LENTIS® Mplus

The only Presbyopia Lens with HD-Vision
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The LENTIS® Mplus intraocular lens for the treatment of presbyopia - successfully established on the international market since 2009 - has since proven, by way of a large number of clinical studies, that it is superior to traditional, diffractive and refractive multifocal lenses.

This leaflet should give you a comprehensive overview of the Mplus technology and its effectiveness.

Globally unique multifocal lens technology to correct presbyopia

The special features of this MIOL are its unique, functional construction and its optical mechanism of action: an aspherical, asymmetric distance zone is combined with a sector-shaped near zone of +3.0 diopters in such a way that there is no visible or perceptible transition between the distance and near zones. This means that reflection due to low lighting or contre-jour, which can dazzle, are avoided and the loss of light is kept to a minimum.

(a) Lateral view of the rotationally asymmetric, multifocal sector lens. Construction of the lens from a combination of two spherical surfaces of differing radii, a primary surface with a radius R1 and an inlaid surface with radius R2.

(b) View of the lens in the direction of the optical axis - topographical representation. The inlaid surface produces a sector segment in the angle range α3 and the radial range r2.

(a) and (b) The mid-points of the sphere of both surfaces are located on the z-axis, ie the optical axis of the sector lens. The vertices of both surfaces pass through the origin. Both main focal points of the lens are located accordingly on the optical axis. An image shift is therefore prevented.
Mplus technology offers many advantages compared with rotationally symmetric MIOL:

- Excellent visual acuity results for the near, intermediate and distance ranges
- Aberration neutrality for better depth of focus
- High pupil independence
- Guaranteed additional 3 dioptres
- Genuine 360° sharp optic edge
- Minimal loss of light <7%
- Optimised image quality and natural contrast and colour perception
- Well proven HydroSmart® acrylate
- Short adaptation phase

Patient surveys confirm:

- Very high level of spectacle independence
- Minimal halo and glare effects
- Above average patient satisfaction

Clinical Results

Prof. Dr. Gerd U. Auffarth, University Ophthalmology Clinic, Heidelberg, Germany

A multi-centre study under the management of Prof. Dr. Gerd U. Auffarth die LENTIS® Mplus were implanted in 134 eyes of 79 patients with an average age of 68 ± 12 years, confirmed that the MIOLs produced very good functional results with a very high patient satisfaction rate of 95%. The IOLs were implanted both unilaterally and bilaterally without any complications. The mean IOL strength was 21.00 ± 2.01D.

Twelve months after surgery, a best-corrected distance visual acuity level of -0.03 logMAR was measured. The uncorrected near visual acuity level came to 0.08 logMAR. This corresponds to, on average, a distance visual acuity level of 1.10 and a near visual acuity level of 0.83.
Clinical Results
Prof. Dr. Jan Venter, Medical Director of Optical Express, London, UK

Visual acuity results of almost 10,000 LENTIS® Mplus IOLs clinical evaluated: in a large comparative study, carried out by Professor Jan Venter between November 2009 and September 2011, 9,366 eyes of 4,683 patients were treated with LENTIS® Mplus intraocular lenses. During a 6-month follow-up study, the near, intermediate and distance visual acuity results of 4,240 LENTIS® LS-312 MF30 IOL models (C-loop design) and 5,126 LENTIS® LS-313 MF30 IOL models (plate haptic design) were compared with each other, before and after surgery, and evaluated. The visual acuity of the patients was excellent for all distances for both lens models.

In addition, a patient survey was carried out. 98% of the patients were happy with the results after surgery and 86% had no problems reading very small print. Almost all patients would therefore unrestrainedly recommend the LENTIS® Mplus!

Patient Questionnaire [3 month follow-up appointment at the clinic]  

How satisfied are you with the result of the procedure?

- Very satisfied: 64%
- Satisfied: 34%
- Dissatisfied: 1%
- Very dissatisfied: 1%

How did the procedure affect your ability to read small print (telephone directory, newspaper)?

- Highly enhanced: 57%
- Enhanced: 29%
- Unaffected: 7%
- Declined: 6%
- Highly declined: 1%
Clinical Results

Prof. Jorge Alió, University Ophthalmology Clinic, Miguel Hernandez, Alicante, Spain

In a comparative study of the Visium Ophthalmology Institute (Alicante, Spain) under the management of Professor Alió, the visual results and the optical quality of the rotationally asymmetric refractive LENTIS® Mplus IOL and of an apodised diffractive multifocal lens were observed for the first time, and evaluated post-operatively in 40 patients and 74 implanted eyes.

The LENTIS® Mplus produced persuasive results during this study, in particular in the wide intermediate range, with considerably better visual acuity results than those obtained with the diffractive IOL group. Near and distance visual acuity results were almost the same for both groups. The LENTIS® Mplus also produced significantly better contrast sensitivity in the photopic range.

**Figure A**: Comparison of mean defocus curves of LENTIS® Mplus (group A) and diffractive IOL (group B). The figure clearly shows better visual acuity results for the LENTIS® Mplus in the intermediate range.

**Figure B**: Comparison of the mean contrast sensitivity function in photopic (85 cd/m²) and low mesopic (3 cd/m²) conditions in eyes with LENTIS® Mplus (group A) and in eyes with diffractive IOL (group B). Group A shows significantly better photopic contrast sensitivity in spacial frequencies of 6, 12 and 18 cycles/degree, post-operatively.
What do the professionals say about the LENTIS® M plus?

“I think that what we have to remember is that diffractive multifocal lenses have been available for 20 years, with a typical energy loss of approximately 20%. If we compare this to 7% (with the Mplus), the difference is not the 14% or 15% we showed in our study—the difference is a 66% less loss of energy. I think if you look at it from this perspective, then you can understand the big difference between this and other multifocal IOLs.”

Gerd U. Auffarth, MD, PhD in LENTIS® Mplus and LENTIS® Mplus™: Advanced multifocal IOL technology for the treatment of presbyopia, astigmatism, and cataract, supplement to CRST Europe 02/2012.

“There are 40 Optical Express clinics in the United Kingdom, and each clinic performs laser vision correction as well as refractive lens exchange/cataract procedures. […] Ninety-five percent of all patients who are treated at one of our centers will receive the Mplus. […] We have so much confidence in the Mplus that the surgeon sees the patient on the day of surgery for the first time.”

Jan A. Venter, MD, PhD in LENTIS® Mplus and LENTIS® Mplus™: Advanced multifocal IOL technology for the treatment of presbyopia, astigmatism, and cataract, supplement to CRST Europe 02/2012.

“My results were so good that I moved to implanting only this lens, without particular discrimination in terms of patient selection.”

Jorge L. Alió, MD, PhD in LENTIS® Mplus – The only Presbyopia Lens with HD-Vision, supplement to CRST Europe 05/2010.

Bibliography:

Jorge L. Alió, MD, PhD, Ana B. Plaza-Puche, MSc; Jaime Javaloy, MD, PhD; María José Ayala, MD, PhD, Comparison of the Visual and Intraocular Optical Performance of a Refractive Multifocal IOL With Rotational Asymmetry and an Apodized Diffractive Multifocal IOL, Journal of Refractive Surgery • Vol. 28, No. 2, 2012, 100-106.

Gerd U. Auffarth, MD, FEBOPht, Detlev R.H. Breyer, MD, Erik L. Mertens, MD, FEBOPht, Jaime Aramberti, MD, Edmondo Borasio, MedCBQ, Claudio Carbonara, MD, Anders Granberg, MD, Johnny Moore, MD, PhD, Dominique Pietrini, MD, Jan A. Venter, MD, LENTIS® Mplus and LENTIS® Mplus™: Advanced multifocal IOL technology for the treatment of presbyopia, astigmatism, and cataract, European expert roundtable SUPPLEMENT TO CATARACT & REFRACTIVE SURGERY TODAY EUROPE I 01/2012.

Gerd U. Auffarth, MD, PhD, Jorge L. Alió, MD, PhD, Erik L. Mertens, MD, FEBOPht, Ruth Lapid-Gorzak, MD, Manfred R. Tetz, MD, PhD, Sunil Shah, FRCOphth, MD, PhD, LENTIS® Mplus – The only presbyopia lens with HD-Vision, European expert roundtable, SUPPLEMENT TO CATARACT & REFRACTIVE SURGERY TODAY EUROPE I 05/2010.


Jan A. Venter, MD, Results and Complications of 9366 Consecutive Multifocal IOLs With Rotational Asymmetry, (co)Optical Express, presented at ASCRS 2012, Chicago.
<table>
<thead>
<tr>
<th>Product</th>
<th>LENTIS® Mplus LS-313 MF30</th>
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<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Foldable one-piece multifocal acrylic IOL</td>
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<tr>
<td><strong>Optic Size</strong></td>
<td>6.0 mm</td>
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<tr>
<td><strong>Overall Length</strong></td>
<td>11.0 mm</td>
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<tr>
<td><strong>Haptic Angulation</strong></td>
<td>0°</td>
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| **Optic Design**        | - Dioptres: Convex-concave  
                          | + Dioptres: Biconvex       
                          | Aspherical surface - posterior | Sectorshaped neavision segment - anterior: +3.0D |
| **Central Thickness**   | 0.97 mm (+22.0D)          |
| **Design**              | Optic and haptics with square edges | Posterior 360° continuous barrier effect |
| **Material**            | HydroSmart® - a copolymer, consisting of acrylates with hydrophobic surface, UV absorbing |
| **Available Diopters**  | −10.0D to −1.0D (1.0D)  
                          | ±0.0D to +36.0D (0.5D)      |
| **Refractive Index**    | 1.46                      |
| **Est. A-Factor [acoustic]** | 118.0              |
| **Anterior Chamber Depth** | 4.97 mm                  |
| **Recommended Incision Size** | 2.2 mm / 2.6 mm          |
| **Recommended Injector [reusable]** | Viscoject-1-hand: L604205  
                                    | Viscoject-2-hand: L604215    
                                    | Cartridges: Viscojet BIO 1.8 Cartridge-Set: LP604250C*  
                                    | Viscojet BIO 2.2 Cartridge-Set: LP604240C |
| **Recommended Injector-sets [disposable]** | Viscojet BIO 1.8 Injector-Set: LP604350C*  
                                    | Viscojet BIO 2.2 Injector-Set: LP604340C |

The given constants are to be seen as a guide value and basis for the calculation of the IOL refractive power. Detailed information on the calculation of own constants can be found at www.augenklinik.uni-wuerzburg.de/eullib/relat.htm.

Source: ULIB (User Group for Laser Interference Biometry)  www.augenklinik.uni-wuerzburg.de/eullib
References:  www.augenklinik.uni-wuerzburg.de/eullib/const.htm

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