



Smooth pursuit eye movement training improves recovery from functional neglect in individuals with postacute stroke

Synopsis

Summary of: Kerkhoff G, Bucher L, Brasse M, Leonhart E, Holzgraefe M, Volzke V, et al. Smooth pursuit "bedside" training reduced disability and unawareness during the activities of daily living in neglect: a randomized controlled trial. *Neurorehabil Neural Repair* 2014;28:554-563.

Question: In people with postacute stroke, does smooth pursuit eye movement training reduce disability and unawareness during activities of daily living? **Design:** Randomised, controlled trial and blinded outcome assessment. **Setting:** An inpatient setting in Germany. **Participants:** Individuals with single right-hemisphere stroke with left visual neglect were eligible. Key exclusion criteria were: psychiatric, ophthalmological or other neurological diseases. Randomisation of 24 participants (11 to 66 days post-stroke) allocated 12 to the smooth pursuit eye movement-training group and 12 to the visual scanning training group. **Interventions:** Both groups underwent their respective treatment programs for 4 weeks (30 minutes per session, five sessions per week). In the smooth pursuit eye movement-training group, the participants repeatedly followed the moving stimulus patterns by making smooth pursuit eye movements from right to left. In the visual scanning training group, the participants viewed the stationary displays of stimuli and performed saccadic eye movements to scan the stimulus objects systematically in a specified direction, naming objects or counting certain stimuli. In both groups, the participants were asked to keep their head stationary in a neutral position while performing the eye movements. **Outcome measures:** The outcomes were the Functional Neglect Index (scored from 0 to 15), the Unawareness and Behavioral

Neglect Index (scored from 0 to 3), the Help Index, the Barthel Index and rehabilitation phase (derived from the Barthel Index). The outcomes were measured at baseline, immediately after completion of training and at 2-week follow-up. **Results:** A total of 24 participants completed the study. Significant group \times time interaction effects were found in the Functional Neglect Index and the Unawareness and Behavioral Neglect Index. Immediately after the 4-week training period, the change in the Functional Neglect Index was significantly greater in the smooth pursuit eye movement-training group by 2.3 points. The change in the Unawareness and Behavioral Neglect Index was also significantly greater in the smooth pursuit eye movement-training group by 0.3 points. During the 2-week follow-up period, the improvement in the Functional Neglect Index continued in the smooth pursuit eye movement-training group, but not in the visual scanning training group (mean difference = 1.8 points). The Help Index and Barthel Index did not demonstrate any significant group \times time interaction effect. The rehabilitation phase also did not show any between-group differences at any time points. **Conclusion:** In the postacute phase after stroke, smooth pursuit eye movement training was more effective than visual scanning training in improving functional neglect and reduced unawareness during activities of daily living.

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Commentary

Increasing research evidence has demonstrated the effectiveness of neglect rehabilitation. To date, most of studies in this field have not been performed at the acute stage of stroke. Although the sample size in the study by Kerkhoff et al was small, with 12 subjects in each arm (either smooth pursuit eye movement training or visual scanning training), they were able to find significant differences after smooth pursuit eye movement training compared to visual scanning training in measures of the Functional Neglect Index and the Unawareness and Behavioral Neglect Index after 4 weeks of training (a total of twenty 30-minute sessions).

The challenge with smooth pursuit eye movement training is how to ensure that the head is kept in a neutral position while moving the eyes. In future, it will be interesting to use an eye tracker to investigate how the eye gaze deviation changes behaviourally when doing smooth pursuit eye movement to the contralesional side or saccadic eye movement in visual scanning.

The primary outcome measures of this study, namely the Functional Neglect Index and the Unawareness and Behavioral Neglect Index, are uncommon, standardised assessment tools for people with unilateral neglect. Although the authors mentioned the Catherine Bergego Scale, they did not give reasons as to why they chose the Unawareness and Behavioral Neglect Index rather than the Catherine Bergego Scale for the behavioural

tasks. Without a reference to the standardised assessments, this meant that the severity of neglect (impairment level) at baseline was unclear.

The smooth pursuit eye movement training did improve performance in both the neglect tests, within-group changes in activities of daily living measures were noted as well, and the effects could be long lasting. This is encouraging, as a previous review concluded that there is insufficient evidence to support the effectiveness of most of the neglect-specific intervention approaches aimed at reducing disability and improving independence.¹ This study contributes to the evidence and neuroscience of using a new treatment – smooth pursuit eye movement training – rather than the conventional visual scanning training, in the design of theory-based treatment in rehabilitation for post-stroke unilateral neglect.

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Reference

1. Bowen A, et al. *Cochrane Database Syst Rev*. 2007;CD003586.

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