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# Myopia imaging biomarkers to predict atropine response by optical coherence tomography and fundus photography

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## Abstract

**Purpose** : Atropine is effective for controlling myopia progression in children. Since the response to atropine differs among patients, identification of biomarkers that can predict drug response before treatment is important. Choroidal thickness is reportedly affected by atropine, implying that the drug exerts effects on the posterior segment. However, whether these effects are associated with drug response remains unclear.
Thus, we aimed to predict atropine response by evaluating the relationship between the posterior segment imaging features and drug response.

**Methods** : We collected optical coherence tomography (OCT) images and fundus photographs (FPs) from our clinical trial "Phase 2 study of STN1012700" (012701LT) (N=99). This study was approved by the Institutional Review Board at Research Committee of Santen Pharmaceutical Co., Ltd. Myopia patients aged 6 to 11 years were included and categorized into three dose groups and a placebo group. The objective equivalent spherical power (SE), axial length (AL), and changes in the SE and AL from baseline to 12 months were evaluated as endpoints. From the OCT data, we extracted the thicknesses of the ganglion cell layer, inner plexiform layer complex (GCL+), and choroid-sclera interface (CSI) at each region, divided in accordance with the Early Treatment of Diabetic Retinopathy Study (ETDRS) grid. From the FPs, we extracted the steepness of the retinal artery (RA) trajectory and the proportion of

R layer (Redness) in the RGB layers. A linear mixed model regression analysis was conducted to identify features that were statistically associated with the endpoints. The OCT or FP factors, baseline value, dose groups, and the interaction between the dose groups and factors were included as explanatory variables.

**Results** : On OCT analysis, the GCL+ thickness in some regions was significantly associated with the change in AL from baseline, depending on the dose group ($P < 0.05$). However, no significant association with the CSI was noted. On PF analysis, while the RA trajectory showed no association with the changes in SE and AL from baseline, the Redness in some regions showed significant association, depending on the dose group ($P < 0.05$).

**Conclusions** : Therefore, the GCL+ thickness and Redness may be associated with atropine response, suggesting their potential use as biomarkers to predict drug response before treatment.

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