Trifokalite Nedir?
Trifokal Göziçi Lensleri ve EDOF Teknolojisi

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03.04.2015, Marriot Hotel, Ankara

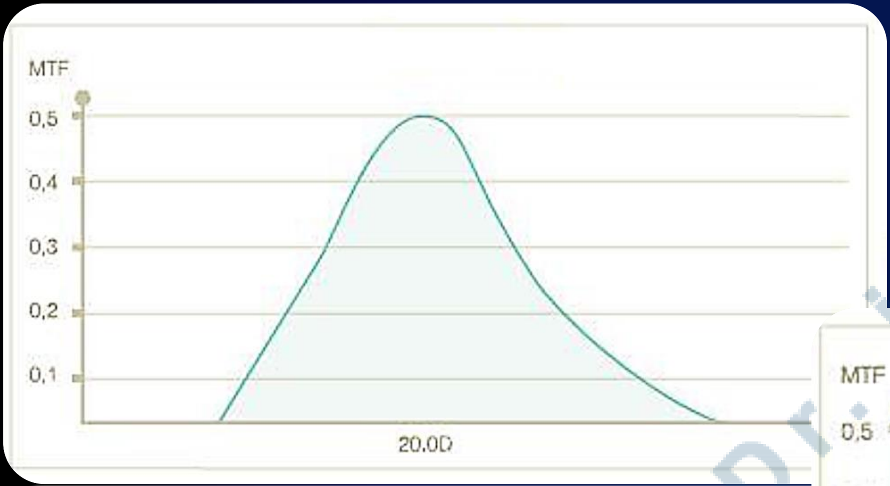
Sık Karşılaşılan Sorular ?????

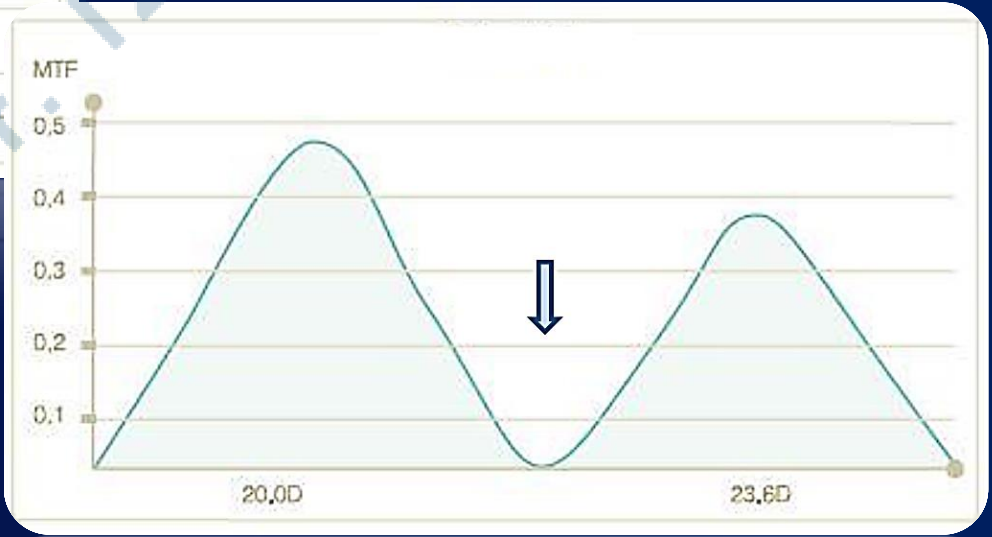
1. Refraksiyonla, difraksiyonun ne farkı var? Difraktif lens ne demek?

2. Madem multifokal lens'de ikiye bölününce %15-20 ışık kaybı oluyor ve KD düşüyor, o zaman üçe böldüğünde olacak kaybı düşünemiyorum? Bu nasıl savunulabilir?

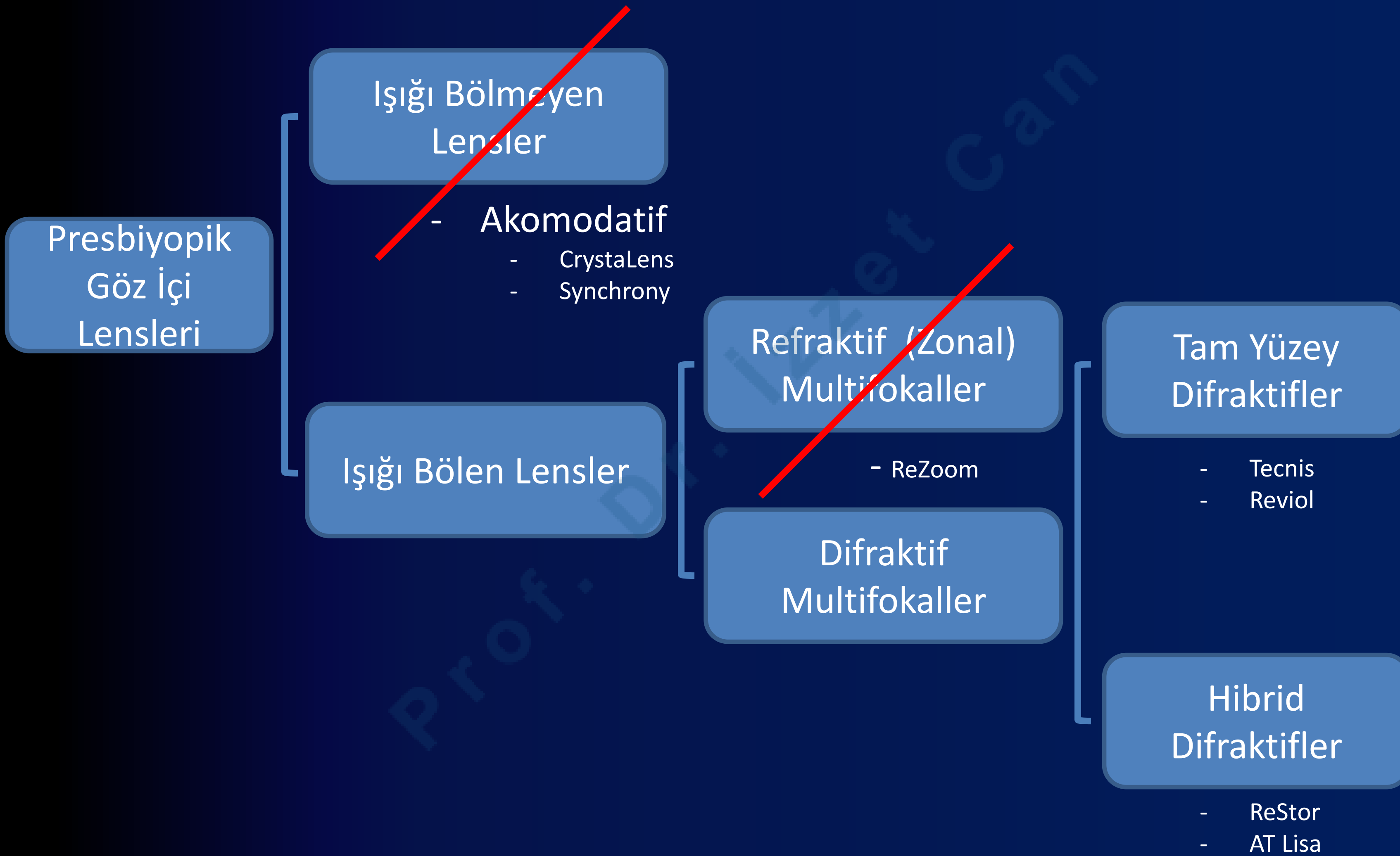
3. Lens multifokal'ken trifokale niçin indirgiyoruz?

Monofokal & Bifokal (=Multifokal) GİL

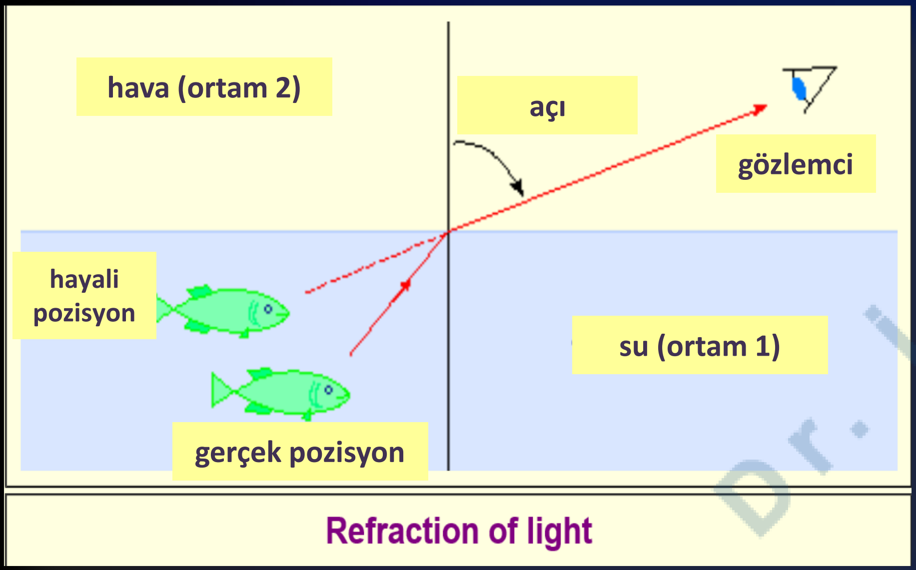


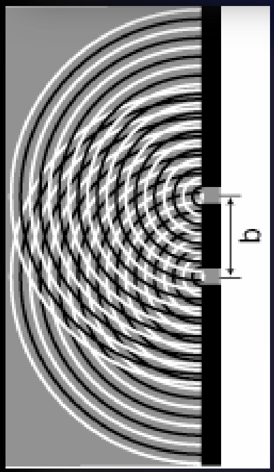


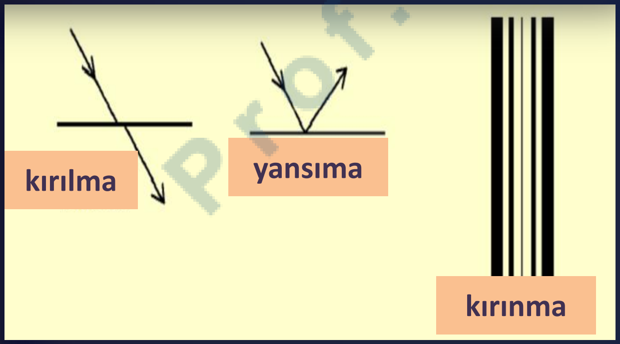
Presbiyopi Tedavisi



Refraksiyon (Kırılma) İle Difraksiyon'un (Kırınım) Ne Farkı Vardır?





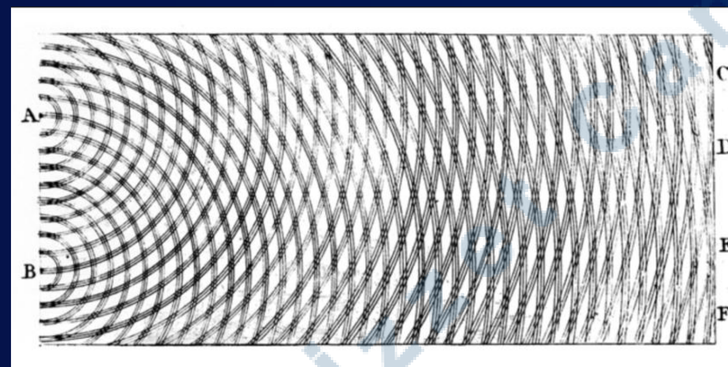


- **Refraksiyon:** Işık yoğunluğu farklı bir ortamdan başka bir ortama geçerken yön değiştirmesidir.
- Her zaman dalga boyu ve hız değişimi vardır.

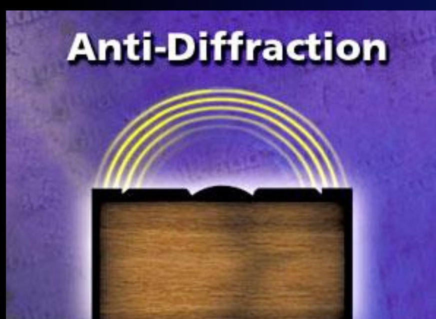
- **Difraksiyon:** Işığın bir engel ya da açıklıktan geçerken bükülmesi demektir.
- Dalgaboyu arttıkça difraksiyon da artar.

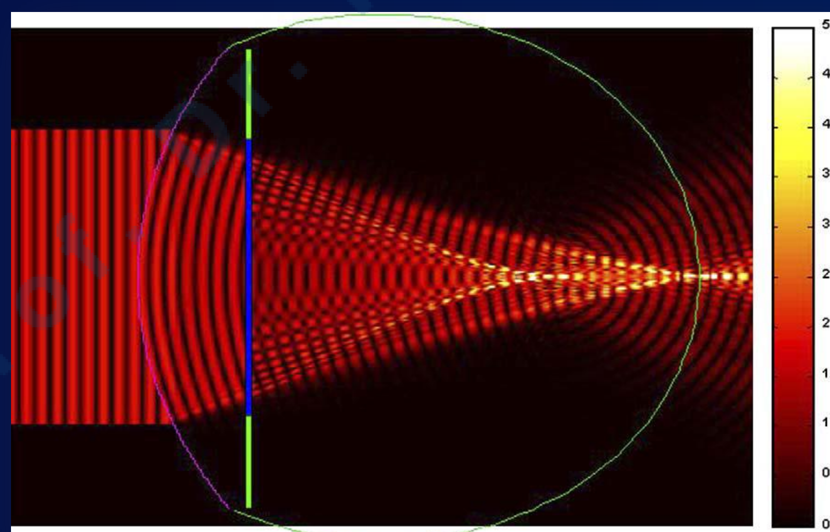
Difraksiyon Nedir?

- Faz farkı
- İnterferans

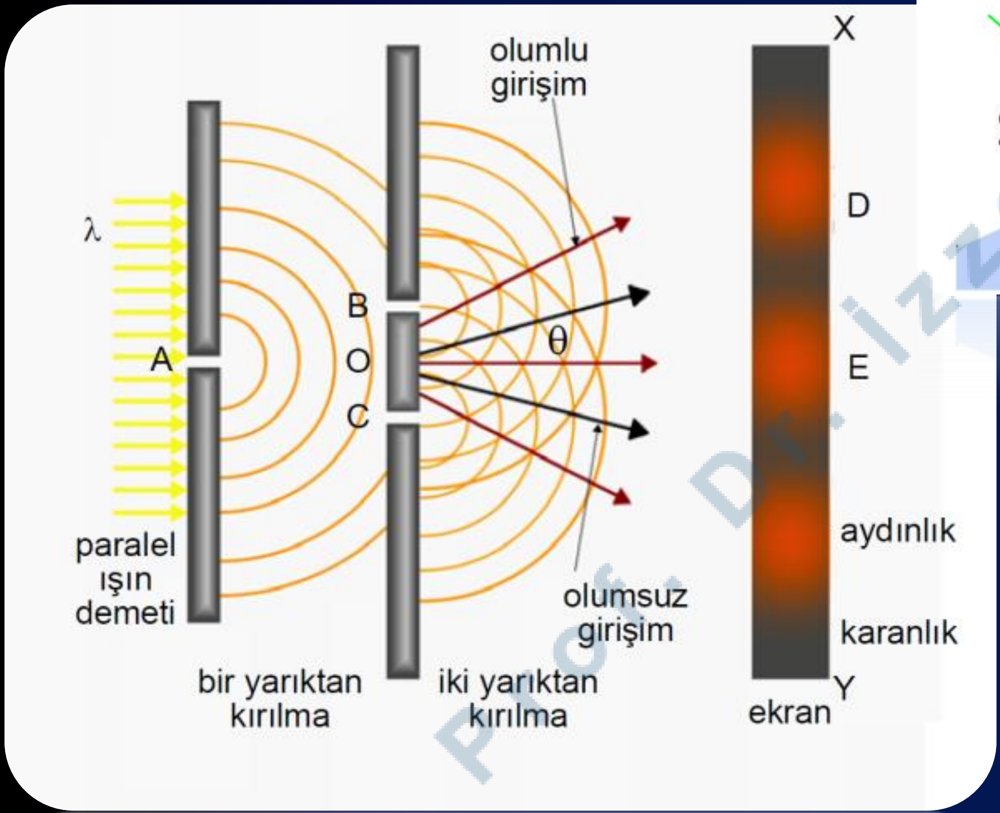


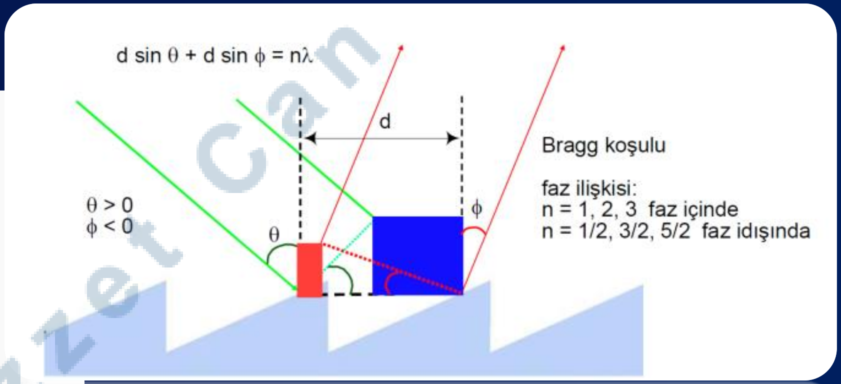
Thomas Young, 1803





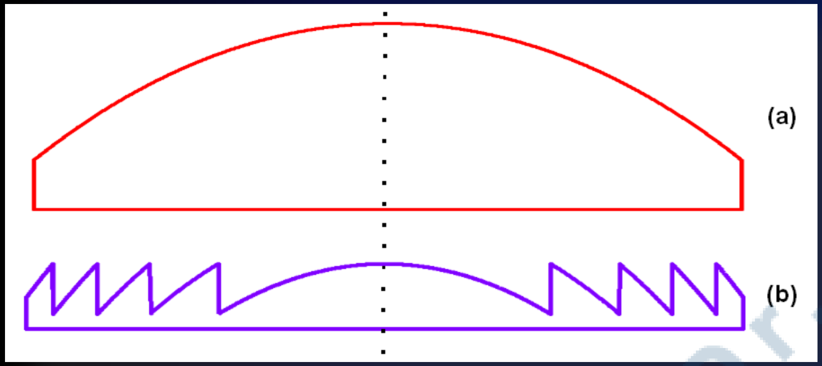
Difraksiyon Nedir?





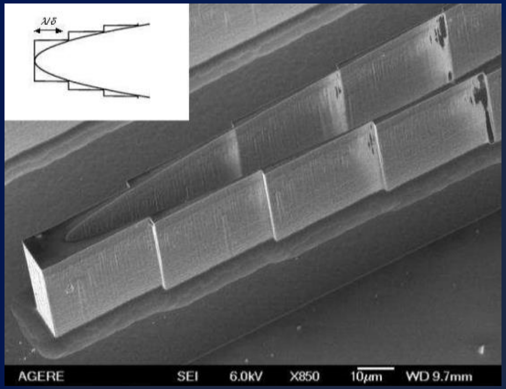
Difraksiyon Nasıl Sağlanır?

- Kinoform lens nedir?



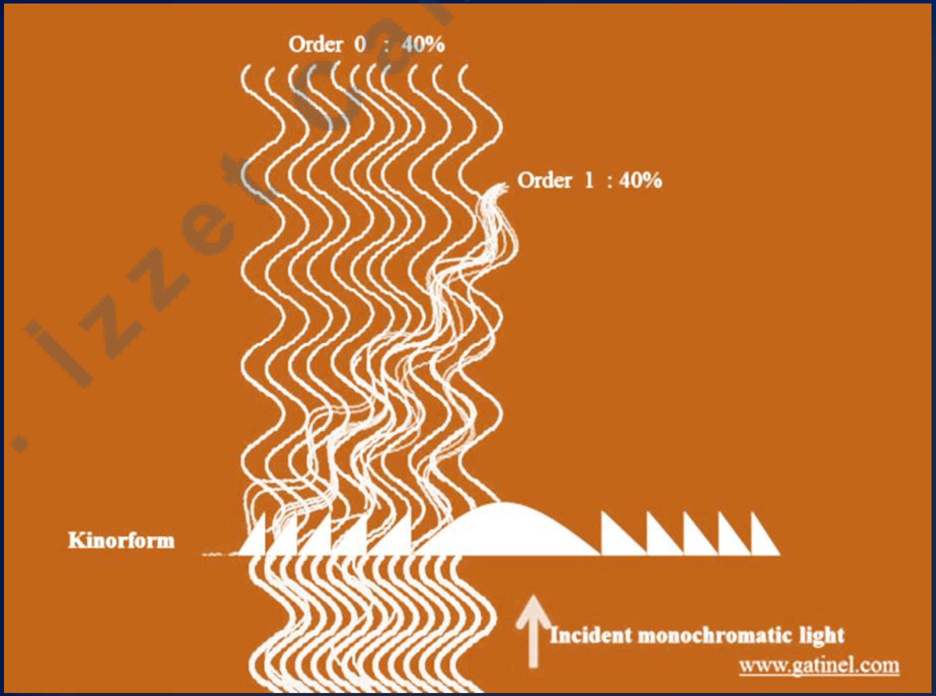
- Fresnel lensleri konvansiyonel lenslerin, bulk'ını yani kabarıklığını azaltmak için dolayısı ile de kalınlığını azaltmak için kollapsa uğratılmış halidir. Ancak odaklama için gerekli kurvatür korunur.

- Fresnel lensleri pür refraktif lensler olarak kullanılırlar, oysa Kinoform lensler, Fresnel lenslerinin refraktif ve difraktif özellikleri ile zon plateleri kombine edilmiş halidirler. Bunlar difraktif odak sağlayabildikleri gibi kromatik aberasyonu da elimine ederler.



Bifokal Difraktif Lenslerin Temel Prensipleri

- Geleneksel monofokal optik ile kinoform zon plate'ini kombine ederseniz Fermat prensibine göre (ışık daima 2 nokta arasında en kısa yolu kullanır) bifokalite gerçekleşir.
- Kaba bir yaklaşımla, kinoform profili asimetrik bir testere dişi profiline benzer. Burada basamakların yüksekliği bir kaç mikron civarındadır. Bu gelen ışığın dalga boyu ile yakındır.



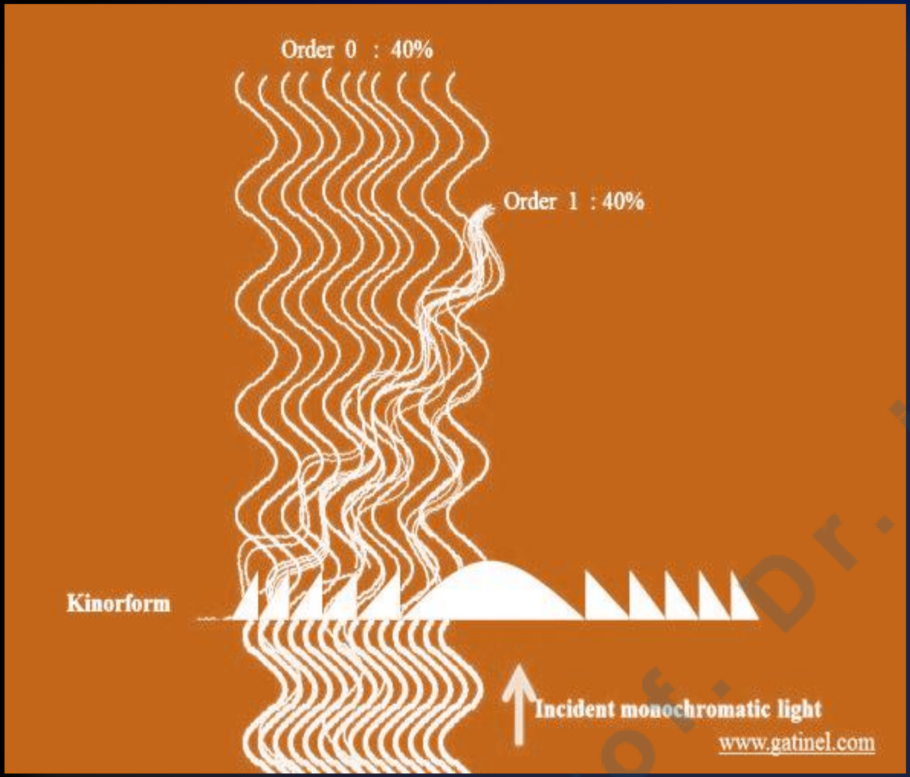
(Görünen ışığın ortalama dalgaboyu bir mikronun yarısı kadar olup, 500 nm'dir).

Basamak Genişliğinin Etkisi

- Her kinoform basamağının genişliği merkezden perifere doğru(giderek azalır) ilave verjansı kontrol eder.
- Eğer ki basamaklar aynı genişlikte olsaydı, 1. order'da difrakte olan ışık enerjisi, uzak odak oluşturacak şekilde toplanma (konverje olma) yerine başka bir yöne paralel modelde devie olurdu. Adisyon arttıkça (1. orderdaki odak mesafesi kısaldıkça) küresel olarak halkalar kabalaşır. Buna karşılık olarak da basamaklar arası boşluklar genişler ve daha az ilave verjans sağlanır.

Basamakları genişleterek verjansı yani yakın etkiyi azaltabilirsiniz.

Basamak Yüksekliğinin Etkisi

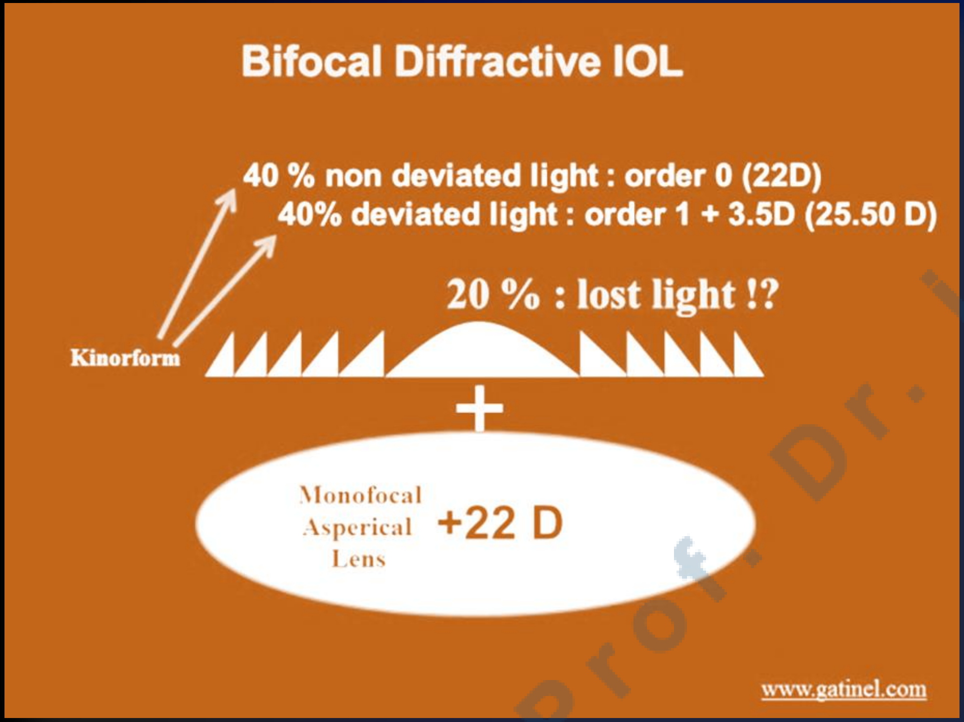


0. Sıra: Uzak odağı (%40)
1. Sıra: Yakın odağı (%40)
2. ve üstü sıralar görünmüyor (%20)

- **Apodizasyon:** GİL'nin difraktif basamaklarının yüksekliğini perifere doğru giderek azaltmak demektir.
- Basamakların yüksekliği kabul edilmiş olan tasarımdaki dalgaboyu değerine göre belirlenir, kontrol edilir.
- Optik tasarımcılar foveanın en duyarlı olduğu dalgaboyu 550 nm. yi genellikle tercih etmektedirler.
- Bu basamakların yüksekliklerinin progresif olarak azalması gelen ışık enerjisinin dağıtımını farklı difraksiyon sıralarına pupil çapıyla modüle etmektedir. Bu azalmaya 'apodizasyon' denir.

Eğer ki basamaklar tamamen tüm GİL boyunca sabit yükseklikte olursa, gelen ışık enerjisinin çeşitli difraksiyon sıralarındaki dağlımı da sabit olurdu.

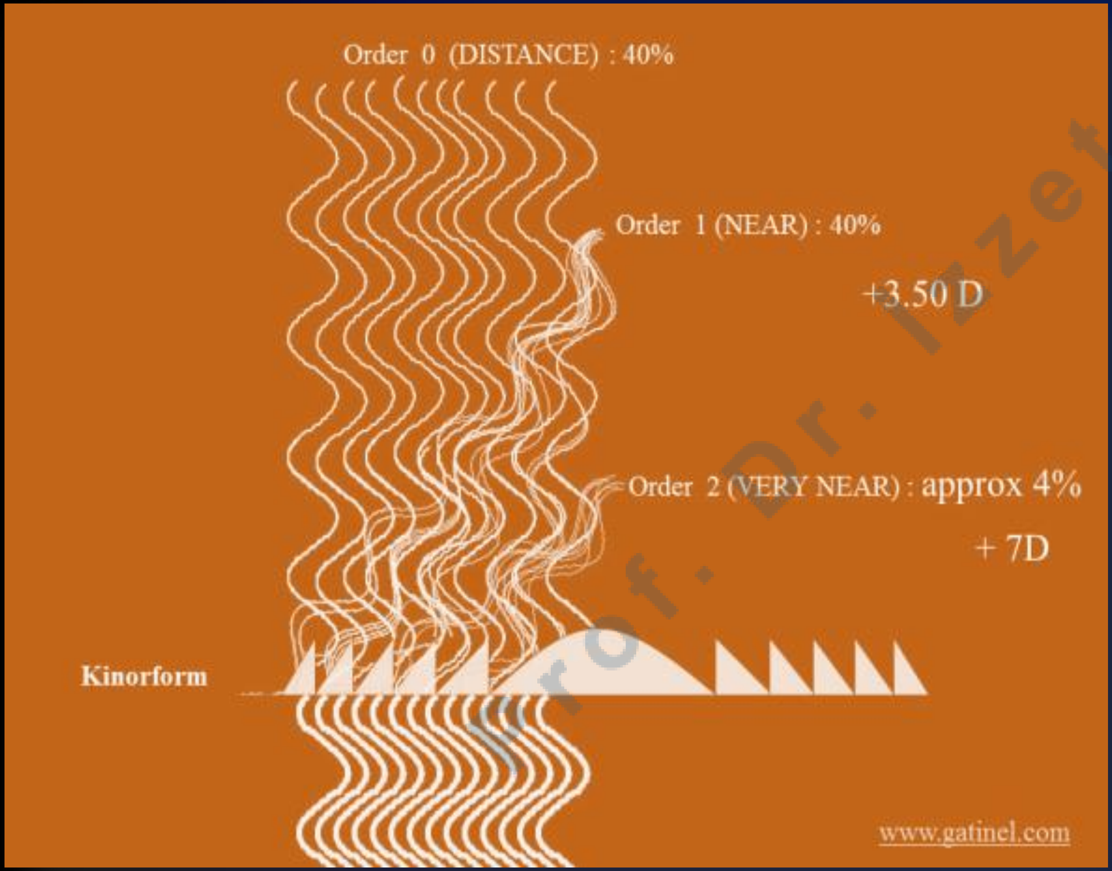
Bifokal Difraktif Lens



- 0. order %40 uzak odak
- 1. order %40 yakın odak
- 2. ve üstü orderlar %20 yaptıkları odak işe yaramaz (kayıp ışık diye söylenir)

Basamak genişliğini artırarak, yakın odağı daha zayıflatabilir ya da azaltarak uzak odağı daha güçlü hale getirebilirsiniz.

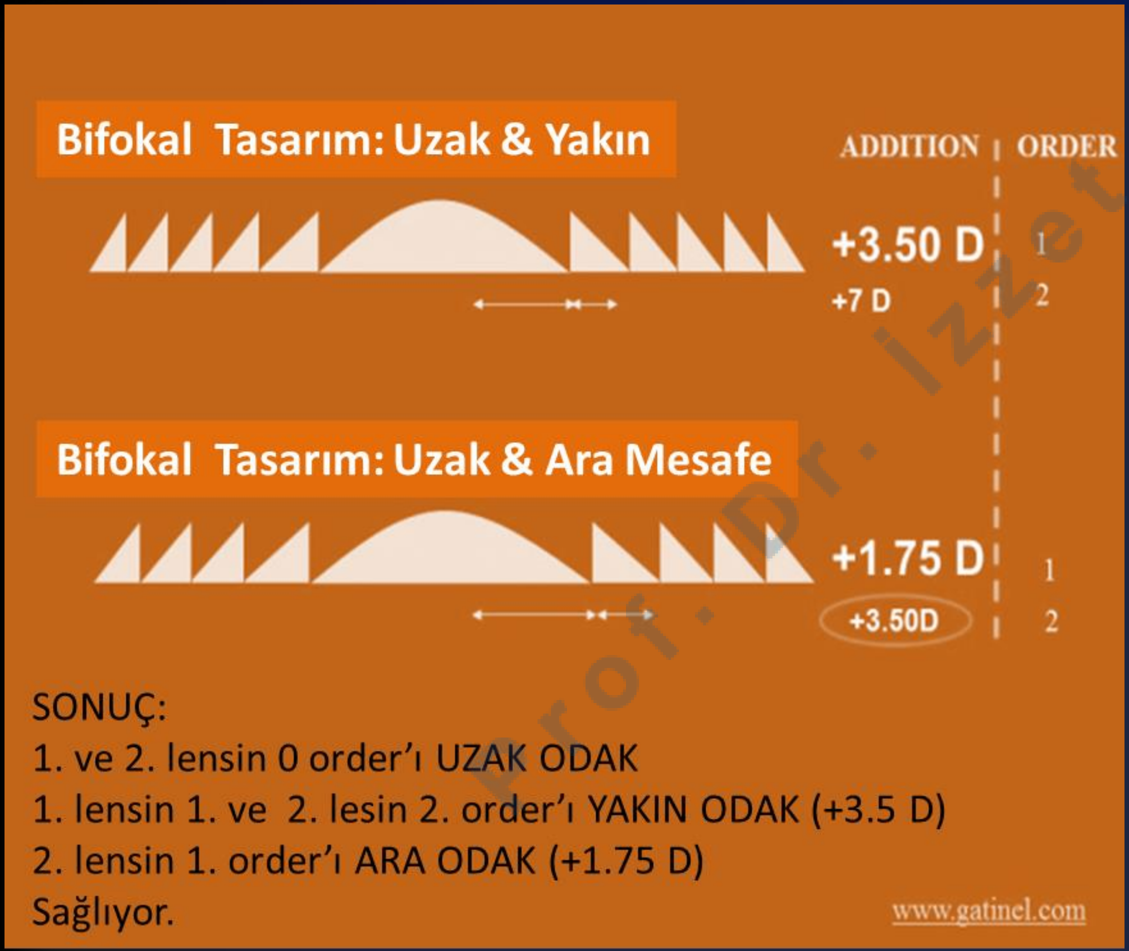
Trifokalite Nasıl Sağlanıyor?



- %40 → 0. sıra: (uzak odak)
- %40 → 1. sıra: +3.5 D ise (yakın odak)
- % 4 → 2. sıra: +7.0 D. (çok yakın odak)
- .....

Orderlarla, yarattıkları verjans arası doğru orantı vardır. Ve bu tam 2 katı şeklinde gider.

Trifokalite Nasıl Sağlanıyor?

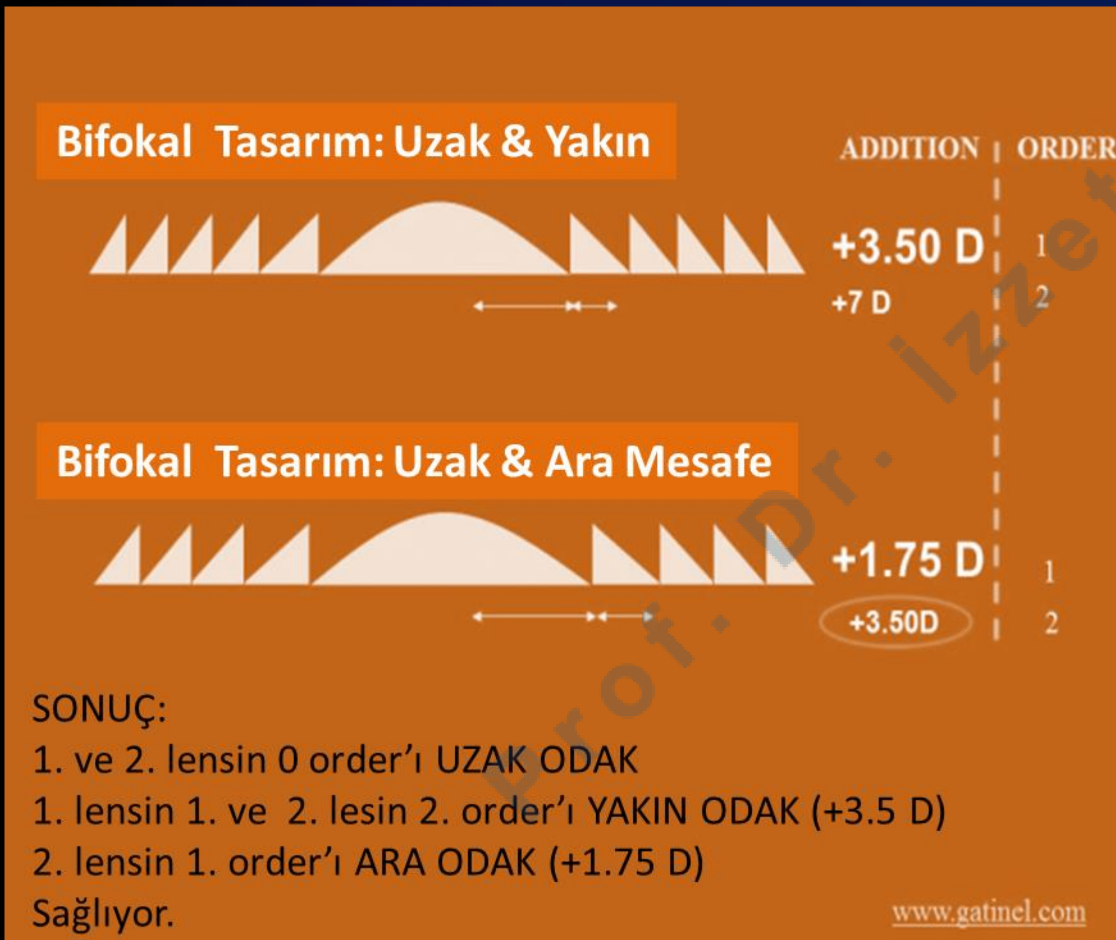


Burada 2 farklı kinoform lensin (bifokal) üst üste konduğunu farz edin.

1. lens 1. order'da +3.5 olan bizim lensimiz ama 2. lens 1. order'da +1.75 verjansı olan bir lens. Bu ikinci lensin 2. order'ı tam iki katı yani +3.5 D.

Böyle olunca kayıp gitti dediğimiz %20 lik kısım (2. order)artık işe yarar bir yakın odağı oluşturuyor.

Trifokalitenin, Bifokal Lenslere Göre Getirdiği Kazançlar

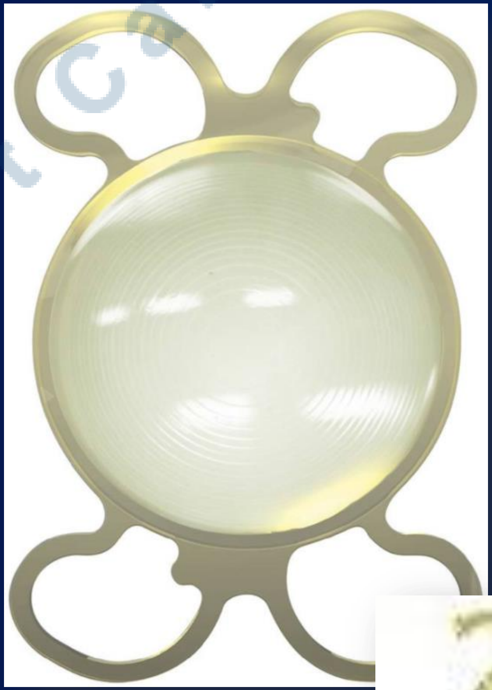


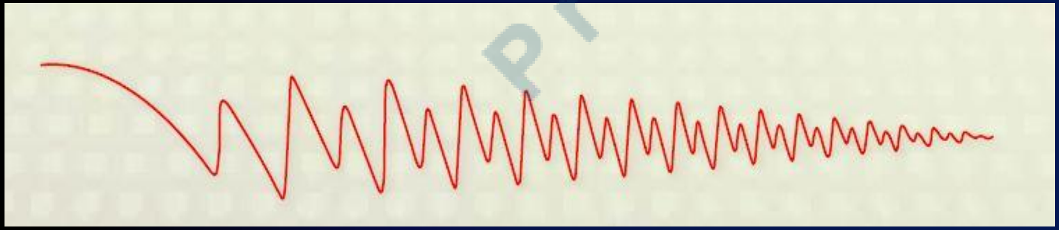
1. Artık iki adet **yakın odağınız** var (1. lensin 1. sırası ve 2. lensin 2. sırası) Bu yakında bifokal lenslere göre **%5 kazanç** anlamına geliyor.
2. 60-80 cm. için artık bir **ara mesafe odağı**nız var. (2. lensin 1. sırası)
3. %20 odaklanamayan bölgenin değerlendirilmesi ile kayıp alan **%14**'e düşüyor.
4. Bifokallere göre kullanılan tüm ışık enerjisinde **%25** artış sağlanmış oluyor.

FineVision Lensi

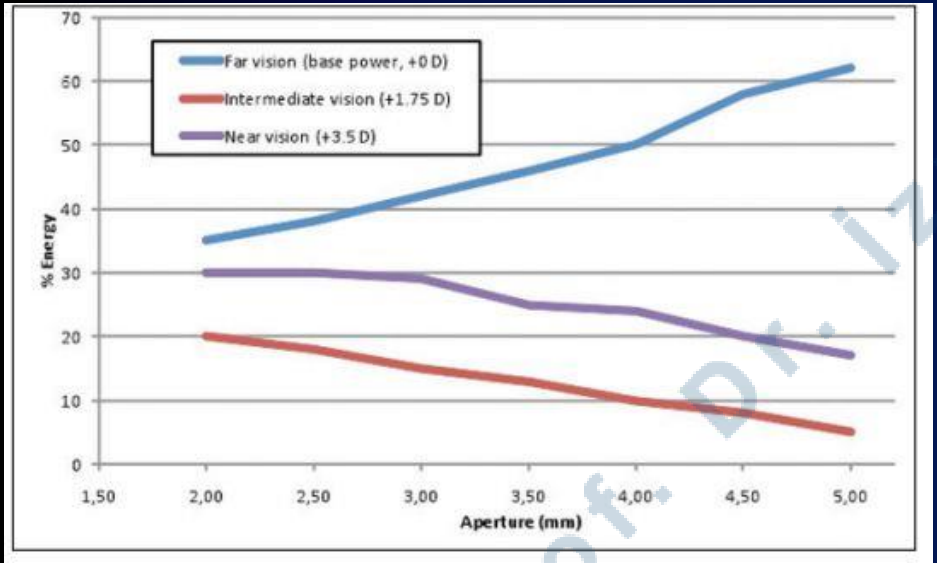
- **FineVision (PhysIOL, Liège, Belgium),**

- Materyal: %25 su içerikli Hidrofilik akrilik
- Optik: Asferik (-0.11 µm) , Apodize, Konvole
- Toplam / Optik çap:
  - Micro F: 10.75 / 6.15mm
  - Pod F: 11.40 / 6.00 mm
- Yakın odak (36 cm): +3.50 D.
- Ara mesafe odağı (60 cm): +1.75 D.
- Haptik açısı: 5°
- Sarı kromofor: UV + Mavi ışık
- Dioptri aralığı: +10-+35.0 D





FineVision Lensi



3 mm pupilde ışığın geçişi;

% 42 Uzak
% 15 Ara Mesafe
% 29 Yakın

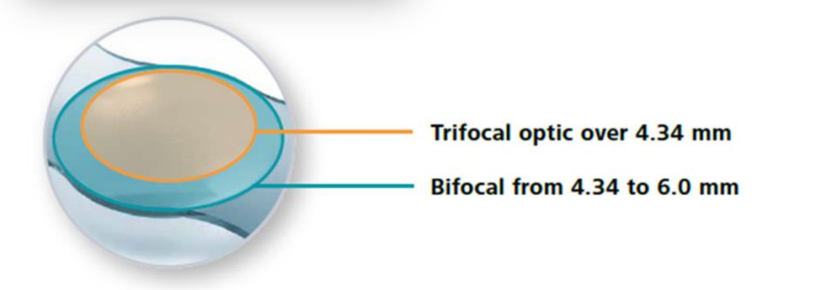
% 14 Odaklanamayan

Pupil 5.0 mm olduğunda ışık geçişi;
Uzak %62,
Yakın %18 oluyor.

AT Lisa Tri 839 MP

- **AT Lisa Tri 839 MP (Carl Zeiss Meditec AG, Ger.),**

- Hidrofobik yüzeyli, %25 su içerikli, Hidrofilik akrilik
- Preloaded
- Toplam/Optik Çap: 11.0 / 6.00 mm.
- Plate haptik
- Haptik açısı: 0°
- Asferik (-0.18 µm)
- Yakın 3.33 D (40 cm), Ara mesafe 1.66 D. (76 cm)
- Dioptri aralığı: 0-+32 D.



AT Lisa Tri 839 MP

- Işık dağılımı: (2.0 mm pupilde)

- Uzak: %50
- Ara: %30
- Yakın: %20

- Odaklanamayan ışık: %14.3

- Pupil genişledikçe ara mesafe ışık dağılımı değişmeksizin hep %30 civarında kalmaktadır.

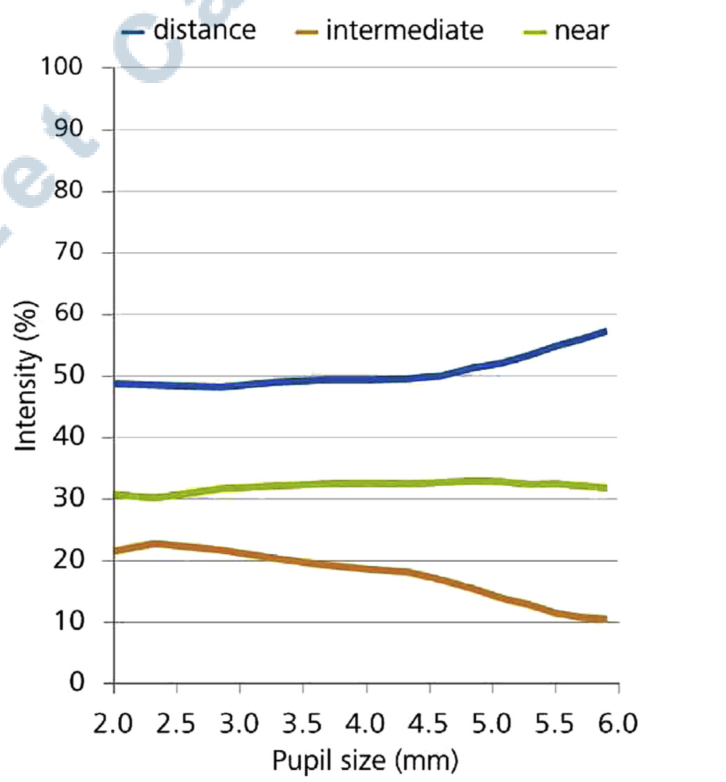


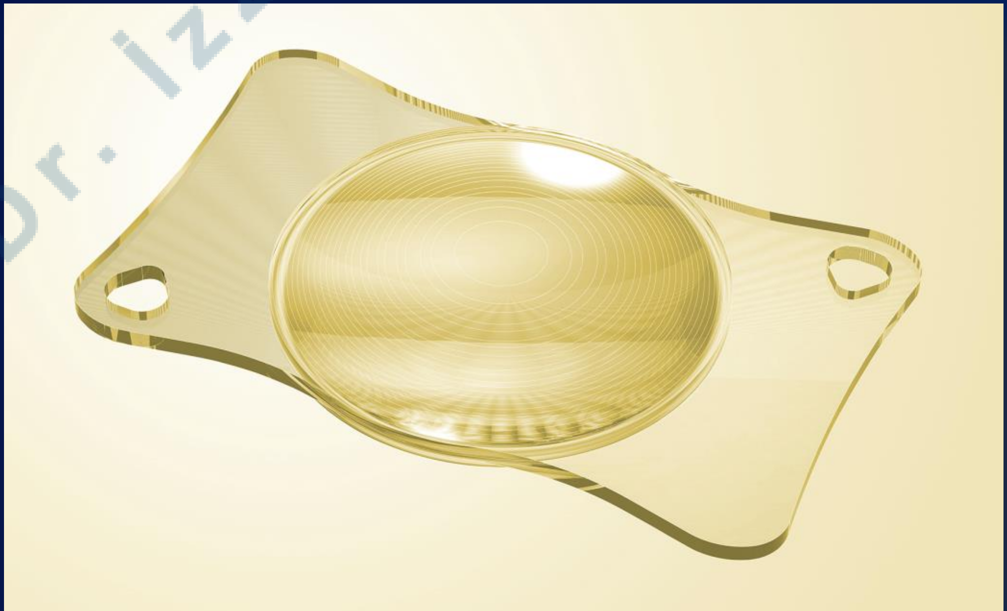
Figure 4. Dependence of light-intensity distribution for far, intermediate, and near distances as a function of pupil size.

Reviol Tri Ed

- **Reviol Tri-ED (VSY Biotech., İstanbul, Tur.)**

- Hidrofobik yüzeyli, %25 su içerikli, Hidrofilik akrilik
- Tasarım: Plate haptik
- Haptik açısı: 0°
- Asferik: -0.18 µm.
- Dioptri aralığı: 0 - +32.0 D.
- Mavi filtreli: UV + Mor

- Tüm/Optik Çap: 11.0 / 6.0 mm
- Yakın: +3.0 (42 cm)
- Ara mesafe: +1.50 (80 cm)

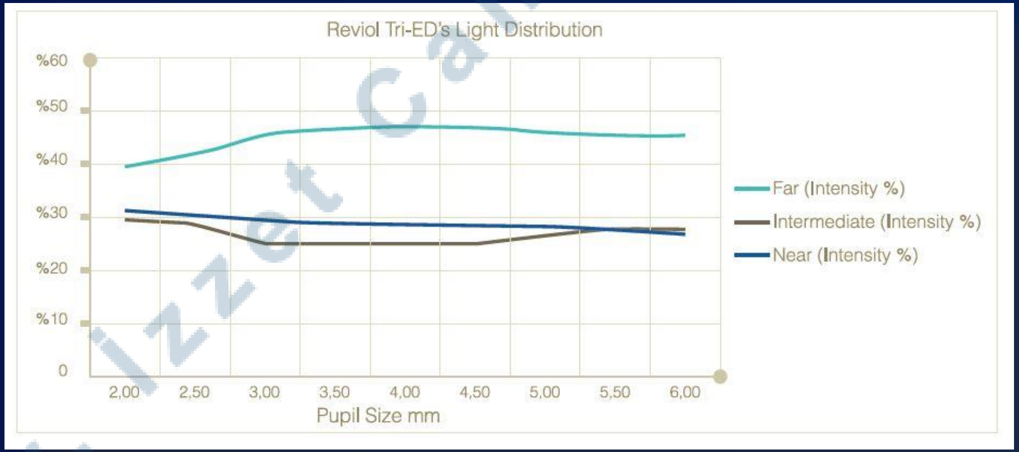


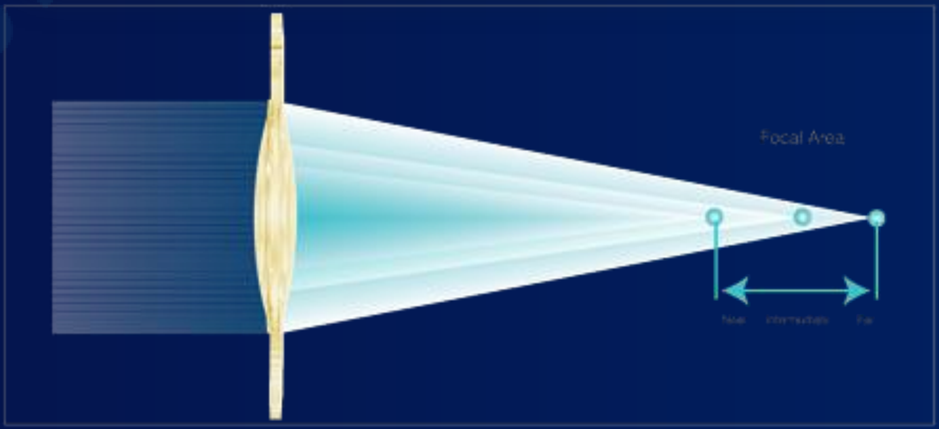
Reviol Tri Ed

- Uzak: % 46
- Ara: % 25
- Yakın: % 29

- Odaklanamayan ışık: %10. 9

- Yarı apodize
  - İlk 3.6 mm. de apodize, sonraki 2.4 mm. de sabit
- EDOF
- Farklı ve gerçek trifokalite

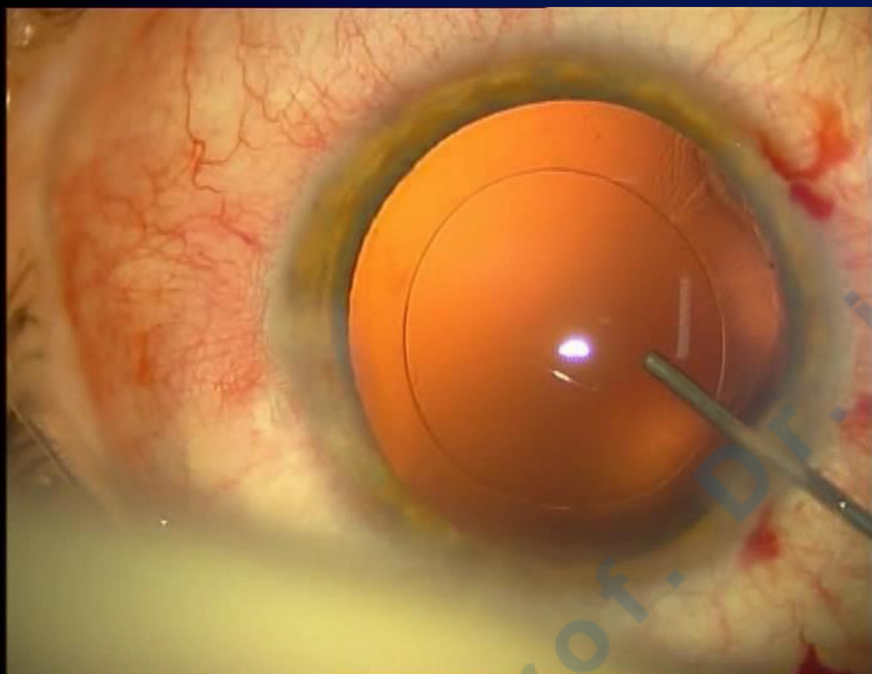




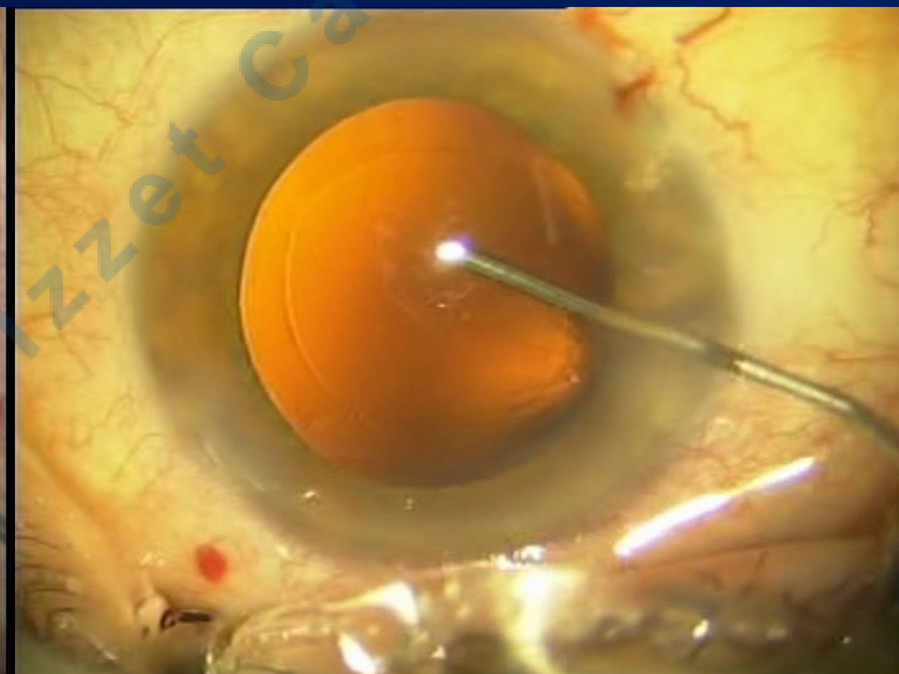
Karşılaştırma

	FineVision	ATLisa Tri 839 MP	Reviol Tri ED
Materyal	Hidrofilik	Hidrofob yüzeyli hidrofilik	Hidrofob yüzeyli hidrofilik
Optik Tasarım	Trifokal Convolution, Apodize	Trifokal-Bifokal Hibrid	Semi-apodize, EDOF
MICS (< 1.8 mm)	Uygun	Uygun	Uygun
Asferik Optik (µm)	- 0.11	- 0.18	- 0.18
Haptik Tasarım	4 yuvarlak haptik	Plate haptik	Plate haptik
Işık Dağılımı	Uzak: % 50 Ara: % 17 Yakın: % 33	Uzak: % 50 Ara: % 20 Yakın: % 30	Uzak: % 46 Ara: % 25 Yakın: % 29
Odaklanamayan	% 15.0	% 14.3	% 10.9
Yakın İlave (D.)	+3.50 (36 cm)	+3.33 (40 cm)	+3.00 (42 cm)
Ara İlave (D.)	+1.75 (60 cm)	+1.66 (76 cm)	+1.50 (80 cm)
Kısa Dalga Boylu Işık Filtreleme	UV + Mavi	UV	UV + Mor

Karşılaştırma

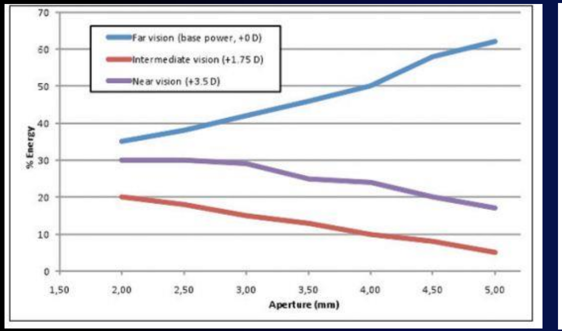


AT Lisa Tri 839 MP

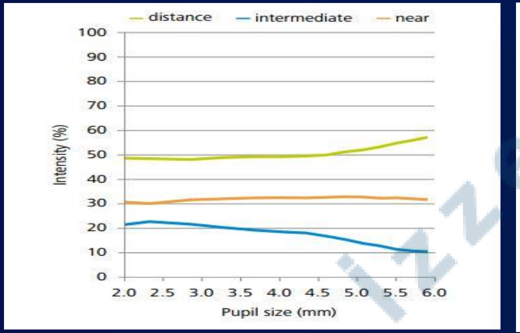


Reviol Tri ED

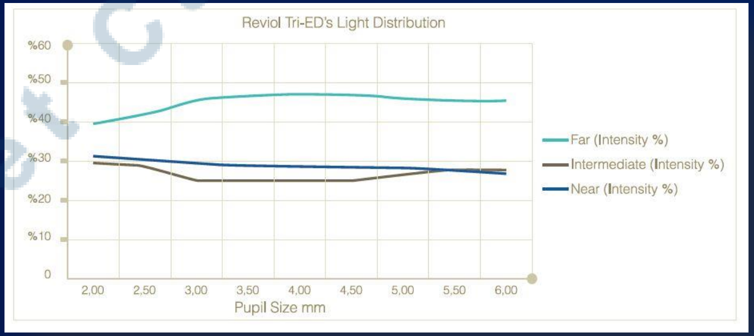
Karşılaştırma



FineVision



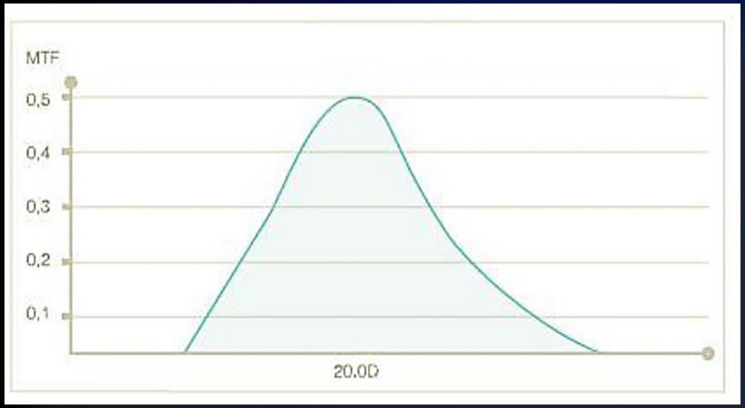
AT Lisa Tri 839-MP



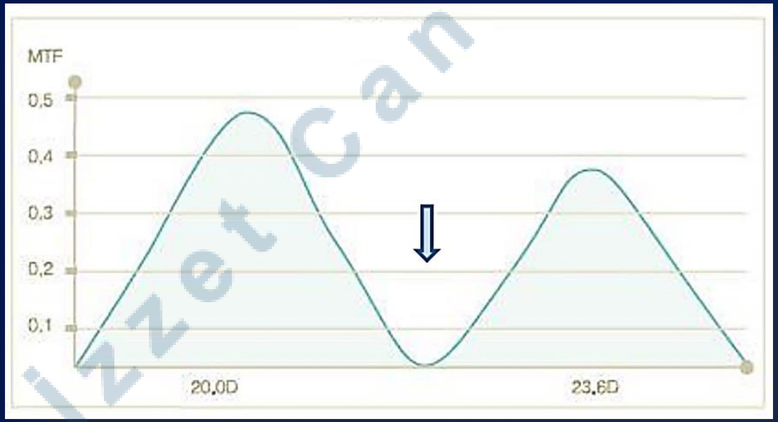
Reviol Tri-ED

* Data on file: First Clinical Findings. ** Comparison of a bifocal and a trifocal intraocular lens. E.Law R. Aggarwal H. Kasaby. Free Paper Session ESRCS 2014 London. *** Diffractive multifocal IOLs: a comparative study of Finevision versus ReSTOR 2.5 and 3.0D. K.Gundersen. Free Paper Session ESRCS 2014 London.

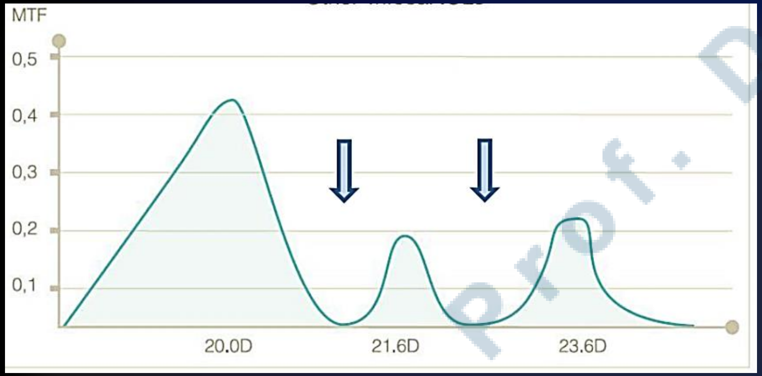
Karşılaştırma



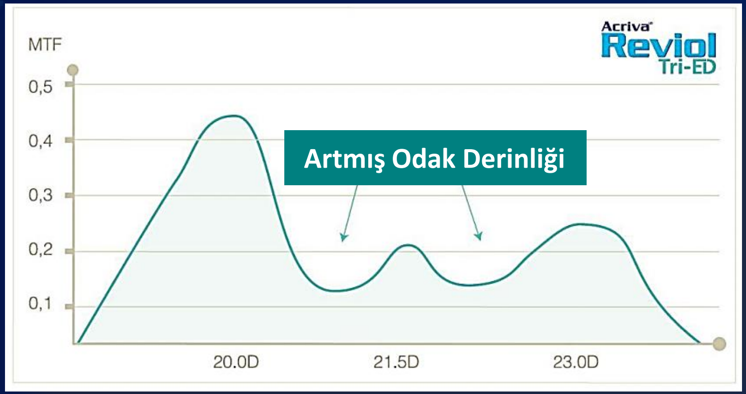
Monofokal



Bifokal



Trifokal



EDOF'lu Trifokal

Karşılaştırma / FineVision & Bifokal Lensler

Clinical Ophthalmology
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CASE SERIES

Visual and refractive outcomes after implantation of a fully diffractive trifocal lens

This article was published in the following Dove Press journal:
Clinical Ophthalmology
31 August 2012
Number of times this article has been viewed

Béatrice Cochener[1]
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Gilles Lesieur[4]
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Johan A Blanckaert[5]
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Background: The purpose of this study was to record the visual ou
by six surgeons after implantation of a trifocal lens.
Methods: The setting for this study comprised six ophthalmology
Belgium and France, with a coordinating center in France, and data
cal analysis in France and Belgium. Ninety-four eyes from 47 patie
trifocal FineVision® intraocular lens by six surgeons. Monocular a
and best distance-corrected, and photopic and mesopic visual acuity
the defocus curve between +4 D and –4 D with best distance correc
Results: Near and far monocular visual acuities were similar to the
cal intraocular lens implantation. Intermediate vision was improved,
scores of near visual acuity as well as far visual acuity with defocus –
is maintained in mesopic conditions.
Conclusion: The trifocal intraocular lens provides good far, inter
acuity.

Cochener B. et al.
Clinical Ophthalmology
2012: 6 1421–1427

Table 6 Visual outcomes of diffractive intraocular lenses in different studies

		CDVA (logMAR)		DCIVA (logMAR)		DCNVA (logMAR)		Eyes
Alcon Acrysof +4 D	Alfonso et al[14]	–0.08 ± 0.1	Binocular	0.15 ± 0.19	Binocular	–0.05 ± 0.06	Binocular	20
Alcon Acrysof +4 D*	Alfonso et al[14]	–0.1 ± 0.1*	Binocular	0.3 ± 0.1*	Binocular	0 ± 0.15*	Binocular	20
Alcon Acrysof +4 D	De Vries et al[12]	–0.01 ± 0.06	Monocular	0.31 ± 0.13	Monocular	0.14 ± 0.11	Monocular	46
Alcon Acrysof +4 D*	De Vries et al[12]	0.05*		0.4*		0.15*		46
Alcon Acrysof +4 D	Blaylock et al[10]	0.00 ± 0.05	Monocular	0.36 ± 0.1	Monocular	0.07 ± 0.08	Monocular	37
Alcon Acrysof +3 D	Alfonso et al[14]	–0.06 ± 0.05	Binocular	0.02 ± 0.13	Binocular	–0.08 ± 0.04	Binocular	20
Alcon Acrysof +3 D*	Alfonso et al[14]	–0.1 ± 0.1*	Binocular	0.25 ± 0.1*	Binocular	–0.05 ± 0.1*	Binocular	20
Alcon Acrysof +3 D	De Vries et al[12]	–0.04 ± 0.09	Monocular	0.19 ± 0.2	Monocular	0.08 ± 0.11	Monocular	68
Alcon Acrysof +3 D*	De Vries et al[12]	–0.05*		0.2*		0.05		68
Alcon Acrysof +3 D	Alió et al[18]	0.10 ± 0.13	Monocular			0.11 ± 0.14	Monocular	
Zeiss AcriLISA +3.75 D	Alfonso et al[14]	–0.08 ± 0.08	Binocular	0.15 ± 0.15	Binocular	–0.02 ± 0.08	Binocular	20
Zeiss AcriLISA +3.75 D*	Alfonso et al[14]	–0.1 ± 0.1*	Binocular	0.3 ± 0.1*	Monocular	0 ± 0.15*	Monocular	20
Zeiss AcriLISA +3.75 D	Alió et al[18]	0.04 ± 0.09	Monocular	0.3(*)		0.17 ± 0.34	Monocular	
Zeiss AcriLISA +3.75 D	Can et al[21]	0.01 ± 0.02		0.14 ± 0.06		0.06 ± 0.20		
Reviol +3.75 D	Can et al[21]	0.02 ± 0.05		0.11 ± 0.07		0.01 ± 0.03		
Present study		0.03 ± 0.06		0.08 ± 0.10		0.00 ± 0.05		90
AMO Tecnis ZM900	Toto et al[11]	–0.01 ± 0.08	Monocular	0.3*		0.04*		14
MIOL-RECORD-3 (decimal notation)	Voskresenskaya[17]	0.86 ± 0.23		0.6 ± 0.2		0.89 ± 0.12		36

Note: *Indicates that the number was extracted from the published defocus curve.
Abbreviations: CDVA, corrected distance visual acuity; DCIVA, distance-corrected intermediate visual acuity; DCNVA, distance-corrected near visual acuity; MAR, minimum angle of resolution.

Karşılaştırma / FineVision

Clinical Ophthalmology

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CASE SERIES

Visual and refractive outcomes after implantation of a fully diffractive trifocal lens

This article was published in the following Dove Press journal:
Clinical Ophthalmology
31 August 2012
Number of times this article has been viewed

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Background: The purpose of this study was to record the visual outcomes of patients treated by six surgeons after implantation of a trifocal lens.
Methods: The setting for this study comprised six ophthalmology units and eye clinics in Belgium and France, with a coordinating center in France, and data management and statistical analysis in France and Belgium. Ninety-four eyes from 47 patients were implanted with a trifocal FineVision® intraocular lens by six surgeons. Monocular and binocular, uncorrected and best distance-corrected, and photopic and mesopic visual acuity was measured, as well as the defocus curve between +4 D and –4 D with best distance correction.
Results: Near and far monocular visual acuities were similar to the data published after bifocal intraocular lens implantation. Intermediate vision was improved, and was demonstrated by scores of near visual acuity as well as far visual acuity with defocus –1.5 D-add lens. Far vision is maintained in mesopic conditions.
Conclusion: The trifocal intraocular lens provides good far, intermediate, and near visual acuity.

Table 3 Monocular visual and refractive outcomes

	Uncorrected			
	3 months		6 months	
Distance visual acuity				
Decimal	0.86 ± 0.19	90 eyes	0.86 ± 0.19	92 eyes
LogMAR	0.08 ± 0.11		0.08 ± 0.12	
Intermediate visual acuity				
Parinaud	2.90 ± 1.53	82 eyes	2.97 ± 1.58	82 eyes
LogMAR	0.08 ± 0.11		0.08 ± 0.12	
Near visual acuity				
Parinaud	2.04 ± 0.90	90 eyes	2.03 ± 0.87	86 eyes
LogMAR	0.01 ± 0.07		0.01 ± 0.06	
Spherica[illegible] equivaler[illegible]				

Abbrevi[illegible]

Table 4 Binocular distance, and intermediate and near visual acuity

	Uncorrected			
	3 months		6 months	
Distance visual acuity				
Decimal	0.97 ± 0.19	45 patients	0.98 ± 0.19	45 patient
LogMAR	0.02 ± 0.09		0.02 ± 0.09	
Intermediate visual acuity				
Parinaud	2.51 ± 1.02	40 patients	2.61 ± 1.13	40 patients
LogMAR	0.05 ± 0.08		0.05 ± 0.08	
Near visual acuity				
Parinaud	1.80 ± 0.54	44 patients	1.81 ± 0.54	44 patients
LogMAR	–0.01 ± 0.04		0.00 ± 0.04	

Abbreviation: MAR, minimum angle of resolution.

Cochener B. et al.
Clinical Ophthalmology
2012: 6 1421–1427

Karşılaştırma / ATLisa Tri

Outcomes of a new diffractive trifocal intraocular lens

Peter Mojzis, MD, PhD, FEBO, Pablo Peña-García, MSc, Ivana Liehneova, MD, Peter Ziak, MD, PhD, Jorge L. Alió, MD, PhD, FEBO

PURPOSE: To evaluate refractive and visual parameters related to distance, intermediate, and near vision after cataract surgery and the optical quality of a new diffractive trifocal intraocular lens (IOL).

SETTING: Vissum Instituto Oftalmologico de Alicante, Alicante, Spain.

DESIGN: Case series.

METHODS: Patients had bilateral refractive lens exchange and multifocal diffractive IOL (AT Lisa tri 839 MP) implantation. A complete ophthalmology examination was performed preoperatively and postoperatively. The follow-up was 6 months. The main outcome measures were uncorrected distance (UDVA) and corrected distance (CDVA), intermediate, and near visual acuities; keratometry; manifest refraction; and aberrations (total, corneal, internal).

RESULTS: The study comprised 60 eyes of 30 patients (mean age 57.9 years ± 7.8 [SD]; range 42 to 76 years). There was significant improvement in UDVA, uncorrected intermediate visual acuity, uncorrected near visual acuity, CDVA, and distance-corrected intermediate and near visual acuity. The postoperative refractive status was within the range of +1.00 to −1.00 diopter. Total internal aberrations decreased significantly (*P*<.001).

CONCLUSIONS: The trifocal IOL improved near, intermediate, and distance vision in presbyopic patients. The use of 3 foci provided significant intermediate visual results without sacrificing near or distance vision.

Financial Disclosure: No author has a financial or proprietary interest in any material or method mentioned.

J Cataract Refract Surg 2014; 40:60–69 © 2013 ASCRS and ESCRS

Mojsiz P. et al. *J Cataract Refract Surg* 2014; 40: 60–69.

Table 3. Changes in visual acuity over time.

LogMAR Acuity	Preoperative	Postoperative 1 Month	Postoperative 3 Months	Postoperative 6 Months	*P* Value*
UDVA					
Mean ± SD	0.53 ± 0.47	−0.03 ± 0.08	−0.04 ± 0.10	−0.03 ± 0.09	<.001
Range	0.00, 1.80	−0.20, 0.20	−0.20, 0.20	−0.20, 0.20	
CDVA					
Mean ± SD	0.02 ± 0.21	−0.05 ± 0.07	−0.06 ± 0.09	−0.05 ± 0.08	.012
Range	−0.30, 0.30	−0.20, 0.20	−0.20, 0.20	−0.20, 0.20	
UNVA (33 cm)					
Mean ± SD	0.92 ± 0.26	0.22 ± 0.13	0.19 ± 0.11	0.20 ± 0.12	<.001
Range	0.10, 1.40	−0.10, 0.50	0.00, 0.50	0.00, 0.50	
CNVA (33 cm)					
Mean ± SD	0.17 ± 0.19	0.20 ± 0.11	0.14 ± 0.10	0.13 ± 0.10	.230
Range	−0.20, 0.70	0.00, 0.50	−0.10, 0.30	0.00, 0.40	
DCNVA (33 cm)					
Mean ± SD	0.68 ± 0.19	0.20 ± 0.11	0.17 ± 0.10	0.17 ± 0.11	<.001
Range	0.10, 0.90	0.00, 1.00	0.00, 0.40	0.00, 0.40	
UIVA (66 cm)					
Mean ± SD	0.76 ± 0.27	0.08 ± 0.11	0.11 ± 0.10	0.08 ± 0.10	<.001
Range	0.00, 1.40	−0.10, 1.30	−0.10, 0.30	−0.10, 0.40	
CIVA (66 cm)					
Mean ± SD	0.13 ± 0.23	0.07 ± 0.10	0.08 ± 0.10	0.06 ± 0.11	.050
Range	−0.20, 0.50	−0.10, 0.30	−0.10, 0.30	−0.10, 0.40	
DCIVA (66 cm)					
Mean ± SD	0.43 ± 0.26	0.07 ± 0.10	0.10 ± 0.09	0.08 ± 0.10	<.001
Range	0.00, 0.90	−0.10, 0.30	−0.10, 0.30	−0.10, 0.40	

CDVA = corrected distance visual acuity; CIVA = corrected intermediate visual acuity; CNVA = corrected near visual acuity; DCIVA = distance-corrected intermediate visual acuity; DCNVA = distance-corrected near visual acuity; UDVA = uncorrected distance visual acuity; UIVA = uncorrected intermediate visual acuity; UNVA = uncorrected near visual acuity

*Preoperative versus 6 months postoperative (Wilcoxon test)

Karşılaştırma / ATLisa Tri

Outcomes of a new diffractive trifocal intraocular lens

Peter Mojzis, MD, PhD, FEBO, Pablo Peña-García, MSc, Ivana Liehneova, MD, Peter Ziak, MD, PhD, Jorge L. Alió, MD, PhD, FEBO

PURPOSE: To evaluate refractive and visual parameters related to distance, intermediate, and near vision after cataract surgery and the optical quality of a new diffractive trifocal intraocular lens (IOL).

SETTING: Vissum Instituto Oftalmologico de Alicante, Alicante, Spain.

DESIGN: Case series.

METHODS: Patients had bilateral refractive lens exchange and multifocal diffractive IOL (AT Lisa tri 839 MP) implantation. A complete ophthalmology examination was performed preoperatively and postoperatively. The follow-up was 6 months. The main outcome measures were uncorrected distance (UDVA) and corrected distance (CDVA), intermediate, and near visual acuities; keratometry; manifest refraction; and aberrations (total, corneal, internal).

RESULTS: The study comprised 60 eyes of 30 patients (mean age 57.9 years ± 7.8 [SD]; range 42 to 76 years). There was significant improvement in UDVA, uncorrected intermediate visual acuity, uncorrected near visual acuity, CDVA, and distance-corrected intermediate and near visual acuity. The postoperative refractive status was within the range of +1.00 to −1.00 diopter. Total internal aberrations decreased significantly (*P*<.001).

CONCLUSIONS: The trifocal IOL improved near, intermediate, and distance vision in presbyopic patients. The use of 3 foci provided significant intermediate visual results without sacrificing near or distance vision.

Financial Disclosure: No author has a financial or proprietary interest in any material or method mentioned.

J Cataract Refract Surg 2014; 40:60–69 © 2013 ASCRS and ESCRS

Mojsiz P. et al. *J Cataract Refract Surg* 2014; 40: 60–69.

Table 4. Scores for different visual tasks.

Task	Score*
Television	
Mean ± SD	1.13 ± 0.35
Range	1, 2
Theater/concert	
Mean ± SD	1.23 ± 0.43
Range	1, 2
Driving at daytime	
Mean ± SD	1.33 ± 0.48
Range	1, 2
At home	
Mean ± SD	1.17 ± 0.38
Range	1, 2
Driving at night	
Mean ± SD	2.57 ± 0.77
Range	1, 4
Cooking	
Mean ± SD	1.13 ± 0.35
Range	1, 2
Newspaper	
Mean ± SD	1.67 ± 0.71
Range	1, 3
Computer	
Mean ± SD	1.67 ± 0.80
Range	1, 4
Homework	
Mean ± SD	1.10 ± 0.31
Range	1, 2
Overall	
Mean ± SD	1.43 ± 0.57
Range	1, 2

*Excellent (1); very good (2); good (3); not completely satisfied (4); dissatisfied (5); very dissatisfied (6)

Karşılaştırma / FineVision & ATLisa Tri

ARTICLE

Comparison of visual outcomes of 2 diffractive trifocal intraocular lenses

Eduardo F. Marques, MD, Tiago B. Ferreira, MD

PURPOSE: To compare the visual outcomes after cataract surgery with bilateral implantation of 1 of 2 diffractive trifocal intraocular lenses (IOLs).

SETTING: Two clinical centers, Lisbon, Portugal.

DESIGN: Prospective comparative case series.

METHODS: Phacoemulsification with bilateral implantation of a Finevision Micro F IOL (Group 1) or an AT Lisa tri 839 MP IOL (Group 2) was performed. Over a 3-month follow-up, the main outcome measures were uncorrected distance visual acuity (UDVA), corrected monocular and binocular distance visual acuity, uncorrected intermediate visual acuity at 80 cm, distance-corrected intermediate visual acuity (DCIVA), uncorrected near visual acuity at 40 cm, distance-corrected near visual acuity (DCNVA), spherical equivalent (SE) refraction, defocus curves, contrast sensitivity, presence of dysphotopsia, and use of spectacles.

RESULTS: Each group comprised 30 eyes (15 patients). The mean values at 3 months were UDVA, 0.03 logMAR ± 0.08 (SD) (Group 1) and 0.08 ± 0.12 (Group 2) (P = .765); DCIVA, 0.04 ± 0.07 logMAR and 0.18 ± 0.18 logMAR, respectively (P = .048); DCNVA, 0.03 ± 0.06 logMAR and 0.11 ± 0.08 logMAR, respectively (P = .032); SE, −0.25 ± 0.30 diopter (D) and −0.02 ± 0.39 D, respectively (P = .087). There was no significant difference in contrast sensitivity or dysphotopic phenomena between groups.

CONCLUSIONS: Both trifocal IOL models provided excellent distance, intermediate, and near visual outcomes. Monocular DCIVA and DCNVA appeared slightly better in Group 1. Predictability of the refractive results and optical performance were excellent, and all patients achieved spectacle independence.

Financial Disclosure: Neither author has a financial or proprietary interest in any material or method mentioned.

J Cataract Refract Surg 2015; 41:354–363 © 2015 ASCRS and ESCRS

Marquez EF. et al. *J Cataract Refract Surg* 2015; 41:354–363

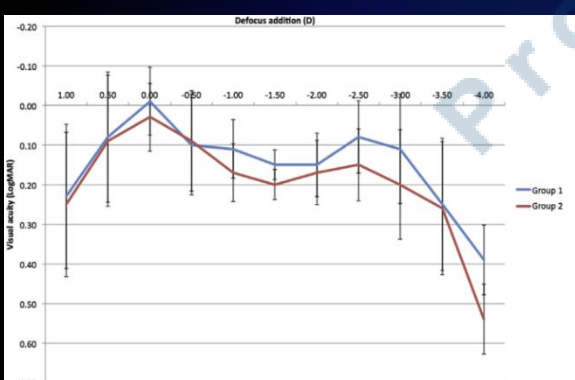


Table 3. Binocular visual acuity results.

Parameter	Result	P Value: Preop Vs Postop	P Value: Between Groups
UDVA (logMAR)			.840
Group 1			
Mean ± SD	0.02 ± 0.02	.001	
Range	0.06, −0.02		
Group 2			
Mean ± SD	0.00 ± 0.01	.001	
Range	0.10, −0.02		
CDVA (logMAR)			.840
Group 1			
Mean ± SD	−0.02 ± 0.04	.001	
Range	0.10, −0.14		
Group 2			
Mean ± SD	−0.03 ± 0.04	.001	
Range	0.00, −0.14		
UIVA (logMAR)			.053
Group 1			
Mean ± SD	0.03 ± 0.05	.001	
Range	0.06, −0.04		
Group 2			
Mean ± SD	0.13 ± 0.42	.001	
Range	0.16, 0.02		
DCIVA (logMAR)			.172
Group 1			
Mean ± SD	0.02 ± 0.05	.001	
Range	0.08, −0.06		
Group 2			
Mean ± SD	0.09 ± 0.04	.001	
Range	0.08, −0.06		
UNVA (logMAR)			.009
Group 1			
Mean ± SD	0.02 ± 0.02	.001	
Range	0.02, 0.00		
Group 2			
Mean ± SD	0.13 ± 0.05	.001	
Range	0.08, 0.00		
DCNVA (logMAR)			.331
Group 1			
Mean ± SD	0.01 ± 0.05	.001	
Range	0.10, −0.06		
Group 2			
Mean ± SD	0.05 ± 0.04	.001	
Range	0.00, 0.08		

CDVA = corrected distance visual acuity; DCIVA = distance-corrected intermediate visual acuity; DCNVA = distance-corrected near visual acuity; SE = spherical equivalent; UDVA = uncorrected distance visual acuity; UIVA = uncorrected intermediate visual acuity; UNVA = uncorrected near visual acuity

Karşılaştırma / FineVision & ATLisa Tri

Clinical & Experimental Ophthalmology
RANZCO The Royal Australian and New Zealand College of Ophthalmologists

Original Article

Optical performance of two new trifocal intraocular lenses: through-focus modulation transfer function and influence of pupil size

Javier Ruiz-Alcocer PhD, David Madrid-Costa PhD, Santiago García-Lázaro PhD, Teresa Ferrer-Blasco PhD, Robert Montés-Micó PhD

Volume 42, Issue 3
April 2014
Pages 271–276

First published: 23 October 2013 Full publication history
DOI: 10.1111/ceo.12181 View/save citation
Cited by: 2 articles Refresh Citing literature
Funding Information

Competing/conflicts of interest: No stated conflict of interest.

Funding sources: This research was supported in part by a Research Grant (#SAF2009-13342#) awarded by the Spanish Ministry of Science and Innovation (Ministerio de Ciencia e Innovación) and by a Complementary Action awarded by the Generalitat Valenciana.

Ruiz- Alcocer J. et al. *Clin Experiment Ophthalmol*. 2014 ;42 :271-6.

Abstract

Background

To compare the *in vitro* optical quality of two new trifocal intraocular lenses at different focal points as a function of pupil size.

Methods

Two intraocular lenses having different design approaches were evaluated: the AT LISA tri 839MP with a trifocal diffractive design, and the FineVision, which combines two distinct apodized bifocal diffractive profiles resulting in three foci. A PMTF optical bench was used to assess the intraocular lenses' performance, and as optical quality metrics, the through-focus modulation transfer function was selected; that is, it was measured at 10 focal points and for four different apertures (2.0, 3.0, 3.75 and 4.5 mm).

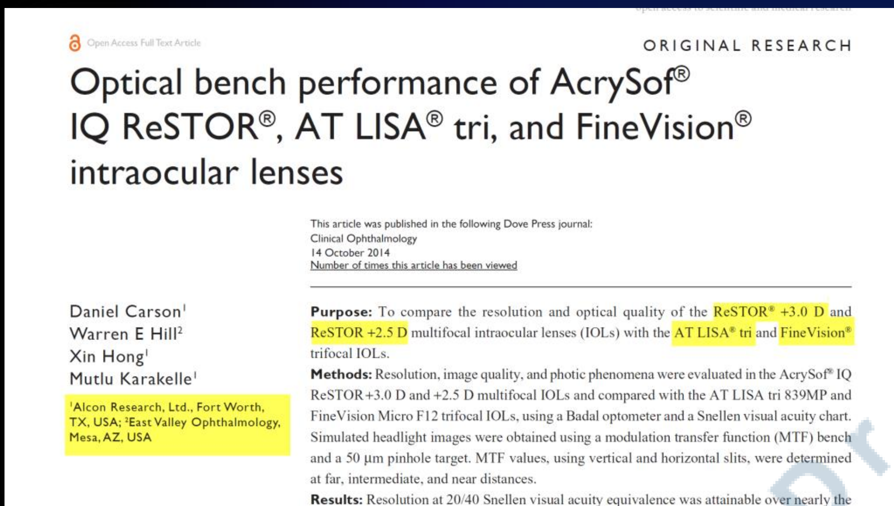
Results

For both lenses, the through-focus curve showed three peaks, corresponding to far, intermediate and near focal point. At the 0.0 D focal point, the FineVision yielded better results for larger pupils. At the −1.5 D focal point, both lenses performed worse for larger pupils. At the −3.0 D, the FineVision provided better results for all apertures. However, at the −3.5 D focal point, it was the AT LISA tri 839MP that outperformed the FineVision for larger pupils.

Conclusions

The two trifocal intraocular lenses under analysis have modulation transfer function peaks that correspond to the far, intermediate and near focal points. For larger pupil sizes, the FineVision seems to provide better results at far focal points, while the AT LISA tri 839MP not only provides better results at the intermediate and near focal points, but is also less pupil size-dependent.

Karşılaştırma / FineVision & ATLisa Tri & AcrySof IQ



Open Access Full Text Article

ORIGINAL RESEARCH

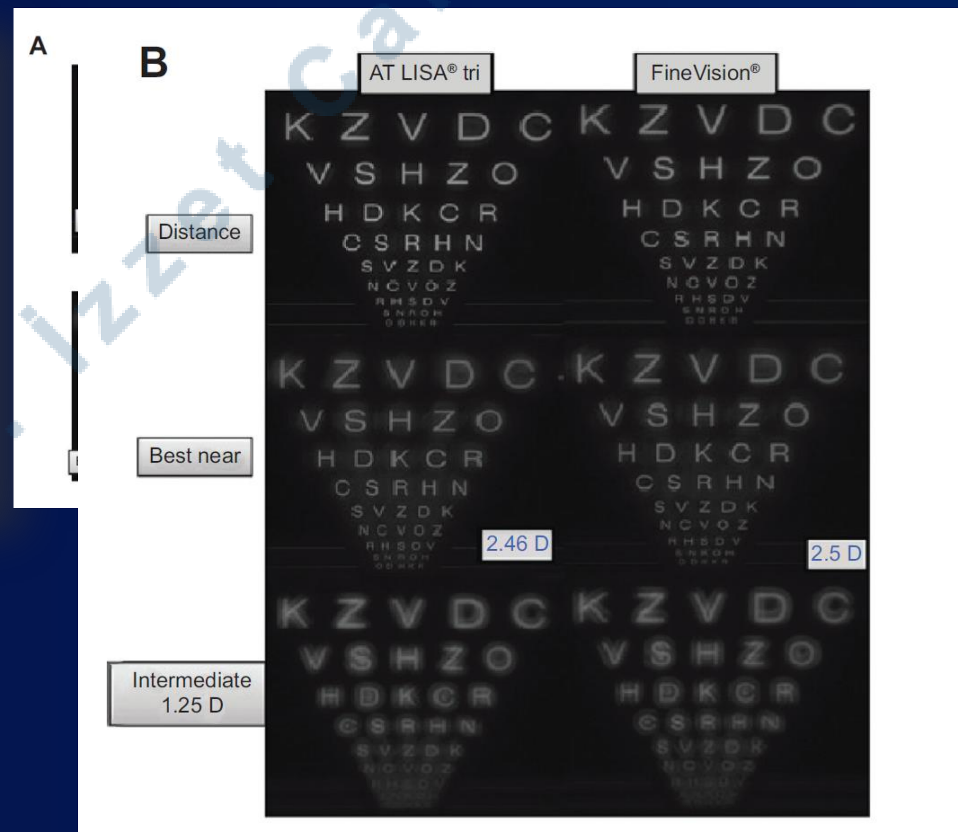
Optical bench performance of AcrySof® IQ ReSTOR®, AT LISA® tri, and FineVision® intraocular lenses

This article was published in the following Dove Press journal:
Clinical Ophthalmology
14 October 2014
Number of times this article has been viewed

Daniel Carson[1]
Warren E Hill[2]
Xin Hong[1]
Mutlu Karakelle[1]

[1]Alcon Research, Ltd., Fort Worth, TX, USA; [2]East Valley Ophthalmology, Mesa, AZ, USA

Purpose: To compare the resolution and optical quality of the ReSTOR® +3.0 D and ReSTOR +2.5 D multifocal intraocular lenses (IOLs) with the AT LISA® tri and FineVision® trifocal IOLs.
Methods: Resolution, image quality, and photic phenomena were evaluated in the AcrySof® IQ ReSTOR +3.0 D and +2.5 D multifocal IOLs and compared with the AT LISA tri 839MP and FineVision Micro F12 trifocal IOLs, using a Badal optometer and a Snellen visual acuity chart. Simulated headlight images were obtained using a modulation transfer function (MTF) bench and a 50 µm pinhole target. MTF values, using vertical and horizontal slits, were determined at far, intermediate, and near distances.
Results: Resolution at 20/40 Snellen visual acuity equivalence was attainable over nearly the



Özet: FineVision ve ATLisa-Tri ara mesafe için yararlı bir odak oluşturmakla birlikte, uzak mesafede daha az görme ve daha fazla background halo'ya yol açmaktadırlar.

Karşılaştırma / FineVision & ATLisa Tri & AcrySof IQ

Open Access Full Text Article

ORIGINAL RESEARCH

Optical bench performance of AcrySof® IQ ReSTOR®, AT LISA® tri, and FineVision® intraocular lens

Daniel Carson[1]
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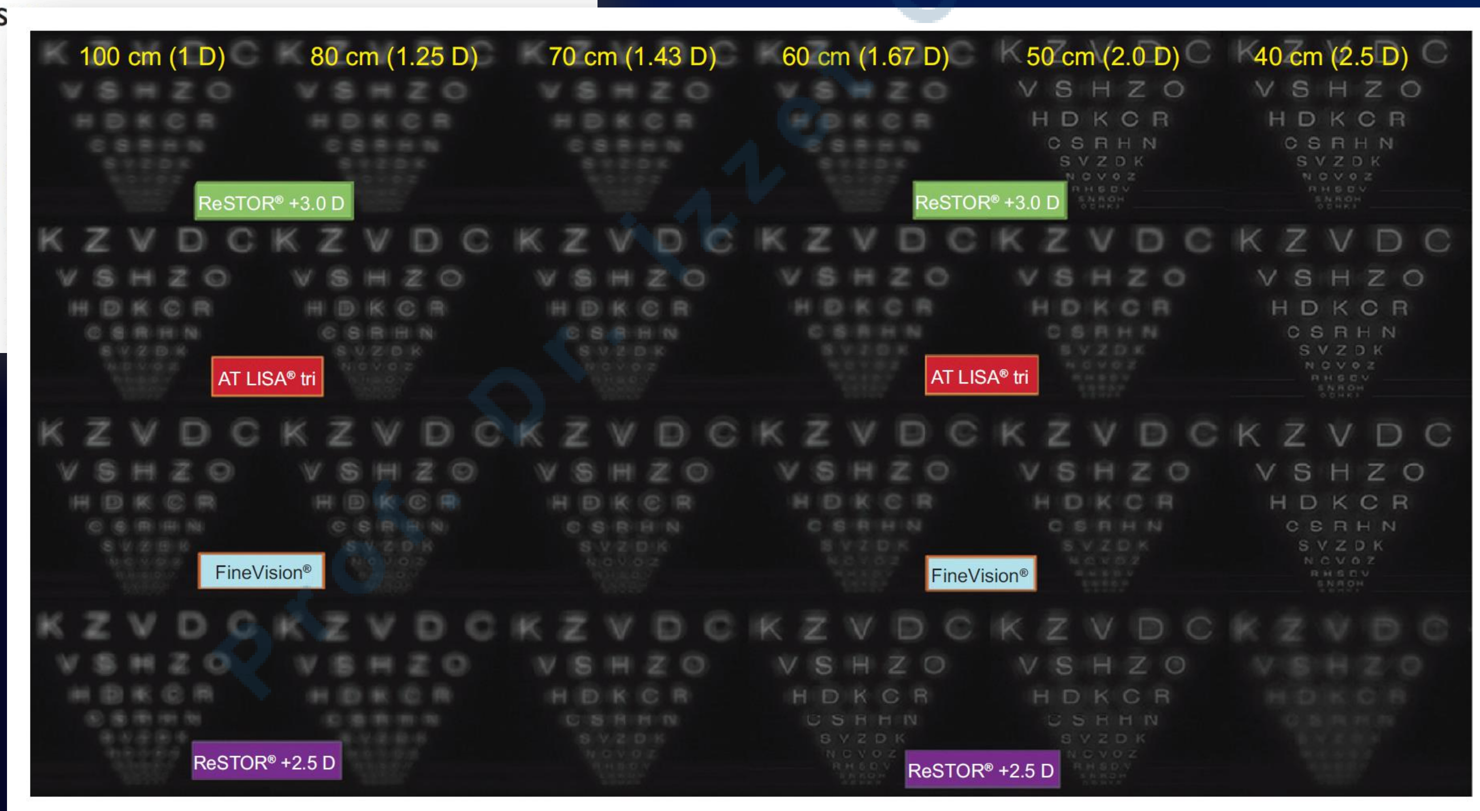

Özet

	Bifokal	Trifokal
Kontrast Kaybı	Var	Var (daha az)
Uzak görme	Çok İyi	Çok İyi
Ara mesafe	Yok	İyi
Yakın	Çok İyi	İyi - Çok iyi
Disfotopsi	Var	Var
Subjektif testler	Orta	İyi

Özet

- **Uzak görme**: FineVison da pupil genişken iyi, normal pupil çapında 0.8-0.9 seviyelerinde, ATLisa Tri ve Reviol Tri ED de iyi ya da çok iyi
- **Yakın Görme**: Hepsinde yeterli
- **Ara Mesafe**: Hepsinde yeterli
- **Üç odak arası bölümde görme**: Reviol Tri ED'de yeterli, diğerlerinde düşük
- **Halo-glare türü disfotopsik sorunlar**: Bifokal lenslerle farklı değil

İlginize Teşekkürler