Title: Regional variation of scleral proteoglycan synthesis in chicks developing myopia and astigmatism.

Purpose: To determine scleral proteoglycan synthesis at different regions of normal and myopic astigmatic eyeballs.

Methods: Twenty-two White Leghorn birds (Gallus gallus domesticus) were treated with diffusers monocularly (treated, n=11) or received no treatment (control, n=11) from 5 days of age for two weeks. After refractometry and keratometry were performed at the end of the treatment period, scleral punches were obtained at 8 different radial regions immediately posterior to the equator (nasal, temporal, superior, inferior, superior-nasal, superior-temporal, inferior-nasal, inferior-temporal). Refractive and corneal astigmatism were measured using Hartinger refractometer and infrared photokeratometry, respectively. Scleral proteoglycan synthesis was estimated by measuring the incorporation of $[^{35}S]$ sulfate into glycosaminoglycans (GAGs) in 3 mm punches sclera tissues. For comparison purposes, relative scleral PG synthesis was calculated for each bird by normalizing regional scleral PG synthesis to the average value of the 8 different regions.

Results: Regional variations in scleral PG synthesis were found in both control and treated birds. Interestingly, compared to control birds, form-deprived birds showed a disproportionate increase in scleral PG synthesis at superior-nasal region (mean $\pm$ S.E. = $0.84 \pm 0.10$ vs. $0.43 \pm 0.05$, two sample t-test, p=0.002) but not at other regions (all p>0.05). More importantly, Pearson’s correlation analyses showed that corneal
astigmatism ($r = 0.66$, $p = 0.03$) and refractive ($r = -0.65$, $p = 0.03$) or corneal ($r = -0.62$, $p = 0.04$) J45 were significantly correlated with relative scleral PG synthesis at nasal region but not at other regions.

Conclusions: Scleral PG syntheses vary across the different regions posterior to the equator. Further studies are needed to confirm the relationship between regional scleral PG synthesis and the characteristics of astigmatism.

REFERENCES:


