

Short-term effect of second-generation defocus incorporated multiple segments spectacle lenses on choroidal thickness in children

Rachel Ka Man Chun^{1,2,3}, Kenneth Liu¹, Tsz Kin Law^{1,3}, Ying Hon¹, Hua Qi⁴, Keigo Hasegawa⁴, Carly Siu Yin Lam^{1,2,3}, Chi Ho To^{1,2,3} and Dennis Yan Yin Tse^{1,2,3}

1. Centre for Myopia Research, School of Optometry, The Hong Kong Polytechnic University, Hong Kong, China
2. Research Centre for SHARP Vision (RCSV), The Hong Kong Polytechnic University, Hong Kong, China
3. Centre for Eye and Vision Research (CEVR), 17W Hong Kong Science Park, Hong Kong, China
4. Technical Research and Development Department, Vision Care Section, Hoya Corporation, Tokyo, Japan

Purpose

To investigate the short-term effect of the new designs of myopic control lenses on choroidal thickness in schoolchildren.

Methods

Myopic schoolchildren aged 6 to 13 years with no previous myopic control interventions were recruited. Baseline measurement including cycloplegic refraction, ocular parameter such as axial length (AL) and choroidal thickness (ChT) were collected before allocation of the group. Choroidal thickness was measured by a swept-source optical coherence tomographer. Schoolchildren were randomly allocated into 2 groups, D1 and D2 group. One eye was randomly treated with D1 or D2 lens while the other eye was fitted with single vision spectacle lenses as control. D1 and D2 lenses were the second-generation defocus incorporated multiple segments (DIMS) lenses. After wearing this pair of lenses for 2 weeks, both eyes were then fitted with single vision lenses for another 2 weeks as recovery. After the data collection at week 4, both eyes were treated with either D1 or D2 lenses according to their grouping for 12 months. AL and ChT were monitored in both eyes of the groups after 1 hour of lens wear and subsequently on a weekly basis for 4 weeks. Interocular difference (IOD) in ChT relative to baseline in both groups were calculated and compared using one-way repeated measures ANOVA.

Results

Eight-nine myopic schoolchildren with similar mean age in both D1 (9.78 ± 1.95 years old, $n = 44$) and D2 group (9.72 ± 1.80 years old, $n = 45$) were recruited. Spherical equivalent refraction between treated and control eyes in both groups were comparable (paired t-test, $p > 0.05$).

There was no significant change in ChT after wearing D1 and D2 lenses for an hour. ChT of the treated eyes were increased significantly after one week of D1 and D2 lens wear (mean changes in IOD at 1 week relative to baseline \pm SEM; D1 vs. D2; $11.32 \pm 2.22 \mu\text{m}$ vs. $11.69 \pm 2.48 \mu\text{m}$, $p < 0.001$). The thickening of choroid continued at 2-week lens wear in both groups (D1 vs. D2;

$14.14 \pm 2.18 \mu\text{m}$ vs. $15.69 \pm 2.60 \mu\text{m}$, $p < 0.001$). After removal of D1 and D2 lenses, ChT decreased and returned to the baseline at week 4.

Conclusions

Both lenses induced significant choroidal thickening in schoolchildren after short-term of lens wear. This observed thickening supports the potential effectiveness of the second-generation DIMS spectacle lenses for myopia control.

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