

Spatial Properties of Photophobia

James M. Stringham,^{1,2} Kenneth Fuld,² and Adam J. Wenzel²

¹From the Department of Ophthalmology, Medical College of Georgia, Augusta, Georgia; and the ²Department of Psychology, University of New Hampshire, Durham, New Hampshire.

PURPOSE

To determine the spatial properties of stimuli that elicit photophobia (PP) in normal subjects: Does PP exhibit spatial summation? Are different parafoveal quadrants (superior, inferior, temporal, and nasal) of the retina differentially sensitive in PP? What is the relationship between PP sensitivity and retinal eccentricity? What is the relationship between the spatial properties of PP and the spatial distribution of macular pigment (MP)?

METHOD

A Maxwellian-view optical system with a xenon light source was used to present the stimuli. Four normal subjects viewed stimuli of various sizes, retinal locations, and one of two chromatic contents: xenon-white and a broadband orange. The intensity of the test stimulus was increased between trials until the PP threshold was reached. The squinting response corresponding to PP was assessed by electromyography and used as an objective criterion of PP. Three parameters were examined: stimulus size, parafoveal retinal locus (superior, inferior, temporal, and nasal), and retinal eccentricity (extending into the perifovea). Spatial profiles of MP were measured psychophysically using heterochromatic flicker photometry (HFP).

RESULTS

Spatial summation for PP was found essentially to adhere to Piper's law (radiance proportional to square root of stimulus area). The PP response was greater to centrally than peripherally viewed targets. In this regard, MP acted as a spatially integrated filter in the attenuation of PP.