

Comparison of near visual performance in myopia control spectacle lenses

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Purpose: The treatment zones of current myopia control spectacle lenses (MCSLs) typically manipulate contrast levels or lens power, which may impact visual performance. The aim of this study was to evaluate the near visual performance of current MCSLs.

Method: In a randomized, masked, three lens cross-over dispensing study, 48 Chinese children (mean age 9.98 ± 1.83 years old, range 6-14, mean manifest spherical equivalent refraction -2.11 ± 0.74 D, range -0.75 to -3.88 D) were assigned to wear MCSLs designed to reduce retinal contrast via light scatter (Diffusion Optics Technology; DOT) or impose myopic defocus peripherally (Defocus Incorporated Multiple Segments; DIMS and Cylindrical Annular Refractive Elements; CARE) for 1 to 2 weeks. Habitual standard single vision (SV) spectacles were also evaluated. Reading speed, head tilt, contrast sensitivity function (CSF), halo radius and binocular near visual acuity with glare were assessed using bespoke app tests.

Results: Functional maximum reading speeds were similar with all MCSLs (LS Mean (SE): DOT 234.1 (6.6); DIMS 234.1 (6.6); CARE 239.9 (6.5); $p > 0.9$). No significant differences were shown in head tilt during reading ($p > 0.05$) or CSF area ($p > 0.10$). Mean halo (glare scotoma) radius for all the MCSLs were larger than the habitual SV spectacles (LS Mean (SD): DOT 1.14° (0.30°); DIMS 1.02° (0.22°); CARE 1.03° (0.23°); habitual SV 0.86° (0.47°), with no differences between MCSLs ($p > 0.10$). Mean logMAR binocular near visual acuity with glare sources were similar for all MCSLs ($p = 0.31$).

Conclusion: This study suggests near visual performance of MCSLs is clinically equivalent and similar to habitual standard SV lenses after 1 to 2 weeks of wear in young children.