Risk factors and protective effect of Cylindrical Annular Refractive Elements (CARE) spectacle lenses on rapid myopia progression in European children (1217 - 0987)

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Purpose

To evaluate whether ZEISS MyoCare (Carl Zeiss Vision GmbH, Aalen) spectacle lenses reduce the risk of rapid myopia progression compared to single vision lenses (SVL), and to identify baseline factors associated with progression risk.

Methods

- Ongoing 3-year prospective, double-masked, multicenter trial (NCT05919654) in 234 European children (6–13y; SE −0.75 to −5.00D; cyl ≤−1.50D; anisometropia ≤1.00D) randomized to ZEISS MyoCare (n=115) vs SVL (n=119).
- Rapid progression (years 1–2): SE change ≤−0.50D and AL increase ≥+0.20mm.
- Risk factors: age, sex, baseline SE/AL, parental myopia, outdoor activity, near work, screen time and lens type, questionnaire-based.
- Analysis: logistic regression overall and by lens group; OR (95% CI). χ^2 for RP rates; t-test for SE/AL change among progressors.

Results

RP with (n= 82 of 102, 80.4%) of SVL vs (n= 52 of 104, 50.0%) of ZEISS MyoCare (χ^2=20.9, p<0.001). The mean SE and AL change was −0.85±0.50 D/+0.50±0.22 mm with SVL vs −0.61±0.42 D/+0.36±0.15 mm with ZEISS MyoCare (p=0.03 for SE and <0.01 for AL).

For the overall model, the logistic regression model demonstrated significant predictive power (χ^2=48.4, p<0.001; Nagelkerke R^2=0.293), with a classification accuracy of 73.9% of cases.The model showed moderate discriminative ability (AUC=0.747, 95% CI 0.680–0.815, p<0.001). At a 0.5 probability threshold, the model achieved 85% sensitivity and 50% specificity in categorizing rapid progressors.

The risk of RP decreased with increasing baseline age (OR=0.72, 95% CI 0.60–0.86, p=0.001), while ZEISS MyoCare lenses reduced the risk of RP by 76% compared to SVL (OR=0.24, 95% CI 0.12–0.45, p<0.001).

In subgroup analyses, increasing age was associated with a reduced risk of RP in both ZEISS MyoCare (OR=0.75, p=0.036) and SVL (OR=0.63, p=0.013).

Table 1. Logistic regression results for predictors of rapid myopia progression

Variable	Total OR (95% CI), p	CARE OR (95% CI), p	SVL OR (95% CI), p
Age (years)	0.72 (0.60–0.86), p=0.001	0.75 (0.58–0.97), p=0.036	0.63 (0.44–0.90), p=0.013
Sex	1.41, p=0.360	1.63, p=0.303	1.03, p=0.964
Baseline SE (D)	0.71, p=0.099	0.78, p=0.324	0.51, p=0.083
Baseline AL (mm)	0.73, p=0.272	0.78, p=0.525	0.67, p=0.392
Parental myopia	0.97, p=0.920	1.13, p=0.713	0.72, p=0.458
Outdoor activity	1.30, p=0.298	1.36, p=0.376	1.19, p=0.670
Near work	1.03, p=0.904	1.35, p=0.331	0.56, p=0.184
Screen time	0.74, p=0.195	0.72, p=0.280	0.84, p=0.684
CARE vs SVL	0.24 (0.12–0.45), p<0.001	—	—

Discussion

This study demonstrates that ZEISS MyoCare lenses effectively modulate the risk RP by specifically attenuating progression intensity in children with high-growth profiles. The inverse relationship between age and RP risk (OR 0.72, p=0.001) highlights a critical therapeutic window: younger children are naturally more predisposed to aggressive axial elongation and, consequently, derive the most significant protective benefit from early intervention. The clinical value of CARE technology lies in its ability to "shift" these high-progressing individuals toward a more stable physiological range. While 80.4% (n=82/102) of the SVL group met RP criteria, MyoCare limited this incidence to 50.0% (n=52/104). This "proportional benefit"—where the treatment effect scales with the individual's underlying progression rate—aligns with findings reported for other optical technologies such as DIMS and HAL, as well as pharmacological interventions, which have also noted a more pronounced slowing effect in children with higher baseline progression rates. By inducing competitive myopic defocus, the lens moderates the growth stimulus, effectively reducing the severity of progression even during the most active years of eye growth. These findings confirm that MyoCare is a robust tool for stabilizing myopia in European children who would otherwise exceed safe physiological limits.

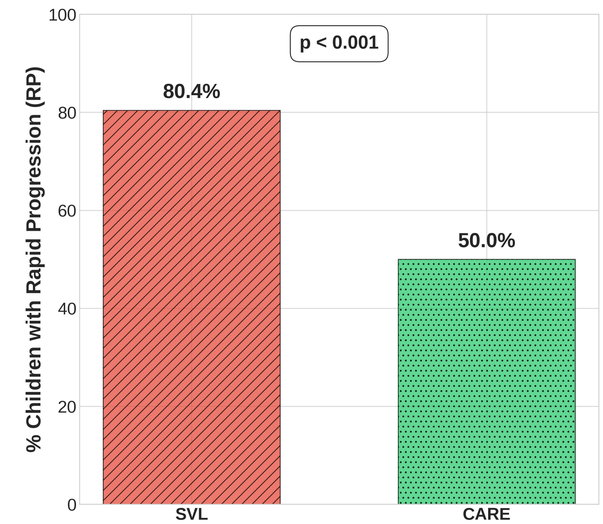

Figure 2. Incidence of rapid progression over 2 years

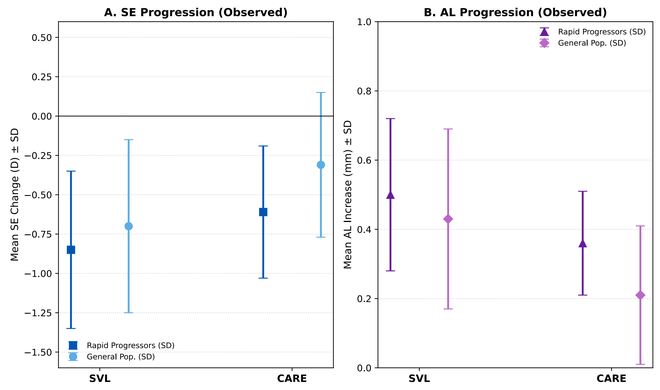

Figure 3. Magnitude of Progression in rapid progressors compared to remaining children in the RCT (a. SE and b. AL)

Conclusions

ZEISS MyoCare significantly reduces both the risk and severity of rapid myopia progression compared to SVL. The risk of RP significantly decreases with increasing age (OR=0.72, p=0.001), highlighting that younger children are the most vulnerable and should be prioritized for treatment. ZEISS MyoCare lowered the proportion of rapid progressors and attenuated progression intensity, with significantly smaller changes in SE and AL, supporting their use as an effective intervention in pediatric myopia management

References

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