A computer-based cognitive rehabilitation program, involving scanning training twice a week for 7 weeks, did not improve cognitive function in patients with unilateral left visual neglect.

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Clinical Question: In patients with unilateral left visual neglect, will computer-based cognitive rehabilitation when compared to non-computerized based cognitive rehabilitation, result in better performance on the Behavioural Inattention Test?

Citation:

Robertson, I.H., Gray, J.M., Pentland, B., & Waite, L.J. (1990). Microcomputer-based rehabilitation for unilateral left visual neglect: A randomized controlled trial. *Archives of Physical Medicine and Rehabilitation, 71,* 663-668.

Clinical Bottom Line: Results from one randomized control trial (Level 2a) indicate that a computer-based cognitive rehabilitation program, involving scanning twice a week for 7 weeks, did not improve cognitive function performance in patients with unilateral left visual neglect.

Search Terms:

[visual neglect*OR
brain injury*OR
traumatic brain injury* OR
acquired brain injury*]
AND [cognitive rehabilitation*]

Databases:

- Cochrane
- PsychINFO
- Cinahl
- PubMed
- Medline

SUMMARY OF STUDY:

Setting:
Hospitals in Edinburgh, Scotland.

Design:
The study was a randomized controlled trial. There was random allocation of subjects to the experimental training and control procedure. Both groups had approximately an equal number of hours of recreational computing. Randomization was done within blocks of severe vs. mild neglect patients. Allocation was not concealed. The ratings of the research design, obtained from the OTseekers database, are shown below.

Ratings Obtained from OTseeker Database

Internal Validity Score: 4/8

- Random allocation: Yes
- Concealed allocation: No
- Baseline comparability: Yes
- Blind assessors: Yes
- Blind subjects: No
- Blind therapists: No
- Adequate follow-up: Yes
- Intention-to-treat analysis: No

Statistical Reporting Score: 2/2

- Between-group comparisons: Yes
- Point estimates and variability: Yes

Subjects:
N= 36
The subjects were all patients in Edinburgh hospitals who showed significant unilateral left visual field neglect according to the Behavioural Inattention Test. The presence of neglect was operationalized as failure on at least three out of nine behavioral tests. All subjects were oriented for time and place, were able to give informed consent, and had the ability to concentrate while sitting at a computer-based task for at least 15 minutes. A consultant neurologist calculated a "neurophysical scale" score for each patient based on the examination. The score measured sensory and motor deficits, cranial nerve deficits, and the presence of abnormal reflexes. Both groups were equivalent on the primary outcome measure at baseline.

Intervention:

Control group (N=16; 16 analyzed): Subjects participated in the training time for 14 sessions of 75 minutes each (twice per week for seven weeks). They were exposed to computer activities that did not require any potential neuropsychological mechanism by which the activities could improve cognitive function. Programs were excluded if they included a speed component (reaction time task) or if they included tasks with a large component of visual search.

Experimental Group (N=20; 20 analyzed): Subjects participated in the training time for 14 sessions of 75 minutes each (twice per week for seven weeks). They completed four suites of programs using a scanning training program that was administered on a microcomputer with a touch-sensitive screen. The first program consisted of the subject selecting a shape that was not identical to the others displayed on the screen. The second program consisted of the combination of scanning and attention. The subject was to locate and touch targets as quickly as possible. Some

tasks in this program required the subject to complete calculations. The last two programs included attention training tasks.

Main Outcome Measure:
Wide ranges of psychological and neuropsychological tests were administered at intake, at the conclusion of training, and six months later. The tests consisted of the Wechsler Adult Intelligence Scale, the Neale Reading Test, a letter cancellation test, Rey-Osterreith Test, and an observer's report of neglect. The primary outcome measure was the cognitive function score on the BIT. The BIT was selected because it is the first adequately standardized test of neglect that rests on a range of measures closely related to real-life functioning. The measures test daily living skills such as dialing a telephone, reading a menu, and picking up money.

Main Results:
At the first post-treatment data collection point, three of the 36 subjects could not be followed-up. This consisted of 85% or more of the original sample. The average BIT score prior to training was 48.8 for the experimental group and 45.9 for the control group. The results indicate no statistically significant difference on the BIT for the experimental (52.0) and control (59.9) groups immediately after training. At the six month follow-up there was no statistically significant differences on the BIT for the experimental (60.1) and control (61.8) groups. The control group showed a greater proportion of improvement than the experimental group. Tables 1 and 2 show calculations of the effect size for both the experimental and control groups.

Evidence:

Table 1

BIT outcome at follow-up immediately after training

Experimental		Control	
Mean	SD	Mean	SD
52.0	24.0	59.9	20.2

Pooled standard deviation = 22.40

Determining Effect Size Using Means and Standard Deviations	
Definition	Calculation
Standardized Mean Difference The number of standard deviation units	-0.35
Effect Size Correlation Change in success rate from the control to the treatment group	-0.17
Experimental Success Rate	0.42
Control Success Rate	0.59
Relative Success Rate	0.71

Table 2

BIT outcome at six month follow-up

Experimental		Control	
Mean	SD	Mean	SD
60.1	18.6	61.8	21.5

Pooled standard deviation = 19.93

Determining Effect Size Using Means and Standard Deviations	
Definition	Calculation
Standardized Mean Difference The number of standard deviation units	-0.09
Effect Size Correlation Change in success rate from the control to the treatment group	-0.05
Experimental Success Rate	0.48
Control Success Rate	0.53
Relative Success Rate	0.91

Commentary:
The findings from this randomized control trial indicate no improvement for the experimental group on the BIT after using a computer-based cognitive rehabilitation program, involving scanning training, compared to the control group.

The BIT is a common outcome measure used in studies. Other possible outcome measures that could be administered to patients consist of the Semi-Structured Scale for Functional Evaluation of Hemi-inattention and the Catherine Bergego Scale.

The authors did discuss inclusion and exclusion criteria. Since multiple measures were used for the study, there was a potential for a Type 1 error. Experimenter bias was present during the study. There was intermittent trainer reimbursement and encouragement. Even though this did not improve the subjects' performance, it is still a problem when conducting an experiment. This could have an impact on the results.

In addition, the study did not consist of a no-treatment control group for comparison. Future investigations need to be conducted to determine this effect. The authors also mention that the control procedures did have an influence on neglect. Future studies

need to examine the different programs used by the control and experimental groups with the addition of a no-treatment control group.