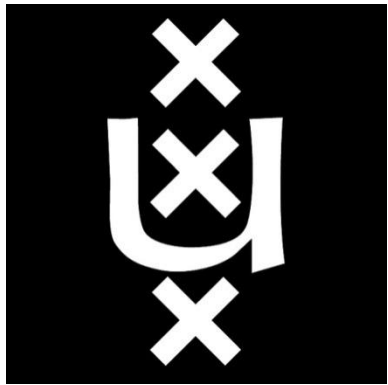




Retina
Total Eye Care®

Straylight (disability glare) results in case of a diffractive multifocal IOL design with apodization pattern adjusted to reduce glare.



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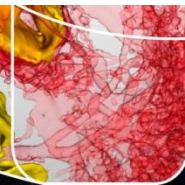
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2. Retina Total Eye Care, Driebergen

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Financial Disclosure:

- Dr. Lapid is a speaker for Alcon, Hanita Lenses, MSD, Oculentis, and a clinical investigator for Alcon.
- Dr. van den Berg has no proprietary interests, the Royal Dutch Academy of Sciences owns the patent for the C-Quant straylight meter.
- Mr. Van der Linden and Dr. van der Meulen have no interest to disclose.



Introduction:

- Multifocal intraocular lenses are designed to effectively restore visual acuity for distance and near.
- Different optical designs of multifocal IOL may affect side effects experienced by the patient.
- Some of these side effects are possibly related to glare disability, which is straylight.
- The effect of multifocality on straylight is not yet clear.



Straylight Ξ disability glare parameter for quality of vision

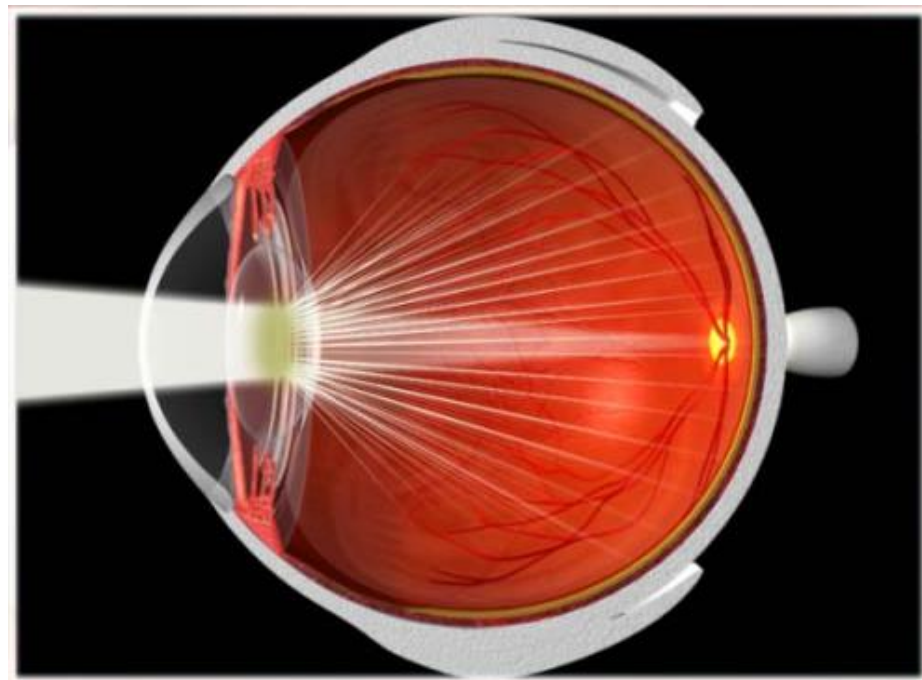
- Light that does not come to focus on the retina, but is strayed in the eye by its own structures, and cause veiling of sight

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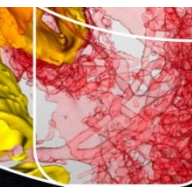
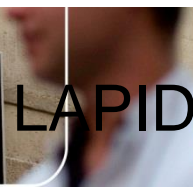


Commission Internationale d'Eclairage (CIE): Disability Glare \equiv Straylight

- retinal straylight is caused by scattering of light in the optically imperfect optical components of the eye

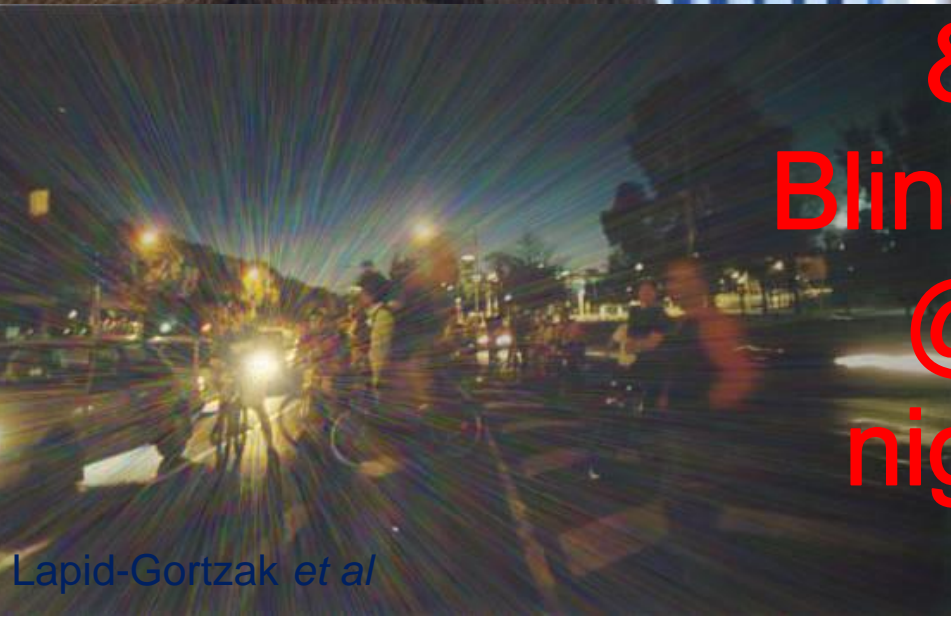


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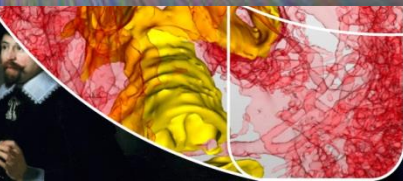


Effects of
Straylight:
loss
of contrast



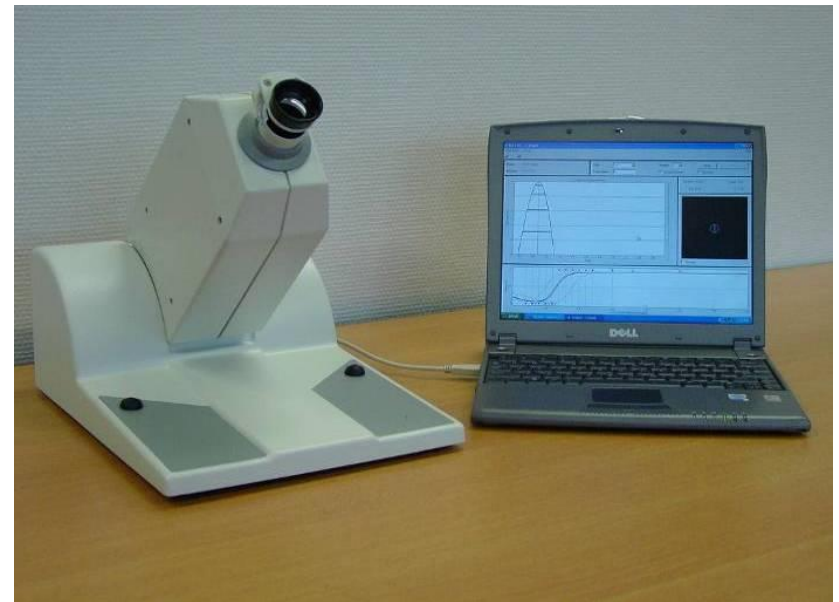
&
Blinding
@
night

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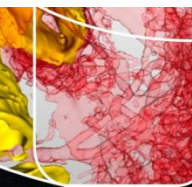
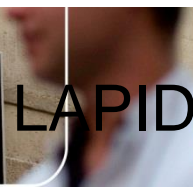
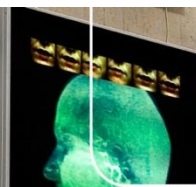


Straylight meter

- Oculus (Germany based firm) C-Quant
- Available since June 2005
- Based on a patent from the Netherlands Royal Academy of Arts and Sciences

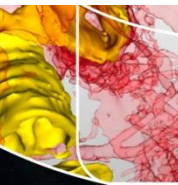
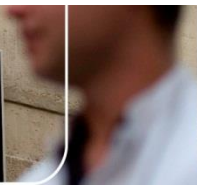


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Background

Author	Journal	Conclusion
Dick <i>et al</i>	1999 Ophthalmology	No difference between MFIOL and monoIOL
De Vries <i>et al</i>	2008 JCRS	SN6AD3 higher log(s) 0.078
Ehmer <i>et al</i>	2011 Ophthalmologe	higher straylight with MFIOL
Hoffmann <i>et al</i>	2009 JRS	No difference
Cervino <i>et al</i>	2008 JCRS	No difference
De Vries <i>et al</i>	2010 JCRS	Addition type +3 +4 no difference
Schrecker <i>et al</i>	2012 JCRS	No difference diffractive versus sectorial addition



Purpose

- To investigate the behavior in straylight in 2 types of apodized diffractive multifocal IOLs (SN6AD1, Alcon, USA, versus Seelens MF and BunnyLens MF, Hanita Lenses, Israel). Hanita claims in adjustments to the apodization surface to reduce side effects such as halos.



Methods:

- Prospective interventional case cohort
- Tenets of Declaration of Helsinki adhered to
- Standard phacoemulsification surgery – implantation with the MFIOL that the patient opted for.
- Inclusion: uneventful phacoemulsification.
- Exclusion: other types of lenses, incomplete data-set, other ocular findings that may influence straylight measurements, such as corneal problems, or vitreous turbidity, PCO etc.
- Outcome measures: UDVA, CDVA, Straylight (log (s)), refraction, pre and post operatively



Methods: MF IOLs compared:

SeeLens MF

BunnyLens MF

(Hanita Lenses, Israel)
hydrophilic

multifocal apodized
diffractive IOL

11 rings on the surface,
6mm optic & 13mm haptic
diameter.

Identical optic design.

SN6AD1

("ReSTOR", Alcon, USA) is
hydrophobic

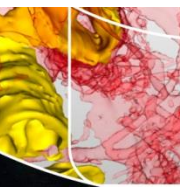
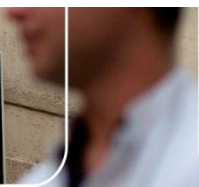
multifocal apodized
diffractive IOL

9 rings on the surface
6mm optic & 13mm haptic
diameter.



Results CVDA and refraction:

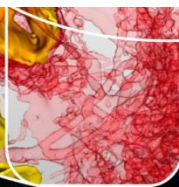
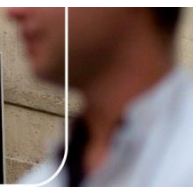
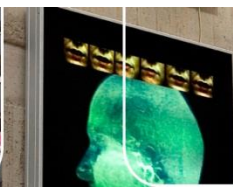
	SeeLens MF BunnyLens MF	SN6AD1
N	84	79
pre-op CDVA (logMAR +/- SD, range)	0.04 \pm 0.08 (0.3 to -0.1)	0.06 \pm 0.10 (0.4 to -0.1)
post-op CDVA (logMAR+/-SD, range)	-0.03 \pm 0.06 (0.2 to -0.16)	-0.02 \pm 0.08 (0.4 to -0.2)
preopRefraction SE +/- SD (range)	+1.30 D \pm 2.05 (-6.625 to +5.75)	+0.48 \pm 2.65 (-10.75 to +6.00)
postopRefraction SE +/- SD (range)	0.01 \pm 0.43 (-1.375 to 1.25)	0.06 \pm 0.35 (-0.75 to 0.875)



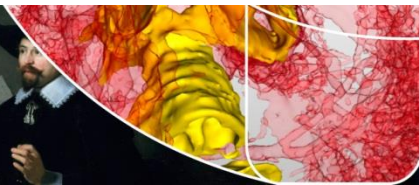
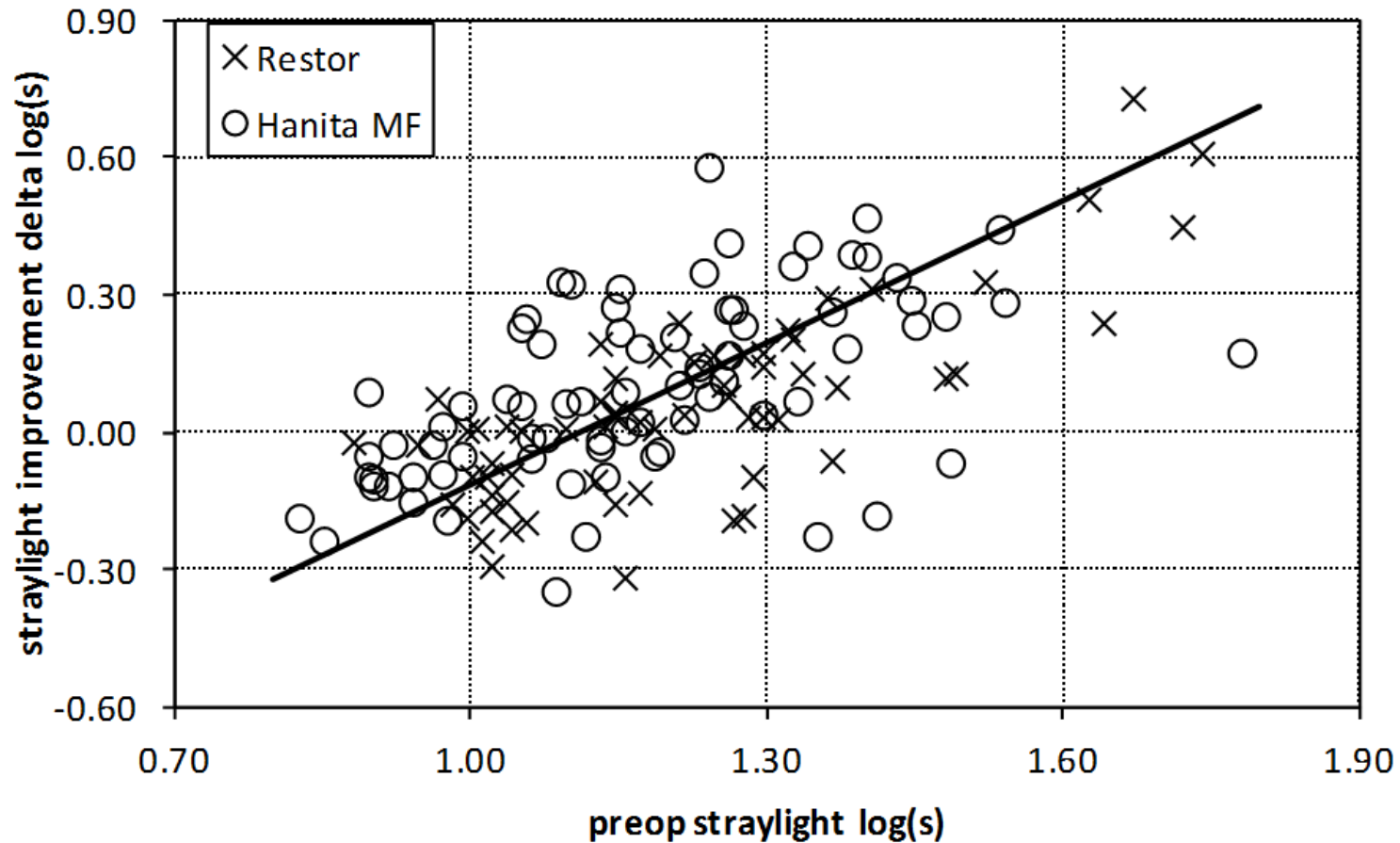
Results straylight

	Pre-op log(s)	Post op log(s)	Improvement
SN6AD1	1.20 \pm 0.20	1.16 \pm 0.14	0.05 \pm 0.20
SeeLens/BunnyLens	1.17 \pm 0.19	1.08 \pm 0.19	0.10 \pm 0.20

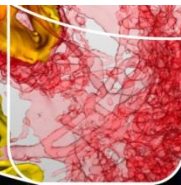
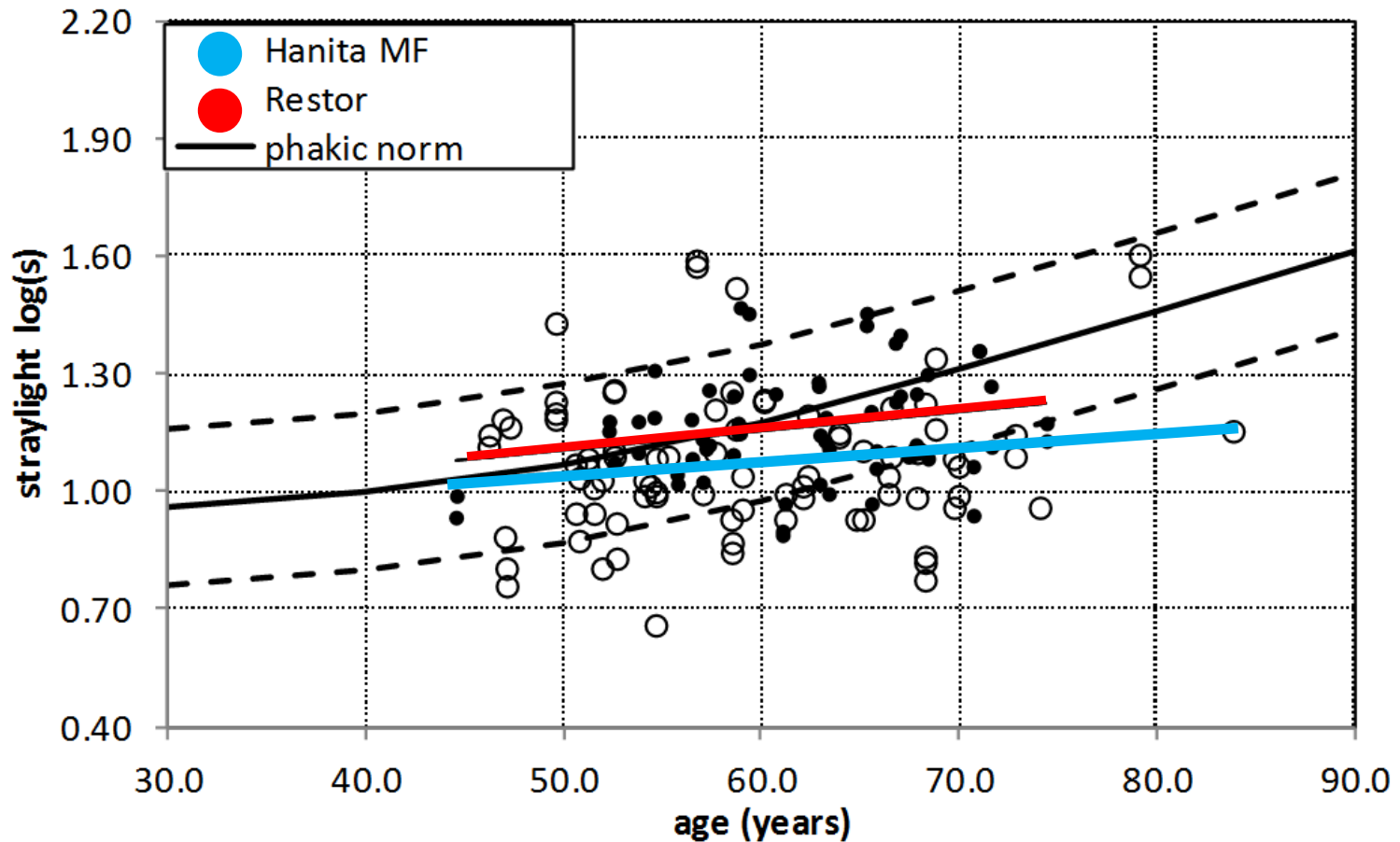
- 0.084 log(s) between SeeLens/BunnyLens vs SN6AD1.
- Age adjusted difference: 0.0707 log(s) in favor of SeeLens/BunnyLens $p < 0.0056$ (double sided t-test)
- Reasons:
 1. Adjusted apodization pattern
 2. Hydrophilic material versus hydrophobic material



Results: straylight improvement upon surgery



Results: Post-op Straylight values compared to the phakic norm



Conclusion:

- Post-operatively the hydrophilic lens with adjusted apodization resulted on average in 0.0707 log (s) less straylight ($p < 0.0056$). Clinically, a mean difference of 0.1 log(s) is comparable to 1 line on the visual acuity chart.
- IOLs perform equally in terms of postoperative CDVA and spherical equivalent refraction.
- These lenses differ in: material – hydrophilic versus hydrophobic, in UV filters – violet filter versus blue-blocking filters, and in the pattern of apodization.
- More study is needed to completely understand the cause of the difference and its clinical impact.

