

THE DISTRIBUTION OF CONES IN THE LIVING HUMAN EYE**S. Otake and C. M. Cicerone** University of California, Irvine, CA

Purpose. We sought to estimate the density of cones at varying nasal and temporal eccentricities in the living human eye. **Methods.** We developed a new method for estimating cone density over a range of eccentricities (fovea centralis; 2, 7, 17, and 28 deg nasal; and 2, 7, and 28 deg temporal). Measurements were made of the probability of detection for small spots of either 520 nm or 640 nm under M cone or L cone isolating conditions, respectively. These results were compared to simulations based on a model which took into account the measured irradiance of the test flash, the preretinal absorption in the eye, optical scatter, and eye movements. We assumed a hexagonal packing for the cones, the Smith and Pokorny fundamentals, and values for the number of quanta required to excite a cone (Otake and Cicerone, 1992), for pigment density (Baylor et al., 1987), and for cone dimensions (Curcio, 1991). The simulations that best fit our results gave us the density of cones, excluding S cones. **Results.** Our results are in good agreement with anatomical measurements. For example, for three observers we estimated cone densities in the fovea centralis of 9.5×10^4 , 1.4×10^5 , and 1.8×10^5 cones per mm^2 . These values are comparable to anatomical estimates in the human eye: Curcio et al. (1990) obtained 1.992×10^5 cones per mm^2 as a mean value for measurements in four eyes, and Østerberg's (1935) value was 1.473×10^5 cones per mm^2 measured in one eye. **Conclusions.** Our study provides the first estimates of the density of cones in the living human eye over a wide range of nasal and temporal eccentricities. These psychophysically obtained values are comparable to anatomical results.

Supported by NSF-BNS8819874 and NIH-EY08200 to CMC.

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