

Influence of "retinal shadows" produced by myopia control spectacle lenses on retinal sensitivity – Preliminary results

Hakan Kaymak^{1,3} Birte Neller^{1,2} Ann-Isabel Mattern¹ Machteld Devenijn¹ Kai Neller^{1,2} Hartmut Schwahn¹

¹ Internationale Innovative Ophthalmochirurgie GbR, Duesseldorf, Germany

² Institute of Experimental Ophthalmology, Saarland University, Homburg, Germany

³ Gottfried O.H. Naumann-Institute of Epidemiology and Prevention of Myopia, Saarland University, Homburg, Germany

Poster # - C09

Background

"Myopia control" spectacle lenses are generally safe and mostly effective in treating myopia progression in children.

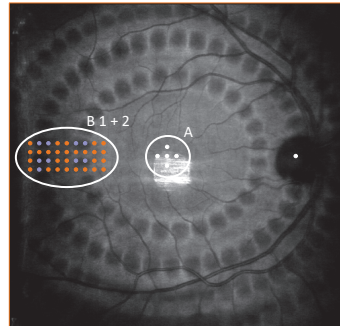
The current designs all comprise a central "single vision" area for the proper refractive correction surrounded by a "treatment area" of particular optical design which brings about a myopia control effect, i.e. slowing of myopia progression. While the optical treatment is believed to mainly act on the perifoveal region and retinal periphery, it remains to be understood why some optical designs result in more effective and/or enduring myopia control than others. All designs have proven to exert a treatment effect in the first one or two treatment years, but, strikingly, for some designs this effect appear to be reversed in the following years of treatment.

Purpose

This pilot study aims to evaluate local retinal sensitivity and fundus light distribution when using different myopia control spectacle lenses, in order to explore the factors behind the variations in myopia control effectiveness.

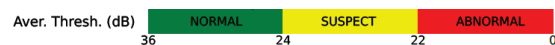
Methods

- Four types of myopia control spectacle lenses (MyoCare® by Zeiss, MiYOSMART® by HOYA, Stellest® by Essilor, and DOT® by SightGlass Vision), and one standard single vision (SV) lens, serving as control, were compared in their effect on retinal sensitivity and retinal light distribution, each measured from 9 healthy subjects using the MAIA microperimetry device (CenterVue SpA) with the spectacle lenses mounted to the device.
- A custom grid was designed to evaluate specific regions of the retina.
- A Bangerter occlusion foil with density 0.8 was tested in a subgroup of four people, to classify the sensitivity reduction of the DOT lens.

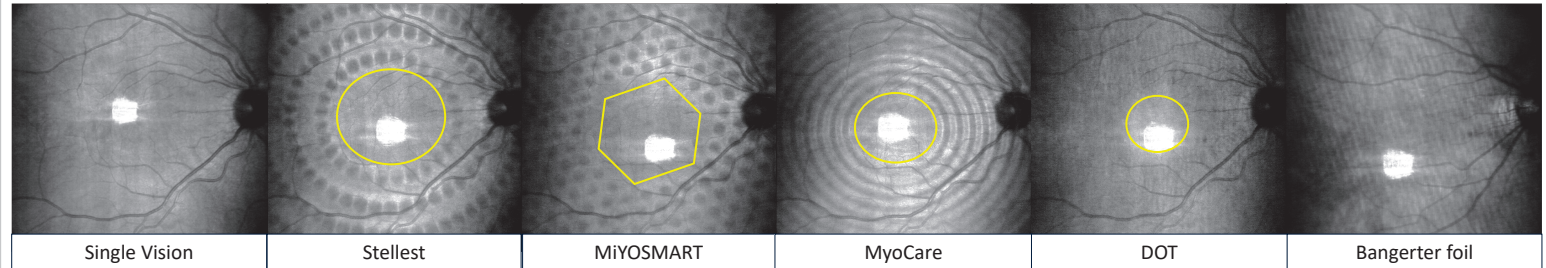


A) Central retinal sensitivity
B) Peripheral retinal sensitivity

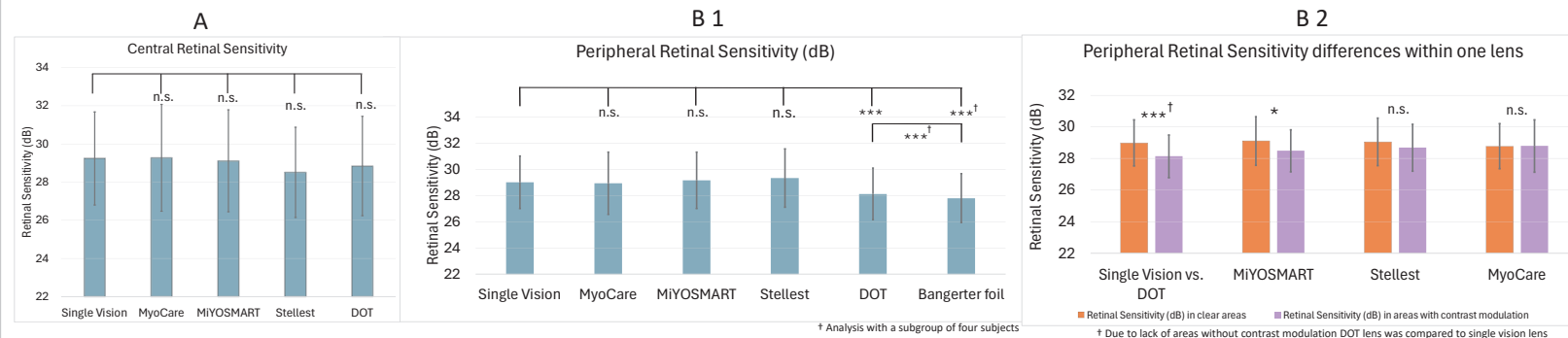
Retinal sensitivity



Results

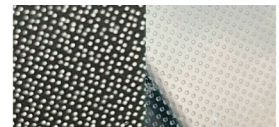


Fundus imaging visualizes the areas where the contrast modulation of the lenses' "treatment zone" appear on the level of the retina (appearance as darker and lighter areas in the fundus). Clear zones' approx. dimensions on the level of the retina: Stellest: 3.2 PD, MiYOSMART: 3.0 PD, MyoCare 2.2 PD, DOT: 1.7 PD (PD= Optic Disc Diameter)



Conclusion

- We pioneer a method to visualize the areas of contrast modulation of the "treatment zone" of myopia control spectacle designs on the level of the retina.
- All optical designs bring about a contrast modulating effect on the level of the sensory retina.
- All lenses are unaffected by contrast modulation in primary gaze through the lenses central clear zone (Fig. A).
- Clear zone sizes differ between lens designs, with the DOT lens having the smallest. A larger clear zone may offer a better safety margin, making it a more practical choice
- In the area which is affected by the "treatment zone" (Fig. B1) the DOT lenses show a significant difference in Retinal Sensitivity when compared to the SV control.
- In a subgroup (n=4) peripheral Retinal Sensitivity under the influence of the 0.8 grade Bangerter occlusion foil is reduced significantly when compared to the DOT lens. Therefore, an amblyopia risk is not anticipated.
- Retinal Sensitivity in areas of local contrast modulation, i.e. appearing darker in the fundus image (Fig. B2), was not reduced in Stellest and MyoCare lenses, but scored significantly lower in the MiYOSMART lens suggesting a more prominent local contrast modulation in this design. The DOT lens as compared to the SV lens showed significant reduction of Retinal Sensitivity.
- Further research is required to evaluate the nature of the contrast modulation induced by myopia control spectacle lenses on the level of the retina.
- The subtle yet crucial impact of retinal contrast modulation required to effectively slow progression over time demands further evaluation. Before lenses of similar optical design are assumed to have equivalent treatment effects, a thorough assessment of these nuances is essential to ensure accurate claims regarding their long-term efficacy.
- For any objective assessment of the actual vision in patients, the influence of contrast adaptation and gaze movements also need to be evaluated.



Photography of DOT lenses and Bangerter foil. DOT lens shows irregular arrangement of diffusion indentations. Bangerter foil shows regular arrangement of diffusion bumps

References

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E-Mail: dr.h.kaymak@gmail.com

