What makes the Acri.LISA special?

Patient satisfaction is bottom line; innovative design features help achieve it

Dominique Piétrini, MD

For Dominique Piétrini, MD of Clinique de la Vision, Paris, France, what makes the Acri.LISA multifocal IOL special is more than just what he thinks about it. It's also what his patients think.

Asked after surgery if they ever wear glasses, 92 per cent of Dr Piétrini's Acri.LISA patients said "no". The remaining eight per cent answered "occasionally", with most reporting they use glasses mainly for computer work. Would they recommend the Acri.LISA to a friend or relative? "Yes", answered 100 per cent.

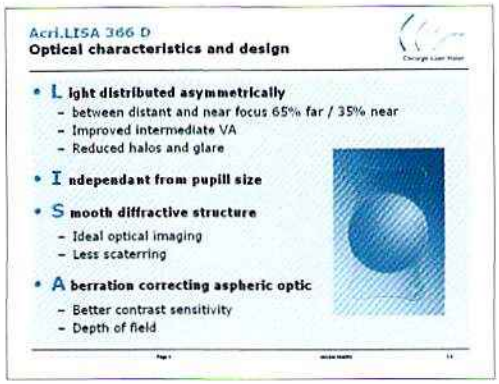
That's about as close to "20/happy" across the board as you're likely to see in a refractive surgery practice. But this level of patient satisfaction doesn't just fall from the sky. Dr Piétrini believes it results from several specific design innovations in the Acri.LISA – and precise surgical technique to take full advantage of them. He also presented research that objectively demonstrates the optical advantages of some of these design features in vivo.

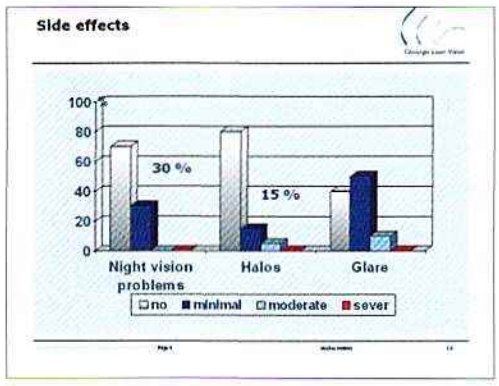
The Acri.LISA 366D and Acri.LISAtoric 466TD are multifocal intraocular lenses, or IOLs, supporting true microincision phacoemulsification cataract and refractive surgery, or MICS, Dr Piétrini pointed out. The lenses are aspheric to offset the positive spherical aberrations of the typical human cornea.

Both lenses are primarily designed for implantation in the capsular bag, with an overall diameter of 11.0mm and an optical zone diameter of 6.0mm. Both lenses are four-haptic designs with zero degrees of haptic offset to ensure maximum centration and rotational stability in the eye, with studies showing less than two degrees rotation on average at six months.

Both accomplish bifocality based on a unique diffractive design with a range of distance power from -10.0 dioptres to +32.0 dioptres in 0.5 D increment, with a power add of +3.75 dioptres for near vision. The major design difference is that the non-toric 366D has the diffractive surface on the front or anterior surface of the lens, while the toric 466TD has a toric profile on the anterior surface with the diffractive bifocal surface on the posterior or back of the lens. The toric lens is available with cylinder correction from +1.0 to +12.0 dioptres in 0.5 dioptre increments.

Either lens can be implanted through an incision as small as 1.5mm. This enhances refractive outcomes because incision sizes below 2.0mm repeatedly have been shown in clinical studies, among other factors, to reduce or eliminate induction of astigmatism and other corneal aberrations. Reduced aberrations in turn improve post-surgical quality of vision as measured by both objective and subjective tests. The 1.5mm incision size makes the lens equally compatible with the latest in both bimanual and coaxial phaco equipment and technique, Dr Piétrini said. "The incision is astigmatically neutral."





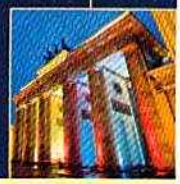
One reason Acri.LISA lenses, which are no thinner than standard lenses, can be injected through such a small incision is that they are extremely flexible and compressible, Dr Piétrini noted. This, along with the lenses' optical precision, is partially a function of the unique material they are made of, according to Carl Zeiss Meditec's representatives.

The lenses are made of a hydrophilic acrylate material with a hydrophobic surface. Before the lens absorbs water it is very rigid, allowing for extremely precise machining that results in superior optical qualities. When hydrated, the lenses contain 25 per cent water, but the hydrophobic surface prevents the infiltration of fluid in the eye. In other words, the material offers the advantages of both hydrophilic and hydrophobic construction without the potential drawbacks of either.

LISA – What's in a word?

The name of the lens – LISA – is an acronym, Dr Piétrini noted. Each letter represents an important feature of the lens' optical characteristics and design.

"L" stands for asymmetrical light distribution. Unlike some lenses that distribute light equally at every distance, the Acri.LISA's diffractive structure allocates 65 per cent of light to distance vision and 35 per cent to near vision. "This is



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supposed to improve intermediate visual acuity and reduce haloes and glare," Dr Piétrini said. His research appears to bear out those theories.

In visual acuity tests of Acri.LISA patients at varying distances, Dr Piétrini found that on average, uncorrected visual acuity peaks at around -0.1 logMAR, or slightly better than 20/20, for distance vision, going down to about +0.2 logMAR at intermediate ranges, and increasing to very close to 0.0 logMAR for near vision. "In our experience tested visual acuity in patients closely mirrors the light distribution of the lens," he said.

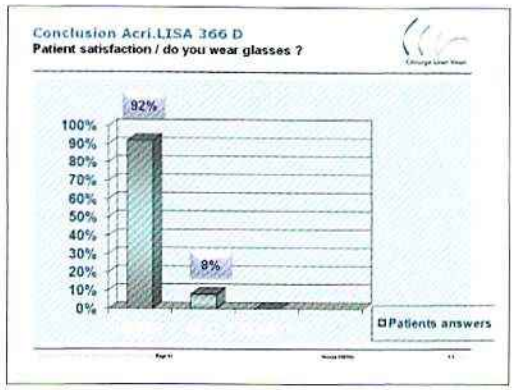
"I" is for pupil independence. Unlike refractive bifocal lenses, which switch from one refractive zone dominating to another as the pupil dilates, the Acri.LISA's diffractive design makes it equally accommodative at all pupil sizes. And unlike spherical IOLs, the Acri.LISA's aspheric profile also keeps its refractive power consistent across pupil-sizes.

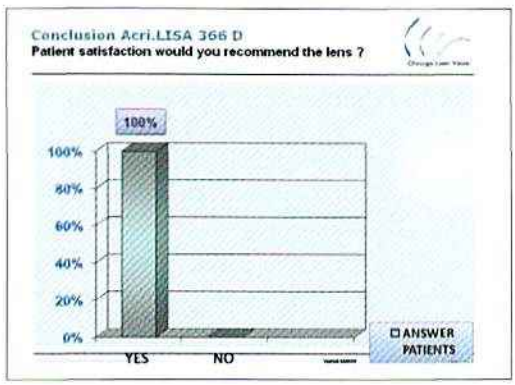
Dr Piétrini demonstrated this advantage dramatically by showing wavefront scans taken at pupil sizes ranging from 3mm to 6mm from a patient with a spherical monofocal lens implanted in one eye and an aspheric Acri.LISA in the fellow eye. The monofocal spherical eye showed a nearly continuous myopic shift as the eye dilated, from +0.5 dioptres at 3mm to -0.5 dioptres at 6mm for a total myopic shift of 1.0 dioptre. The eye with the Acri.LISA varied much less, from -0.03 at 3mm up to a maximum of +0.19 at just over 4.5mm, ending up at +0.10 at 6mm, for a maximum shift of less than one-quarter that seen with the monofocal lens. "With a monofocal spheric IOL, this patient has night vision problems, especially haloes, with this myopic shift with the dilation of the pupil," Dr Piétrini said. "This patient has much less haloes in the multifocal eye."

"S" is for smooth. The Acri.LISA lens is designed with a smooth diffractive structure, which gives the lens ideal optical imaging and results in less light scatter. Dr Piétrini pointed out that the lens has very smooth steps, or phase zones, between its diffractive main zone ridges. By comparison, other diffractive lenses have sharp right angle ridges between the main diffractive zones, which tend to produce abrupt changes in the angle of light striking them.

"The diffractive structure is very smooth due to the patented innovative manufacturing process of the lens and this is important to reduce light scattering of the diffractive structure especially for night vision," Dr Piétrini said. "When we ask patients about side effects, only 30 per cent have minimal or moderate night vision problem with haloes."

"A" is for aspheric optics. Here again, the aspheric Acri.LISA corrects for the spherical aberrations of the typical cornea. Once again, his research bears it out. Among his Acri.LISA patients, Dr Piétrini has seen total fourth order aberrations, or Z4.0, on average go from -0.21 µm to +0.06 µm. "This improves contrast sensitivity and depth of field," Dr Piétrini said. Together with the smooth diffractive surface, these low aberrations also promote pseudoaccommodation in the intermediate vision range.





MICS matters

Of course, no matter how good the lens, the skill of the surgeon and his technique are also supremely important, Dr Piétrini stressed. The surgeon must be expert in evaluating the patient, measuring corneal topography and interior biometry, calculating lens power and must exercise impeccable technique in surgery. In particular, small incisions and accurate correction of astigmatism are essential to a good refractive outcome without resorting to a second touch-up or piggyback lens procedure.

Again, the design of the Acri.LISA helps. Its compressibility makes it possible to routinely perform surgery through sub-2mm incisions. The toric option allows compensation for a complete range of corneal astigmatism without relying on limbal incisions which may not heal predictably.

The result is very few induced aberrations, which is essential for multifocal lenses to perform properly, Dr Piétrini said. "With careful preparation and this lens, you can treat all pre-existing and induced astigmatism. The secondary procedure after implantation should be the exception."

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