

Visual Crowding in Glaucoma

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PURPOSE: Crowding refers to the phenomenon in which objects that can be recognized when viewed in isolation are unrecognizable in clutter. Crowding sets a fundamental limit to the capabilities of the peripheral vision and is essential in explaining performance in a broad array of daily tasks. Due to the effects of glaucoma on peripheral vision, we hypothesized that neural loss in the disease would lead to stronger effects of visual crowding.

METHODS: Subjects were asked to discriminate the orientation of a target letter when presented with surrounding flankers. The critical spacing value (scritical), which was required for correct discrimination of letter orientation, was obtained for each quadrant of the visual field. scritical values were correlated with standard automated perimetry (SAP) mean sensitivity (MS) and optical coherence tomography (OCT) retinal nerve fiber layer (RNFL) thickness measurements.

RESULTS: The study involved 13 subjects with mild glaucomatous visual field loss and 13 healthy controls. Glaucomatous eyes had significantly greater (worse) scritical than controls (170.4 ± 27.1 vs. 145.8 ± 28.0 minimum of visual angle, respectively; $P = 0.007$). scritical measurements were significantly associated with RNFL thickness measurements ($R^2 = 26\%$; $P < 0.001$) but not with SAP MS ($P = 0.947$).

CONCLUSIONS: In glaucoma patients, a pronounced visual crowding effect is observed, even in the presence of mild visual field loss on standard perimetry. scritical was associated with the amount of neural loss quantified by OCT. These results may have implications for understanding how glaucoma patients are affected in daily tasks where crowding effects may be significant.

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