

**Meta-analysis of EEG biofeedback in treating epilepsy.** - Tan G - *Clin EEG Neurosci* - 01-JUL-2009; 40(3): 173-9 (MEDLINE® is the source for the citation and abstract of this record )

**Abstract:**

About one third of patients with epilepsy do not benefit from medical treatment. For these patients electroencephalographic (EEG) biofeedback is a viable alternative. EEG biofeedback, or neurofeedback, normalizes or enhances EEG activity by means of operant conditioning. While dozens of scientific reports have been published on neurofeedback for seizure disorder, most have been case series with too few subjects to establish efficacy. The purpose of this paper is to meta-analyze existing research on neurofeedback and epilepsy. We analyzed every EEG biofeedback study indexed in MedLine, PsychInfo, and PsychLit databases between 1970 and 2005 on epilepsy that provided seizure frequency change in response to feedback. Sixty-three studies have been published, 10 of which provided enough outcome information to be included in a meta-analysis. All studies consisted of patients whose seizures were not controlled by medical therapies, which is a very important factor to keep in mind when interpreting the results. Nine of 10 studies reinforced sensorimotor rhythms (SMR) while 1 study trained slow cortical potentials (SCP). All studies reported an overall mean decreased seizure incidence following treatment and 64 out of 87 patients (74%) reported fewer weekly seizures in response to EEG biofeedback. Treatment effect was mean log (post/pre) where pre and post represent number of seizures per week prior to treatment and at final evaluation, respectively. Due to prevalence of small groups, Hedges's g was computed for effect size. As sample heterogeneity was possible (Q test,  $p=.18$ ), random effects were assumed and the effect of intervention was  $-0.233$ ,  $SE = 0.057$ ,  $z = -4.11$ ,  $p<.001$ . Based on this meta-analysis, EEG operant conditioning was found to produce a significant reduction on seizure frequency. This finding is especially noteworthy given the patient group, individuals who had been unable to control their seizures with medical treatment.

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**NLM Citation ID:**

19715180 (PubMed ID)

**Full Source Title:**

*Clinical EEG and neuroscience : official journal of the EEG and Clinical Neuroscience Society (ENCS)*

**Publication Type:**

Journal Article; Meta-Analysis

**Language:**

English

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**Major Subjects:**

- Biofeedback (Psychology)
- Electroencephalography / \* statistics & numerical data
- Epilepsy / diagnosis / \* epidemiology / \* rehabilitation

**Additional Subjects:**

- Humans
- Incidence
- Treatment Outcome