

Longitudinal Changes and Predictive Value of Choroidal Thickness for Myopia Control after Repeated Low-Level Red-Light Therapy

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Abstract

Purpose: To evaluate longitudinal changes in macular choroidal thickness (mCT) in myopic children treated for 1 year with repeated low-level red-light (RLRL) therapy and their predictive value for treatment efficacy on myopia control.

Design: A secondary analysis of data from a multicenter, randomized controlled trial (RCT; [NCT04073238](https://clinicaltrials.gov/ct2/show/study/NCT04073238)).

Participants: Myopic children aged 8-13 years who participated in the RCT at 2 of 5 sites where mCT measurements were available.

Methods: Repeated low-level red-light therapy was delivered using a home-use desktop light device that emitted red-light at 650 nm. Choroidal thickness was measured by SS-OCT at baseline and 1-, 3-, 6-, and 12-month follow-ups. Visual acuity, axial length (AL), cycloplegic spherical equivalent refraction (SER), and treatment compliance were measured.

Main outcome measures: Changes in mCT at 1, 3, 6, and 12 months relative to baseline, and their associations with myopia control.

Results: A total of 120 children were included in the analysis (RLRL group: n = 60; single-vision spectacle [SVS] group: n = 60). Baseline characteristics were well balanced between the 2 groups. In the RLRL group, changes in mCT from baseline remained positive over 1 year, with a maximal increase of 14.755 μm at 1 month and gradually decreasing from 5.286 μm at 3 months to 1.543 μm at 6 months, finally reaching 9.089 μm at 12 months. In the SVS group, mCT thinning was observed, with changes from baseline of -1.111, -8.212, -10.190, and -10.407 μm at 1, 3, 6, and 12 months, respectively. Satisfactory myopia control was defined as annual progression rates of less than 0, 0.05, or 0.10 mm for AL and less than 0, 0.25, or 0.50 diopters for SER. Models that included mCT changes at 3 months alone had acceptable predictive discrimination of satisfactory myopia control over 12 months, with areas

under the curve of 0.710-0.786. The predictive performance of the models did not significantly improve after adding age, gender, and baseline AL or SER.

Conclusions: This analysis from a multicenter RCT found RLRL induced sustained choroidal thickening over the full course of treatment. Macular choroidal thickness changes at 3 months alone can predict 12-month myopia control efficacy with reasonable accuracy.

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Keywords: Choroidal thickness; Myopia control; Repeated low-level red-light therapy.

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