

# 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

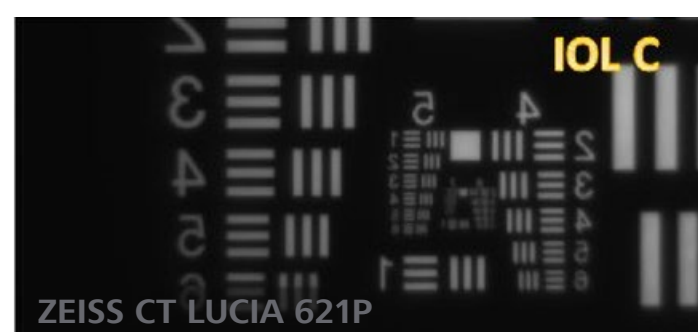
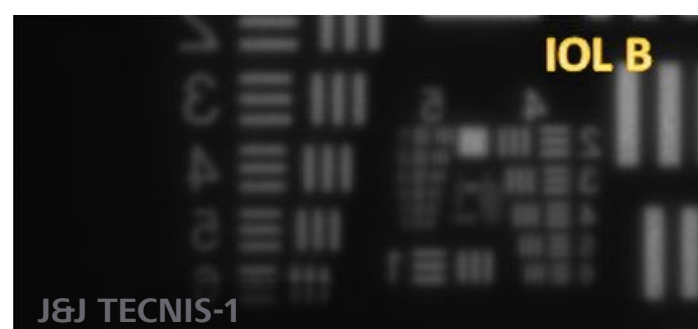
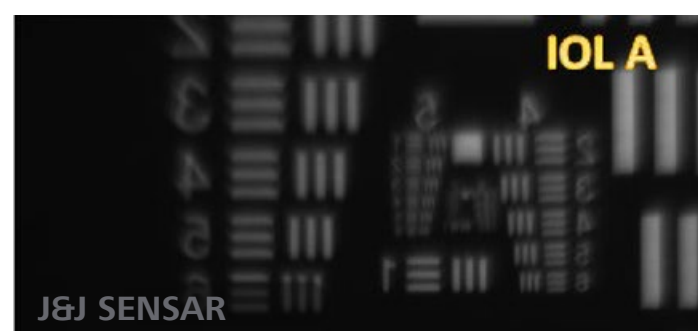
### Optical Bench

- Two in situ eye models: one cornea model with spherical aberration (+0,28  $\mu\text{m}$ ) 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.

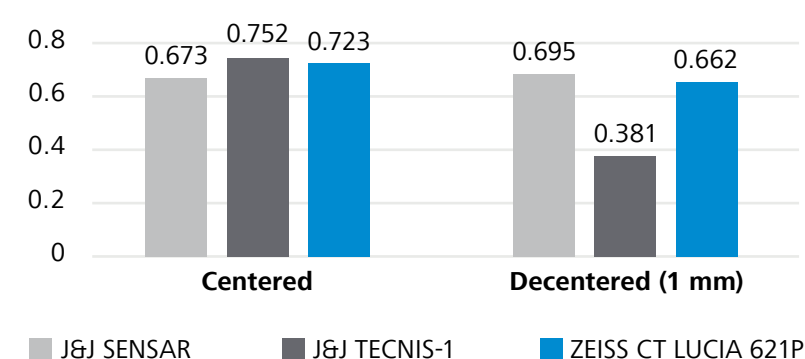
- ▶ When centered, the ZEISS CT LUCIA 621P has a larger contrast sensitivity in relation to the spherical lens.
- ▶ When decentered, the ZEISS CT LUCIA 621P has less relative loss of contrast compared to the aberration correcting lens.

### 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 surgery<sup>1</sup>.

<sup>1</sup> 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)

