

Visual features most relevant to functional impairment in glaucoma

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Purpose: To determine the visual parameters which most strongly determine ability in a variety of functional domains within a cohort of glaucoma patients.

Methods: 152 glaucoma patients provided data on a wide variety of functional outcomes including: glaucoma-related quality of life, fear of falling, driving cessation, maximum reading speed (assessed using the MNRead chart), and balance (root mean square sway measured using the OPAL kinematic system [APDM, Inc.]). Patients' vision was evaluated using 7 measures including: average sensitivity across the integrated visual field (IVF), ETDRS visual acuity (VA), MARS contrast sensitivity (CS), area under the log contrast sensitivity function (AULCSF) assessed using the quick contrast sensitivity function (qCSF) test, color vision evaluated using the Hardy-Rand-Rittler test, distance stereoacuity measured using the Distance Randot Stereotest, and visual acuity in noise (VIN) assessed with the Pelli-Levi Dual Acuity Chart. Dominance analysis was performed to evaluate the relative contribution of the various vision metrics to each functional outcome.

Results: Together, the 7 tested vision metrics explained between 8% and 25% of the variance for the functional outcomes assessed. The dominant visual measure with regards to glaucoma-related quality of life was CS, explaining 6.7% of the overall variance (30.3% of the vision-related variance). VA was the dominant visual measure with regards to fear of falling, driving cessation and reading speed, explaining 2.3%, 6.4% and 3.1% of the overall variance, respectively (29.5%, 25.9% and 34.4% of the vision-related variance). AULCSF was the dominant visual measure with regards to balance, explaining 2.7% of the overall variance (25% of the vision-related variance). IVF ranked as the 2nd to 5th most dominant predictors for the functional outcomes studied, explaining between 7.6% and 18.1% of the vision-related variance.

Conclusions: VF damage, while central to the diagnosis and monitoring of glaucoma, is not the most visual measure most highly predictive of functional ability. The dominant visual measure associated with functional ability varies across functional domains, suggesting that functional impairment may be better evaluated through a battery of functional measures as opposed to global measures of ability or quality of life.