

PHOTIC PHENOMENA OF EDOF IOLS: ¿ARE THEY DOING BETTER THAN MULTIFOCALS?

Dr. Jorge L. Alió del Barrio MD, PhD, FEBOS-CR, FWCRS

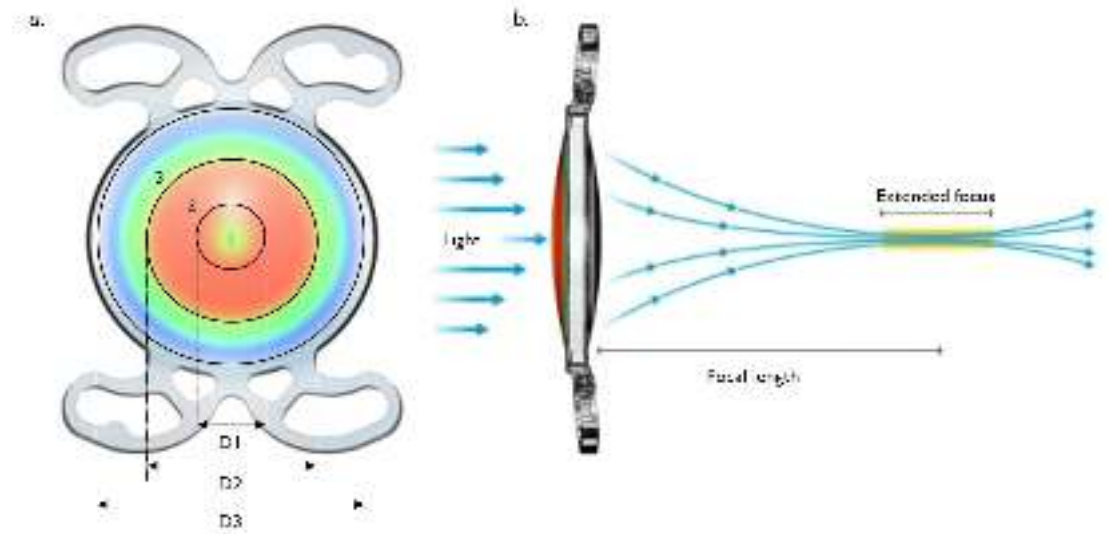
Medical Director, Vissum (Miranza Group), Alicante (Spain)

Professor of Ophthalmology, Universidad Miguel Hernández, Alicante (Spain)

	Monofocal	Multifocal	EDOF
Far VA			
Intermediate VA			
Near VA			
Contrast Sensitivity & Photic Phenomena			 

EDOF IOLs: The basic concept...

- The typical extended depth of field (EDOF) IOL is a lens that uses a modification of the spherical aberrations to extend the depth of field along the visual axis without creating a variety of focus. They stretch the light, do not create different focus



EDOF IOLs: The consequences...



- Light dispersion at the visual axis at the level of the fovea
- **Less accurate image** for far and near
- Lower quality of retinal image
- **Decay of the PSF Strehl ratio**
- Decay in MTF (related to PSF)

Special Report: American Academy of Ophthalmology Task Force Consensus Statement for Extended Depth of Focus Intraocular Lenses

With the advent of wavefront technology, our clinical understanding of human optics and visual performance allows intraocular lens (IOL) manufacturers to manipulate lens design to optimize our visual world. These specially designed extended depth of focus (EDF) lenses use optics that increase depth of focus, potentially allowing better intermediate vision while minimally affecting distance vision. The tradeoff with use of EDF lenses is a reduction in distance image quality if the aberration magnitude is too large.

The American Academy of Ophthalmology Task Force depth of focus (EDF) lenses use optics that increase depth of focus, potentially allowing better intermediate vision while minimally affecting distance vision. The tradeoff with use of EDF lenses is a reduction in distance image quality if the aberration magnitude is too large.

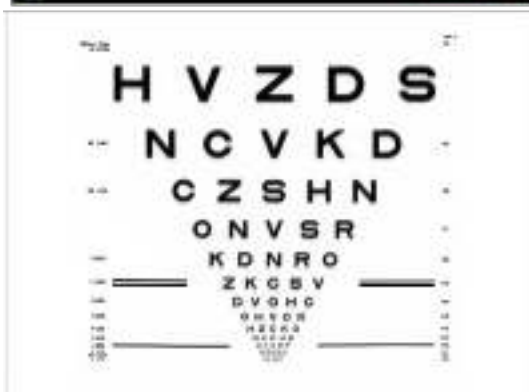
recommendations will improve the sensitivity of testing and provide more objective data for the U.S. Food and Drug Administration and clinicians.

Choose the best quality of Retinal Image

Monofocal IOL

SA60AT

PSF Strehl ratio: 0.5303



EDOF IOL

Miniwell

PSF Strehl ratio: 0.0973

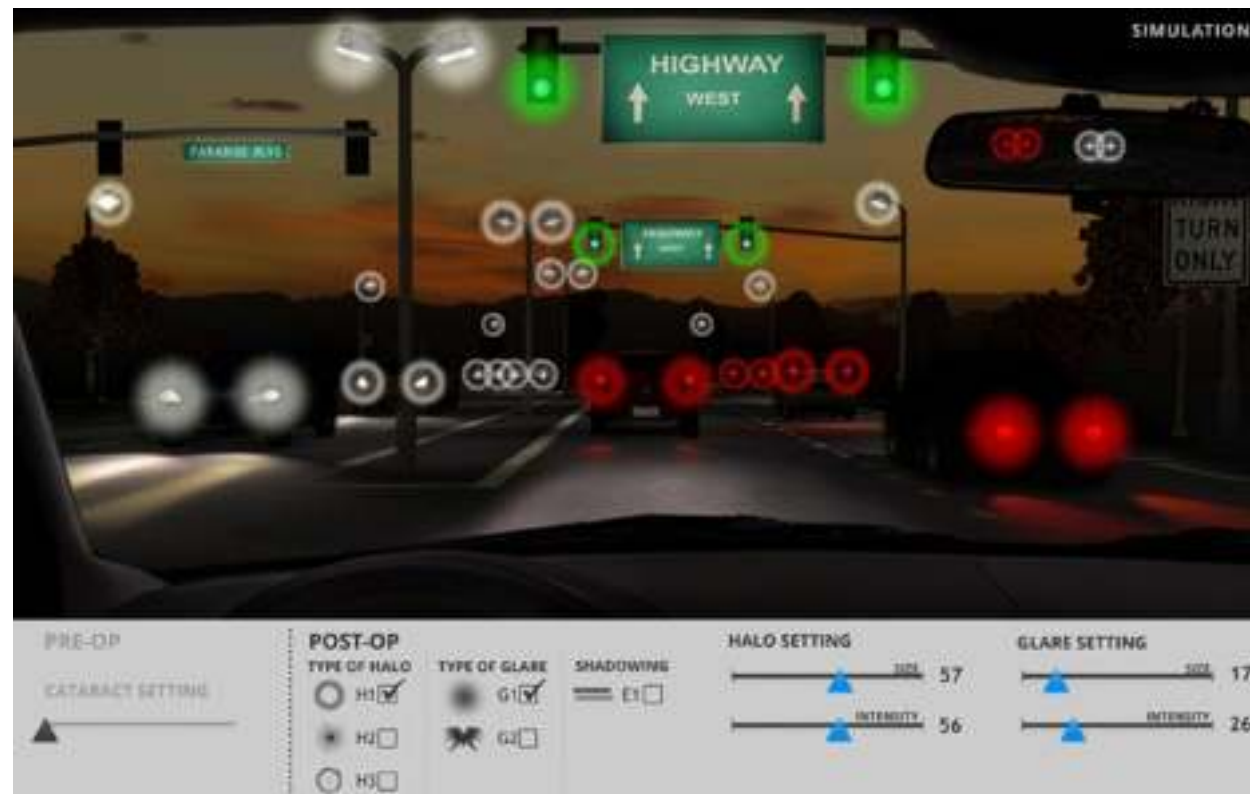


PUPILLARY DIAMETER: 3 MM

PSF WITHOUT LOA

Examples for conceptualization only

¿Do EDOF IOLs really perform better than Trifocal IOLs regarding photic phenomena?



Extended Depth of Focus Versus Trifocal for Intraocular Lens Implantation: An Updated Systematic Review and Meta-Analysis

Mohammad Karam¹, Nahlaa Alkhowaiter², Ali Alkhabbaz³, Ahmed Aldubaikhi⁴, Abdulmalik Alsaif⁵, Eiman Shareef⁶, Rand Alazaz⁷, Abdulaziz Alotaibi⁶, Mona Koaik⁸, Samir Jabbour⁹

Ocular aberration, CS, haloes (odds ratio = 0.64, $P = .10$), glare, and patient satisfaction were not statistically significant between the groups

Probably biased by

Purpose: To compare the ex patients undergoing IOL im

Design: Systematic review a

Methods: An electronic sea Reviews and Meta-Analyses Refraction and visual acuity) intraocular aberrations, cont and glare, spectacle indeper

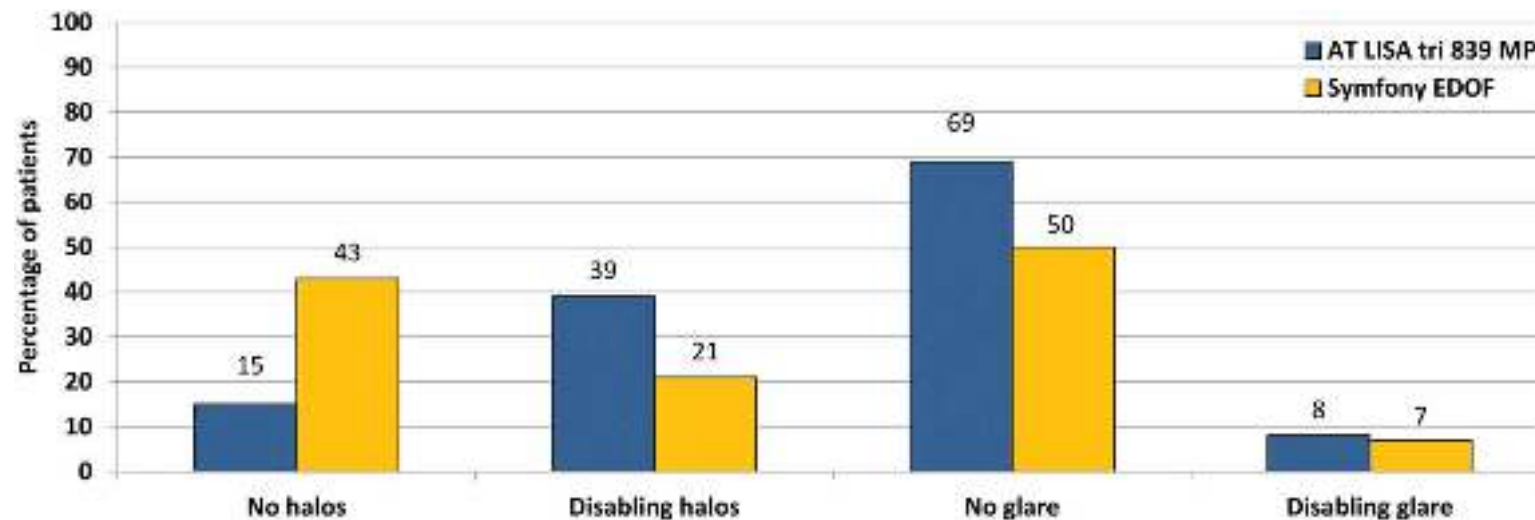
Results: A total of 22 studie improvement in sphere (mean difference [MD] = -0.23; $P = .001$) and spherical equivalence (MD = -0.11, $P = .0001$) compared to EDOF IOL. No difference was observed in cylinder (MD = -0.03, $P = .25$) or astigmatism. Trifocal IOL had superior near visual acuity outcomes, namely uncorrected near visual acuity (MD = 0.12, $P < .00001$) and distance-corrected near visual acuity (MD = 0.12, $P = .002$). Postoperative corrected distance visual acuity (MD = -0.01, $P = .01$) was significantly improved for the EDOF group, although no difference was noted in postoperative uncorrected distance visual acuity (MD = 0.00, $P = .84$), uncorrected intermediate visual acuity (MD = 0.01, $P = .68$) or distance-corrected intermediate visual acuity (MD = -0.01, $P = .39$). Defocus curve favored trifocal IOLs at near vision and EDOF IOLs at intermediate vision. Ocular aberration, CS, haloes (odds ratio = 0.64, $P = .10$), glare, and patient satisfaction were not statistically significant between the groups. The trifocal IOL was associated with an improved QoV questionnaire score (MD = 1.24, $P = 0.03$) and spectacle independence (odds ratio = 0.26, $P = .02$).

Conclusions: Trifocal IOLs improved uncorrected near visual acuity compared to EDOF IOLs. Uncorrected distance and intermediate visual acuity, halos, and glare were not statistically different between both groups.

BIAS

Symfony vs AT Lisa Tri

- Prospective Randomized Controlled Trial
- 60 eyes of 30 patients
- Disabling halos **AT LISA tri 39%** and **Symfony 21%** of cases ($P = .12$).
- **No significant differences seen in contrast sensitivity and incidence of photopic phenomena**

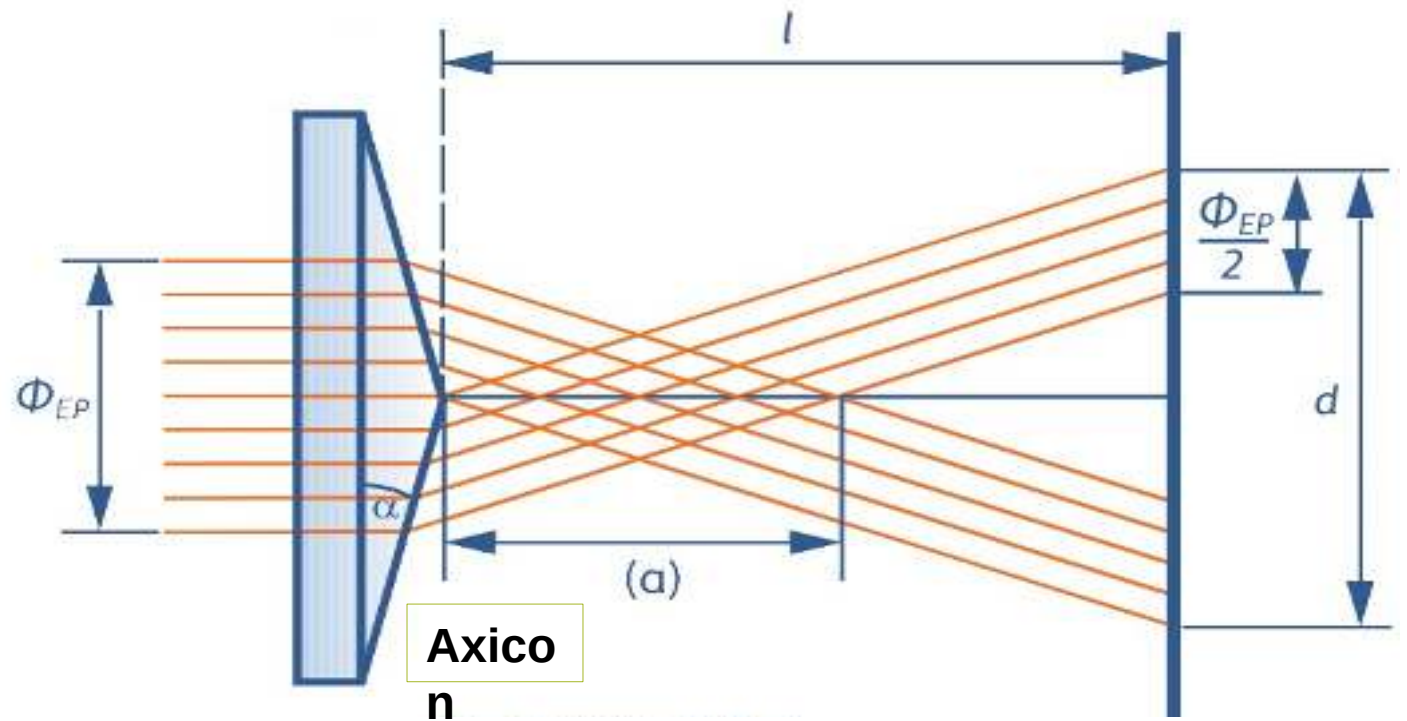
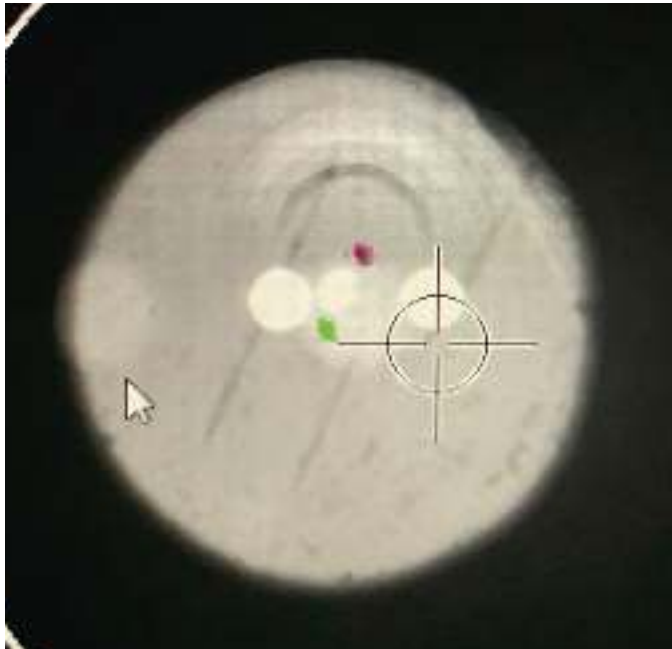


Meta-analysis Symphony vs Trifocal IOLs

- Comparative clinical trials that involved bilaterally implanting EDOF IOLs
- 9 CT with a total of 1336 eyes
- **Compared to Monofocal IOL**: EDOF IOLs resulted in **reduced contrast sensitivity**, **more frequent halos** (RR: 2.81, P = 0.04).
- **Compared to Trifocal IOL**: EDOF IOLs performed **better than trifocal IOLs in contrast sensitivity**, and there were **no significant difference in halos**

¿What About Modern EDOF IOLs?

(Wavefront-shaping)



Symphony vs Vivity

- Prospective Randomized Controlled Trial

- 69 patients

- **Not experiencing Glare:**

- Symphony: 60%

- Vivity: 88% (p= .008)

- **Not experiencing Starbursts:**

- Symphony: 66% (34% reported "moderate" or "severe" starbursts)

- Vivity: 88% (9% reported "moderate" or "severe" starbursts; p=0.019)

Symphony induces more visual disturbances, notably the frequency, severity, and bothersomeness of starbursts and glare.



Clinical outcomes in a U.S. registration study of a new EDOF intraocular lens with a nondiffractive design.

Authors: McCabe C, Berdahl J, Reiser H, et al.

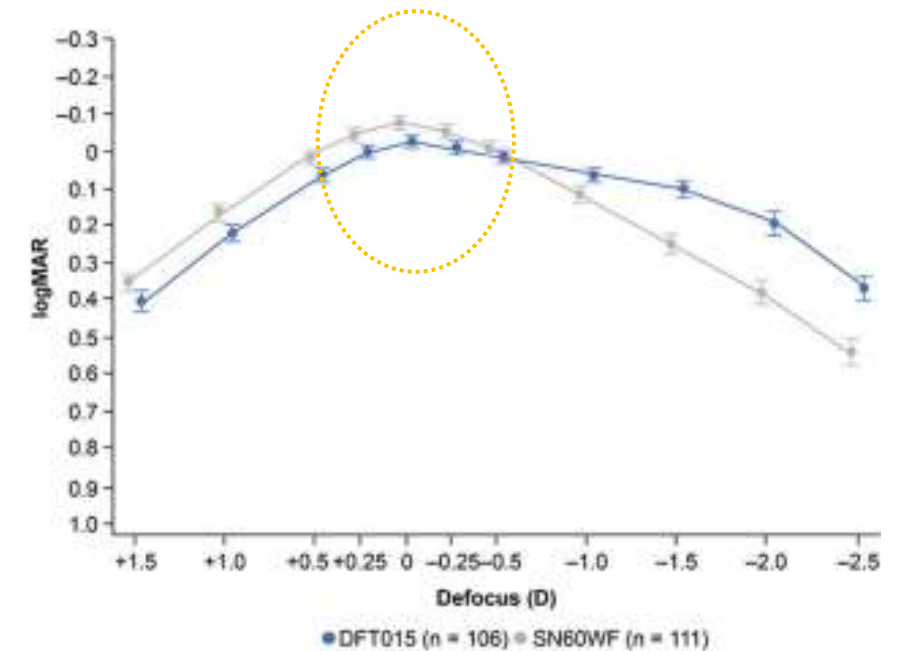
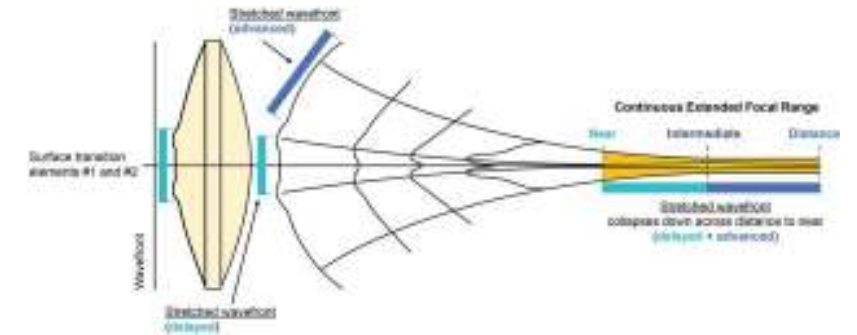
Journal: *J Cataract Refract Surg*

Objective:

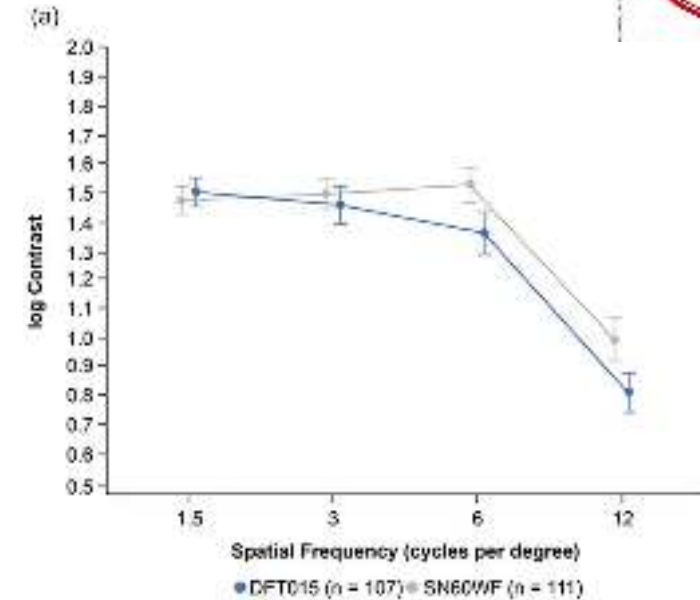
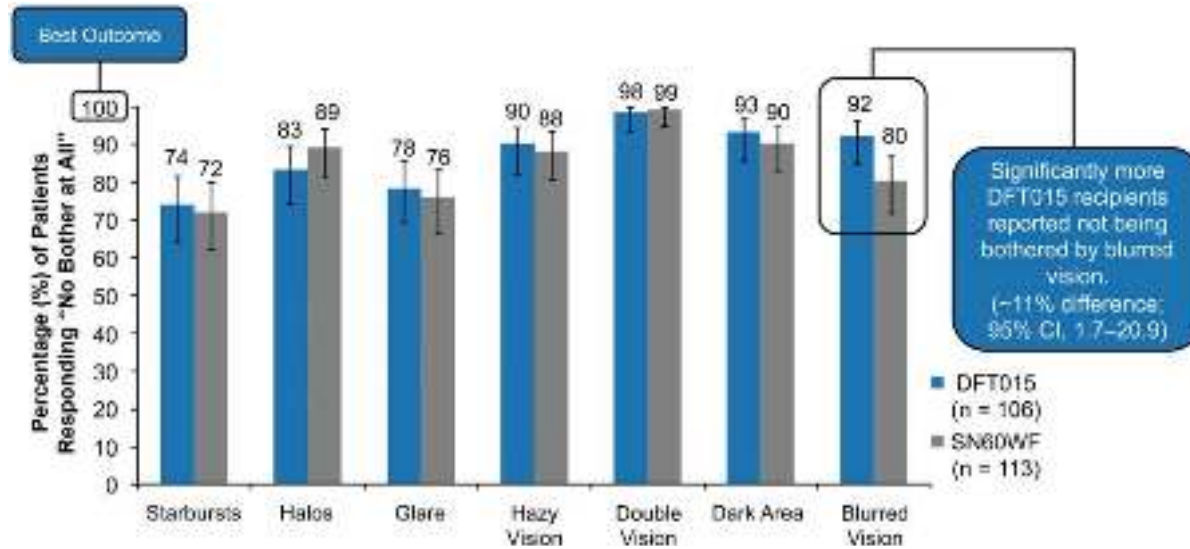
- To evaluate the effectiveness and safety of AcrySof IQ Vivity compared with an aspheric monofocal control IOL (AcrySof IQ SN60WF).

Design:

- Prospective randomized controlled clinical study. Bilateral cataracts with bilateral implantation of Vivity or SN60WF. 6 months follow-up.
- 218 patients (435 eyes)



- Patient-reported most bothersome visual disturbances were low and consistent between groups.



- Vivify is safe and effective for the visual correction of aphakia, exceeding American National Standards Institute criteria for an extended depth-of-focus IOL by providing superior DCIVA and DCNVA, with comparable CDVA and visual disturbances to the SN60WF monofocal IOL.

Multicountry clinical outcomes of a new nondiffractive

Authors:

Journal:

Objective

- To evaluate the visual quality of the AcrySof IQ Vivity (AcrySof IQ Vivity) compared to the SN60WF.

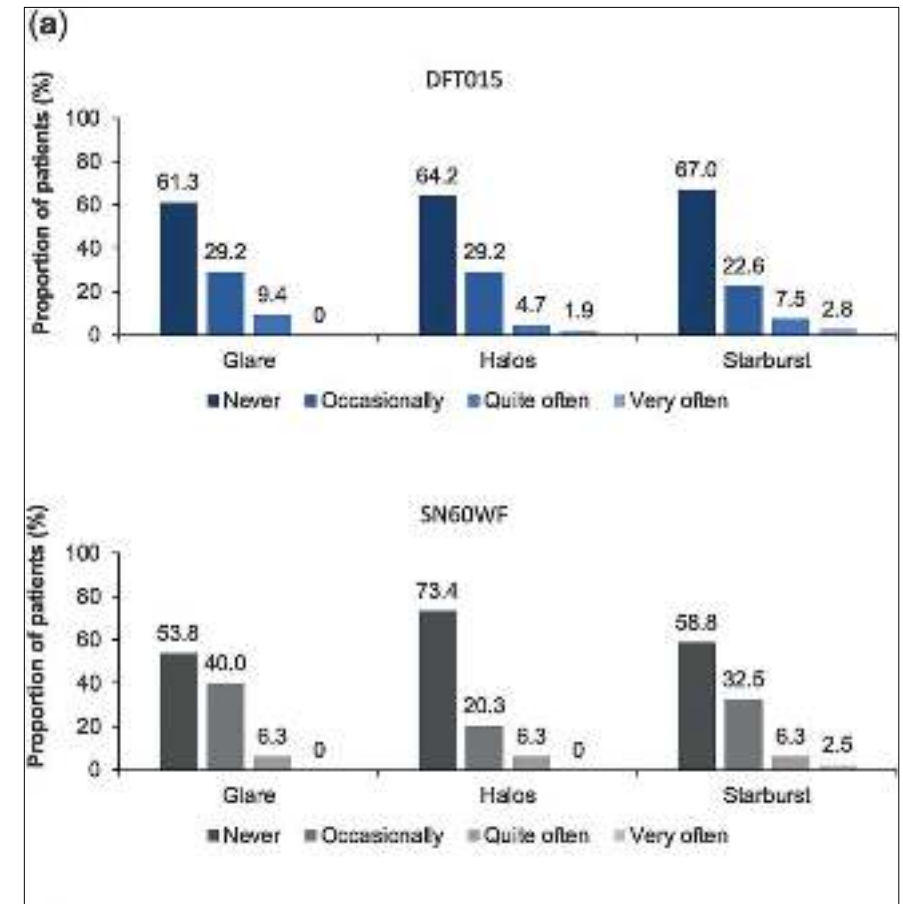
Design:

- Prospective, multicenter, masked clinical study. Australia, Canada, Spain, UK.
- 282 patients (564 eyes)



AcrySof IQ Vivity
(AcrySof IQ Vivity)

➤ Vivity exhibited a similar visual disturbance profile than SN60WF.



- Prospective Randomized Controlled Trial

- 56 patients

- **Moderate or severe Glare:**

- Vivity: 20.8%

- Monofocal: 7.4% (p= .228)

- **Moderate or severe Halos:**

- Vivity: 16.7%

- Monofocal: 11.1% (p= .697).

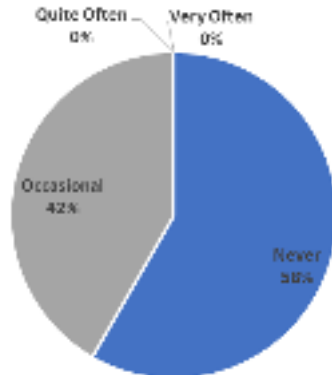
Vivity vs Monofocal



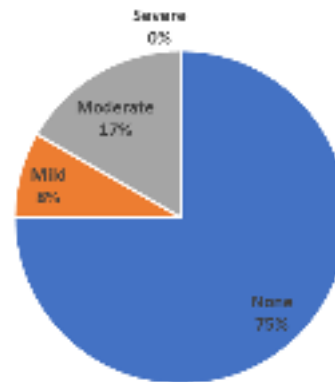
Vivity: Our data –Photic Phenomena



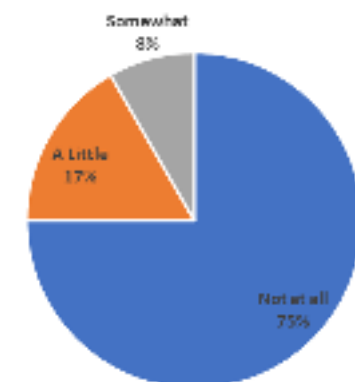
How often do you experience starbursts?



How severe are the starbursts?



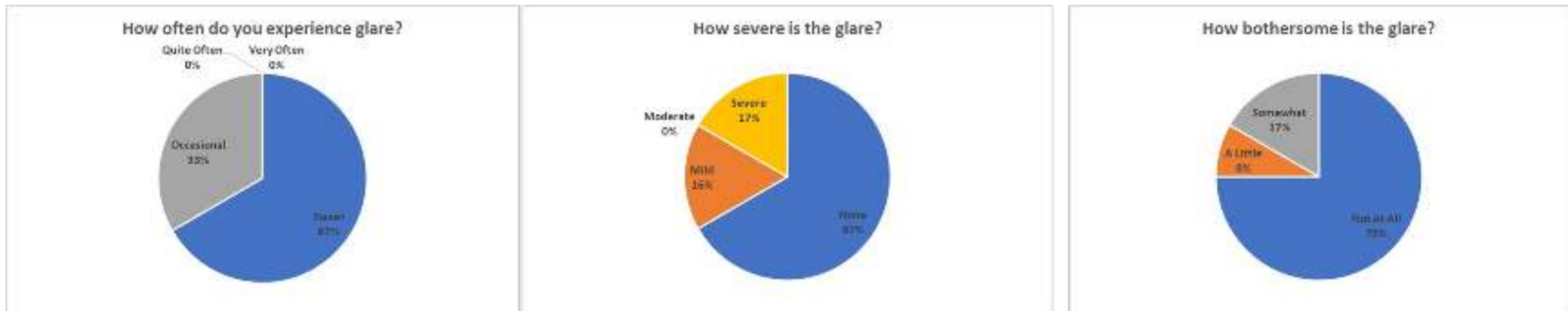
How bothersome are the starbursts?



¿EDOF > Trifocal?.... Yes

OoV Questions	Never	Occasionally	Frequently	Very frequently
But either NOT a Monofocal				4 %
				26 %
				4 %
Glare	46 %	25 %	25 %	4 %

Gemetric Trifocal

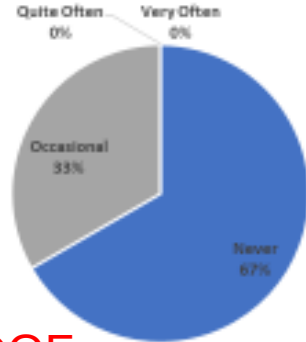


Vivity EDOF

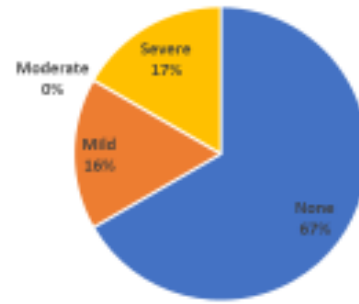
PureSee EDOF: Our data



How often do you experience glare?



How severe is the glare?



How bothersome is the glare?

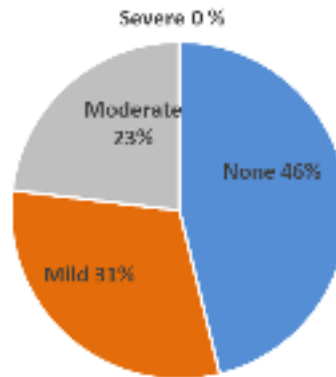


Vivity EDOF

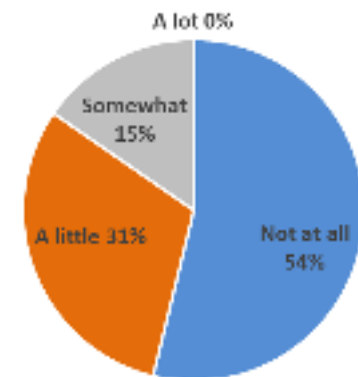
How often do you experience glare?



How severe are the glare?



How bothersome are the glare?

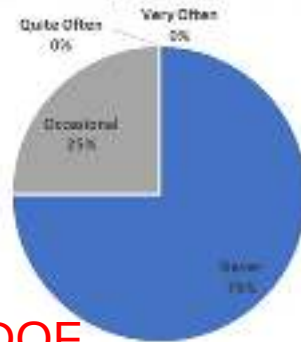


PureSee EDOF

PureSee EDOF: Our data

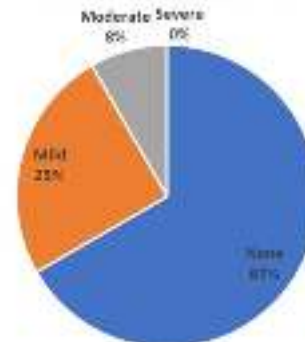


How often do you experience haloes?

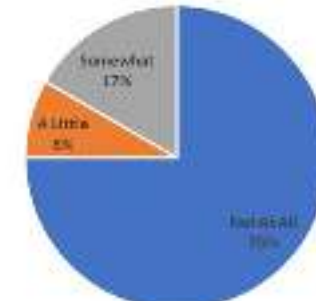


Vivity EDOF

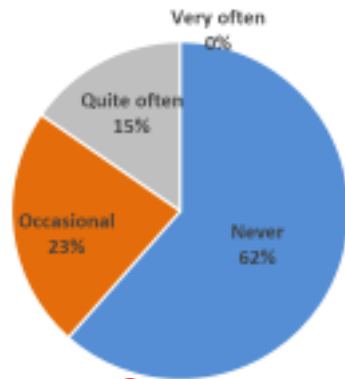
How severe are the haloes?



How bothersome are the haloes?

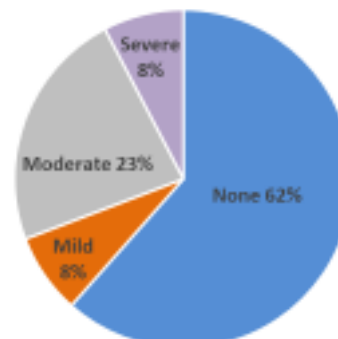


How often do you experience haloes?

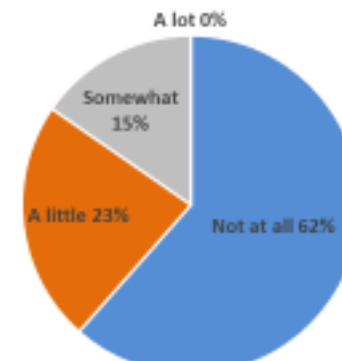


PureSee EDOF

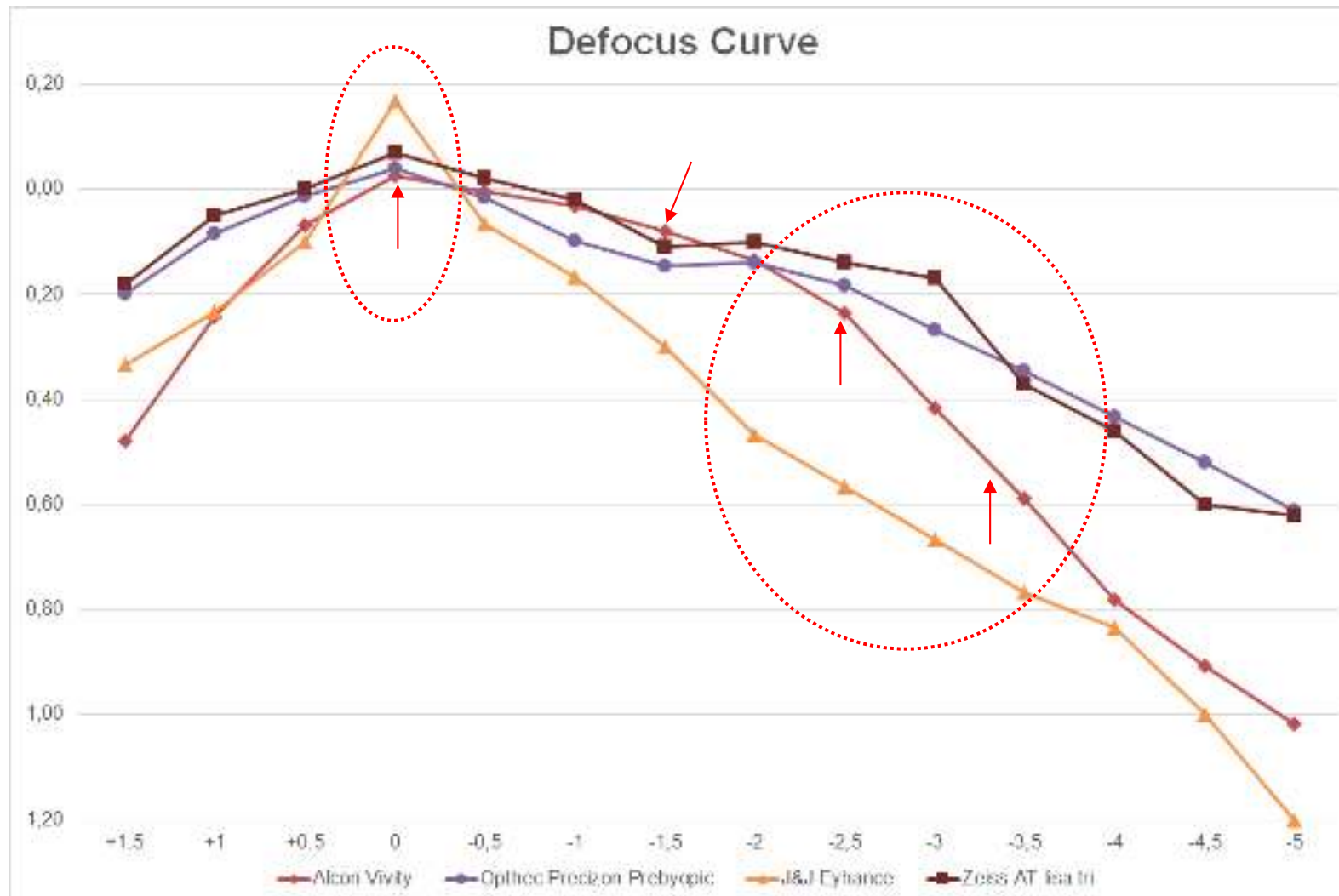
How severe are the haloes?



How bothersome are the haloes?



EDOF Results: good enough? Vivity



EDOF Results: good enough? Vivity

	Precizon Presby		Vivity		AT Lisa Tri		Eyhance	
	n	%	n	%	n	%	n	%
≥ 0.40	4	16,0	2	8,0	0	0,0	22	88,0
< 0.40 and > 0.10	18	72,0	19	76,0	6	24,0	3	12,0
≤ 0.10	3	12,0	4	16,0	19	76,0	0	0,0



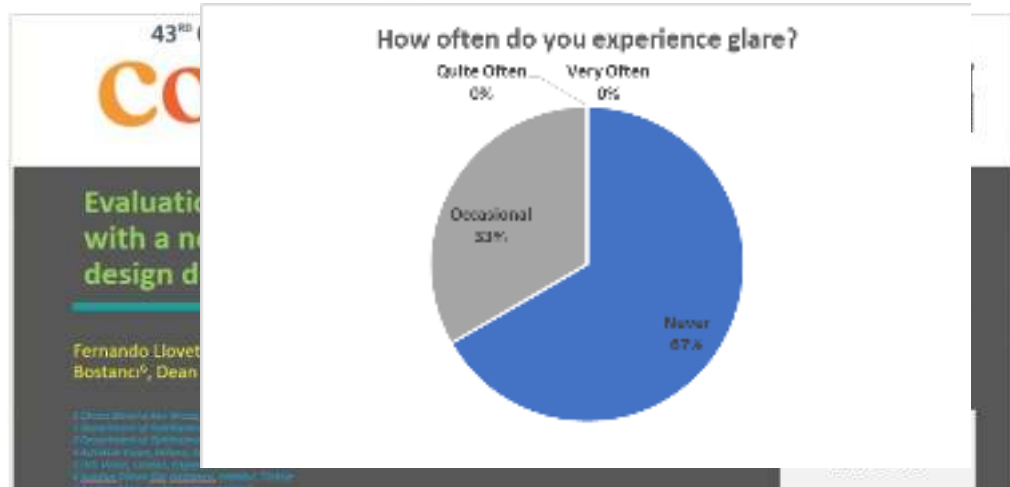
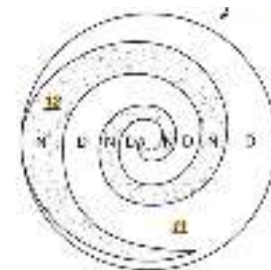
nd percentage (%) of patients for each of the l
ected near visual acuity (UNVA).

!!EDOF IOLs $\geq$ Trifocals!!!



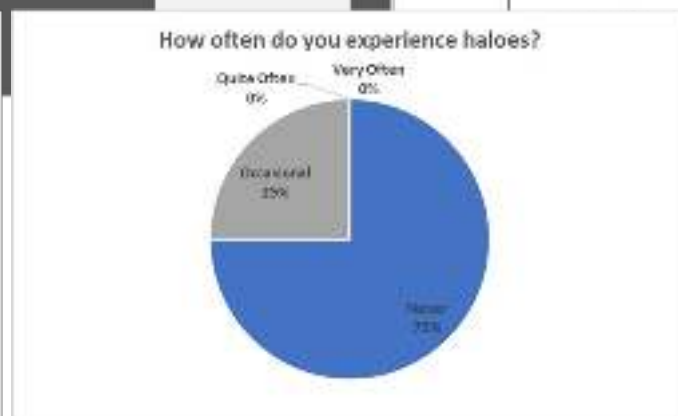
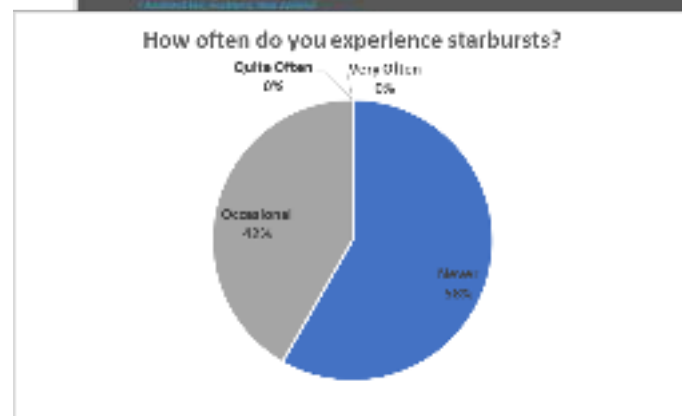
DS

Are We Facing The End of EDOF IOLs?



1. Do you experience visual disturbance like:

	Never	Rarely	Sometimes	Most of the time	Always
Starbursts	52%	14%	28%	0%	6%
Halos	40%	28%	17%	6%	9%
Glare	70%	16%	6%	0%	6%
Hazy Vision	86%	14%	0%	0%	0%
Blurred Vision	86%	14%	0%	0%	0%
Double Vision	100%	100%	0%	0%	0%
Dark Area (negative dysphotopsia)	100%	100%	0%	0%	0%

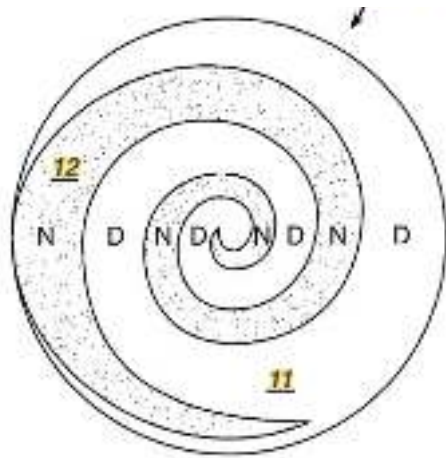


experience visual disturbances, how bothersome is this for you?

	Not at all	A little bit	Somewhat	Quite a bit	Very much
	80%	14%	6%	0%	0%
	78%	10%	12%	0%	0%
	80%	6%	6%	6%	0%
	100%	0%	0%	0%	0%
	86%	6%	6%	0%	0%
negative	100%	0%	0%	0%	0%
	100%	0%	0%	0%	0%

n 50

Are We Facing The End of EDOF IOLs?



➤ Distance Vision: Spiral > EDOF

➤ Near Vision: Spiral >> EDOF

➤ Intermediate Vision: Spiral ≈

EDOF

➤ Photic Phenomena: Spiral ≥
Solid data available for 2026

EDOF

ESCRS!!



Jorge.aliodelbarrio@vissum.com

VISSUM

GRUPO MIRANZA

