

**Program#/Poster#:** 4288/B749

**Abstract Title:** **Altering the diurnal light cycle differentially affects the vitreous chamber responses to negative lens and diffusers in young chicks except after optic nerve-section**

**Presentation Start:** Wednesday, Apr 28, 2004, 8:30 AM -10:30 AM

**Location:** Hall BC

**Reviewing Code:** 117 animal models: myopia – AP

**Author Block:** *K.L. Yew, C.F. Wildsoet.* Vision Science, Optometry School, University of California, Berkeley, Berkeley, CA.

**Keywords:** 590 myopia,653 refractive error development,453 circadian rhythms

**Purpose:** Different mechanisms may underlie form deprivation- (FD) and hyperopic defocus-induced myopia. Interrupting the night dark cycle with light (IN) inhibits vitreous chamber (VC) elongation in eyes compensating for high negative lenses (-30D) but not for low negative lenses (-5D) nor to FD in young chicken eyes (*Yew et al, 2003*). To investigate whether this effect of IN is dependent on retinal communication with central circadian rhythm regulators, we combined optic nerve section (ONS) with a similar experimental paradigm.

**Methods:** 5 day-old White Leghorn chicks were unilaterally optic nerve-sectioned. 1 week after ONS, ONS-eyes were fitted with either white diffusers (WD), or -5D or -30D lenses (n=6 per group), and birds were reared under normal (12/12 hr light/dark; LD) or interrupted night (15 min/hour light during the dark phase; IN) light cycles. Axial dimensions and refractive errors (RE) were measured every 2 days for 2 weeks, by high frequency A-scan ultrasonography and photoretinoscopy, respectively.

**Results:** In ONS-eyes, VC elongation in -5D, -30D lens and diffuser groups were not affected by IN (p=0.499) but anterior chamber development (AC) was, with IN groups showing significant reductions relative to LD groups (p<0.0001). Axial length (AL) show the generally smaller changes in the interrupted night cycle than that in normal cycle (p=0.0134), while -30D and WD groups pertains the larger elongation than -5D groups do (p=0.0014). This tendency is also parallel to the development of RE. Data of AC, VC, and RE are shown below.

**Conclusions:** The inhibitory effect of altering the diurnal light cycle on the VC response to -30D lens in normal eyes was seen in ONS eyes. This result suggests that under ONS conditions, the -30D lenses act as form deprivation stimuli, perhaps due to the loss of accommodation. The same altered lighting significantly inhibited AC growth across all ONS groups, an effect that was only weak in normal eyes. These results shed the potentially new direction of further study in myopia development. Results of ONS chicks in AC, VC, RE


**Commercial Relationship:** **K.L. Yew, None; C.F. Wildsoet, None.**

**Grant Identification:** NEI RO1 EY012392-04