Measurement of short-term choroidal response as a predictor of the effectiveness of 3 multifocal soft lenses for myopia control in young adults

DR LANGIS MICHAUD OD MS, FAAO (DIPL) FBCLA FEAOO FSLS

PROFESSOR

INNOVATION ET RECHERCHE EN LENTILLES CORNÉENNES | MONTRÉAL IRLCM Université de Montréal

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- Co-authors
  - Dr Remy Marcotte-Collard OD MS – PhD Candidate
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  - Alcon
  - Johnson and Johnson Vision
  - Bausch and Lomb

Background

- Myopia management is now recognized as standard of care (WCO)
  - Many options exist to manage myopia
- Soft multifocal contact lenses are used with success
  - On and off label products
- Efficacy may vary vs designs and patients characteristics
  - A personnalized approach is necessary
- Choroidal thickness/volume analysis may help to determine which are the best options
  - Short term response is predictive of the long term outcome in general

Goal of this study

- To determine which soft multifocal contact lens, used on and off label for myopia management, has the best potential, based on short-term choroidal response

Material and methods

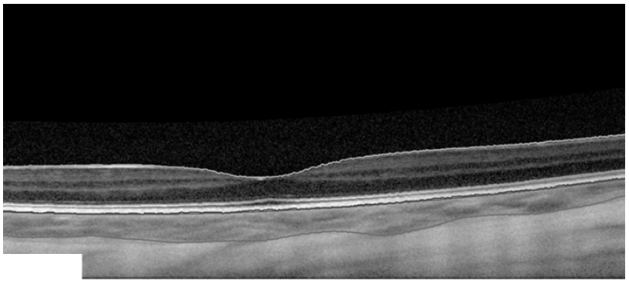
- Young myopic adults are recruited (18-40, -1.00 to -5.50)
- Randomly fitted with 3 different soft Multifocal CL
  - Etafilcon A (NaturalVue- VTI)
  - Omaficon A (MiSight- Cooper)
  - Senofilcon A (Oasys for presbyopia- J&J)
- Controlled environment, nutrition before and during assessment
- Lenses worn 30 minutes / 15 minutes w/o after; new baseline measured each time
- Choroidal images through Heidelberg OCT / Matlab program (proprietary)

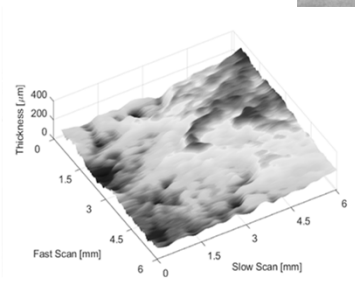
Parameters to evaluate

- Choroidal volume

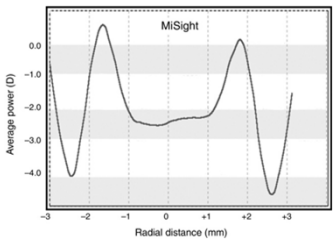
(not thickness)

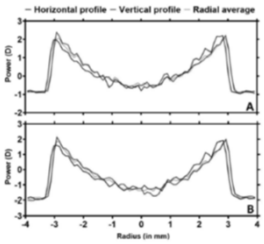
- ETDRS quadrants

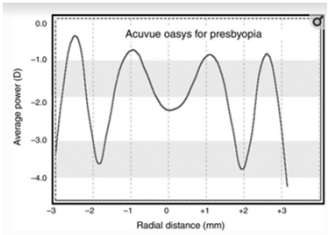




Lenses power profiles







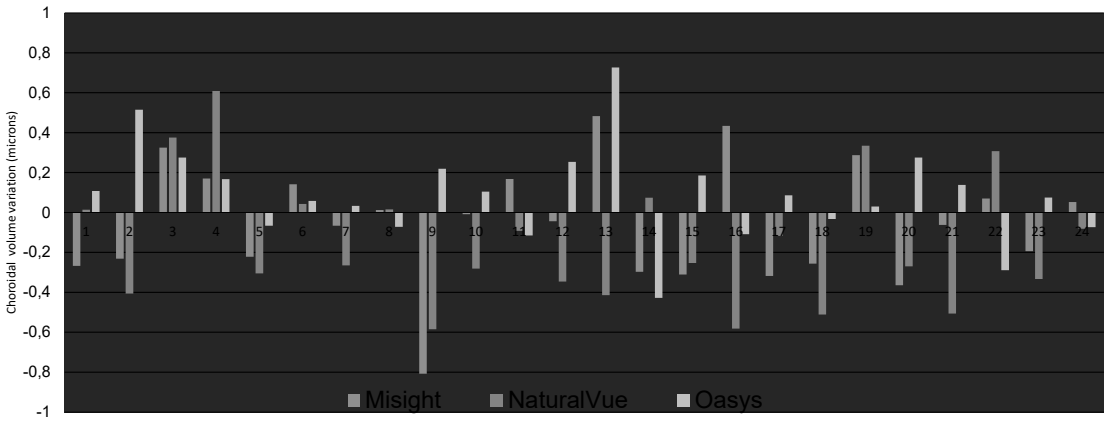
	Omafilcon A	Etafilcon A	Senofilcon A
Add	+2.00	+3.00	+2.25
Central zone	2 mm	0.5 mm	1.5 mm
Design	Alternating zones	Aspheric	Alternating zones

Paune, J. Soft contact lenses for myopia management. Power profiles review and analysis. Conférence. Vision By Design, San Antonio, 2019
Kim E, Bakaraju RC, Ehrmann K. Power Profiles of Commercial Multifocal Soft Contact Lenses. Optom Vis Sci. 2017 Feb;94(2):183–96.
Jaisankar, D et al. Biomedical Optics Express 11(12): 2020

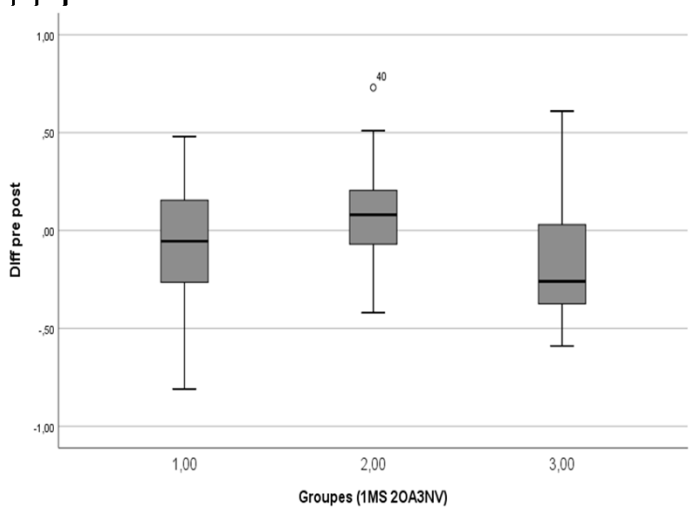
Results – Clinical population

Characteristics	n	Gender	Age
Average	24	12 F/ 12 M	25.8 ± 3.46
	Ethnicity	Refraction (D)	Pupil diameter (mm)
	24 Caucasians	-2.58 ± 1.48	5.1 ± 1.0

Results – Choridal volume (sub-foveolar)- by participant



Results- Choroidal volume – subfoveolar- average



Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2	ω^2
RM Factor 1	0.671	2	0.336	4.413	0.018	0.161	0.081
Residuals	3.499	46	0.076				

Note. Type III Sum of Squares

Post Hoc Tests

Post Hoc Comparisons RM Factor 1

		Mean Difference	95% CI for Mean Difference Lower	Upper	SE	t	Cohen's d	P_{bonf}
MiSight	Oasys	−0.140	−0.338	0.057	0.080	−1.764	−0.360	0.253
	Natural.Vue	0.095	−0.103	0.292	0.080	1.189	0.243	0.722
Oasys	Natural.Vue	0.235	0.037	0.433	0.080	2.952	0.603	0.015

Note. Cohen's d does not correct for multiple comparisons.
Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the bonferroni method).

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Pupilles	0.051	1	0.051	0.504	0.486
Myopie	3.153e −4	1	3.153e −4	0.003	0.956
Residuals	2.107	21	0.100		

Note. Type III Sum of Squares

SO….

	THICKENING	THINNING	Best Option
Senofilcon A	16	8	14/24
Omafilcon A	10	14	4/24
Etafilcon A	8	16	6/24

DISCUSSION

- Design matters
- Individual response to a specific design
  - Quality of the signal
    - Where
    - How much
    - Individual threshold
- Not a single product is the best option for all participants

Conclusion

- Choroidal analysis help to predict the long-term outcome
- Lens design can influence the retinal response
- In some cases, soft MF lenses can increase myopia progression
- Future work is needed to confirm these findings.