



**Title** **Phakic Intraocular Lenses**  
**Agency** **CEDIT, Committee for Evaluation and Diffusion of Innovative Technologies**  
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**Reference** CEDIT Report (in French) No. 02.05/Ra1/02/Recommendation 02.05/Re-1/02

## Aim

Phakic intraocular lenses (IOLs) are designed to correct myopia, hyperopia, presbyopia, and, in the future, astigmatism. In contrast to corneal ablation, implantation of phakic intraocular lenses is reversible. The technology is long-standing. Innovations in design make the new generation of intraocular lenses more effective and simpler to position surgically. Anterior and posterior chamber phakic IOLs comprise a lens (which is concave in the case of myopia and convex in the case of hyperopia) together with a system for positioning and fixating the lens. Angle-fixated anterior chamber IOLs (of the GBR type by Ioltech, and Vivarte by CIBA-vision) are supported by the angle where the iris and cornea meet. The iris-fixated anterior chamber IOLs (ARTISAN® by OPHTEC) and posterior chamber IOLs supported on 4 points of the ciliary sulcus (ICL™ by STAAR Surgical) are 1-piece lenses.

## Conclusions and results

Several generations of anterior chamber phakic intraocular lenses have been introduced since 1986. The first generation of intraocular lenses (ZB IOL) were discontinued due to complications. Newer models were designed to avoid contact with the iris while maintaining sufficient distance from the natural lens and the cornea. Results obtained with ZB5M (not used since 1997), NuVita, and ZSAL-4 intraocular lenses have been published. Several complications have been described: pupil ovalization, halos, glare, retinal detachment, uveitis and endothelial cell loss. The new, foldable, anterior chamber IOLs are not assessed in the literature due to insufficient data.

Iris-fixated lenses were designed in 1991 (named ARTISAN® in 1998). After 2 years of followup, endothelial cell loss was reported also with this type of intraocular lens. Posterior chamber phakic intraocular lenses can cause cataracts because of contact between the implant and the natural lens. Cases of retinal detachment have also been reported. Endothelial alteration is less of a problem for these IOLs than for anterior chamber IOLs.

The unit price for a phakic IOL varies between 381 and 640€ depending on manufacturer. The cost for implanting intraocular lenses depends on the type of establishment (public, private) and on the surgical practice of the ophthalmologist (ambulatory or inpatient).

## Recommendations

Phakic IOLs are an alternative to ablative surgery to correct mild refractive error. They appear to be the only technology capable of treating severe, disabling myopia. CEDIT considers this technology to be insufficiently evaluated, particularly as regards long-term tolerance. Furthermore, followup of patients via a registry does not seem feasible. CEDIT recommends setting up a clinical research protocol within the framework of a multicenter evaluation. The study should consider patients suffering from high ametropia who are intolerant to contact lenses and willing to comply with medium- and long-term followup. The study would be a means to define the criteria for choosing a particular type of implant (iris-fixated, anterior chamber angle-fixated or posterior chamber).

## Methods

A literature search included several databases (MEDLINE, EMBASE, Biosis, Pascal, EBM reviews, Cochrane). Five experts were interviewed on the medical benefits of this technology.