

ESLRR Symposium on Mobility and Visual Field

Chairs: Blaithín Gallagher (Ireland) & Maria Coco (Spain), ESLRR board members

1. Functional Visual Fields 1: Visual Field Paradigms for Assessing Functional Field Loss

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Purpose

Visual field assessment is not only important to monitor disease progression, but also to reflect and predict functional difficulty in the real world. The aim of this study is to develop an appropriate method of assessing field loss which reflects its functional consequences.

Methods

50 participants with peripheral field impairment undertook three custom binocular visual field tests on the Octopus 900 assessing 60 degrees from fixation: threshold, 10dB supra-threshold, and 10dB kinetic assessment; and two existing tests on the Humphrey Field Analyzer: integrated monocular threshold 24-2 visual fields (IVF), and an Esterman field. The average mean threshold, percentage of stimuli seen, and visual field area were used as principal outcome measures for analysis and compared to self-reported mobility function. Receiver Operating Characteristic (ROC) curves were compared to determine which field tests were best at discriminating between those with and without difficulty with mobility tasks.

Results

Greater visual field loss was associated with greater self-reported mobility difficulty ($R^2=0.47$; $R^2=0.47$ and $R^2=0.48$ for threshold, supra-threshold, and kinetic assessment respectively, all $p<.001$). Perceived mobility function related similarly to Esterman scores ($R^2=0.46$; $p<.001$) and IVF ($R^2=0.38$; $p<.001$). All three custom tests and the Esterman

assessment were better than the IVF at predicting difficulty with at least three mobility tasks in ROC analysis.

Conclusion

Binocular visual field tests can reflect self-reported mobility function. While all five visual fields assessments relate similarly to perceived function, the three custom tests and the Esterman explain a greater degree of variance in self-reported mobility function, and produce significantly better discrimination in ROC analyses. A binocular visual field test that does not ignore the peripheral 30-60 degrees of the field is effective for disability determination and reflecting functional difficulty.

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No conflicts of interest

2. Functional Visual Fields 2: Utilisation in Low Vision Practice

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Purpose:

To determine which functional visual field paradigms are most clinically acceptable to patients and have potential to be useful to clinicians.

Methods:

50 participants with peripheral field impairment undertook three custom binocular visual field tests on the Octopus 900 assessing 60 degrees from fixation: threshold, 10dB supra-threshold, and 10dB kinetic assessment; and two tests on the Humphrey Field Analyzer: integrated monocular threshold 24-2 fields, and an Esterman field. The duration of each test was noted. Participants were asked to rank the tests in order of their acceptability, and the test outputs in terms of their usefulness.

Results:

The binocular kinetic test was the quickest to perform (86 ± 6 sec), followed by binocular supra-threshold (190 ± 6 sec), Esterman (380 ± 15 sec), binocular threshold (460 ± 18 sec) and

integrated monocular fields (566±16sec). The kinetic test was ranked first by 50% of participants, and monocular threshold fields were ranked last by 64%. Participants found it easier to maintain concentration during shorter tests, preferred not wearing an eye patch, liked tests using brighter (supra-threshold) targets, and did not like long periods during the assessment when no lights are seen. Binocular threshold (greyscale) and binocular kinetic (isopter) outputs were ranked as most useful by 30% of participants each. Esterman and binocular supra-threshold outputs were least well ranked, with comments made that the small size of the printout test points made results difficult to view. 28% of participants did not recall having been shown their visual field results before, but all valued having field results shown and explained to them.

Conclusions:

If all visual field paradigms provide similar information to the clinician, patients prefer functional visual field tests which are binocular, quick, use bright stimuli, and produce results that can be easily seen. The binocular kinetic and suprathreshold paradigms were most favoured in this analysis.

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No conflicts of interest

3. The mediating role of mobility restrictions in the association between glaucomatous visual impairment and depression

Ger van Rens, Hilde van der Aa, Jacob Schroevers, Ruth van Nispen, Netherlands

Open abstract

4. Evaluation of driving safety in mobility scooters in individuals with visual impairment

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Introduction/aim: Mobility scooters help people with motor impairments to keep up their independent mobility. However, visual impairment can influence the ability to drive such a device safely. Whereas much research has been done on the influence of visual impairment

on driving safety in fast traffic (personal cars), hardly anything is known about the impact of visual impairment on mobility scooter driving performance. The present study therefore investigated the impact of different visual impairments on indoor and outdoor mobility scooter safety.

Methods: 38 normally sighted controls, 24 people with low visual acuity [Binocular Best Corrected Visual Acuity between 0.03 and 0.40], 11 people with peripheral visual field defects and 14 people with both low visual acuity and peripheral field defects completed a training drive and an unstructured test drive in and around the University Medical Centre. The drives were recorded by a GPS-camera and included different tasks, such as basic manoeuvring skills, crossing a street, and driving with different speeds. The drives were evaluated by means of an observation form and videos that were evaluated independently by two orientation and mobility specialists working in low vision rehabilitation centres.

Results: On average, participants with visual impairments performed worse than normal-sighted controls, but sufficiently safe. Out of the visually impaired participants, those with peripheral visual field defects with or without additional low visual acuity seemed to have most difficulties driving a mobility scooter.

Conclusion: In general, people with visual impairments are capable to learn driving in mobility scooters and using them safely in traffic. Visual impairment on its own cannot be seen as a determinant of driving safety in mobility scooters. Mobility scooter allocators should be aware that individuals with peripheral field defects (with or without low visual acuity) might need more attention. The use of an individualised practical fitness-to-drive test is advised.

5. Gaze scanning and detection of hazards by drivers with hemianopia

Alex Bowers, USA

Open abstract

6. The effectiveness of explorative saccadic training in tunnel vision

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Background: Retinitis Pigmentosa (RP) is a degenerative retinal disease causing severe peripheral visual field loss (tunnel vision), which impairs mobility. This study applies compensatory Explorative Saccadic Training (EST) in a randomized controlled trial in RP patients to improve mobility and dynamic visual field.

Methods: Twentyfive RP-patients were randomly assigned into two training conditions: Saccadic (Experimental) and Reading (Control). In a waiting list control group, all subjects, who first did Reading training underwent Experimental training later. Eye movements were recorded during walking and avoiding obstacles in a controlled environment using a mobile infra-red eye tracker before and after the 6 weeks of Saccadic or Reading training and 6 weeks after end of training. Additionally outcome variables related to daily-life were assessed. To assess any training effect, performance on the training task and daily-life related outcome variables were measured: Response Times (RT) during EST; Percent Preferred Walking Speed (PPWS), number of collisions with obstacles, eye-movement dispersions, total number of fixations and average fixation duration, and number of fixations outside subjects' intact visual fields (blind areas). **Results:** In both the Experimental Saccadic and Cross-overtraining groups RTs decreased and PPWS significantly improved. The improvement persisted 6 weeks after end of training. On average the eye-movement patterns of RP patients in PRE-/POST- training conditions were similar to that of normal observers. In both Experimental- and Reading- training groups, before and after training we found a high number of fixations outside subjects' seeing visual field. Only in the Experimental training condition average fixation duration was significantly shorter after training.

Conclusions: EST was beneficial for RP patients and resulted in shorter fixation durations after EST and a significant improvement in relative walking speed while navigating in real-world like controlled environment.

EST can be a valuable additional rehabilitative measure to classical orientation and mobility training.