

Evaluation of Visual Performances of New 2.2 mm Preloaded Aspheric IOL



Fabrizio Camesasca MD¹ & Matteo Piovella MD
Centro Microchirurgia Ambulatoriale – CMA
Monza (Milan)- Italy
¹Istituto Clinico Humanitas – Milan – Italy

Financial Disclosure

Dr Camesasca has no financial interests or relationships to disclose

Dr Piovella has the following financial interests or relationships to disclose.

As consultant

Abbott Medical Optics
Aaren Scientific
Carl Zeiss Meditec

As lectures fees:

BVI Beaver Visitec International
Ocular Therapeutix
TearScience

piovella@piovella.com

The Ideal Aspherical IOL



The ideal aspherical IOL should be perfectly

- Positioned
- Aligned
- Centered

However, the performance (PSF – MTF) of the ideal aspherical IOL can be **worse** than the one of an spherical IOL

Prolate Aspheric IOL

Any aspheric IOL demonstrate a reduction in optical quality in IOL misalignment

If more prolate type asphericity is involved, the optical performance is more sensitive to IOL misalignment

Contrast and Lens Misalignment (simulated letter E with monofocal IOLs)



Nominal Eye at 5 mm pupil with Best focus position at 3 mm pupil for the corresponding IOL position in the Eye

LENS	Spherical IOL	Aaren Scientific Aspheric IOL	TECNIS® Z9000 IOL (assessed)	Acrysof® IQ (equivalent IOL*)	SofPort® A0 IOL
20/20 Perfectly Centered					
20/20 Decentered by 0.5 mm					
20/20 Decentered by 1.0 mm					
20/20 5° tilt					














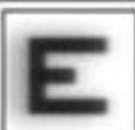


Vision Quality of Aspheric IOL



Is Total Residual Spherical Aberration the most important factor in choosing an aspheric lens?

LENS	Spherical IOL	Aaren PAL IOL	Competitor 1	Competitor 2
Average Corneal SA	+0.27	+0.27	+0.27	+0.27
Lens SA	+0.15	-0.12	-0.27	-0.17
Total Residual SA (for a centered lens)	+0.42	+0.15	0.00	+0.10

The answer is not as clear as one might think...

LENS	Spherical IOL	Aaren PAL IOL	Competitor 1	Competitor 2
20/20 Perfectly Centered				
20/20 Decentered by 0.5 mm				
20/20 Decentered by 1.0 mm				
20/20 5° tilt				

Images simulated from theoretical analysis using Zemax® software.

Regardless of lens spherical aberration, the optics of 1st generation aspheric IOLs are optimized for the centered position: because of this, some perform poorly if they become decentered or tilted.

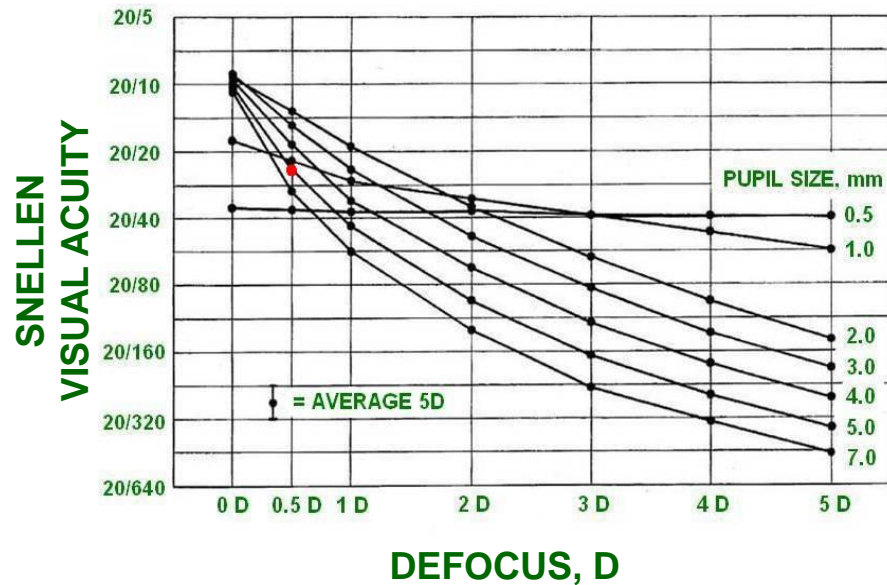
Aaren PAL IOL has its optics designed to take consideration of a broad range of aberrations arising with the lens misalignment

Residual Refractive Error as Function of Pupil Size and Defocus



Monofocal Technology Visual Acuity Sensitivity to Residual Refractive Error as Function of Pupil Size (Patent of Jack Holladay)

Visual Acuity (20/24) with 0.50 D
Defocus and 5mm Pupil Size



Monofocal Technology Snellen Visual Acuity as Function of Pupil Size and Defocus (Patent of Jack Holladay)

Pupil size

D
i
o
p
t
e
r
s

	2.0	3.0	4.0	5.0	6.0	7.0
TDL	20/09	20/06	20/04	20/04	20/03	20/03
0.0	20/10	20/09	20/10	20/10	20/11	20/11
0.50	20/12	20/15	20/19	20/24	20/28	20/30
1.00	20/19	20/24	20/33	20/44	20/52	20/56
2.00	20/36	20/49	20/68	20/95	20/121	20/130

TDL indicates Theoretical Diffraction Limits



Aaren EC-1R / 1Y HPI Preloaded Lens

Features

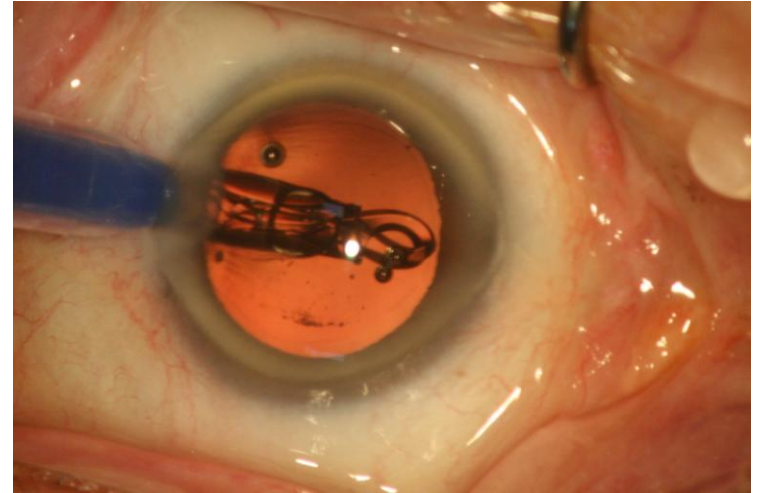
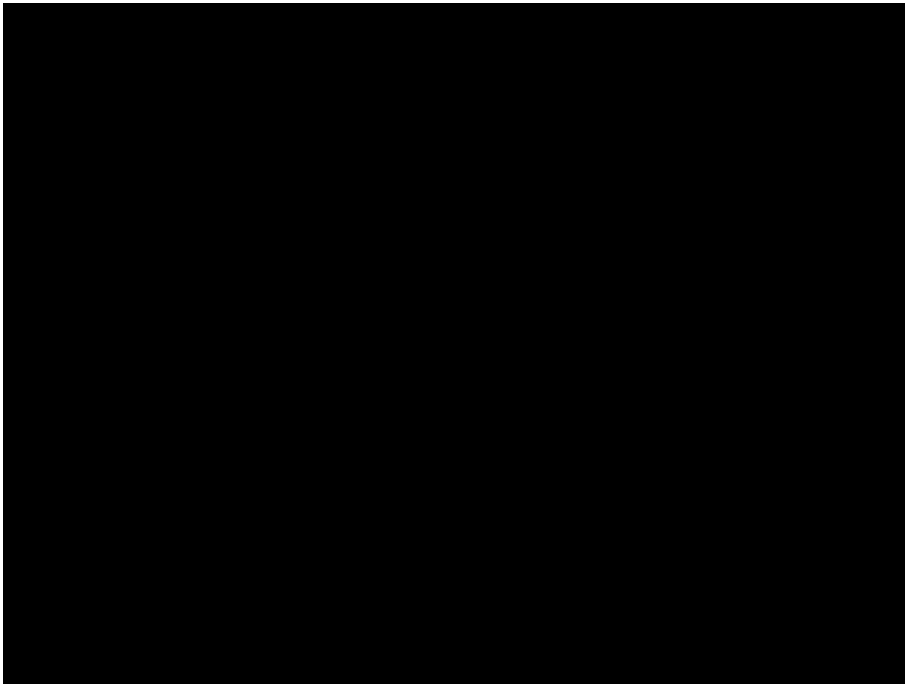
- Available fully pre-loaded
- Next generation aspheric optics – non prolate aspheric surface.
- Square edge design – 360° sharp edge to decrease PCO rate.
- Refractive index equal to PMMA to reduce unwanted images and glare.
- Haptic profile designed to eliminate capsular bag stretching.
- Blue-blocking EC 1Y HPI and heparin surface modification.

Benefits

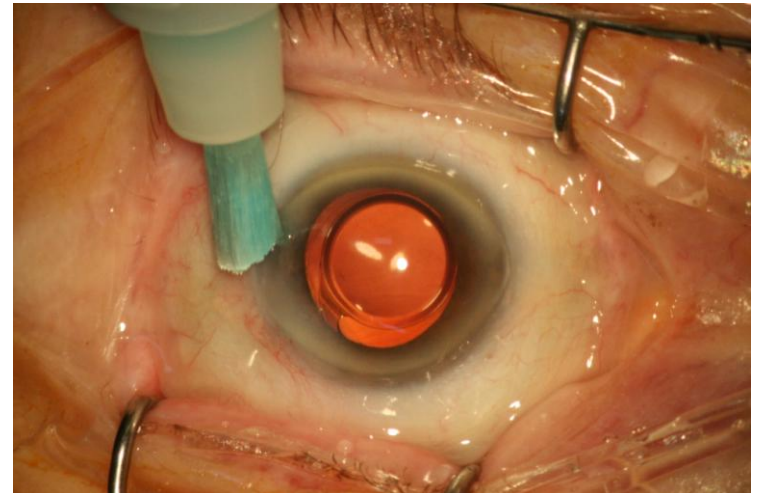
- Reduce postoperative inflammatory response in the early postoperative period.
- Results in reduced foreign-body sensation reactions as measured by specular microscopy and slit-lamp examination, especially in the early postoperative period.
- Appears to be a valuable tool to decrease implant- associated bacterial endophthalmitis.



EC-1R HPI Preloaded Lens Implantation Technique



Preloaded IOL implantation



Hydrogel Ocular Bandage

Aaren EC-1R/1Y HPI Preloaded Lens - 43 Eyes

Materials and Methods



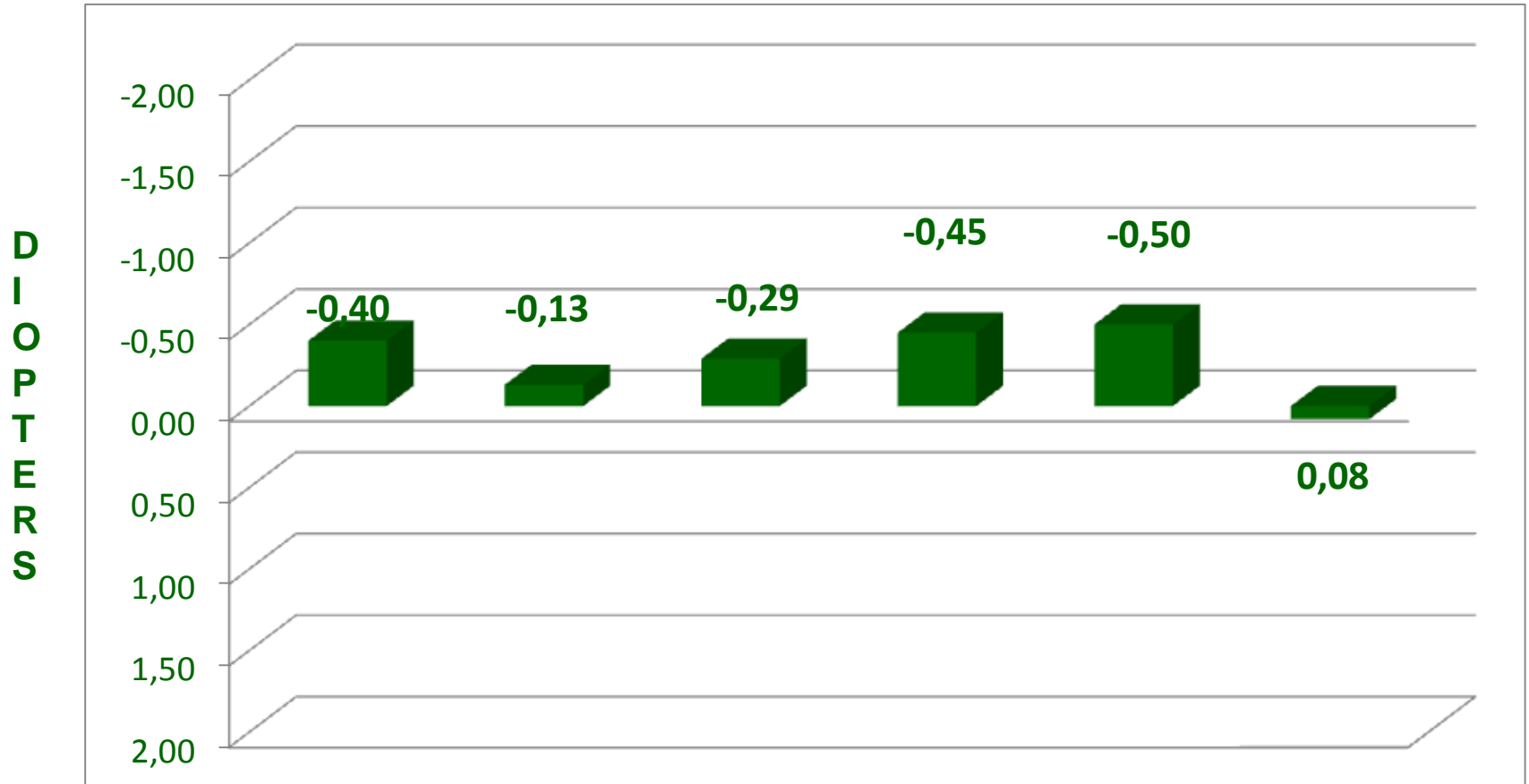
- **EC-1R HPI preloaded lens implanted in 43 eyes of 25 patients**
 - **Mean age: 74.03 ± 7.38 years**
 - **Postoperative evaluation:**
1 Day PO, 1 – 3 – 6 Months PO, 1 Year Po
 - **Follow-up: 1 year**
-
- **Manifest Refraction: Spherical Equivalent**
 - **Uncorrected VA (UCVA)**
 - **Best corrected distance VA (BCVA)**

EC-1R HPI Preloaded Lens

Manifest Refraction: Spherical Equivalent



Outcome for targeted refraction

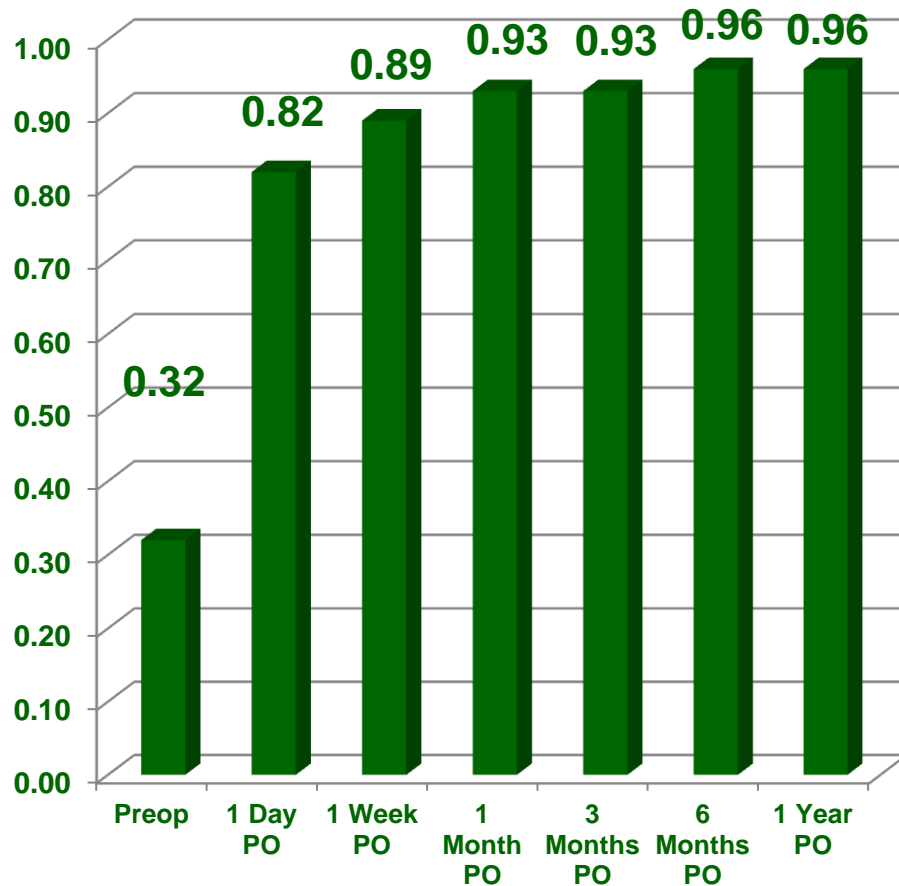


EC-1R HPI Preloaded Lens

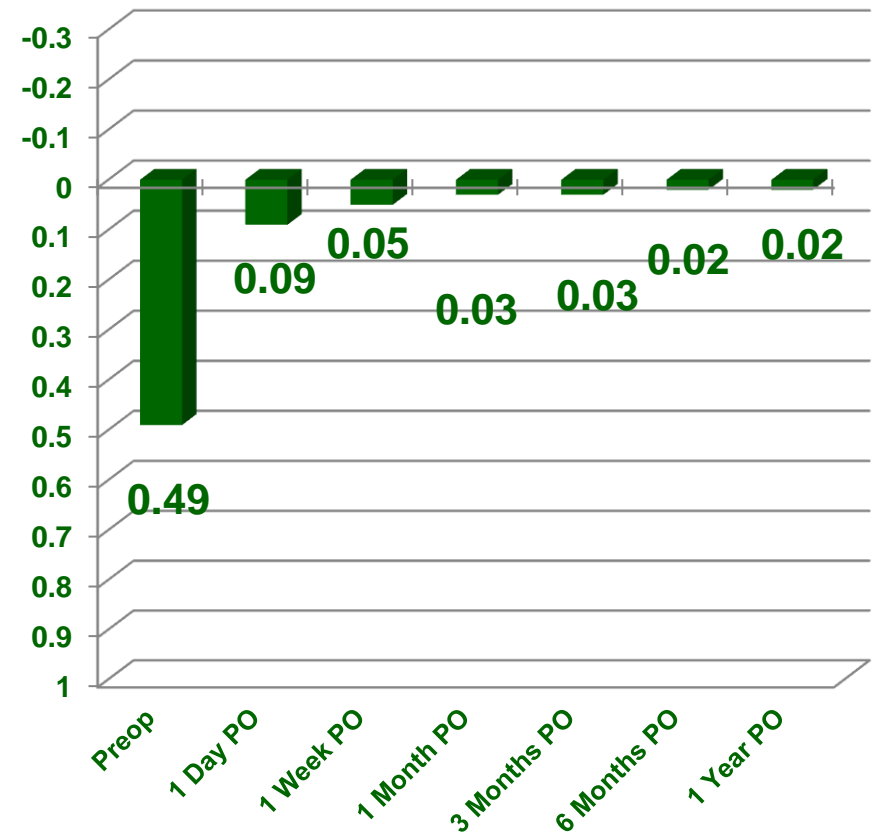
Uncorrected Monocular Visual Acuity



UCVA Decimal



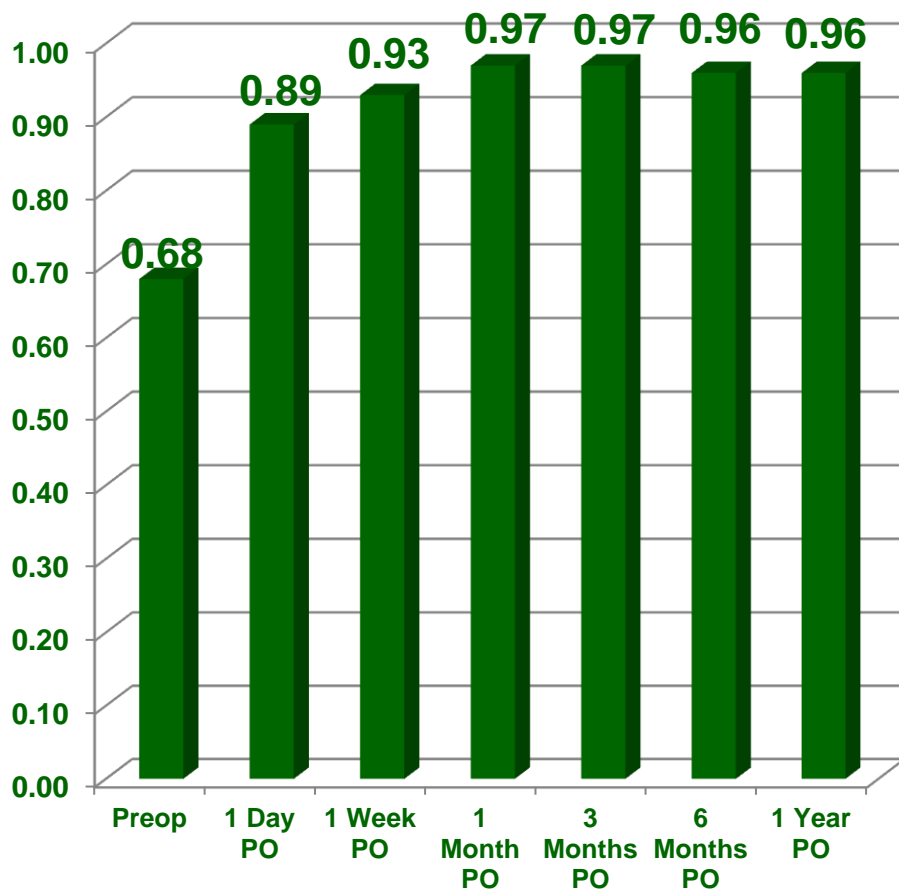
UCVA LOGmar



EC-1R HPI Preloaded Lens Best Corrected Visual Acuity



BCVA Decimal



BCVA LOGmar

