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Abstract Title: **Rearing in constant light disrupts compensation to negative lenses in chicks**
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Purpose: Rearing in constant light is known to alter eye growth in chicks, with profound effects on the anterior chamber (AC). This study was undertaken to examine whether the emmetropization process is affected by rearing in constant light. **Methods:** Four day-old White Leghorn (*Gallus gallus domesticus*) chicks were reared either in constant light (CL; n=25) or 12L/12D cycle (NL; n=11) for one week; +10 or -10 D lenses were then applied unilaterally. Lenses were removed after one week in order to study recovery from lens-induced effects; some CL-reared chicks (n=11) were transferred to NL (CL→N) for the recovery period. Refraction, corneal curvature and intraocular dimensions were measured at baseline (4 days old), and 6, 8, 13, 15 and 20 days later using keratometry, retinoscopy and high-frequency A-scan ultrasonography, respectively. **Results:** Compensation to +10 D lens was apparently normal in CL chicks (+10.63 ±0.53, mean change± SE, n=13). The induced hyperopia regressed when the lenses were removed, in both NL and CL. However chicks in CL wearing -10 D lenses (n=12) did not show defocus compensation; instead they became hyperopic by 6 days (+4.13 ±1.76 D, mean change ±SE, n=12) with only 2 out of 12 chicks showing the usual myopic response. All CL chicks showed shallower than normal ACs (p<0.001) all through the 3 week period. Compared to the NL chicks, the untreated eyes of CL chicks also showed thinner choroids (p=0.057), deeper vitreous chamber (VC) (p=0.016), and shorter optical axial lengths (p=0.035) over the 3 week period. On return to NL, the untreated CL eyes showed deepening of their ACs, thickening of their choroids, and slower growth of their VCs, rendering them significantly different from the eyes remaining in CL (p<0.01 in all cases). Although the untreated eyes of the CL chicks showed the most hyperopia throughout the experimental period, there was no significant difference between the refractive changes among untreated eyes. **Conclusions:** Although both positive and negative lenses induced ocular growth changes in CL chicks, the changes were not compensatory for the latter, implying that the sign of the defocus signal was not correctly decoded. This result argues for two different growth signals underlying the effects of positive and negative lenses, only one being disrupted by CL. The ocular changes induced by constant light are reversible in NL, indicating that active emmetropization is not permanently altered by rearing in CL. Moreover, emmetropization can sense and respond to corneal growth-related refractive changes.

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