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**Abstract**

**TITLE:** Pupil light reflex in response to monochromatic light stimuli in younger and older subjects

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**ABSTRACT BODY:**

**Introduction :** Aging induces changes in the circadian regulatory process which may be associated with impaired photic input. Changes in pupil light reflex (PLR) during aging may alter retinal photic input and consequently affect the impact of light on non-visual functions. Circadian entrainment and other non-visual functions are regulated by a non-visual photoreceptive system that shows peak sensitivity to blue light, in contrast to the photopic visual system, maximally sensitive to green light. Here, we assessed whether PLR to green and blue light of different irradiance levels changes with aging.

**Methods :** PLR was measured in 16 young (23±3.9y) and 14 older (61.1±4.4y) healthy subjects, in response to blue (480nm, hbw=10nm) and green (550nm, hbw=10nm) monochromatic light presented at low (7x10<sup>12</sup> ph/cm<sup>2</sup>/s), medium (3x10<sup>13</sup>ph/cm<sup>2</sup>/s), and high (10<sup>14</sup>ph/cm<sup>2</sup>/s)

irradiance levels. Subjects were first dark adapted before light exposure. Light exposures lasted 45s and were separated by 60s of darkness. Pupil constriction was normalized according to pupil size at the end of dark adaptation.

**Results :** Analysis of raw data showed that young subjects had larger pupils than older subjects at the end of dark adaptation (young:  $0.39 \pm 0.01$ , arbitrary unit, mean  $\pm$  SEM, older:  $0.33 \pm 0.02$ ;  $p=0.008$ ) and during light exposure (young:  $0.232 \pm 0.01$ , older:  $0.185 \pm 0.01$ ;  $p=0.002$ ). Analysis of normalized sustained pupil constriction (6-45s) revealed that blue light induced more constriction than green light (blue:  $57.7 \pm 2\%$ , mean  $\pm$  SEM; green:  $59.4 \pm 2\%$ ;  $p < 0.05$ ), and constriction was greater with higher irradiances (low:  $64.9 \pm 19\%$ ; medium:  $57.8 \pm 15\%$ ; high:  $52.9 \pm 16\%$ ;  $p < 0.01$ ).

**Conclusion:** Pupillary constriction is greater with blue than green light and varies with irradiance level. Although the degree of pupil constriction is not significantly affected by age, absolute pupil size is smaller in older individuals both in darkness and during light exposure. This may reduce retinal illumination and affect other non-visual responses to light such as circadian entrainment.