

# Exploring advanced IOL technology for patients with presbyopia

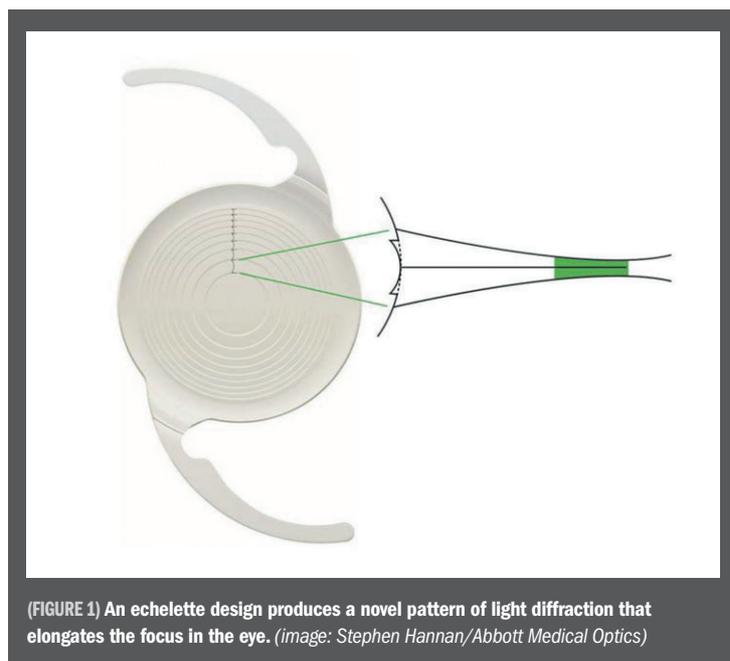
New extended range of vision IOLs offer high-quality vision to presbyopic patients, without side effects

By **Stephen Hannan,**  
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**P**resbyopia-correcting IOL technology has been revolutionary for patients. In the midst of having a problem corrected—cataract—patients have the unique opportunity to improve their vision. For many, their post-cataract vision is the best it has ever been.

In discussion with the patient, the surgeon at Optical Express makes the lens decision and completes the informed consent process, most commonly on the day of surgery. All patients are recommended to see the surgeon in advance, but the vast majority elect to meet their surgeon on the day of surgery. Eyes are typically treated on sequential days, with routine follow-up at 1 day, 1 week, 3 months and annually thereafter.



(FIGURE 1) An echelette design produces a novel pattern of light diffraction that elongates the focus in the eye. (image: Stephen Hannan/Abbott Medical Optics)

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We currently offer a choice from premium aspheric monofocal lenses, functional (low) add lenses and high-add multifocals.

The middle category includes both low-add multifocal IOLs and the relatively new Tecnis Symphony extended range of vision IOL (Abbott Medical Optics), which incorporates compelling new technology.

## Optics advances

The Symphony lens has diffractive optics but is not a traditional multifocal that splits light into two or three focal points. Instead, its ‘echelette’ design produces a novel pattern of light diffraction that elongates the focus in the eye (Figure 1) to produce a continuous range of vision (Figure 2).

The FDA has created a new ‘extended depth of focus’ lens category based on the unique optical properties of the Symphony. Unlike a multifocal, all of the incoming light is directed to the retina. Because the focus is elongated rather than having distinct peaks, the brain doesn’t have to suppress secondary focal points, reducing the chance of ghosting or haloes.

## IN SHORT

► **New extended range of vision IOLs offer high-quality vision to presbyopic patients, without side effects.**

In clinical studies and in our own experience, the incidence of glare and halo is similar to that of a monofocal IOL.

The trade-off of the extended range is some loss of acuity at the very near range. We have found, however, that this has little impact on patient satisfaction.

The optical quality is another technological advance that bears explaining. Tecnis Symphony incorporates achromatic optics that reduce the eye's natural chromatic aberration – the small

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degree of blur that arises from the difference in how light from opposite ends of the visible

spectrum focuses on the retina (Figure 3).

By bringing red and blue/violet light into tighter focus, achromatic technology (especially when combined with correction of spherical aberration) enhances retinal image quality without any negative effect on the depth of focus.<sup>1,2</sup>

The result is a lens that provides very sharp distance vision with near to intermediate vision that is very functional for using a mobile phone or computer, reading the newspaper and many other daily tasks.

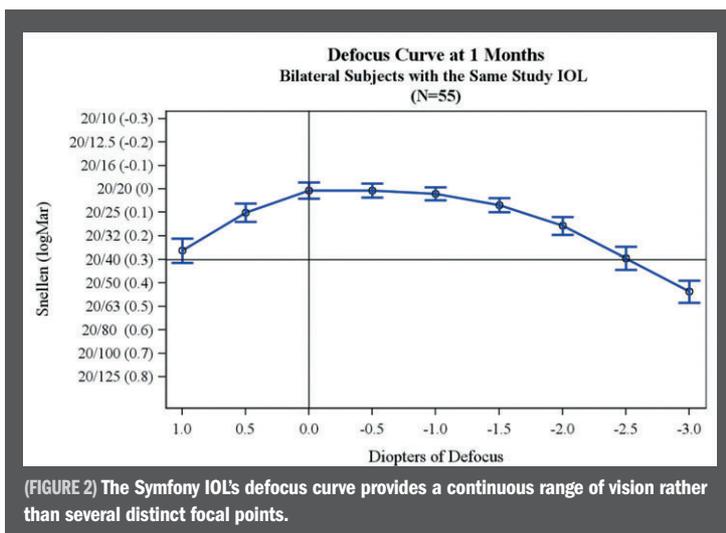
We spend less time counselling patients about glare and halo and about adaptation because patients seem to adapt to this lens faster than they do to multifocal technologies.

And, because it is also available in the UK in a toric version, we can offer it to a wide range of patients.

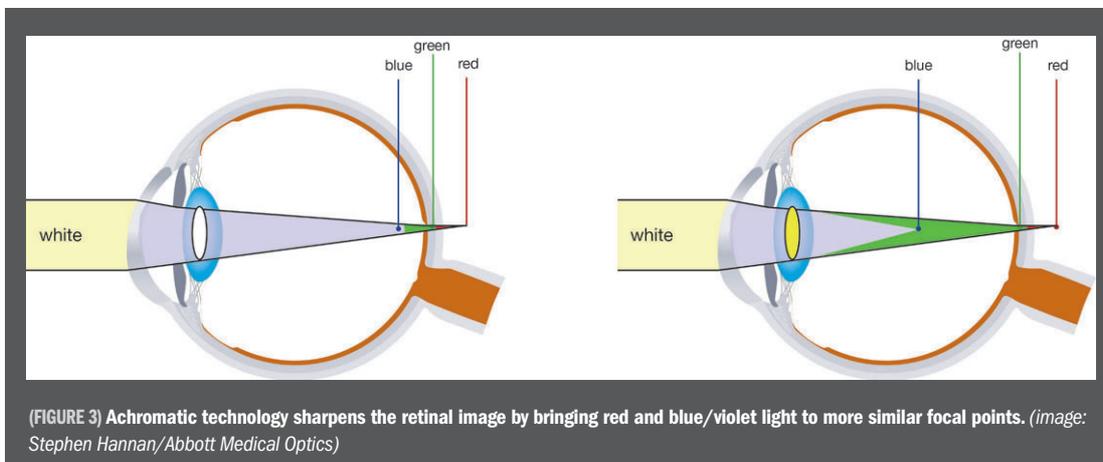
**Clinical results**

After one year of experience with the Tecnis Symphony, we can report excellent results.

We have implanted the lens



(FIGURE 2) The Symphony IOL's defocus curve provides a continuous range of vision rather than several distinct focal points.



(FIGURE 3) Achromatic technology sharpens the retinal image by bringing red and blue/violet light to more similar focal points. (image: Stephen Hannan/Abbott Medical Optics)

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in 4464 eyes of 2702 patients, including more than 300 eyes with the toric version of the lens.

The mean age of the patients is 56.9 years (range 36–88). Eyes with a wide range of refractive error, from –14.13 D to +8.38 D, with up to 3.75 D of astigmatism, have been treated.

Postoperatively, the mean manifest spherical equivalent for all eyes was  $-0.27 \pm 0.56$  D.

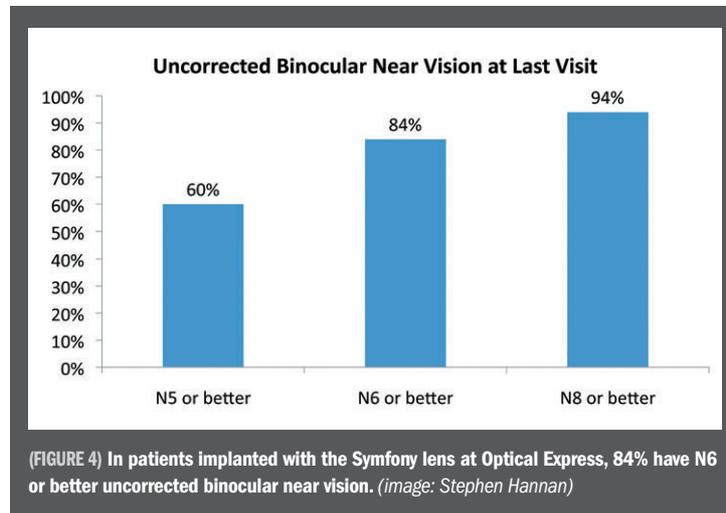
At the last follow-up examination, the mean monocular uncorrected distance visual acuity (UCDVA) was  $0.06 \pm 0.18$  (20/20–3) and mean binocular UCDVA was  $-0.03 \pm 0.11$  (20/20+1), with 99% of patients seeing well enough to pass their driving test without correction.

Uncorrected near visual acuity was  $0.31 \pm 0.17$  monocularly and  $0.24 \pm 0.14$  binocularly at the last visit, with the majority of patients seeing N5 or better (Figure 4).

Patients were very satisfied with these outcomes: 92% said they would recommend the Symfony lens to a friend.

### Conclusions

While ophthalmic surgeons have a range of IOLs that they



can choose to implant, the Tecnis Symfony has become our premium lens of choice for many patients.

Each patient’s clinical and lifestyle requirements are taken into careful consideration during the consultation process.

For most people, the combination of achromatic lens technology and advanced diffractive optics means that we can promise them the kind of functional vision they want without the side effects they would prefer to avoid.

There are still exciting advances to come in presbyopia correction.

We may, for example, see further developments in optical quality and lenses that can fit through smaller incisions. Further into the future, one can envision a time when the multifocality of a lens could be adjusted or removed, or when we could offer patients a truly accommodative IOL.

In the meantime, surgeons already have presbyopia-correcting technology that is a marked improvement over the multifocal technology of just a year ago.

### REFERENCES

1. H.A. Weeber and P.A. Piers. *J. Refr. Surg.* 2012; 28(1): 48-52.
2. P. Artal *et al.*, *Opt. Express* 2010; 18(2): 1637-1648.

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