

**EFFECTIVENESS OF NEUROFEEDBACK TRAINING IN CHRONIC INSOMNIA.**

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**Introduction:** The most effective treatment for chronic insomnia is cognitive behavior therapy (CBT). Though effective over the long term, CBT requires specialized training in behavioral sleep medicine therapies. Early neurofeedback (EEG biofeedback) training protocols have been shown to be effective therapy for insomnia (Hauri et al 1982). This training involves the use of real-time, processed electroencephalographic (EEG) activity for feedback to subjects for gradually reducing hyperarousability evident in the EEG. In this pilot study we evaluated the efficacy of a simple but comprehensive neurofeedback training protocol in chronic insomniacs in our Center. Our design utilized a retrospective analysis of clinical data to assess benefit of this training in a real world clinic population.

**Methods:** A retrospective data analysis of consecutive patients meeting chronic insomnia diagnosis (difficulty initiating and/or maintaining sleep for at least 3 months) and given neurofeedback training NeuroCare neurofeedback system (Zengar, Inc) integrated with CBT therapy was performed. Eight patients with complete sleep logs were included in data analysis. Patients lay on a reclined chair facing displayed LCD computer generated graphics synchronized to music heard over headphones. EEG data was collected from C3 and C4 referenced unilaterally to earlobe with separate grounds. Periods with high EEG variability triggered interruptions in the audiovisual datastream (negative feedback).

**Results:** Analyzing pre-post sleep log data with t-tests, all patients had significant improvement in total sleep time ( $5.1 \pm 0.8$  to  $6.4 \pm 1.0$  hrs,  $p=0.002$ ), sleep efficiency ( $70 \pm 9$  to  $91 \pm 5$  %,  $p = 0.00004$ ), wake after sleep onset ( $1.7 \pm 0.8$  to  $0.5 \pm 0.4$  hrs,  $p=0.0003$ ), and sleep onset latency ( $48 \pm 40$  to  $12 \pm 10$  min,  $p=0.009$ ).

**Conclusion:** Neurofeedback training is an effective, integral component of CBT for insomnia. Further research is needed to determine the relative contribution of neurofeedback training to CBT for insomnia and its efficacy as monotherapy.

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