Fachhochschule Jena
University of Applied Sciences Jena

Fachbereich SciTec
Präzision – Optik – Materialien – Umwelt

Abstract zur Diplomarbeit

Specific Field:	Ophthalmology / Medicine
Name:	Späth, Tina
Diploma Thesis:	**Asphärische Intraokularlinsen - ein erster Schritt zur customized IOL**
Year:	2004
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Background

Intraocular Lenses (IOL) are used in order to correct the refraction of eyes after cataract extraction. Pseudophakic patients have problems with their mesopic vision, which is often caused by the spherical aberration of the implanted IOL. The solution to minimize this aberrations can be found in aspheric optics. The aspheric optic achieves an improvement of resolution and mesopic vision.
It has to be proven, if the theoretically resulting improvement of the image quality of aspheric IOLs corresponds with the practical test results.

Methods

The geometric parameters of the new lens design are analysed with a Raytrace program from Optocraft.
The image quality of the aspherical lens is exposed by PSF (point spread function) and MTF (modulation transfer function). For the ray tracing the Gullstrand eye model with an aspheric cornea was used.
Accordingly both lens (spherical and aspherical) were compared on the optical bench. Another wavefrontanalysis pictures the deviation in the image quality of the new lens.

Results

The image quality of the aspherical lens (back surface) was considerably better than that of the spherical lens.
The results from the Raytrace program regarding the image property with large pupil diameter show improvements with the aspheric lens design. These results are not reproducible with the wavefrontanalysis.

Conclusion

The optical performance of intraocular lenses can be improved by aspherization. The production procedure can be kept fairly simple by aspherizing only one side of the lens.

Key words

Aspheric intraocular lens, spherical aberration, cataract surgery, Raytrace