

Impact of Central Superior and Inferior Visual Field on Quality of Life in Glaucoma Patients

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Purpose: To test the impact of damage to the integrated visual field (IVF) in the central superior and inferior hemifields on a broad range of functional outcomes. We also explore the validity of regression models with multiple correlated predictors.

Methods: 242 patients with glaucoma or suspect glaucoma underwent 24-2 visual field testing to derive IVF sensitivities. Questionnaires and functional testing assessed gait, reading, self-reported driving patterns, accelerometer-defined physical activity, fear of falling, and overall quality of life (QoL). Multiple linear regression models analyzed the isolated and independent impacts of superior and inferior IVF sensitivity on these outcomes. Variance inflation factors (VIF) were calculated to assess multicollinearity between IVF regions.

Results: Regression models in which the independent effects of >2 IVF regions were examined (i.e. IVF quadrants) demonstrated high levels of multicollinearity (VIF>5). In models evaluating superior or inferior IVF sensitivity as the sole visual predictor, most outcomes (QoL, fear of falling, driving cessation, number of driving limitations, reading speed, and variability in stride velocity and stride length) were significantly associated with IVF sensitivity in both regions ($p<0.015$ for all). Daily steps were significantly associated with superior, but not inferior, IVF sensitivity ($p=0.02$), while base of support was associated with inferior, but not superior, IVF sensitivity ($p=0.01$). In models designed to determine the independent effects of superior and inferior IVF sensitivity, some outcomes (number of driving limitations, quality of life score) showed a significant association with superior, but not inferior, IVF sensitivity ($p<0.02$ for all), while others (driving status, base of support) were significantly associated with inferior, but not superior, IVF sensitivity ($p<0.04$ for all). No outcomes showed independent effects of superior and inferior IVF sensitivity.

Conclusions: Strong multicollinearity prohibits the ability to assess the independent functional implications of more than 2 regions within the same IVF. The relative impact of superior and inferior IVF damage varies based on the functional outcome assessed, and efforts to determine the importance of various IVF regions should focus on specific functional domains and not questionnaires/instruments which integrate information from multiple functional areas.