Abstract

"Objektive and subjective effects of systematic visual stimulation in glaucoma patients"
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Glaucoma is a progressive optic neuropathy caused by slow retinal ganglion cell (RGC) degeneration resulting in loss of visual functions and thus impairments in quality of life. Based on the evidence that visual system plasticity can be manipulated by training and visual restoration training (VRT) leads to visual field enlargements and improvements of subjective vision in brain and optic nerve damaged patients, the question arises whether training-induced functional recovery also occurs in the visual system of patients with visual function deficits due to retinal lesion. To explore if vision loss, in particular visual field defects caused by glaucomatous retinal damage can be modified by VRT, a double-blind, randomized and placebo-controlled study was carried out.

Thirty patients with stable glaucoma were randomized into two groups. Fifteen patients performed VRT (experimental condition) and fifteen the stimulus discrimination training (SDT, control condition) for a total of 3 months. At baseline and after completion of training, the visual field and different central visual functions were examined. Visual field was tested with High Resolution Perimetry (HRP) as well as with 30° white/white (W/W) and blue/yellow (B/Y) conventional automatic perimetry. Visual field test results have been established by determination of the number of detected stimuli. During HRP examinations eye movements were recorded by an eye tracker. Vision-related quality of life (vQoL) was assessed by NEI-VFQ (National Eye Institute Visual Function Questionnaire) and health-related quality of life (hQoL) by SF-36 (Health Survey-Short Form).

After 3 months of VRT the average detection performance was significantly increased if measured by HRP, but not if assessed by W/W and B/Y conventional perimetry. Comparing the training induced detection performance changes between the groups, VRT was superior to control condition in all three visual field tests. Detection performance changes were independent of eye movements, but the number of false positive responses contributed to training outcome. Visual functions other than light detection performance did not increase significantly after VRT and the training did not have a significant impact on vQoL and hQoL. However, the domain "mental health" increased both in the experimental and control group after intervention, indicating that regular training of the visual system may generally improve patients control belief patterns and reduce the concern about vision- and health-targeted impairments.

The results of the present study demonstrate that by systematic stimulation of residual vision, glaucoma patients may partially improve their detection performance and the effects of training are task specific.