#### Background

Two key hallmarks of multifocal contact lens fitting for all ages are centration and pupil size. This includes pediatric patients, who are fit in center distance lenses for myopia management. Currently, limited fitting parameters are available for center distance soft multifocal contact lenses. Special consideration should be given to those who are on dual treatment modalities with multifocal contact lenses and atropine where new complications may arise.

#### **Case Description**

22-year-old Asian female presents for multifocal soft contact lens follow-up in myopia management with complaints of double vision and ghosting. She is currently on a dual treatment plan with 0.05% atropine and multifocal soft contact lenses.

In the last few years, the patient started with atropine treatment, increased from 0.01% to 0.05%, with variable compliance over the years. Multifocal soft contact lenses were then added to move to a dual treatment modality to help with patient compliance and ensure adequate amount of treatment.

#### **Manifest Refraction**

	OD	OS
Entering Visual Acuity with Habitual Contacts	20/20-1	20/20-1
Manifest Refraction	-10.50-3.50X005	-10.00-2.5
Spectacle BCVA	20/25	20/25

#### **Phorias**

	Horizontal	Vertical
Distance Method: modified thorington	Ortho	Ortho
Near Method: modified thorington	2 PD Exo	lso

#### Slit Lamp Examination

	OD	OS
Angles/PI	Open angle	Open ang
Adnexa	Adnexa normal	Adnexa no
Eye Lids	Lids normal	Lids norm
Sclera/Conjunctiva	White and Quiet	White and
Cornea	Normal endothelium, epithelium, stroma, and tear film, (-) NaFl staining	Normal er epitheliun film, (-) Na
Iris	Iris normal	Iris norma
Anterior Chamber	Anterior chamber is deep, no cells, no flare	Anterior c cells, no fl
Lens	Clear lens capsule, cortex, and nucleus	Clear lens and nucle



1. Monsálvez-Romín D, González-Méijome JM, Esteve-Taboada JJ, García-Lázaro S, Cerviño A. Light distortion of soft multifocal contact lenses with different pupil size and shape. Cont Lens Anterior Eye. 2020;43(2):130-136. doi:10.1016/j.clae.2019.11.014. 2. Fedtke C, Ehrmann K, Thomas V, Bakaraju RC. Visual performance with multifocal soft contact lenses in non-presbyopic myopic eyes during an adaptation period. Clinical optometry (Auckland). 2016;8:37-46. doi:10.2147/OPTO.S96712 3. Christine F. Wildsoet, Audrey Chia, Pauline Cho, Jeremy A. Guggenheim, Jan Roelof Polling, Scott Read, Padmaja Sankaridurg, Seang-Mei Saw, Klaus Trier, Jeffrey J. Walline, Pei-Chang Wu, James S. Wolffsohn; IMI – Interventions for Controlling Myopia Onset and Progression Report. Invest. Ophthalmol. Vis. Sci. 2019;60(3):M106-M131. doi: <u>https://doi.org/10.1167/iovs.18-25958</u>.

# STATE UNIVERSITY OF NEW YORK COLLEGE OF OPTOMETRY . Toeing the Line: diplopia in multifocal soft lenses for myopia management

## Julie Song, OD, Travis Pfeifer, BS, Shelby Leach, OD

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- d Quiet
- ndothelium, , stroma, and tear
- aFl staining
- hamber is deep, no are
- capsule, cortex, US





		OD Right eye		OS Laft oyo				OD right eye			
Measuring mode	Mode	Phakic		Phakic							1
Axial length	AL	27.00 mm	±0.009 mm	26.76 mm	±0.003 mm.	Measuring mode	Mode	Phakic		Phakic	
Comea thickness	OCT	531 µm.	±2.0 μm.	533 µm.	±3.5 μm	Axial length	AL	🔂 27.92 mm	±0.032 mm	🔁 27.53 mm	±0.025 mm
Aqueous depth	AD	2.69 mm	±0.002 mm	2.73 mm	±0.007 mm.	Comea thickness	CCT	541 µm	±3.7 µm	533 µm	±1.0 µm
Anterior chamber depth incl	ACD	3.22 mm	±0.003 mm	3.26 mm	±0.005 mm	Anterior chamber depth incl	ACD	3.22 mm	±0.007 mm	3.24 mm	±0.003 mm
Lens thickness	LT			▲ 3.70 mm	±0.005 mm.	Lens thickness	LT	▲ 3.78 mm	mm		
Ratina thickness	RT	200** µm	±0.0 μma.	200** µm	±0.0 μm	Retina thickness	RT	200** µm	±0.0 µm	200** µm	±0.0 µm
Flat meridian	Kl	41.80 D @ 1*	±0.114 D	41.85 D @ 169*	±0.166 D	Flat meridian	К1	41.80 D @ 3*	±0.091 D	41.76 D @ 163*	±0.062 D
Steep meridian	K2	44.86 D @ 91*	±0.223 D	44.73 D@ 79*	±0.354 D	Steep meridian	К2	44.56 D @ 93*	±0.099 D	44.40 D @ 73*	±0.051 D
Astigmatism	AST	3.06 D @ 91*	±2.3"	2.87 D @ 79*	±2.1*	Astigmatism	AST	2.76 D @ 93*	±0.8"	2.64 D @ 73*	±1.5*
Keratometric index	<b>n</b>	1.3375		1.3375		Keratometric Index	n	1.3375		1.3375	
White to White	wrw				-	White to White	WTW	12.06 mm	±0.039 mm	12.01 mm	±0.024 mm
Inis haravantar	ICY					Iris barycenter	ICX	-0.57 mm	±0.098 mm	0.71 mm	±0.081 mm
	ICY						ICY	0.23 mm	±0.095 mm	0.12 mm	±0.183 mm
D 1 /		6.00	10.005		10.041	Pupil diameter	PD	6.50 mm	±0.071 mm	6.54 mm	±0.044 mm
Pupu dameter	PD	0.96 mm	±0.025 mm	7.14 mm	±0.041 mm	Pupil barycenter	PCX	-0.59 mm	±0.011 mm	0.71 mm	±0.015 mm
Pupu oarycanar	PCY	-0.20 mm	±0.010 mm ±0.013 mm	-0.23 mm	±0.010 mm. ±0.015 mm.		PCY	-0.14 mm	±0.010 mm	-0.16 mm	±0.005 mm
				* Value saw-de	tered .					<ul> <li>Value uner de System const</li> <li>Significant eff</li> </ul>	fired int lanance between OD and OS

Signi Sanai dillarman betresan OD and O
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 Anatyria

LENSTAR

HAAG-STRET LS 900, SN 21286, V 2.1.1

EyeSuite<sup>TM</sup> Biometry, V2.6.

Figures 3 and 4: Baseline Biometry Measurements and Biometry Measurements 3 Years Later

LENSTAR

					OD right eye						OS left eye
	1	2	3	4	5		1	2	3	4	5
Measurement	Ø [mm]	dX [mm]	dY [mm]			Measurement	Ø [mm]	dX [mm]	dY [mm]		
1 2 3 4	7.80 7.71 7.71 7.70	-0.59 -0.58 -0.59 -0.58	-0.03 -0.03 -0.05 -0.03	Ø dX dY	Diameter x-coordinate of pupil centre relative to apex y-coordinate of pupil centre relative to apex	1 <b>—</b> 2 <b>—</b> 3 <b>—</b> 4 <b>—</b>	7.78 7.75 7.70 7.73	0.73 0.71 0.69 0.72	-0.15 -0.16 -0.19 -0.15	Ø dX dY	Diameter x-coordinate of pupil centre relative to apex y-coordinate of pupil centre relative to apex
5 💻	7.62	-0.57	-0.05	<u>·</u>	Value user-defined Value not used	5	7.72	0.72	-0.19	<u>·</u>	Value user-defined Value not used
Average Standard dev.	<b>7.71 mm</b> 0.062	<b>-0.58 mm</b> 0.010	-0.04 mm 0.006			Average Standard dev.	<b>7.74 mm</b> 0.031	<b>0.71 mm</b> 0.014	-0.17 mm 0.018		
Calculation parameter	: Iris depth = 3.7 mm					Calculation parameter:	Iris depth = 3.7 mm				

Figures 5 and 6: Pupil Size Measurements after Initiation of 0.05% Atropine Treatment

### **Contact Lens Fitting**

			0			
Eye	Power	ADD	Brand	Туре	Base Curve	Diameter
OD	-10.00-2.75X010	+1.50D	CooperVision	<b>Biofinity Toric Multifocal</b>	8.7	14.50
OS	-9.50-1.75X155	+1.50D	CooperVision	<b>Biofinity Toric Multifocal</b>	8.7	14.50

EyeSuite™ Biometry, V2.9.1 LS 900, SN 21286, V 2.1.3

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HAAG-STRET



## CONCLUSIONS

As more and more children are being fit in multifocal lenses for myopia management, additional considerations need to be made for the differing physiological characteristics when compared to adults, such as pupil size and accommodation. For our patient who was wearing a center distance design with a large pupil size, she was experiencing blur and discomfort that a patient with a smaller pupil size perhaps would not experience in the same lens design[1,2].

To troubleshoot this visual distortion, there are multiple changes to the lens design that can be made to resolve the problem. Trialing a different contact lens brand with a steeper base curve or larger diameter may help to center the lens better on the patient's eye, but limited options are available in the patient's prescription and in a center distance design. When lens parameters and brands are limited based on the patient's prescription, additional customized lens designs can be utilized. For example, when multiple-packaged soft lens brands fail, opting for customizable multifocal gas permeable lenses can be an alternative, although the effectiveness of opting for different lens modalities in myopia management has not been as comprehensively researched[3].

As an adult, additional treatment management for this patient could involve removing one myopia management modality and monitor closely for stability in prescription and axial length.

Moving forward, additional research and innovation is needed to create more effective soft multifocal lens designs for patients with more difficult prescriptions and for patients who need more customized optic zones. Creating more customizable lens designs can potentially help better treat the vast demand for pediatric patients who are part of the myopia epidemic.

Figure 7: Slit Lamp Camera Photograph of Habitual Soft Multifocal Lens on Patient's Eye (lens showed identical presentation on OD)