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Abstract Title: **Retinal Pigment Epithelium Function is Altered by Optic Nerve Section in Chicks**
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Purpose: Chick eye growth is influenced by the visual world. Experiments using optic nerve section (ONS), used to eliminate communication between the retina and brain, indicate that eye growth regulation mostly occurs within the eye although ONS eyes tend to be shorter than normal and hyperopic. We have also observed thickness increases of both the neural retina and choroid 1 to 3 days following ONS in young chicks. Altered retinal pigment epithelium (RPE) ion and fluid transport could lead to such expansion of the choroid and retina. Thus the purpose of this study was to examine whether there are functional changes in the chick RPE following ONS.

Methods: ONS was performed on one eye of 7 or 8 day old chicks (n=4). Two days later, RPE/choroid preparations from ONS- and fellow-eyes, and both eyes from age-matched controls (n=3) were mounted in turn in a modified Ussing chamber. Transepithelial potential (TEP) and tissue resistance (R_T) changes in response to a decrease in apical [K] were measured (5 to 2 mM, mimicking light-onset changes in subretinal K). The time to reach the maximal TEP change (peak response time) was recorded for each tissue and interocular differences in peak response time were calculated for each bird.

Results: In all eyes, decreasing apical [K] caused a transient TEP increase (of 0.5 to 3.3 mV, 108 to 144% over baseline), followed by a decrease towards baseline. In ONS birds, peak response times were greater for ONS eyes than for fellow eyes, by a factor of 2.04 ± 0.64 (mean \pm SD). In control birds the interocular variability in peak response times (longest/shortest) was only 1.15 ± 0.07 . This difference between ONS and control birds was statistically significant ($p=0.0339$, Mann-Whitney U test). Decreasing apical [K] caused small, variable increases in R_T , on a much slower timescale than TEP changes; R_T changes were not appreciably different between ONS and fellow eyes.

Conclusions: The RPE TEP changes in response to decreased apical [K] develop more slowly following optic nerve section. This effect suggests functional changes in the RPE transporters that may play a role in the retinal and choroidal thickening observed following ONS.

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