

Monovision.
Enhanced.

Ray One
EMV

Rayner

Monovision. Enhanced¹

As a surgeon, you always want to provide your patients with the best possible visual outcomes. However, patients that desire spectacle independence are not always suitable candidates for diffractive trifocal IOLs. To overcome these challenges, many surgeons turn to monovision as an affordable way of delivering some extended depth of vision with reduced dysphotopsia.

RayOne EMV was developed in collaboration with world renowned surgeon, Professor Graham Barrett, to specifically enhance the visual outcomes achieved with monovision.

RayOne EMV uniquely extends a patient's range of vision with a patented non-diffractive optic profile, enabling the depth of field of many presbyopia-correcting IOLs but with no dysphotopsia, short neuroadaptation, reliable outcomes, high patient satisfaction, and improved affordability. RayOne EMV is a versatile IOL that also enhances patient outcomes when bilateral emmetropia is targeted.

Offered on a superior hydrophilic optic platform through the RayOne fully preloaded two-step injector, RayOne EMV is an enhanced monofocal IOL solution unlike any other.



RAYONE FULLY PRELOADED INJECTOR SYSTEM:



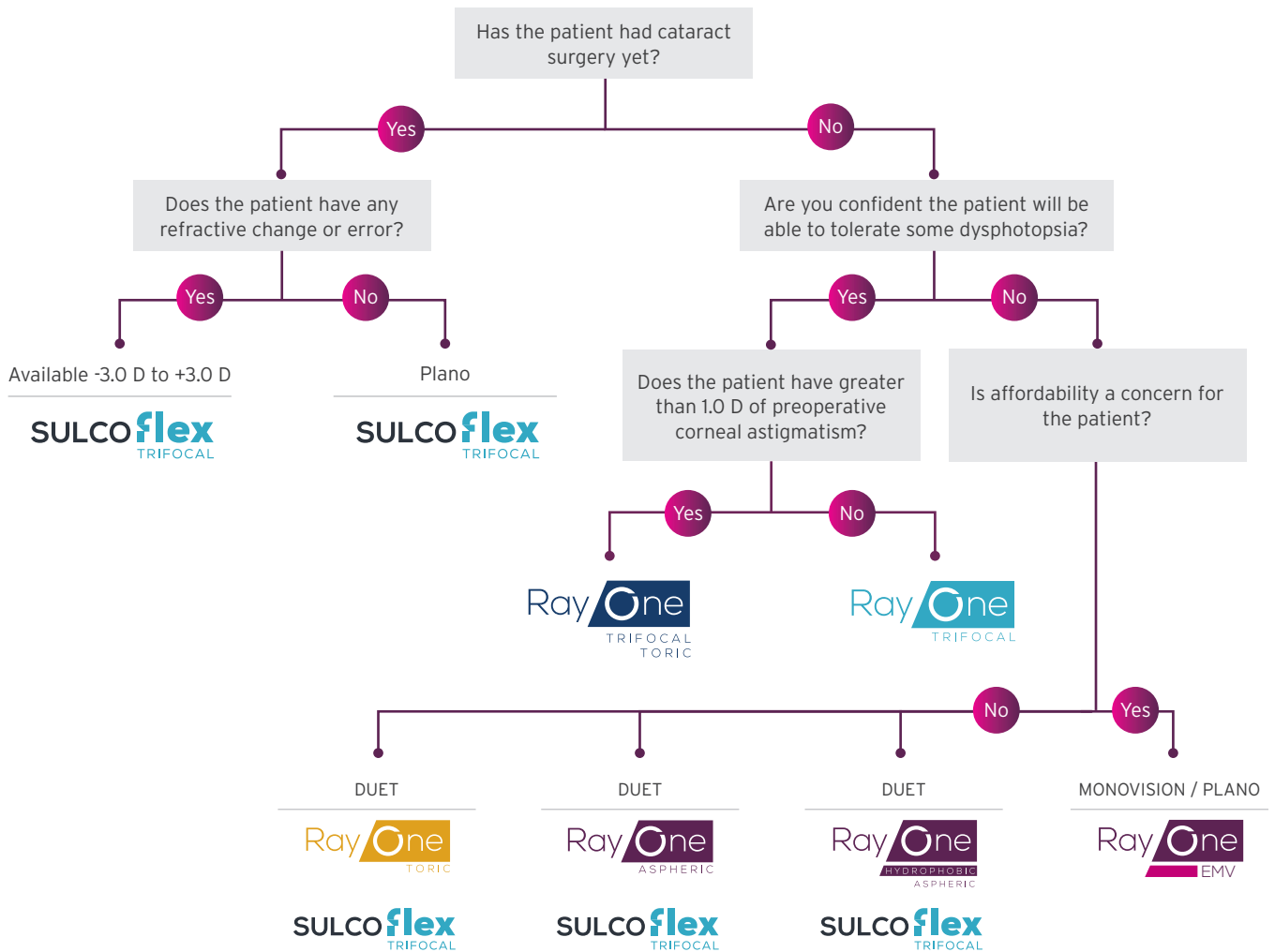
THE QUEEN'S AWARDS
FOR ENTERPRISE:
INNOVATION
2020



"For many years I have worked on optimising a lens for monovision, given that it accounts for nearly 30% of all surgeries. I collaborated with Rayner on bringing this lens to market as RayOne EMV, an exciting new product for all surgeons looking to treat presbyopia reliably"

Professor Graham Barrett, president of the Australasian Society of Cataract & Refractive Surgeons

Choosing the right lens for your premium patients



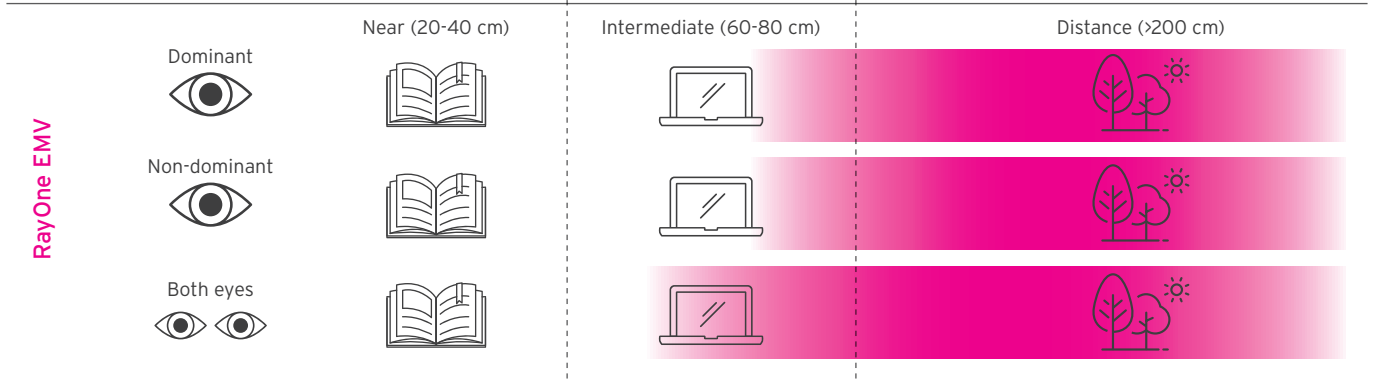
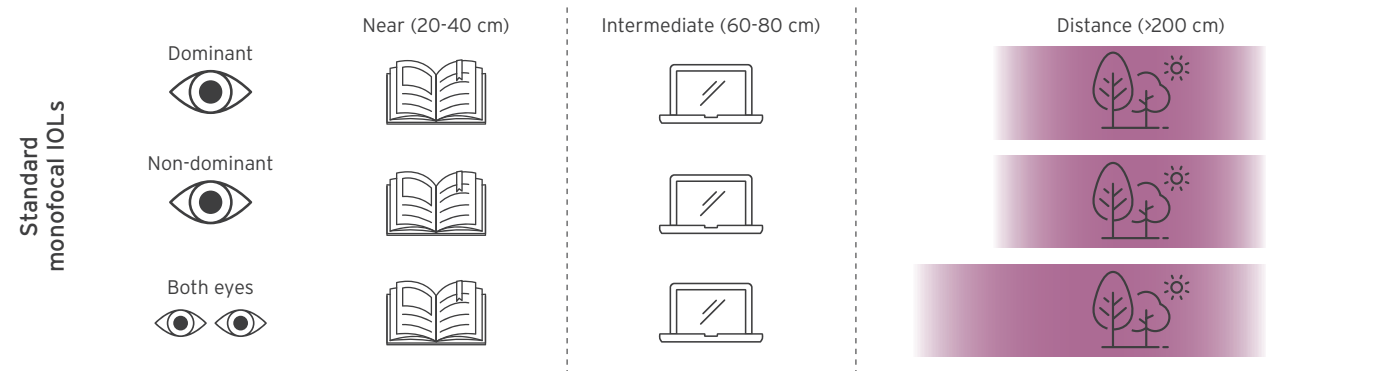
One injector for all RayOne IOLs

A single fully preloaded and repeatable injector for all RayOne IOLs reduces training for clinic teams and supports surgeon confidence in the operating room.

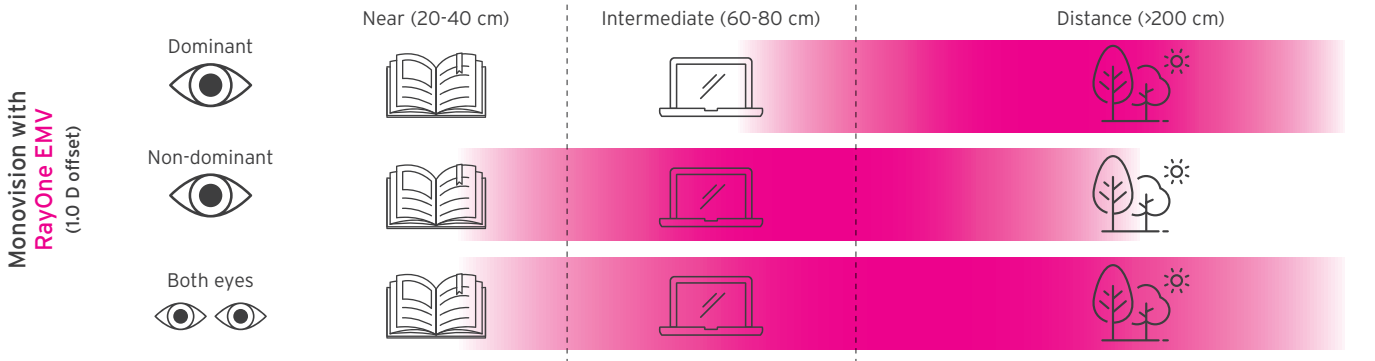
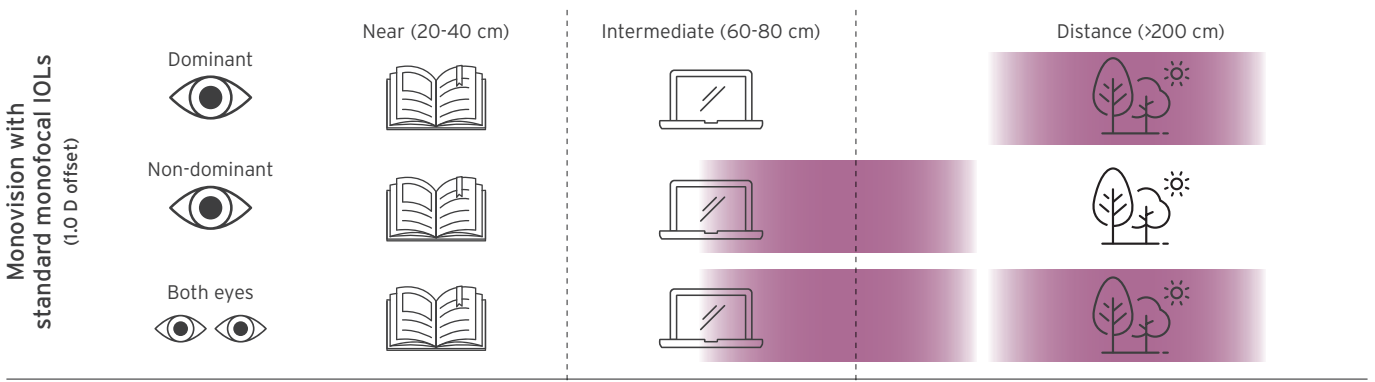


Improve your patient satisfaction

Bilateral emmetropia



Monovision



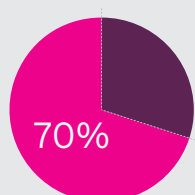
First clinical results with RayOne EMV¹

RayOne EMV was launched in CE mark-accepting countries in October 2020. The following clinical results are from twenty patients in the UK, Spain and Portugal who were implanted bilaterally with RayOne EMV in the months leading up to the commercial launch.

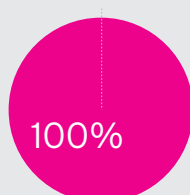
At one-month postoperative, visual acuity and refractive data showed excellent results.

To read the RayOne EMV white paper, visit www.rayner.com/eyescience and search for 'EMV'.

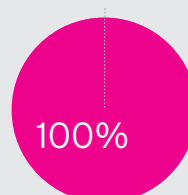
Value		Acuity (LogMAR)	Snellen Approximation
Binocular UDVA	(n=18)	-0.03 ± 0.05	6/6 20/20
Dominant Eye UDVA	(n=18)	-0.02 ± 0.07	6/6 20/20
Binocular UIVA	(n=17)	0.08 ± 0.12	N8 @ 100 cm J1 / J2
Binocular UNVA	(n=5)	N6 Range N4 - N10	6/9 20/32



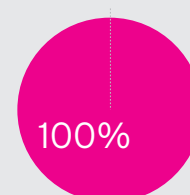
70%
of patients reported spectacle independence at distance, intermediate and near



100%
of patients reported no difficulty negotiating steps, stairs or curbs with no depth perception or contrast sensitivity issues reported



100%
of patients reported no incidence of halo, glare, starbursts or haze



100%
of patients reported being dysphotopsia free

Why positive spherical aberration?

RayOne EMV is the only patented aspheric IOL that induces controlled positive spherical aberration.

With its unique design, RayOne EMV elongates the optical performance in the hyperopic direction, enabling the lens to maintain some distance imaging performance in the non-dominant eye, in a monovision setup.

RayOne EMV complements the natural positive corneal spherical aberration so that there is less deviation from the natural spherical form in order to provide consistent visual results across a wide range of corneas and optic alignments.

Dominant eye target	Non-dominant eye offset	Approximate depth of focus
0 D	0.00 D	1.25 D (~80 cm)
0 D	0.25 D	1.50 D (~66 cm)
0 D	0.50 D	1.75 D (~57 cm)
0 D	0.75 D	2.00 D (~50 cm)
0 D	1.00 D	2.25 D (~44 cm)

Early experience with RayOne EMV

Dr. Mariano Royo, Director of Ophthalmology at the Hospital San Rafael in Madrid and Director of the Ophthalmic Institute of Madrid, shared his clinical results of 22 eyes of 11 patients implanted with RayOne EMV at six months post-op and 70 eyes of 35 patients implanted with TECNIS Eyhance (Johnson & Johnson Vision) measured at one-year post-op. Bilateral emmetropia was targeted for all patients in both groups. Figure 1 reports the binocular defocus curve obtained using the best distance correction. A progression of plus and minus lenses in 0.5 D increments was consecutively added (range +3.0 to -5.0 D) to produce defocus after which visual acuity was tested again.

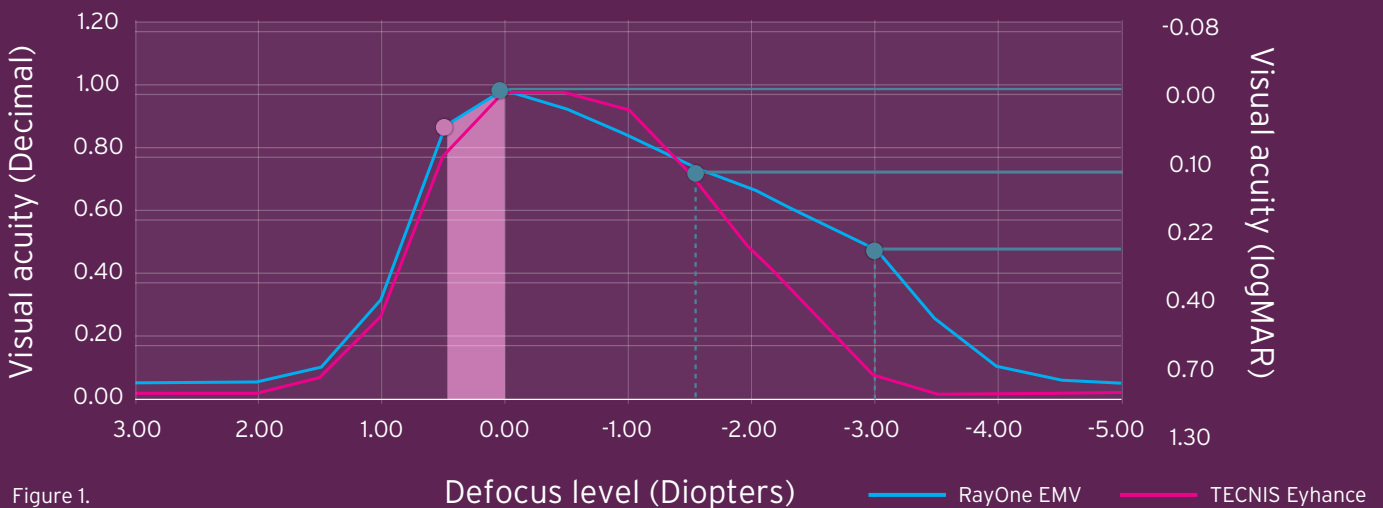


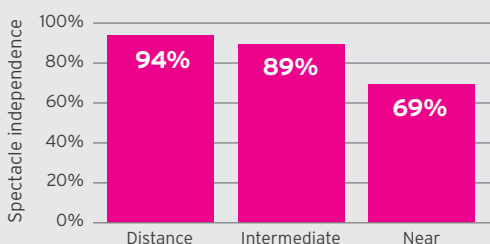
Figure 1.

The defocus curves of both IOLs showed a peak at defocus 0.00 D (4 m) and a reduction in visual acuity with the increase in negative defocus. However, Dr. Royo found that RayOne EMV achieved a smoother profile along the entire curve with a less abrupt decrease in visual acuity, especially within the defocus range from -2.00 (corresponding to 50 cm) to -3.00 D (corresponding to 33 cm).

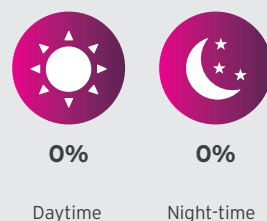
Dr. Royo reported that 100% of his patients that received RayOne EMV achieved spectacle independence in the distance and intermediate range. The average reading aid at 33 cm was reported to be +1.5 D. One in three patients that received RayOne EMV had functional near vision without the need for spectacles.¹¹

To read the RayOne EMV comparative white paper, visit www.rayner.com/eyescience and search for 'EMV'

RayOne EMV patient reported outcomes:*

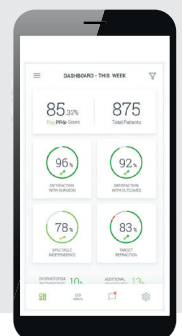


Dysphotopsia:



RayPRO

Learn more at
rayner.com/RayPRO



*RayPRO global metrics. 23 September 2021.



“RayOne EMV can easily be the lens that helps surgeons go from being a standard lens surgeon to a premium lens surgeon. It is a natural, easy transition for most surgeons to make, and it provides patients with good quality distance and intermediate vision along with useful near vision for many, particularly with a mini-monovision approach.”¹²

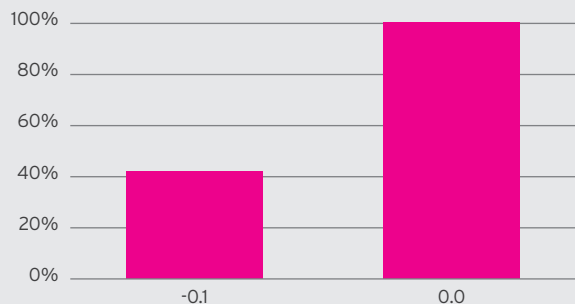
Mr Allon Barsam, Consultant Ophthalmic Surgeon & Director at OCL Vision

Uncorrected distance visual acuity at 2 weeks postoperative

Binocular UDVA LogMAR	No. of patients	Cumulative %
-0.1	5	41.70%
0	7	100%

n=24 eyes

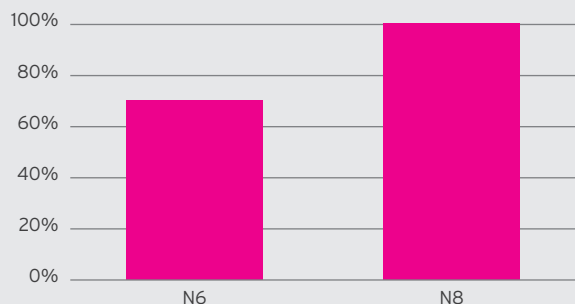
Mean Binocular UDVA (LogMAR) -0.04 ±0.05



Uncorrected intermediate visual acuity at 2 weeks postoperative

Binocular UIVA	No. of patients	Cumulative %
N6	7	70%
N8	3	100%

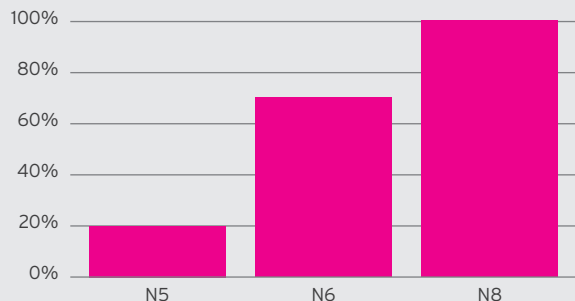
n=20 eyes



Uncorrected near visual acuity at 2 weeks postoperative

Binocular UNVA	No. of patients	Cumulative %
N5	2	20%
N6	5	70%
N8	3	100%

n=20 eyes

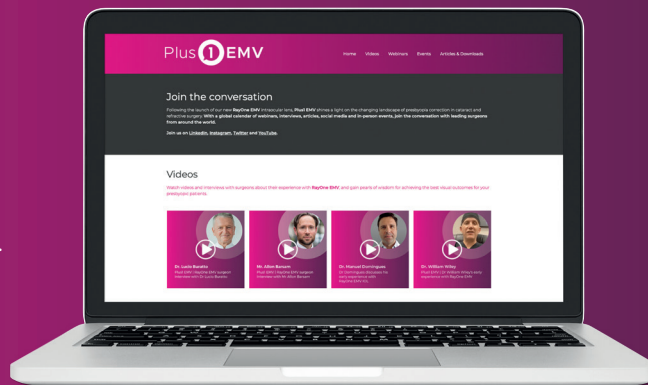


To learn more about Mr Barsam’s experience with RayOne EMV, visit www.rayner.com/eyescience and search for ‘EMV’

Join the conversation

Plus1 EMV shines a light on the changing landscape of presbyopia correction in cataract and refractive surgery. Engage with thought leaders from around the world on their experiences and patient outcomes with RayOne EMV.

Visit www.rayner.com/Plus1EMV to watch video content, download resources and join future events and discussions.



Search for #Plus1EMV



RayOne EMV



KEY INFORMATION

- Approximately 2.25 D of extended depth of vision (with 1.0 D offset)
- Superior intermediate vision when compared with standard monofocals
- Fully preloaded across the entire power range



HYDROPHILIC
MATERIAL

FEATURES & BENEFITS

- Smoother, blended transition between the dominant and non-dominant eyes when compared with standard monofocals, maintaining binocular stereoacuity and reducing asthenopia.
- High quality spectacle-free distance vision.
- Reduced pupil dependency, for optimised performance under low light conditions.
- Reduced sensitivity to decentration and tilt compared to other IOL designs.
- Complements the eye's natural positive spherical aberration.
- Bilateral emmetropia can be targeted.

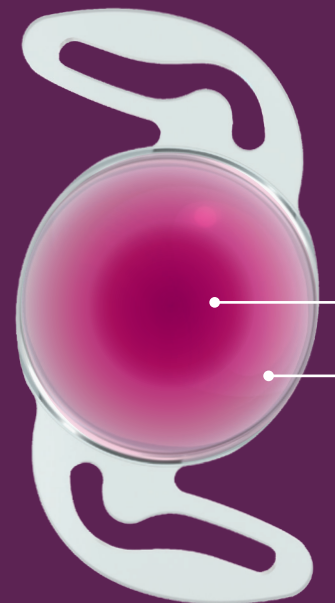
When considering a presbyopia-correcting solution, what's important to you?

- Increased range of functional vision
- Minimal dysphotopsia
- High patient satisfaction

RayOne EMV is designed with an aspheric anterior surface and unique inner optic zone which induces controlled positive spherical aberration to extend depth of field without compromising visual acuity under low-light conditions.

RayOne EMV provides approximately 2.25 D of extended depth of vision with a 1.0 D offset, improving intermediate vision compared to monovision achieved with standard monofocals and reducing dysphotopsia compared to diffractive IOL designs.

Centre region: Induced positive spherical aberration



Blended edge region: Reduced longitudinal spherical aberration to maintain visual acuity and contrast sensitivity under mesopic conditions

VACUOLE FREE MATERIAL FOR A GLISTENING FREE IOL

- Single piece IOL created from a homogeneous material free of microvacuoles³
- Compressible material for delivery through a micro incision
- Excellent handling characteristics with controlled unfolding within the capsular bag
- Low silicone oil adherence⁴
- Excellent uveal biocompatibility⁵
- Hydrophilic acrylic material with low inflammatory response⁶

A PREDICTABLE AND DEPENDABLE PRELOADED IOL

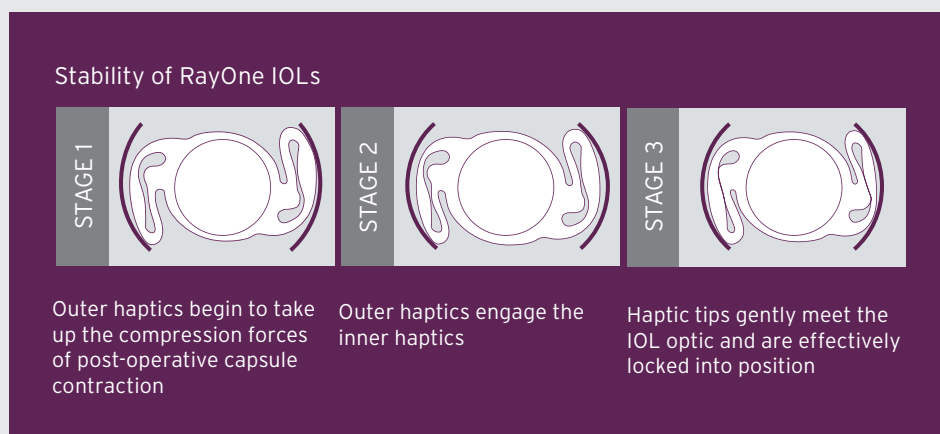
- Amon-Apple enhanced square edge for minimal PCO 1.7% at 24 months⁷
- Average offset of only 0.08 mm 3 to 6 months after surgery⁸
- 1.83° mean IOL rotation 3 to 6 months after surgery⁸
- Fully preloaded from +10.0 D to +30.0 D, in 0.5 D increments

360° Optimised barrier to reduce PCO

Rayner's 360° Amon-Apple Enhanced Square Edge creates an optimum barrier to reduce epithelial cell migration including at the haptic-optic junction.^{7,9}

ND: YAG CAPSULOTOMY RATES ⁷		MEAN TIME TO ND: YAG CAPSULOTOMY ⁷
At 12 months	0.6%	9.3 ± 5.5 mths (range 2.6 - 22.7 mths) Follow-up period: 5.3 - 29 mths
At 24 months	1.7%	

Extremely low Nd:YAG capsulotomy rates, comparable with hydrophobic acrylic lenses with square-edge optics.⁷

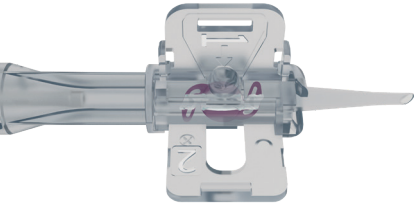


Comparison of preloaded IOLs

Company	Rayner	Alcon	J&J
Lens platform	200E	Acrysof IQ	Tecnis1
Injector	RayOne	UltraSert	iTec
Nd:YAG rate	1.7% ¹	7.47% ⁷	3.75% ⁷
Miyata grade (glistenings)	0 ² (None)	3 ⁸ (High)	0 ¹² (None)
Abbe value	56 ²	37 ⁹	55 ⁹
Refractive index	1.46 ³	1.55 ¹⁰	1.47 ¹²
Mean decentration	0.08 mm ⁴	0.78 mm ¹¹	0.27 mm ¹³
Nozzle diameter	1.65 mm ⁵	2.08 mm ⁵	1.86 mm ⁵
Injector preparation steps	2 ⁶	3 ¹⁰	4 ¹²

1. Mathew RG and Coombes AGA. Ophthalmic Surg Lasers Imaging. 2010 Nov-Dec; 41(6):651-5. 2. Rayner. Data on File. White paper. 3. Ferreira T et al. J of Refract Surg. 2019; 35(7): 418-25 4. Bhogal-Bhamra GK et al. Journal of Refractive Surgery. 2019;35(1):48-53. 5. Nanavaty MA et al. J Cataract Refract Surg. 2009; 35:663-671. 6. www.rayner.com 7. Cullin F et al. Acta Ophthalmol. 2014; 92(2): 179-83 8. Werner L. J of Refract Surg. 2010; 36(8): 1398-1420 9. Zhao H et al. Br J Ophthalmol. 2007; 91(9): 1225-29 10. www.mylcon.com 11. Humbert G et al. FR J Ophthalmol. 2013; 36(4): 352-61 12. jnvisionpro.com 13. Baumeister M et al. J of Refract Surg. 2009; 35(6): 1006-12

RayOne injector

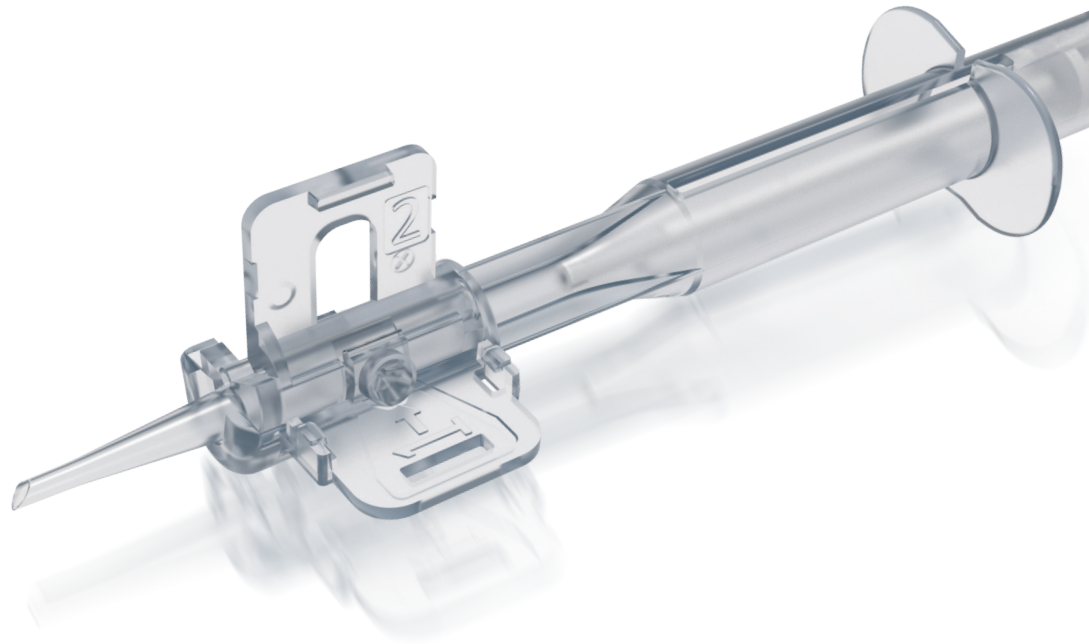


TWO-STEP SYSTEM

- Easy to use¹⁰
 - i. Minimal learning curve
 - ii. Minimises error
- Efficient IOL delivery time¹⁰
 - i. Designed for repeatability
 - ii. Reduces operating time
- **Step 1:** Insert OVD into cartridge via port
- **Step 2:** Lock cartridge ready for implantation

FEATURES & BENEFITS

- 1.65 mm nozzle for 2.2 mm incision
- Smallest fully preloaded injector nozzle
 - i. Ease of insertion
 - ii. Enables true micro incision
- Parallel sided for minimal stretch
 - i. 2.2 mm delivery
 - ii. Maintains incision architecture
- Ergonomic design for ease of handling
- Single handed plunger with minimal force required



Unique patented Lock & Roll technology for consistent delivery

- Rolls the lens to under half its size before injection
 - i. Consistent, smoother delivery
 - ii. Reduces insertion forces
- Fully enclosed cartridge with no lens handling
 - i. Reduces the risk of lens damage
 - ii. Minimises chance of contamination

Lock & Roll technology



Consistently locked and rolled to under half its size in one simple action

In a comparative study of six market-leading preloaded delivery systems¹⁰

1. RayOne received the maximum score for 'ease of use' for all delivery steps:



- 2. RayOne was the least time consuming system for delivering the IOL
- 3. RayOne showed less injector tip damage post-insertion than 50% of the tested delivery systems
- 4. RayOne showed minimal wound stretch compared to other tested delivery systems when inserted through a 2.2 mm incision

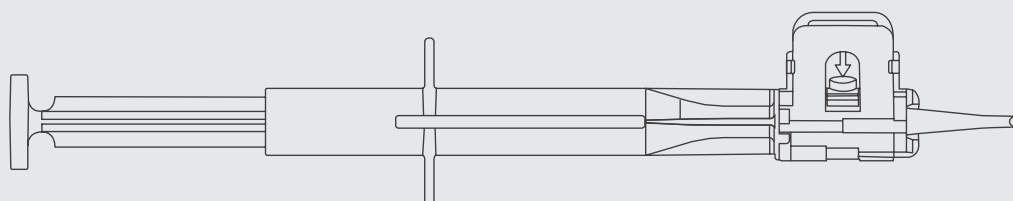


Ultrasert (U) (Alcon Laboratories, Inc.), iTec (IT) (Abbott Medical Optics, Inc.), Eyecee (E) (Bausch & Lomb, Inc.), iSert (IS) (Hoya Surgical Optics, Inc.), and CT Lucia (CT) (Carl Zeiss Meditec AG). All trademarks are property of their respective owners

RAYONE FULLY PRELOADED INJECTOR SYSTEM:



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RayPRO

Real-time patient feedback data

RayPRO is a mobile and web-based digital platform that collects insightful Patient Reported Outcomes (PROs) over three years.

• New insightful trends

- Promote your services to new patients, with easy-to-understand metrics.
- Supports appraisals, recertification and auditing.

• Fast and simple

- Patients are registered in seconds.
- Only value-adding data is collected.
- Access metrics anytime from your smartphone (iOS and Android).

• Automated collection of PROs

- Patients provide their feedback in just a couple of minutes.
- Responses are anonymous to encourage patient honesty.
- Reports are always live, with no data analysis needed.
- Use product and patient trends to improve your service.

• Secure cloud-based platform

- Designed for data security and to be GDPR and HIPAA compliant.
- Only you can see your personal RayPRO reports and metrics.
- Questionnaire responses are non-identifiable to protect patients' data privacy.



RayPRO is FREE for users of Rayner IOLs.
rayner.com/raypro



RayOne EMV References:

1. RayOne EMV: First Clinical Results, Rayner. 2020 Oct. 2. Zhang F, Sugar A, Barrett G. Pseudophakic monovision: A clinical guide. Thieme. 2018. 3. Rayner. Data on File (RDTR1937).
4. McLoone E, Mahon G, Archer D, Best R. Br J Ophthalmol. 2001; 85:543-545. 5. Tomlins PJ, Sivaraj RR, Rauz S, Denniston AK, Murray PI. J Cataract Refract Surg. 2014; 40:618-625.
6. Rayner. Data on File. 7. Mathew RG, Coombes AGA. Ophthalmic Surg Lasers Imaging. 2010 Nov-Dec; 41(6):651-5. 8. Bhogal-Bhamra GK, Sheppard AL, Koli S, Wolffsohn JS. J Refract Surg. 2019;35(1):48-53. 9. Vyas AV, Narendran R, Bacon PJ, Apple DJ. J Cataract Refract Surg 2007; 33:81-87. 10. Nanavaty MA and Kubrak-Kisza M. J Cataract Refract Surg 2017; 43:558-563. 11. Royo, M. RayOne EMV and TECNIS Eyhance: A Comparative Clinical Defocus Curve. Data on file. 2021. 12. How to Choose the Right Solution for Your Patients, CRSTE April 2021.

Technical information

Model Name	RayOne EMV
Model Number	RAO200E
Power Range	+10.0 to +30.0 D (0.5 D increments)
Delivery System Type	Fully preloaded IOL injection system
Incision Size	2.2 mm

Delivery System	
Injector Type	Single use, fully preloaded IOL injection system
Nozzle Size	1.65 mm
Bevel Angle	45°
Lens Delivery	Single handed plunger

Aspheric Monofocal IOL	
Material	Single piece Rayacryl hydrophilic acrylic
Water Content	26% in equilibrium
UV Protection	Benzophenone UV absorbing agent
UV Light Transmission	UV 10% cut-off is 380 nm
Refractive Index	1.46
ABBE	56
Overall Diameter	12.50 mm
Optic Diameter	6.00 mm
Optic Shape	Biconvex (positive powers)
Asphericity	Aspheric anterior surface
Optic Edge Design	Amon-Apple 360° enhanced square edge
Haptic Angulation	0°, uniplanar
Haptic Style	Closed loop with anti-vaulting haptic (AVH) technology

Estimated Constants for Optical Biometry								
SRK/T	Haigis			HofferQ	Holladay	Holladay II	Barrett Universal II	
A-constant	a0	a1	a2	pACD	SF	pACD	LF	DF
118.6	1.17	0.40	0.10	5.32	1.56	5.32	1.67	0

For Contact Ultrasound, the estimated A-constant is 118.0

Please note that the constants indicated for all Rayner lenses are estimates and are for guidance purposes only. Surgeons must always expect to personalise their own constants based on initial patient outcomes, with further personalisation as the number of eyes increases.

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An eye drop family designed specifically to support visual outcomes and patient satisfaction before and after surgery.

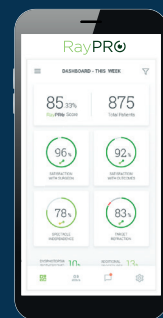
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RayPRO

A free mobile and web-based digital platform that collects insightful Patient Reported Outcomes (PROs) over three years.

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MADE IN UK

