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Sexual dimorphism in retinal function: endocrine modulation of sensitivity to light

Hormones such as estradiol have been shown to have protective effects in the retina. Additionally, visual processing in human females varies with reproductive state and life stage. Studies have shown that post-menopausal women not on hormone replacement therapy (HRT) are at risk for losing sensitivity to certain wavelengths of light. However, how hormones such as estradiol affect visual sensitivity, including in the retina, is still unknown. The natural and regular fluctuation in estradiol levels that females experience likely have transient effects on their visual processing and retinal sensitivity. This in turn can affect visual perception. The current study examines the effects of reproductive state on sensitivity to light. The sensitivity to multiple wavelengths of light were measured in reproductive male vs reproductive female and reproductive female vs nonreproductive female *Hyla cinerea* using electroretinogram (ERG). *Hyla cinerea* frogs were used as the animal model in this study because their retinas respond to all wavelengths of light across the visible light spectrum and thus can model human perception of color. Hormone levels will be verified using an enzyme-linked immunosorbent assay. Data show retinas of reproductive females are one logarithmic unit more sensitive to almost all wavelengths of light measured (400nm, 450nm, 500nm, 600nm and 650 nm) than those of nonreproductive females. The only wavelength in which reproductive females' retinas were not significantly more sensitive was 550nm. Reproductive females and males do not show a significant difference in retinal sensitivity. These results imply that systemic modulation of estradiol has retinal effects with potential perceptual consequences. Coupled with previous studies that show the protective effects of HRT on the retina in post-menopausal women, these results further highlight the potential of hormones as a therapeutic tool, particularly in regards to retinal health, into late adulthood.