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Suprathreshold contrast perception remains unimpaired in keratoconus despite loss of contrast sensitivity | IOVS

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Suprathreshold contrast perception remains unimpaired in keratoconus despite loss of contrast sensitivity

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Abstract

Purpose : Threshold-level spatial vision (e.g., contrast sensitivity, logMAR visual acuity) is known to be deteriorated in keratoconus. However, suprathreshold spatial visual performance in this disease condition remains largely unknown. This study assessed the suprathreshold contrast perception in keratoconus using the well-known contrast constancy paradigm. The study hypothesized that suprathreshold contrast matches for keratoconus will show deficiencies that may be predicted from the pattern of loss in their contrast sensitivity function (CSF).

Methods : Apparent contrast matches were determined at 10% and 50% stimulus contrast in 10 unilateral keratoconic cases (24 – 29yrs) and 10 age-similar controls using an adaptive staircase procedure with 8 reversals. Contrast matches were determined between a “standard” Gabor grating, with spatial frequency corresponding to the peak of the subject’s CSF, and “test” gratings with frequencies at one-third, one-half, twice or thrice that of the standard grating.

Results : Contrast sensitivity of keratoconic cases showed significant deterioration (mean \pm 1SD area under CSF: 1.25 \pm 0.37log units), relative to controls (2.23 \pm 0.24log units) ($p < 0.001$). For both cases and controls, the matching contrasts of test gratings for both suprathreshold contrast levels were within $\pm 20\%$ of the standard grating contrast for spatial frequencies greater than the peak CSF ($p = 0.12$ for both). In comparison, the contrast matches of test gratings were significantly higher ($\sim 40 - 60\%$) for spatial frequencies lower than the peak CSF ($p < 0.05$ for both frequencies).

Conclusions : Suprathreshold contrast perception appears to remain unaltered in keratoconus for spatial frequencies higher than the peak of the CSF, even though contrast sensitivity is significantly deteriorated. Suprathreshold contrast losses may however be perceived in both keratoconics and controls for spatial frequencies lower than the peak of the CSF.

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