

Study Spotlight: Impact of Decentration and Tilt on ZEISS CT LUCIA® 621P



Seeing beyond

A comparative bench analysis demonstrating less relative loss of contrast when being decentered for the ZEISS Optic (ZO) IOL compared to an aberration correcting IOL.

Source



Title

Impact of Decentration and Tilt on Spherical, Aberration Correcting, and Specific Aspherical Intraocular Lenses: An Optical Bench Analysis



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Methodology

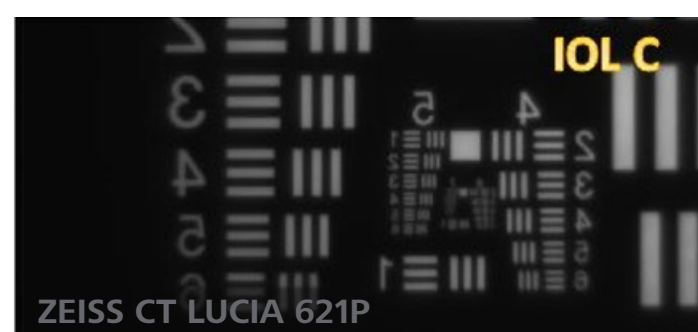
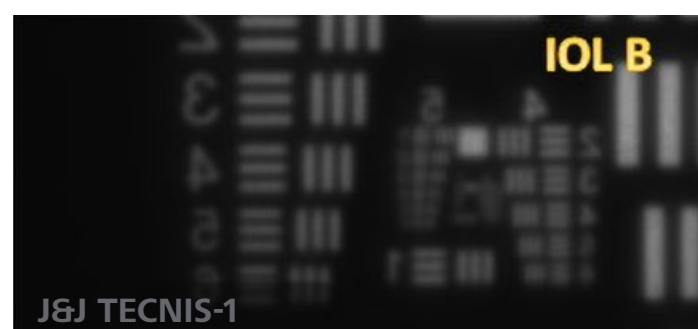
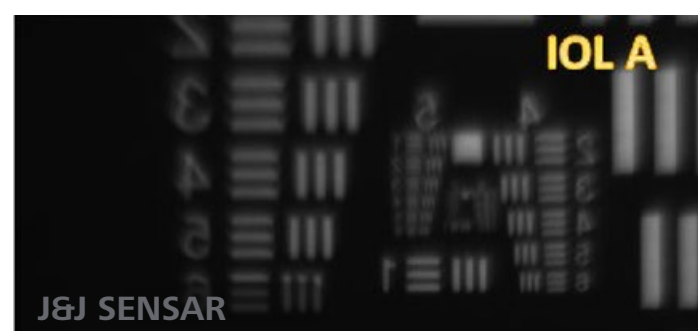
Optical Bench

- Two in situ eye models: one cornea model with spherical aberration (+0,28 μm) and one without SA
- Evaluation centered, at 1 mm decentration, and at 5° tilt
- Assessment for 3.0 mm (photopic) and 4.5 mm (mesopic) aperture
- Testing of ZEISS CT LUCIA 621P (aspheric, ZO optic), J&J SENSAR (spherical) and J&J TECNIS-1 (aspheric, fully spherical aberration correcting)

Metrics

- Through frequency MTF
- Strehl Ratio for overall image quality
- Simulation of contrast visual acuity using USAF test targets

Results



USAF results with 4.5 mm aperture and 1 mm decentered IOLs

The ZEISS Optic (ZO) asphericity concept of ZEISS CT LUCIA 621P IOLs seems to be a good alternative to aspheric lenses as it achieves to combine benefits of spherical and aspheric IOLs.

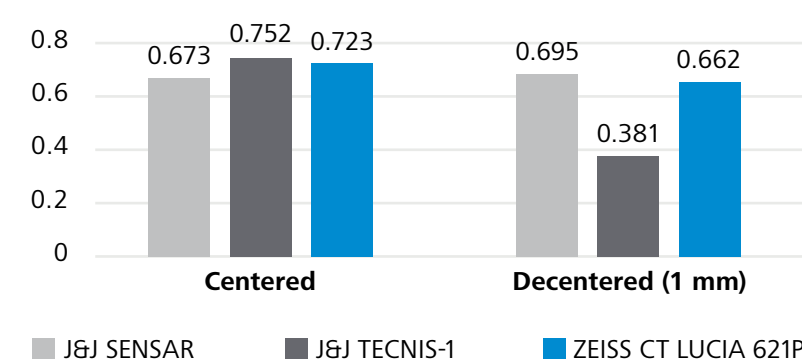
- ▶ When centered, the ZEISS CT LUCIA 621P has a larger contrast sensitivity in relation to the spherical lens.
- ▶ When decentered, the ZEISS CT LUCIA 621P has less relative loss of contrast compared to the aberration correcting lens.

Side note:

Many IOLs are naturally decentered in the eye, which can markedly downgrade the optical performance of fully aberration correcting IOLs. A large body of studies show that IOL decentration to the visual axis of >0.3 mm is commonly found after cataract surgery¹.

¹ Chen et al., 2022, Influence of IOL Weight on Long-Term IOL Stability in Highly Myopic Eyes, Original Research; Gu et al., 2022, Building prediction models of clinically significant intraocular lens tilt and decentration for age-related cataract, JCRS; Xu et al., 2020, Risk Factors Associated With Intraocular Lens Decentration After Cataract Surgery, American Journal of Ophthalmology.

MTF mean 50 lp/mm – Cornea with SA
3 mm aperture (photopic)



MTF mean 50 lp/mm – Cornea with SA
4.5 mm aperture (mesopic)

