

Short term effect of DOT spectacle lenses on choroidal thickness in emmetropic children

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Purpose: To investigate regional changes in choroidal thickness (ChT) following short-term wear of Diffusion Optics Technology™ (DOT) spectacle lenses, designed to control myopia by lowering retinal contrast.

Method: Emmetropic children (SER +1.00 to -0.75 D) aged 8 to 14 years wore plano DOT spectacle lenses without central apertures and +3.00D spectacle lenses in a two-visit, prospective, randomized, subject-masked crossover study. High-resolution OCT (Triton DRI-OCT, Topcon) evaluated central, parafoveal (3 mm from the fovea) and perifoveal (6 mm from the fovea) ChT after 0, 30 and 60 minutes of viewing a high contrast video at each visit.

Results: A total of 30 participants (17F, 13M) with a mean (\pm SD) age of 10.9 (1.7) years completed the study. After 30 minutes of spectacle lens wear, a significant increase in ChT was observed with DOT spectacle lenses compared to +3.00D spectacle lenses in 4 of the 9 macula regions evaluated ($p < 0.05$ for all). DOT spectacles showed a significant ChT thickening in the central ($+7.69 \pm 4.19 \mu\text{m}$), parafoveal regions at nasal ($+9.01 \pm 2.77 \mu\text{m}$) and temporal ($+6.20 \pm 5.46 \mu\text{m}$) and inferior perifoveal ($+9.79 \pm 2.31 \mu\text{m}$) compared to myopic defocus with +3.00D lenses. After 60 minutes, ChT remained higher only in the inferior parafoveal region ($+3.96 \pm 8.33 \mu\text{m}$, $p = 0.03$), while all other regions returned to baseline levels.

Conclusion: After short-term DOT spectacle lens wear, emmetropic children experienced macula ChT thickening, similar or greater than the response observed with +3.00D spectacle lens wear. These results indicate the choroid is able to respond to contrast reduction. Further research is required to investigate the long-term impact of contrast modulation on ChT.

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