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Evaluation of retinal status using chromatic pupil light reflex activity in healthy and diseased canine eyes.

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Abstract

PURPOSE: To differentiate rod-cone-mediated pupil light reflexes (PLRs) from intrinsic melanopsin-mediated pupil light reflexes by comparing pupil responses with red and blue light stimuli of differing intensities in normal dog eyes and in those with sudden acquired retinal degeneration syndrome (SARDS) exhibiting a nonrecordable electroretinogram.

METHODS: The PLR was evaluated in 14 healthy dogs using a computerized pupillometry system and in five dogs with SARDS. Contraction amplitude, velocity, and implicit time of the PLR were studied as a function of peak wavelength (480 nm vs. 630 nm) and light intensity (-0.29 to 5.3 log units) to determine characteristics of the rod-cone versus predominantly melanopsin-mediated PLR activity.

RESULTS: The PLR in healthy, mildly sedated dogs could be elicited at low light intensities (-0.29 log units; 0.51 cd/m(2)). Canine SARDS patients displayed a complete absence of vision, electroretinographic amplitude, and PLR at low light intensity. However, in SARDS dogs, a pupil light reflex could be elicited with wavelengths corresponding to the melanopsin spectral sensitivity (blue light - peak at 480 nm) and at relatively high intensity (4.3 log units or higher), whereas red light (630 nm peak wavelength) was ineffective in eliciting any detectable PLR response even at light intensities of 6 log units (1,000,000 cd/m(2)).

CONCLUSIONS: The PLR in healthy canine eyes can be elicited at very low light intensities using red and blue wavelengths of light, but in dogs with blindness caused by SARDS, the pupil reacts only to high-intensity blue wavelength light, implying loss of the rod-cone-mediated PLR and most likely the presence of intrinsic, melanopsin-mediated, retinal ganglion cell-mediated PLR.

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