

Initiation of walking in glaucoma

Author Block: *Moneesha Rani Mukherjee¹, Aleksandra Mihailovic¹, David S. Friedman¹, Sheila West¹, Pradeep Ramulu¹*

¹ Johns Hopkins Wilmer Eye Institute, Baltimore, Maryland, United States

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Purpose: Difficulty with changes in lighting are amongst the most common complaints in glaucoma, but have not been objectively evaluated. Here, in a group of glaucoma subjects, we examine the relationship between visual field or contrast sensitivity (CS) and the time taken to initiate walking under stable normal lighting, bright to dim lighting changes, dim to bright lighting changes, and normal lighting with an obstructed pathway.

Methods: Participants walked along the GAITRite Electronic Walkway (CIR Systems Inc) under 4 conditions: 1) normal light, 2) a sudden change from bright to dim light, 3) sudden change from dim to bright light, and 4) normal light with an obstacle in the walkway. Participants began each walk as soon as they felt comfortable, with time to first step recorded. Pointwise sensitivity data measured using Humphrey 24-2 VF testing were integrated to derive mean sensitivity in the integrated VF (IVF). Multiple regression models controlling for age, race, gender, comorbidities and medications assessed the association between IVF sensitivity or CS and the time to first step under different conditions.

Results: Mean times to initiate walking were 0.97 (IQR=0.75-1.16), 2.98 (IQR=1.60-3.63), 1.81 (IQR=1.22-1.97), and 0.93 (IQR=0.72-1.07) seconds under normal, bright-to-dim, dim-to-bright and obstructed pathway walking, respectively. Among the visual measures associated with time to initiate bright-to-dim walking, CS was the strongest predictor as judged by the strength of the association (4.7% longer time to initiate walking per 0.1 decrement in logCS, 95% CI=1.5%-8.0%, p=0.004). Each 5dB decrement in total IVF sensitivity was associated with an 11.5% longer initiation time (95% CI=0.98%-23%, p=0.03). Under normal light with an obstacle, each 5dB decrement in total IVF sensitivity was associated with a 9.7% longer time to initiate walking (95% CI=2.9%-17%, p=0.005). Similar effects were seen for a 5 dB decrement in inferior IVF sensitivity (11.3% longer time, 95% CI=2.9%-17%, p=0.005), while weaker effects were noted for a 5 dB decrement in the superior IVF (6.7% longer time, 95% CI=0.82%-13%, p=0.03). No visual measures predicted initiation times during the normal or dim-to-bright light walks.

Conclusions: Glaucoma patients with worse vision take longer to initiate walking during bright-to-dim and obstructed pathway walking, and specific attention should be devoted to these scenarios when rehabilitating mobility in glaucoma.