: with negative SA, correcting the cornea; with positive SA, adding to the cornea and lenses without SA.

Results: The aberrations of the implanted eyes predicted by our personalized computer model are extremely well correlated with the actual aberration measured in each patient. This demonstrated that our approach is quite powerful to evaluate the actual optical performance of different types of lenses. The SA correcting lens are more sensitive to decentrations than the conventional IOLs, but they present a better optical performance than conventional lenses over a range of normal decentrations.

Conclusions: Although SA-correcting IOLs induce more off-axis aberration when decentred, typical values of misalignments in implanted eyes were inside the improvement range for an average eye, supporting the benefit of correcting corneal SA. Our combined experimental and computational approach is specially well suited to propose new strategies for aberration correcting IOLs design based on typical tendencies of these parameters.