

Implanted Lenses

With an estimated 20 million surgeries performed each year worldwide, cataract extraction is the most common surgical procedure across all medical fields. An implanted intraocular lens (IOL) replaces the cataract-clouded natural lens, providing a functional outcome at a relatively low complication rate. Here we look at different IOL lenses and the possibilities they offer for post-cataract vision.

The first IOL was implanted in 1949 by British ophthalmologist Sir Harold Ridley

Ridley posterior chamber lens

MONOFOCAL IOLs

Standard lenses used in cataract surgery

SETUP: The lens is set to either optical infinity (rendering the eye emmetropic) or a fixed finite distance (rendering the eye myopic)

+/-: Recipient no longer experiences clouding from cataracts, but is unable to accommodate (change focus between distance and near vision); monovision, in which one eye is made emmetropic and the other myopic, can partially compensate for the loss of accommodation in not-yet-presbyopic patients

Monofocal

TORIC IOLs

Correct preexisting corneal astigmatism

SETUP: Similar to toric contact lenses, there are different powers in different meridians and the lens must be positioned on the correct meridian to reverse the astigmatism

+/-: Standard toric lenses are monofocal; a multifocal option can provide vision at far and reading distances; astigmatism can also be treated with limbal relaxing incisions or an excimer laser procedure

Toric

ADJUSTABLE IOLs

Prescription power can be adjusted post-surgery

SETUP: After the eye has healed, surgeons apply UV light to fine tune the prescription; the UV-exposed part of the lens swells slightly, adjusting the lens surface curvature; once the lens has been optimized, a final exposure is made to lock in the changes

+/-: Measurements are taken pre-surgery, so don't account for minuscule shifts that can occur during healing; to avoid exposure to random UV light, protective glasses must be worn post-surgery until the lens is locked

Adjustable

MULTIFOCAL IOLs

Provide simultaneous viewing of distance vision and near vision; trifocal IOLs can add intermediate vision

SETUP: Many use a concentric ring design that alternates distance and near focal points

+/-: Recipients may be less likely to need additional glasses compared with monofocal lenses, but may experience more visual problems, including glare, halos and loss of contrast sensitivity in low light

Multifocal

ACCOMMODATING IOLs

Option for restoring partial accommodation

SETUP: Hinges at both ends of the lens "latch on" to ciliary muscles and zonules and move forward and backward inside the eye, similar to normal accommodation; hinges are made of an advanced silicone called BioSil that is capable of flexing in the eye

+/-: May achieve only limited improvement in near vision, which reduces over time; may also have a slightly higher risk of developing secondary cataracts, requiring a one-time laser capsulotomy procedure

Accommodating

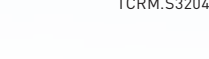
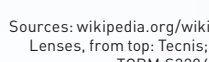
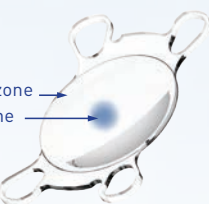
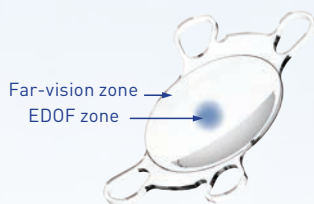
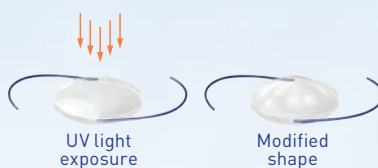
EDOF IOLs

Option for treating presbyopia

SETUP: The lens forms a single elongated focal point to enhance depth of focus

+/-: EDOF lenses are intended to improve middle-distance and near vision with the aim of not needing glasses post-surgery, while also reducing glare, halos and other photic phenomena that occur with multifocal IOLs

EDOF (Extended depth-of-focus)



Sources: wikipedia.org/wiki/Intraocular_lens; BMJ Open Ophthalmol., doi: 10.1136/bmjophth-2020-000464 / Lenses, from top: Tecnis; ReSTOR; ReSTOR; Crystalens; RxSight; Ther. Clin. Risk Manag., doi: 10.1016/j.tcr.2020.10.017 / TCRM.S320422, CC BY-NC 3.0 / Background: Getty Images / Infographic by Alessia H. Kirkland