PREMIUM INTRAOCULAR LENSES

Since the first intraocular lens (IOL) was implanted almost seventy years ago we have strived to emulate the performance of the young human lens. The existence of so many different forms of IOL is testament to the fact that no single perfect solution exists. Cataract extraction with lens implantation is now the most common and the most successful surgical procedure worldwide. Because of both the low surgical risk and the quality of visual outcome we now consider clear lens surgery for those without cataract who seek a degree of freedom from spectacles. This form of intervention has many acronyms and marketing labels but is commonly known as refractive lens exchange, or RLE.

There are contradicting opinions on the relative merits of laser eye surgery and RLE, but in general laser is offered to the younger patient group and is particularly successful in the correction of myopia (short sightedness). Around the age of 45 the natural flexibility of the human lens that allows variable focusing (accommodation) is lost. This is a normal ageing process known as presbyopia, but the impact on life style varies according to an individual's refraction and visual needs. For the younger group undergoing laser (which usually reshapes the corneal surface for distance vision) natural focusing for near is retained and freedom from spectacles is achieved. With advancing years and the onset of presbyopia RLE is favoured, particularly when early cataract is present. Cataract creates an on-going change in refraction, compromising the longer-term success of corneal laser and itself causing visual loss. For those who are presbyopic then, as a general rule, RLE is preferred.

The quality of visual results with multifocal lenses and the capacity to deliver useful multifocality depend heavily on the general health of the eye. All lenses, in any form of optical device, are subject to aberrations and quality issues, which many of us witness every day with starbursts radiating from advancing headlights, dazzle when the sun is low in the sky or loss of contrast in dim illumination. These, along with other effects such as haloing and ghosting (a second blurred image alongside the first clear image) can be more pronounced with certain forms of IOL, particularly multifocals. A variety of ophthalmic conditions including a lazy eye, dry eye, age-related macular change and glaucoma can all limit success and thus be seen as contraindications to RLE.

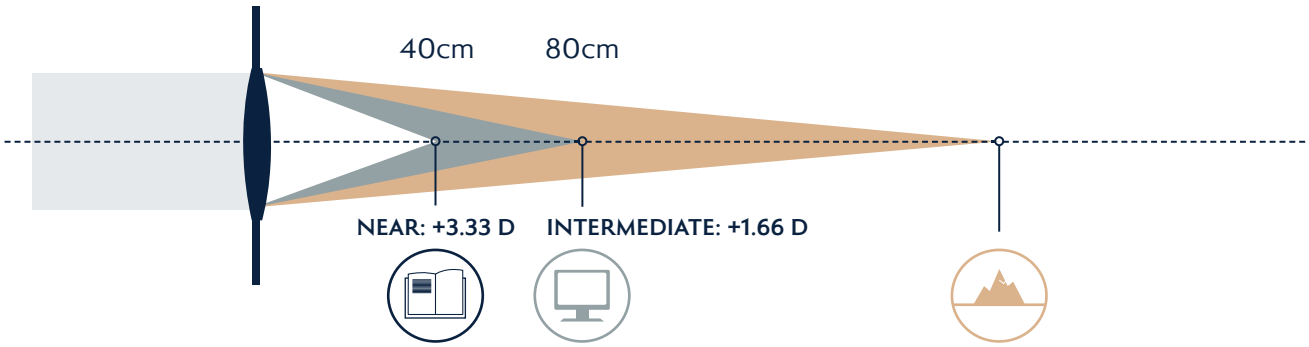
Any implant lens can give rise to the sensation of loss of vision at the outer edge, almost as if wearing blinkers or having tunnel vision, and these various manifestations of "edge effect" (although rarely severe and frequently short-lived) can be troublesome. Ultimately success is defined not by the results of reading an optician's chart in a gently lit examination room but more by success in everyday situations, coping with a variety of visual tasks in varying lighting conditions. It is vital to understand a given individual's particular lifestyle, visual needs and expectations before committing to surgery and the choice of a particular IOL.

THE ZEISS TRIFOCAL INTRAOCULAR LENS

Multifocal implants have been available for many years, although until recently the majority has been bifocal with a limited range of focusing power. The original concept of one focal point for distance and a second for reading has changed as our modern world becomes dominated more by computer work and the need for unaided intermediate vision.

A trifocal implant lens produces three distinct spots of focus at distance, arms' length and near. The intraocular lens from Zeiss (AT LISA tri) is one of a number of trifocal lenses now on the market; my choice of this model is based on the long-standing excellence of Zeiss optical products, the popularity of this lens internationally and the many medical publications supporting its success.

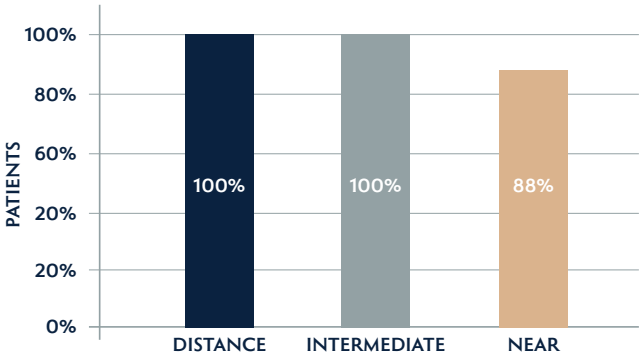
TRIFOCAL RANGE



ADVANTAGES OF A TRIFOCAL LENS

A trifocal lens increases the chance of true spectacle-independence, but with the disadvantage of potentially poorer quality intermediate vision than some other options. However, for the majority of patients this will be of no relevance, the detrimental effect only being noticed by those whose use of a desktop computer involves extremely fine detail such as computerised design packages.

SPECTACLE INDEPENDENCE



Postoperative spectacle-free-vision at different distances

For standard word processing, email and Internet surfing the lens works well. The main driver for implantation is independence from spectacles so choice is based solely on patient preference, not medical need. It is an ideal lens for patients with an active lifestyle who wish to be free from spectacles for all daily tasks, noting that a minority will still require simple readers for small print or when working in dim illumination. As with all lens systems there is variability in individual outcomes and this guidance must only be seen as a general rule.

DISADVANTAGES OF A TRIFOCAL LENS

Unlike a varifocal spectacle lens where the upper part focuses solely for distance and the lower part solely for near, a multifocal intraocular lens splits light from any object three ways producing three different images. Two of these images will be unfocused whilst one is concentrated clearly on the retina and perceived as true. Remarkably, as a consequence of the amazing processing powers of both the retina and the human brain, patients do not perceive a significant loss of light. Contrast sensitivity, however, can be reduced although this effect appears minimal when both eyes are used together. For this reason trifocal lenses are only considered for eyes with potentially excellent vision. Optically they are recognised as intolerant of other ocular pathologies, even dry eye disease.

Optical aberrations (for example halos and ghosting) are less common than with earlier generations of multifocals, as is loss of contrast in dim light and glare in very bright light. However, halos will be perceived around points of light when the pupil is dilated, most obviously from car headlights whilst driving at night. Trifocal lenses may be contraindicated in those who are committed to extensive night driving and in some countries are regarded as an exclusion to the holding of a pilot's licence.

SUMMARY

- The Zeiss trifocal IOL offers excellent visual quality throughout the focal range
- It provides the maximum possible degree of spectacle-independence
- Simple readers may still be required for occasional near vision tasks
- Rings will be visible around point light sources at night, but adaptation is rapid