World Academy of Science, Engineering and Technology
International Journal of Biomedical and Biological Engineering
Vol:17, No:03, 2023

# Cone Contrast Sensitivity of Normal Trichromats and Those with Red-Green Dichromats

**Authors :** Tatsuya Iizuka, Takushi Kawamorita, Tomoya Handa, Hitoshi Ishikawa

**Abstract :** We report normative cone contrast sensitivity values and sensitivity and specificity values for a computer-based color vision test, the cone contrast test-HD (CCT-HD). The participants included 50 phakic eyes with normal color vision (NCV) and 20 dichromatic eyes (ten with protanopia and ten with deuteranopia). The CCT-HD was used to measure L, M, and S-CCT-HD scores (color vision deficiency, L-, M-cone logCS□1.65, S-cone logCS□0.425) to investigate the sensitivity and specificity of CCT-HD based on anomalous-type diagnosis with animalscope. The mean ± standard error L-, M-, S-cone logCS for protanopia were 0.90±0.04, 1.65±0.03, and 0.63±0.02, respectively; for deuteranopia 1.74±0.03, 1.31±0.03, and 0.61±0.06, respectively; and for age-matched NCV were 1.89±0.04, 1.84±0.04, and 0.60±0.03, respectively, with significant differences for each group except for S-CCT-HD (Bonferroni corrected $\alpha = 0.0167$, $p < 0.0167$). The sensitivity and specificity of CCT-HD were 100% for protan and deutan in diagnosing abnormal types from 20 to 64 years of age, but the specificity decreased to 65% for protan and 55% for deutan in older persons > 65. CCT-HD is comparable to the diagnostic performance of the anomalous type in the anomaloscope for the 20-64-year-old age group. However, the results should be interpreted cautiously in those ≥ 65 years. They are more susceptible to acquired color vision deficiencies due to the yellowing of the crystalline lens and other factors.

**Keywords :** cone contrast test HD, color vision test, congenital color vision deficiency, red-green dichromacy, cone contrast sensitivity
**Conference Title :** ICVS 2023 : International Conference on Vision Science
**Conference Location :** Paris, France
**Conference Dates :** March 27-28, 2023