Pupil size effect on myopia progression with contrast modulation spectacle Lenses

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Purpose:

The role of pupil size in myopia progression and myopia control spectacle lens efficacy is unclear. This study explored whether pupil size at baseline affects myopia control efficacy with Diffusion Optics Technology™ (DOT) spectacle lenses, where the central zone is 5mm.

Methods:

Pupil size data was measured using NeurOptics VIP-300 Pupillometer under low (dark ~ 0.3 lux) and high (bright ~3 lux) mesopic conditions from the CYPRESS (NCT03623074) study in North America with children aged 6-10 years. Myopia control efficacy with DOT lenses compared to control (standard single vision) was evaluated at baseline and at 12-months. The mean difference in cycloplegic Spherical Equivalent Refraction (SER) progression for DOT versus control was −0.40 D ($p<0.0001$) and the difference in Axial Length (AL) progression was 0.15mm ($p<0.0001$).*

The total sample size analyzed was n=130 (61 DOT and 69 Control). Pupil sizes were averaged for both eyes and sub-age group analysis were also performed (young: age 6-7 and older: age 8-10). Linear multiple regression analysis was used to analyze the myopia progression, SER and AL outcome (change from baseline at 12-month).

Results:

At baseline, mean (SD) of pupil size in low (L) mesopic was larger than the high (H) mesopic conditions (L: 6.19 (0.84) vs H: 5.68 (0.91)). Younger age (6-7yo) pupil sizes were smaller than older age (8-10yo) in both lighting conditions. At 12 months, there was no significant change in pupil size compared to baseline in both lighting conditions. For each unit increase in pupil size change from baseline, there was a very small 0.025D increase in SER, but it was not statistically significant ($p=0.614$) and there was a very small decrease -0.004mm in AL, but it was not statistically significant ($p=0.802$).

Conclusions:

With contrast management DOT lenses, no significant association was found between pupil size and the rate of myopia progression in children at 12-months. Additional research

may help to understand whether pupil size has an impact on myopia control effect in alternative lens designs.

**Rappon et al. Control of myopia using diffusion optics spectacle lenses: 12-month results of a randomised controlled, efficacy and safety study (CYPRESS). British Journal of Ophthalmology 2023:107;1709-1715*