

Researchers design a new intracorneal inlay to correct presbyopia

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Researchers at the Universitat Politècnica de València, University of Valencia, Instituto de Investigación Sanitaria La Fe and the companies AJL Ophthalmic SA and Aiken-Tecnología Ocular Preventiva SL have designed a new type of intracorneal inlay to correct presbyopia and farsightedness.

The design is based on a diffractive [lens](#) with micro-holes that permit the flow of nutrients in the corneal stroma. Also, this new type of prosthesis allows doctors to customize the treatment of presbyopia (farsightedness). Unlike its commercial counterparts, due to its high-efficiency, the prosthesis can be implanted in both eyes without producing binocular vision. The design is easily adaptable to the shape of the intraocular lens and contact lens.

According to Juan Antonio Monsoriu, researcher at Politècnica de València, standard treatment for farsightedness has included bifocal and progressive contact lenses, multifocal intraocular lenses, etc. The most current alternatives include the use of intracorneal inlays. However, "these prostheses are limited because of the reduction of the retinal image quality produced by the diffractive light passing through the micro-holes necessary for the proper flow of nutrients," says Juan A. Monsoriu.

In order to reduce those undesired effects of light diffraction, the researchers have invented a solution: the redistribution of the lens micro-holes, which turns the diffraction produced by the holes into a beneficial

factor. In addition, in this case it is possible to implant it in both eyes without producing binocular vision problems, which is not feasible with the inlays currently used.

"In our invention, the distribution of the micro-holes is concentrated in rings distributed inside a zone plate made for a specific area. In addition, this new lens presents a new versatile design, as it permits a variable density of holes in each area, depending on the relative intensity wanted between the different focuses generated by the lens for correcting ocular aberrations," says Waler D. Furlan, coordinator of the DiOG (Diffractive Optics Group) Research Group of the University of Valencia.

For intracorneal inlays in emmetropic eyes, this is safer than LASIK surgery, as the removal of the corneal tissue is not necessary. However, this technique is totally suitable for patients with presbyopia with some refractive error.

The main advantages of this technique include that it allows patients with presbyopia to clearly see near objects and also that can be customized depending on the visual needs of the patient: working distance, pupillary diameter, focus relative intensity, etc. It offers the possibility of being used in both eyes without creating binocular vision problems and it provides an extension of the depth of far focus of the eye and the near focus while guaranteeing an optimized range of clear vision for near and far objects.

More information: Walter D. Furlan et al. Diffractive corneal inlay for presbyopia, *Journal of Biophotonics* (2017). [DOI: 10.1002/jbio.201600320](https://doi.org/10.1002/jbio.201600320)

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