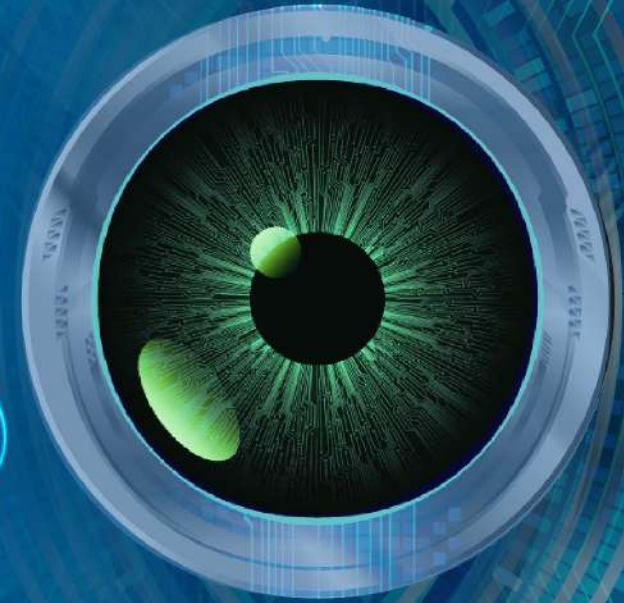
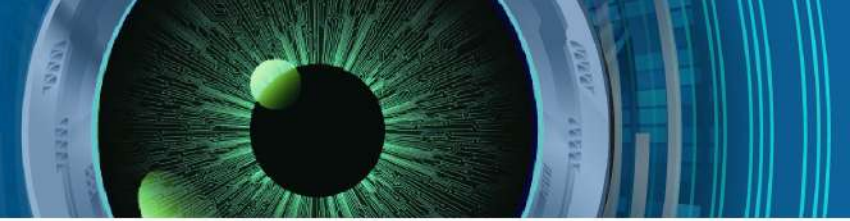


NATIONAL FORUM
IOL Revolution
HIGH QUALITY VISION



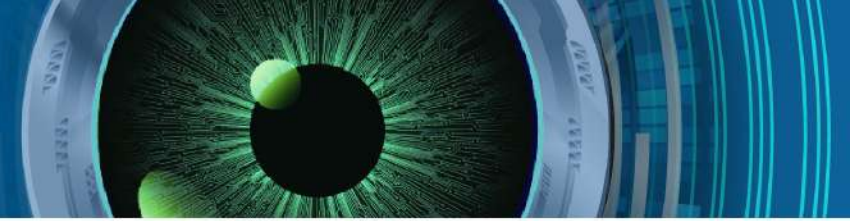
Lenti intraoculari e presbiopia: evoluzione o illusione?

M. Camellin, U. Camellin
Sekal Microchirurgia Rovigo



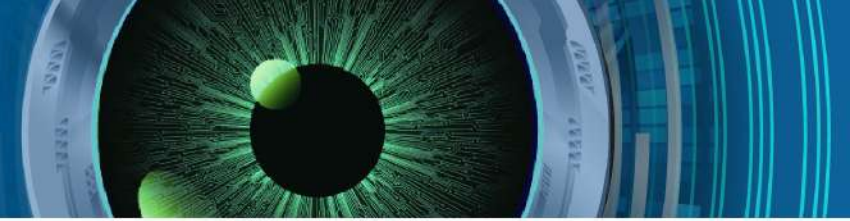
Presbiopia

- La **presbiopia** [dal greco *presbys* (πρέσβυς) *vecchio* e op- (οπ-) -opia *ottico* o *dell'occhio*, radice dei termini riguardanti la vista, quindi *occhio vecchio*], detta anche **presbitismo**, è una condizione parafisiologica del cristallino dell'occhio che dopo le prime quattro decenni di vita perde elasticità e dunque la capacità di focalizzare in modo nitido gli oggetti a distanze inferiori a 25 cm (convenzione oftalmica).



IOL

- Non possono ovviare alla patogenesi della presbiopia ma possono ovviare agli effetti così come fanno gli occhiali per lettura
- In sintesi si tratta di un compromesso
- Ci sono inevitabilmente dei limiti nella soluzione che andiamo ad adottare



Per tecnologia ottica

Per comportamento Ottico (MTF)

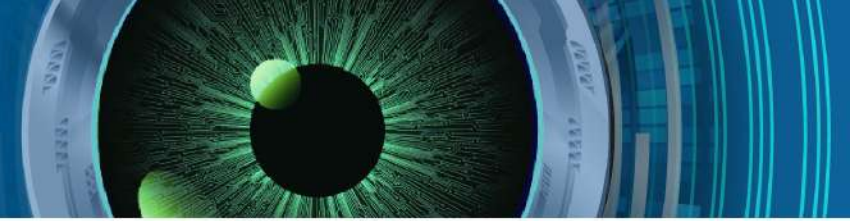
CLASSIFICAZIONE IOL Per la presbiopia (IOL Premium)

ISO 11979-7 (2024)
Standardizzazione analisi

Classificazione funzionale (DOFi) ESCRS

ANSI Z80.35
Criteri Standard EDOF



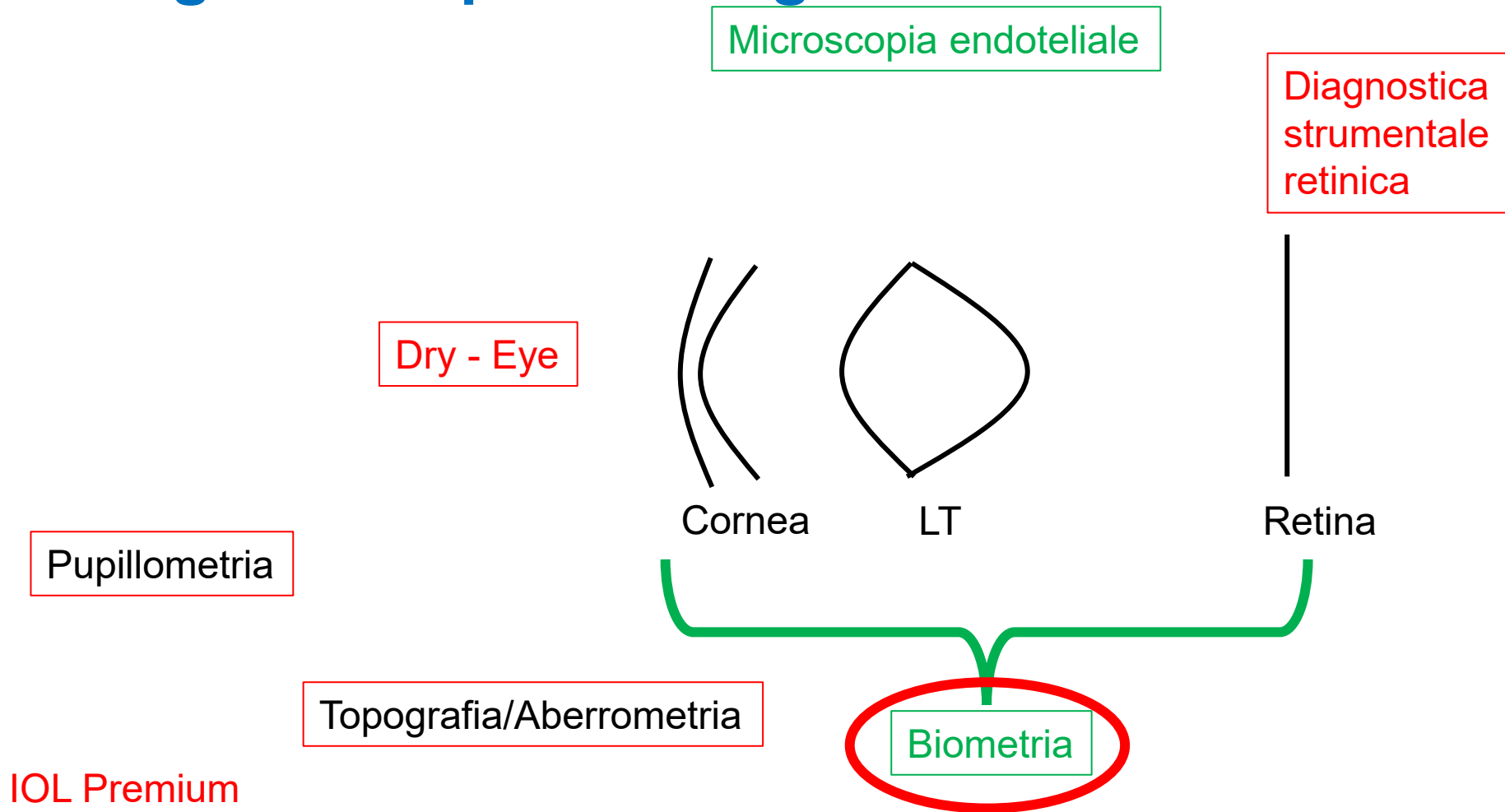


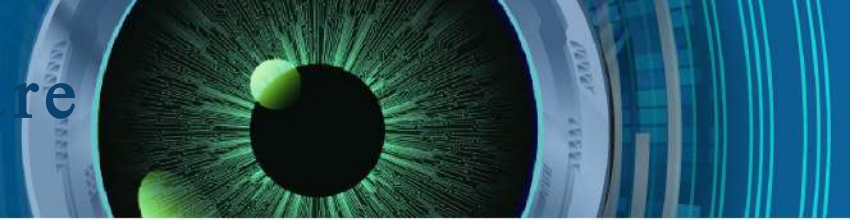
I criteri e gli esami per una corretta selezione dei pazienti. Chi escludere? Chi candidare?

La vera evoluzione non è semplicemente avere sempre più tipi di IOL, ma essere diventati più capaci di capire quale sistema ottico può funzionare in quale occhio.



Diagnostica pre-chirurgia della cataratta **IOL PREMIUM**



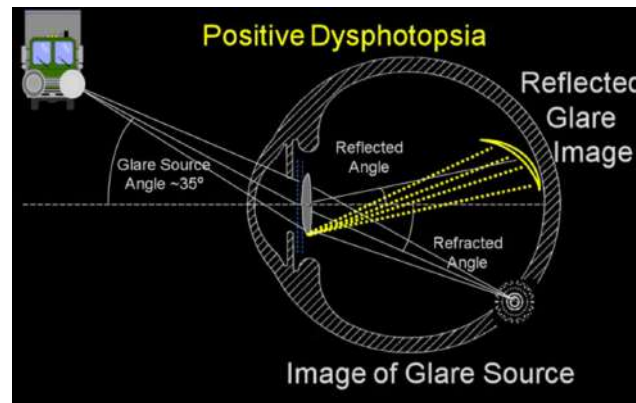
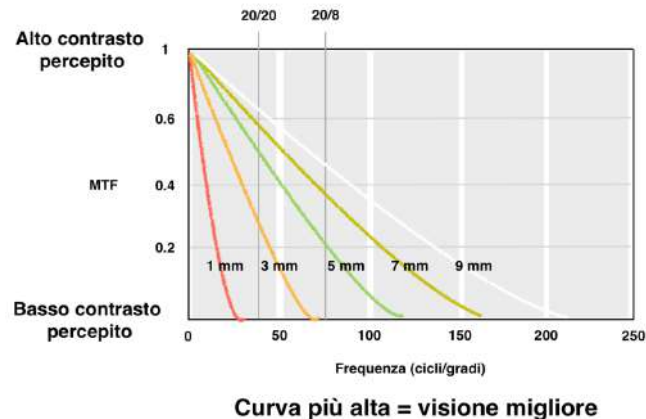


Pupille Grandi

Migliore sensibilità al contrasto (solo nella teoria)

Ma aumento delle HOAs (coma, trifoglio, SA) → Aloni, Glare

Ma disfotopsie positive (IOL con bordo squadrato)

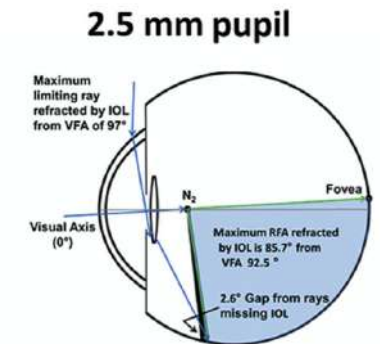
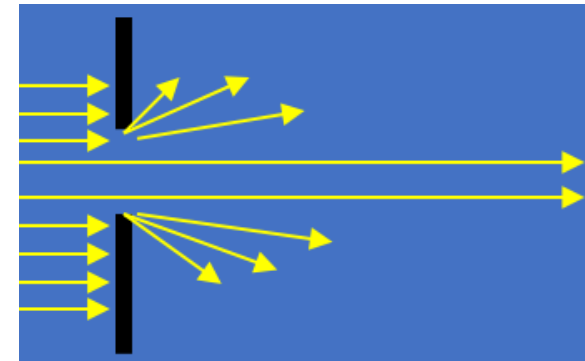


Pupille piccole

Migliore DOF

Ma diffrazioni (se < 3mm) → Starburst

Ma disfotopsie negative (ombra per bordo IOL)



*Gu et al Ann Transl Med 2020,

*Xu et al, Am J Ophth 2022

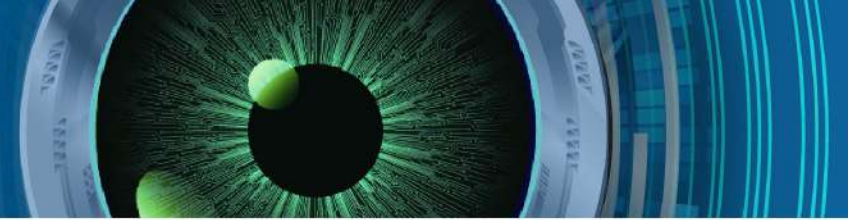
*Gu et al Eye and Vision 2022

*Ashena et al Vision MDPI 2020

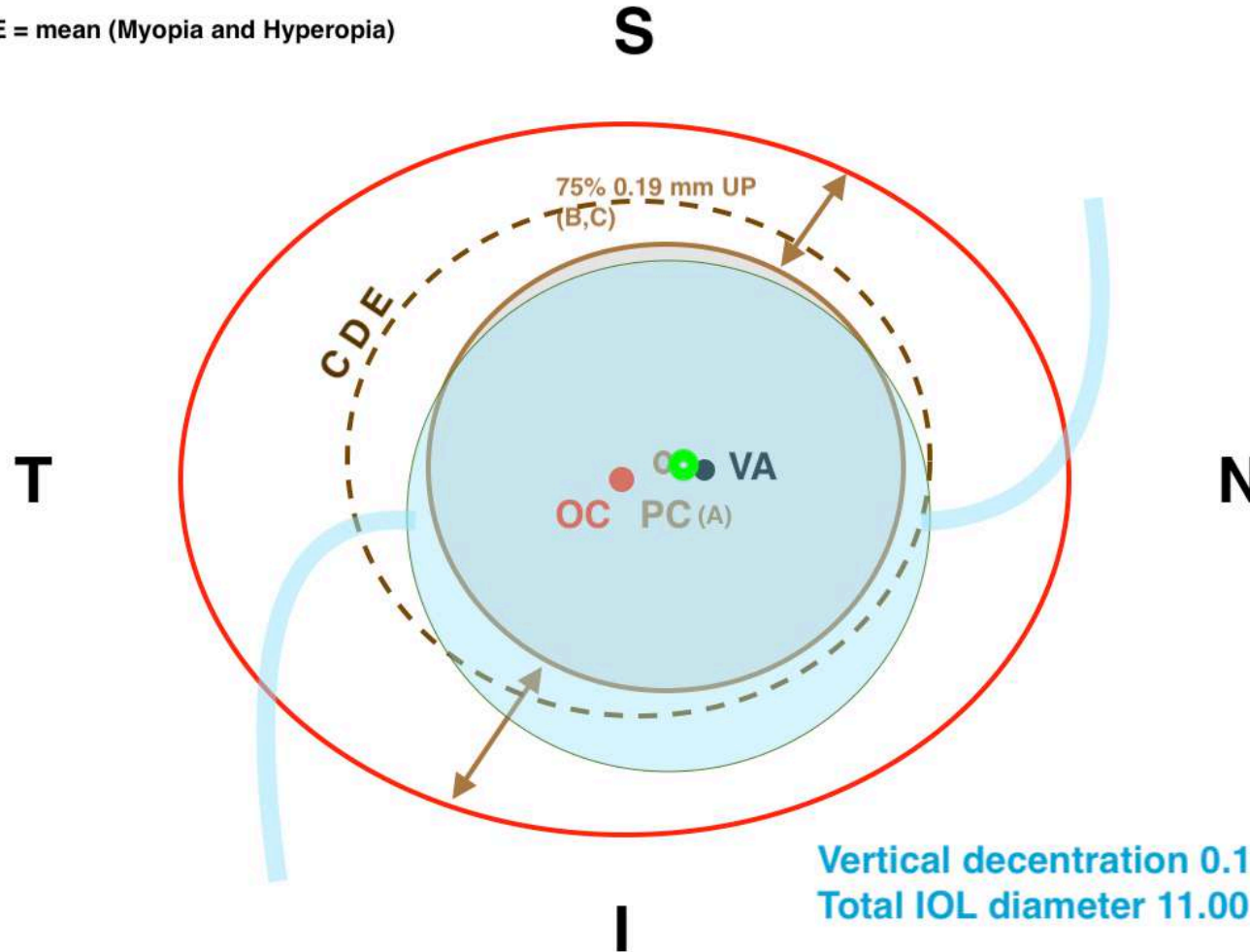
*Perez-Vives et al Graefes Arch Clin Exp Ophth. 2014

*Holladay JT JCRS 2012

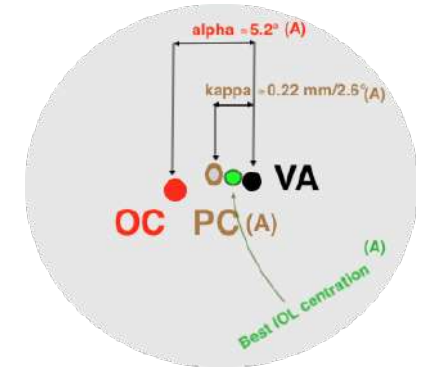




ALL VALUE = mean (Myopia and Hyperopia)

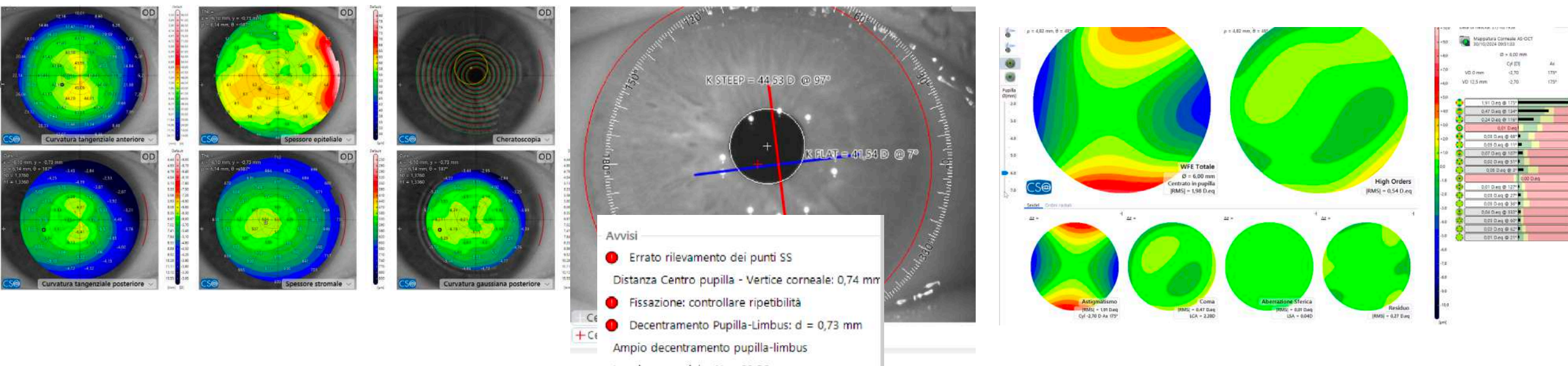


- A Holladay JT Quality of vision 2007
- B Asano-Kato et al JCRS 2005
- C Camellin M et al JCRS 2005
- D Pande et al Ophth 1993
- E Nuzzi et al Eye 1997
- F Gu et al Ann Transl Med 2020
- G Meng et al Eye and Vision 2020
- H Xu et al Am J Ophth 2022
- I Gu et al Eye and Vision 2022
- L Kemp PS et al Eye 2015



Vertical decentration 0.15 - 0.2 mm - (F, G, H, I, L[sulcus])
 Total IOL diameter 11.00 -13.00 mm

Decentration of ocular surfaces with VA: non rotationally symmetric aberrations (Coma, trifoil, cyl,...)



Se queste strutture non sono coassiali, la stessa IOL che funziona molto bene in un occhio può comportarsi diversamente in un altro.



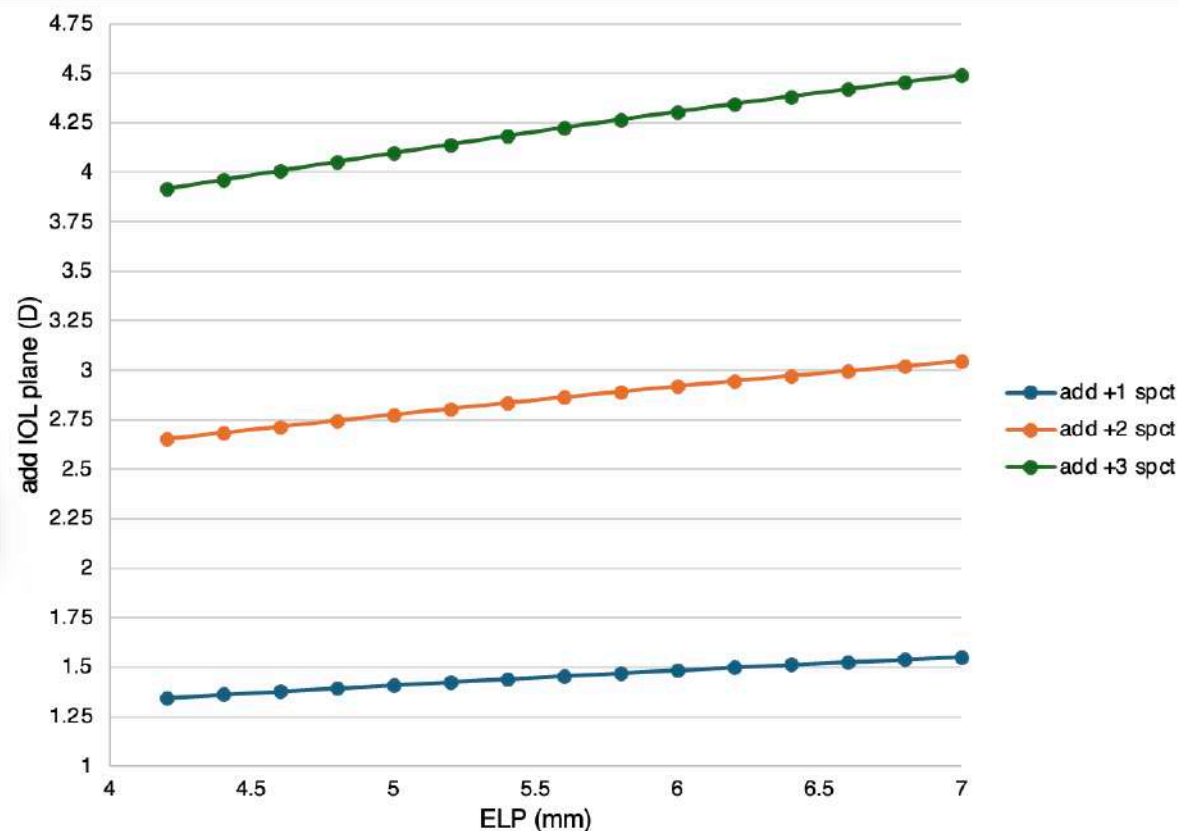
Add (SPEC) $\propto$ ELP



$a=1000/\text{prerx-V}$
 $b=1000/a+K$
 $c=1336/b-\text{ELP}$

$d=1000/\text{DpostRx-V}$
 $e=1000/d+K$
 $f=1336/e-\text{ELP}$

$\text{IOL}=(1336/c)-(1336/f)$



Anche l'ELP della IOL modifica l'effetto additivo della IOL stessa



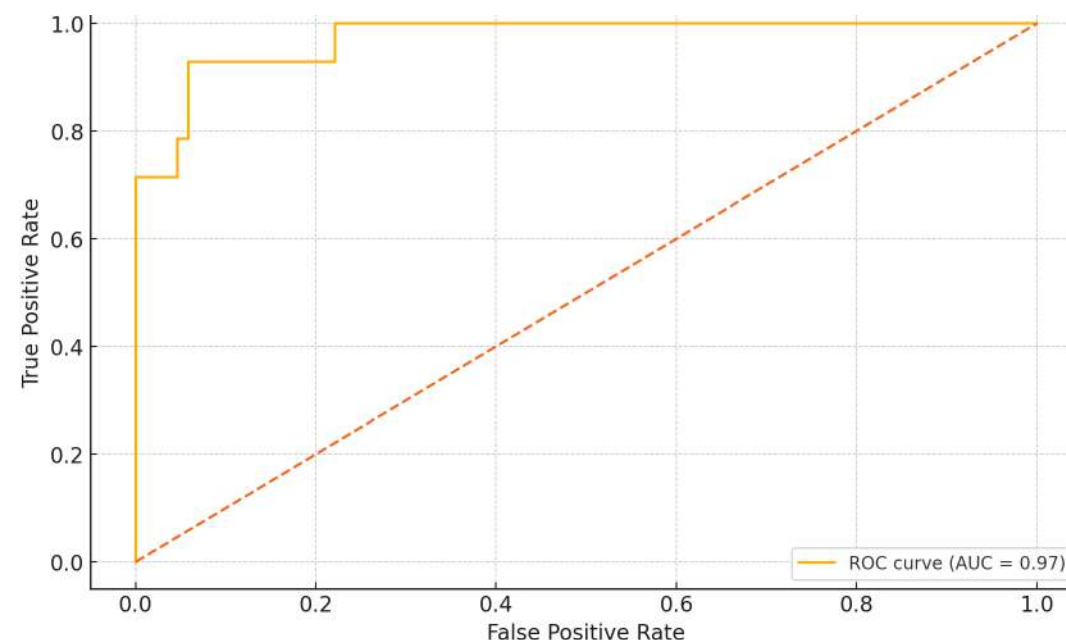


ODS (Ocular Dominance Shift): 40.4% (total sample=188 eyes)

hole-in-card test

Fattore preoperatorio	OR (Odds Ratio)	P-value
Età	1.093	0.033
UDVA dell'occhio non dominante	3.856	0.038
Cataratta sottocapsulare posteriore (PSC)	7.618	0.047
Astigmatismo totale	3.479	0.018

ROC estrapolata



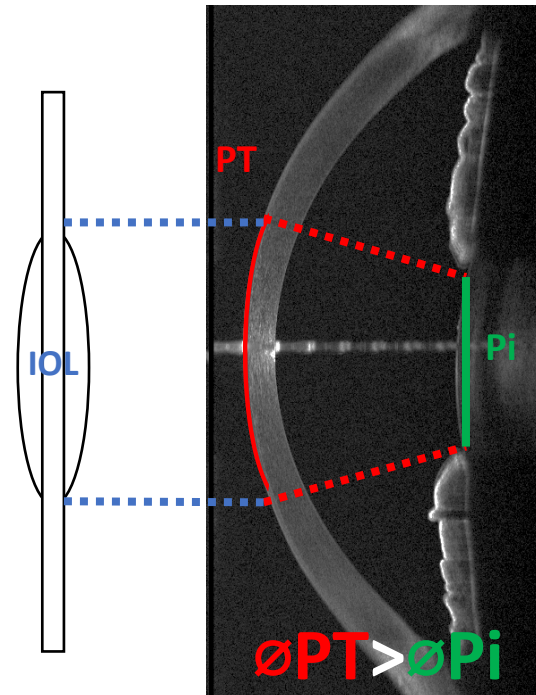
Monovisione/Blended v/mix and match: cautela in caso di UDVA non dom >0.7 logMAR



Il nostro studio: Background

The **topographic pupil (PT)** is the result of the magnification of the real pupil (iris plane)¹

The **real pupil (Pi)** is the parameter used to evaluate the MTF curves in MIOL (ISO method)²



Quando misuriamo la pupilla preop, lo stiamo facendo correttamente?

¹Bennett and Rabbett Clin. Vis. Opt. 1989

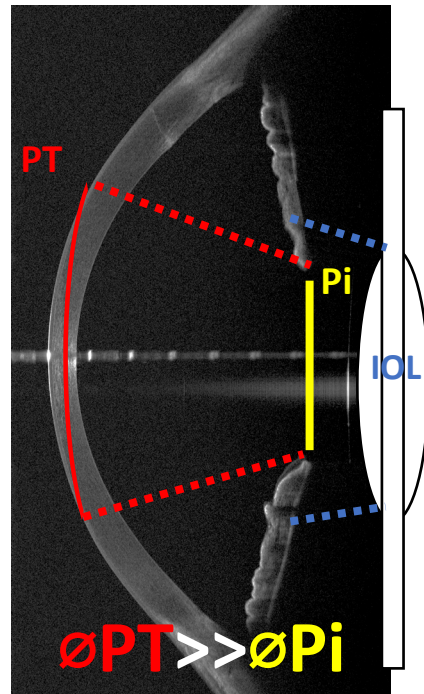
² Monteiro e Trindade Ad. In Ophth Optics Tech 2022



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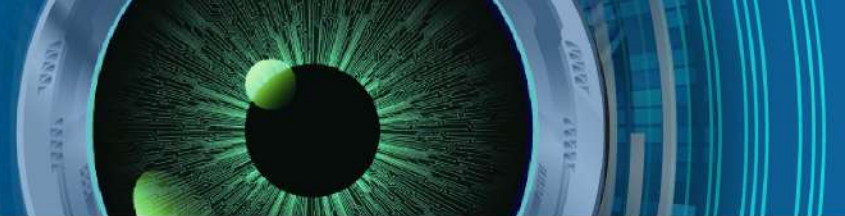
Quando misuriamo la pupilla preop, lo stiamo facendo correttamente?

NO!

¹Bennett and Rabbett Clin. Vis. Opt. 1989

² Monteiro e Trindade Ad. In Ophth Optics Tech 2022





OS LEFT

Calculation

Calculation Pupil calculator

IOL

ICL

Keratometry

K1 D

K2 D

Biometry

ACD mm

LR-Lens Rise (Optional) mm

AL mm

Preop Pupil

Mesopic mm

Photopic mm

Scotopic mm

Ideal multifocal area 35 %

Input <https://3ccalculator.lasek.it>

Output

OS (Left) | Pupil Calculator

KERATOMETRY

K1 - Flat (D) 41.00
K2 - Steep (D) 41.00

BIOMETRY

Axial Length (mm) 24.00
Anterior Chamber Depth (mm) 3.00
LR-Lens Rise (mm) 0.20

PREOP PUPIL SIZE (mm)

	Entrance	Real *
Mesopic	3.00	2.72
Photopic	2.00	1.81
Scotopic	5.00	4.53

Postoperative Iris Plane Position (mm) * 3.59
Preoperative Pupil Magnification (%) 10.28
Postoperative Pupil Magnification (%) 12.55

ESTIMATED POSTOP PUPIL SIZE (mm)*

	Entrance	Real
Mesopic	2.88	2.56
Photopic	2.40	2.13
Scotopic	4.11	3.65

Ideal multifocal area (%)

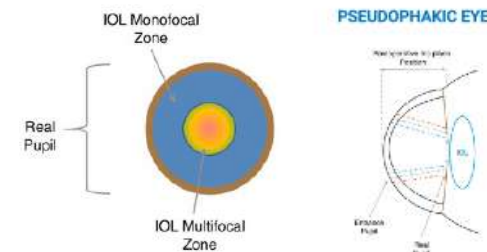
35

Ideal multifocal zone diameter (mm) *

1.53

* Predicted or Calculated Values

Explanatory Figures



Camellin U, Camellin M, Prantero M, Di Pietro R, Ponzetto F, Aragona P. **Estimation of pupil size at iris plane and its magnification after cataract surgery.** Indian J Ophthalmol. 2024 Aug 14. doi: 10.4103/IJO.IJO_544_24. Epub ahead of print. PMID: 39186627

SmartIOL v1.55 (Beta)

Esperienza personale + 90 pubblicazioni



Courtesy of A. Bedei

Operation of Prova — 15 mar 2026

Print PDF Delete Update

Patient * Age * Eye *

Prova 34 years OD (Right)

Systemic Notes

☒ High expectation patient ☐ Allergy ☐ Diabetes ☒ Autoimmune/Inflammatory disease ☐ Neurologic pathology ☐ Neuropsychiatric disorder ☐ Alpha agonist therapy ☐ Antiplatelet therapy

Additional systemic notes...

Glaucoma Notes

Previous Glaucoma Surgery

☒ Conventional eye (pseudophakic) ☐ Refractive surgery ☐ Corneal surgery ☐ Vitreoretinal surgery ☐ Strabismus surgery ☐ Other

Glaucoma Conditions

☐ Previous ocular trauma ☐ Ocular motility problem ☐ Eyelid problem ☐ OSD ☐ Corneal problem ☐ Iris/pupil problem ☐ Lens problem ☐ Retinal problem ☐ Glaucoma

Additional surgical notes...

SmartIOL v1.55 (Beta)

Operation of Prova — 15 mar 2026

Print PDF Delete Update

Add New Operation

Search patients...

Prova 15 mar 2026

Add New Operation Edit Patient Delete Patient

Keratometry

K1 Axis	K1 Axis	K1 Axis	K1 Axis	K1 Axis	K1 Axis	K1 Axis	K1 Axis
41.1	41.1	41.1	41.1	41.1	41.1	41.1	41.1

Endothelial Cell Count

Ocular Parameters

Parameter	Value	Unit
Offset Limbus	0.4	mm
Offset Pupil	0.2	mm
SRI	0.2	mm
SAI	0.3	mm
AbSph	-0.2	D
Coma	0.25	mm
HOA	0.3	mm
Pupil Photopic	2	mm
Pupil Mesopic	3	mm
Pupil Scotopic	3.5	mm
Axial Length	24	mm
ACDepth	3	mm
Lens Thickness	4.5	mm

SmartIOL v1.55 (Beta)

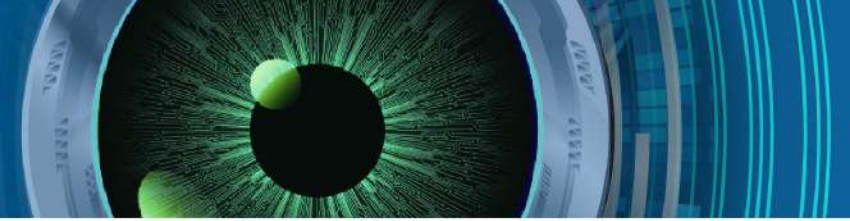
Operation of Prova — 15 mar 2026

Print PDF Delete Update

Monofocal	Monofocal Plus	EDOF	Multifocal
Score 87%	Score 75%	Score 60%	Score 27%
Offset Limbus 0.4 mm -3%	Offset Limbus 0.4 mm -3%	Offset Limbus 0.4 mm -5%	Offset Limbus 0.4 mm -8%
Offset Pupil 0.2 mm -0%	Offset Pupil 0.2 mm -0%	Offset Pupil 0.2 mm -1%	Offset Pupil 0.2 mm -2%
SRI 0.2 -0%	SRI 0.2 -0%	SRI 0.2 -0%	SRI 0.2 -0%
SAI 0.3 -0%	SAI 0.3 -0%	SAI 0.3 -0%	SAI 0.3 -0%
AbSph -0.2 -2%	AbSph -0.2 -5%	AbSph -0.2 -8%	AbSph -0.2 -20%
Coma 0.25 -2%	Coma 0.25 -6%	Coma 0.25 -10%	Coma 0.25 -17%
HOA 0.3 -4%	HOA 0.3 -8%	HOA 0.3 -10%	HOA 0.3 -17%
Pupil Photopic 2 mm -0%	Pupil Photopic 2 mm -0%	Pupil Photopic 2 mm -0%	Pupil Photopic 2 mm -0%
Pupil Mesopic 3 mm -0%	Pupil Mesopic 3 mm -0%	Pupil Mesopic 3 mm -0%	Pupil Mesopic 3 mm -0%
Pupil Scotopic 3.5 mm -2%	Pupil Scotopic 3.5 mm -3%	Pupil Scotopic 3.5 mm -6%	Pupil Scotopic 3.5 mm -8%
Axial Length 24 mm -0%	Axial Length 24 mm -0%	Axial Length 24 mm -0%	Axial Length 24 mm -0%
ACDepth 3 mm -0%	ACDepth 3 mm -0%	ACDepth 3 mm -0%	ACDepth 3 mm -0%
Lens Thickness 4.5 mm -0%	Lens Thickness 4.5 mm -0%	Lens Thickness 4.5 mm -0%	Lens Thickness 4.5 mm -0%
Total deduction -13%	Total deduction -25%	Total deduction -40%	Total deduction -73%

Il passaggio successivo non è inventare l'ennesima IOL. È migliorare la nostra capacità di scegliere!





Conclusioni

- Illusione? **ONE LENS FITS ALL**
- Evoluzione? **The right IOL for the right eye and the right patient**
- L'obiettivo è equilibrio tra qualità visiva, indipendenza e tollerabilità.
- **ATTENZIONE:** la bi-tri-multifocalità divide l'energia luminosa



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GRAZIE PER L'ATTENZIONE!