

Myopia control efficacy through Emmetropic Progression Ratio: 1-year of spectacle wear with cylindrical annular refractive elements (CARE)

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Purpose

Strategies to slow myopia are evaluated based on the progression observed in myopic eyes using single vision lenses. However, physiological eye growth occurs in eyes maintaining an emmetropic state and additionally, a proportion of eye growth in myopic eyes is considered physiologic. We evaluated the performance of MyoCare spectacle lenses in slowing axial elongation to physiological growth observed in emmetropic eyes.

Methods

- Published data on annual change in axial length (AL) in children (age range 6 to 13 years) was used to develop annual AL elongation curves for Asian myopic eyes ^{1,2,3,4,5}
- AL growth curves for emmetropic children was based on published data of different ethnicities, as physiological normal eye growth is equivalent between ethnicities. ^{1,3,4,6,7}
- progression with Myopia MyoCare and MyoCare S lenses was evaluated based on 12-months AL change in children participating in a 2prospective, doubleyear masked, multicenter clinical trial (NCT05288335, Figure 1).



Figure 1. Overview of the randomized controlled clinical trial.

For the analysis, data from children aged 7 to 12 years were considered as the sample for ages 6 and 13 years was small. Emmetropic progression ratio (EPR) is reported on a scale of 0-100%, where 0% = AL growth similar to a myopic eye and 100% = AL growth similar to an emmetropic eye.

$$EPR = \left(1 - \left(\frac{(Progression with intervention-physiological emmetropic grwoth)}{(Progression without intervention-physiological emmetropic grwoth)}\right)\right) * 100\%$$

• Thresholds for "similar to emmetropic AL growth" (EPR > 50%) and "equivalent to emmetropic AL growth" (EPR > 75%) were also determined.⁸







Results

Emmetropic Progression Ratio (EPR)

- Age-dependent logarithmic AL growth fits were calculated with Matlab R2023 fminsearch with the following equation: prog(age) = a+b*log(age)
- Factors a and b for the logarithmic equation were 0.5504 (a) / -0.191 (b) for emmetropes and 1.8373 (a) / -0.6223 (b) for Asian myopic eyes, respectively.
- 1-year AL growth with MyoCare and MyoCare S revealed an EPR of 70% for MyoCare and 68% for MyoCare S (when the entire sample of 6 to 13) years were considered, EPR for MyoCare and MyoCare S were 71% and 68% respectively).
- For MyoCare, EPR ranged from 61% in 7-year-olds to 82% in 12- year-olds, while EPR ranged from 62% in 7-year-olds to 74% in 12-year-olds for MyoCare S (Figure 2).



- Myopic Growth Std Error
- Physiological Emmetropic Growth Std Error
- ZEISS MyoCare Std Error ZEISS MyoCare S Std Error

Similar and equivalent to emmetropic AL growth

• With respect to "similar to" and "equivalent to" emmetropic AL growth, 17% of eyes had AL growth "similar to" emmetropic eyes, while 53% of eyes showed AL growth "equivalent to" emmetropes with MyoCare. Similarly, 21% and 44% of MyoCare S eyes showed AL growth "similar to" or "equivalent to" emmetropic eyes respectively.

Disclosures: CBM (E), PS (E), AO (E), KR (E), SW (E), JU (E), CL (E); XC (F), CY (F), MW (F), LL (F) – ZEISS Vision Care; PS (P) – Brien Holden Vision Institute; PS (R) – Essilor International, SightGlass Vision





Figure 2. The emmetropic progression ratio indicates how close annual progression with a myopia intervention comes to the physiological emmetropic progression in contrast to untreated myopic progression. Both ZEISS MyoCare designs can help to significantly slow down myopia progression compared to the untreated control group (myopic growth) to come closer to the physiological growth curve of emmetropic children.

- children of Asian ethnicity.
- Our results suggest that wear of MyoCare and MyoCare S spectacle lenses can slow axial elongation of myopic eyes to approach physiological growth observed in emmetropic eyes of same ethnicity and age.
- The EPR values indicate that both MyoCare and MyoCare S reduced myopic AL growth by 70% and 68% respectively, approaching the level of physiological growth.
- Seven of ten eyes wearing MyoCare or MyoCare S had eye growth similar to or equivalent to emmetropic or physiological growth.
- We also found that both lenses significantly slowed axial length growth compared to the control group wearing single vision lenses (see ARVO Poster 2736 - B0572)

The Emmetropic Progression Ratio provides a comparison between the growth of a myopic eye to that of an emmetropic eye of the same age. Both designs, ZEISS MyoCare and ZEISS MyoCare S, reduce the excessive AL elongation observed in myopic eyes, to result in eye growth that is closer to physiological eye growth observed in emmetropic eyes.

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Discussion

• Annual AL change by age in emmetropic eyes (black line, Figure 2) was comparable between emmetropic eyes from various ethnic groups, whereas myopic AL growth (red line) is observed to be higher in

Conclusion

References



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