The Effect of EEG Biofeedback on Reducing Postcancer Cognitive Impairment.

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Abstract
Background and hypotheses. Postcancer cognitive impairment (PCCI) is observed in a substantial number of breast cancer survivors, persisting for as long as 20 years in some subgroups. Although compensatory strategies are frequently suggested, no restorative interventions have yet been identified. This study examined the feasibility of EEG biofeedback ("neurofeedback") and its potential effectiveness in reducing PCCI as well as the fatigue, sleep disturbance, and psychological symptoms that frequently accompany PCCI.

STUDY DESIGN: This was a 6-month prospective study with a waitlist control period followed by an active intervention. Participants were female breast cancer survivors (n = 23), 6 to 60 months postchemotherapy, with self-reported cognitive impairment.

METHODS: Four self-report outcome measures (Functional Assessment of Cancer Therapy-Cognitive Function [FACT-Cog], Functional Assessment of Chronic Illness Therapy-Fatigue [FACIT-Fatigue], Pittsburgh Sleep Quality Index [PSQI], and Brief Symptom Inventory [BSI]-18) were administered 3 times during a 10-week waitlist control period, 3 times during a 10-week (20-session) neurofeedback training regimen, and once at 4 weeks postneurofeedback.

RESULTS: All 23 participants completed the study, demonstrating the feasibility of EEG biofeedback in this population. Initially, the sample demonstrated significant dysfunction on all measures compared with general population norms. Repeated-measures ANOVAs revealed strongly significant improvements (P < .001) on all 4 cognitive measures (perceived cognitive impairment, comments from others, perceived cognitive abilities, and impact on quality of life [QOL]), the fatigue scale, and the 4 psychological scales (somatization, depression, anxiety and global severity index) as well as on 3 of 8 sleep scales (quality, daytime dysfunction, and global). Two of the other sleep scales (latency and disturbance) were significant at P < .01, and 1 (use of medication) at P < .05; 2 were not significant. Improvements were generally linear across the course of training, and were maintained at the follow-up testing. At the follow-up testing, the sample no longer differed significantly from normative populations on 3 of the 4 FACT-Cog measures (impairment, impact on QOL, and comments), FACIT-Fatigue, PSQI sleep quality and habitual efficiency, or any of the BSI-18 measures of psychological disturbance.

CONCLUSIONS:
Data from this limited study suggest that EEG biofeedback has potential for reducing the negative cognitive and emotional sequelae of cancer treatment as well as improving fatigue and sleep patterns.