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TITLE	Enduring Responses to Spectacle Lens-Wear in Chicks
ABSTRACT	<p>PURPOSE: Spectacle lenses induce compensatory changes in retinal position by altering eye length and choroidal thickness. It is not known whether plus and minus lenses modulate the same signals, and whether these signals affect both choroid and eye length. Do plus and minus lenses have equally enduring effects on these ocular components? We followed the effect on these ocular components when we replaced one lens with another of the opposite sign.</p> <p>METHODS: <i>First Lens:</i> Week-old chicks were fitted with a plus or minus monocular lens. <i>Second Lens:</i> 24 hrs later, a lens of equal power but opposite sign replaced the first, staying on for up to a week. Refractive error (Hartinger refractometer) and ocular components (A-scan ultrasound) were measured daily in treated and contralateral (control) eyes.</p> <p>RESULTS: The first lens, plus or minus, produced the expected changes in choroidal thickness and refractive error: Plus lenses induced hyperopia and choroidal thickening; minus lenses induced myopia and choroidal thinning. Surprisingly, if a plus lens was worn first, the treated eye elongated more slowly for two days after the switch to a minus: $46 \pm 33 \mu\text{m}$ less than the fellow eye over the first day, $34 \pm 32 \mu\text{m}$ less over the next day. In contrast, if a minus lens was replaced by a plus, there were no lingering effects of increased elongation from the minus lens: the treated eyes elongated at the same rate as the fellow eye over the first day, and $102 \pm 37 \mu\text{m}$ less the next day. Unlike ocular elongation, the choroids of both groups responded immediately to the lens-switch. Those switched to minus lenses thinned dramatically (by $197 \pm 18 \mu\text{m}$), while those switched to plus lenses all thickened ($160 \pm 29 \mu\text{m}$).</p> <p>CONCLUSIONS: First, the effect of plus lenses, but not minus lenses, persists long after the visual stimulus is removed. Second, this persistent signal affects only the eye length, and not the choroidal thickness. Third, as with shorter intervals of lens-switching, equal amounts of plus and minus lens-wear do not cancel each other's effects, but rather tend to produce hyperopia.</p>
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