Effect of intravitreal injection of ouabain on refractive error and choroidal thickness in lens-induced hyperopic chicks

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Purpose:
The change in choroidal thickness is believed to associate with the development of refractive errors and myopia. The underlying mechanism of this phenomenon is unclear and it may be caused by the alternation of fluid secretion across the retinal pigment epithelium (RPE). This study aims to determine the potential significance of ouabain-induced fluid transport across RPE on refractive error and choroidal thickness in lens-deprived hyperopic chicks.

Methods:
White Leghorn chicks were used. Lens-deprived hyperopia was achieved by securing a +10D lens in one eye while the fellow eye (mounted with a plano lens) was used as control. Ouabain, a Na⁺,K⁺-ATPase inhibitor, was administered intravitreally once daily for 4 consecutive days. Thereafter, refractive error was determined by retinoscopy and choroidal thickness was measured by A-Scan ultrasonography.

Results:
In +10D deprived eyes, intravitreal ouabain injection slowed the progression of lens-induced hyperopia by about 80% as compared to saline-treated control. However, the refractive error was not affected by ouabain treatment in control eyes mounted with plano lens. Consistent with this finding, ouabain reduced the choroidal thickness from 0.19±0.03 mm to 0.09±0.01 mm (p=0.005, n=5) in lens-deprived eyes, but had no effect in control eyes.

Conclusions:
Our results suggest that intravitreal injection of ouabain retards the progression of hyperopia and reduces the choroidal thickness when subjected to the lens-induced hyperopia paradigm. These effects might be mediated by the inhibition of ouabain-driven fluid transport from subretinal space to choroid across the RPE, potentially reducing the choroidal thickness.

Supported by: PolyU Internal Grants (A-PB0N; A-PH30; G-YF33), Niche Areas (PolyU, J-BB7P)