

Age-related changes in temporal S-cone ON- and OFF-pathways.

John S. Werner¹ and Keizo Shimomori²

¹ Department of Ophthalmology & Vision Science, University of California, Davis

² Department of Information Systems Engineering, Kochi University of Technology

S-cone sensitivity decreases with age, but the magnitude may depend on temporal parameters. In this study, age-related changes in an S-cone pathway were quantified for chromatic increments and decrements in terms of their impulse response functions (IRF). Thresholds for a series of double pulses, separated by varying interstimulus intervals (20-360 ms), were measured for chromatically modulated stimuli. Isoluminance and the location of tritan lines were determined individually. The stimuli were presented as a Gaussian patch (± 1 SD = 2.3 deg) on an equiluminant white background in one of four quadrants around a central fixation cross so that detection could be measured with a four-alternative forced-choice method and interleaved staircases for each ISI. Subjects included ten younger (mean = 23 years) and ten older (mean = 74 years) observers, who were carefully screened to rule out anterior segment, retinal or optic nerve abnormalities. IRFs were calculated from thresholds as a function of ISI using a model that varied four parameters of an exponentially-damped sinewave. As previously reported, IRFs for S-cone increments in excitation were slower than for luminance modulation, but faster than IRFs for S-cone decrements. This is consistent with detection by separate ON- and OFF- S-cone pathways. Additional analyses will describe differences in S-cone IRFs for increments and decrements to compare age-related changes in putative ON- and OFF-pathways.