



# Neurofeedback: Effective Treatment for Epilepsy without Harmful Side Effects



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## Abstract

This case blog highlights the beneficial effects of neurofeedback for a child with epilepsy. Neurofeedback (also known as EEG biofeedback) is an alternative treatment modality for epilepsy that involves “playing” computer games with brainwaves. Players earn points when their brainwave patterns are normal. Scientific, peer-reviewed research shows that by practicing and reinforcing normal brainwave patterns, people learn to generate and maintain normal patterns and prevent seizures even when they are not playing. This case blog provides basic information about neurofeedback and demonstrates how neurofeedback changed the lives of a child with epilepsy and his family for the better.

## Neurofeedback: Effective Treatment for Epilepsy without Harmful Side Effects

Our son’s epilepsy began just before he started kindergarten. We were shocked when he had his first tonic-clonic seizure and rushed to the emergency room. The doctors started him immediately on anti-convulsant medication and we (his two college professor parents) actively read the scientific and medical literature to learn more about what was happening to him.

By the time 6 months had passed, we were no longer naïve. We had been through a mountain of meds and our son had received the diagnosis “intractable epilepsy.” An initial scientific study we read indicated that permanent brain damage was less likely to occur in people who had fewer than 100 seizures in their lifetimes. At this point, our son was having over 100 seizures a day on a cocktail of medications that affected his coordination and made him confused, irritable, aggressive, and unable to learn. We didn’t know what damage the drugs were doing to his liver, kidneys, and other internal organs that we couldn’t see, but we knew that pumping over \$1,200 of drugs a month into a small child was likely to have some negative repercussions.

When it became clear that the usual drug therapies were not working for our son, we looked elsewhere for answers. At age 5, he seemed too young for brain surgery and a Vagus nerve stimulator. He was overwhelmingly unwilling to try the ketogenic diet, and we were skeptical about various touch therapies. The only alternative

treatment that had significant scientific merit indicating that it was effective for treating epilepsy was neurofeedback (also known as EEG biofeedback).

We found a neurofeedback practitioner to work with our son. After 4 weeks of daily treatment, his seizures stopped. After 3 months seizure-free, he was weaned off his medications and then weaned off neurofeedback. Unfortunately, his seizures returned 8 months later and were worse than ever. The second time around, medication did not control his seizures. In desperation, we tried neurofeedback again and then neurofeedback twice a day and finally his seizures stopped. We continued neurofeedback after he was weaned off all medication for 6 years. We wanted to make sure that his seizures were under control.

Now, 5 years after discontinuing neurofeedback, things are not completely perfect; our son occasionally has erratic brainwave patterns indicative of abnormal brain activity. He also has times when it is hard for him to focus and times when he gets angry that appear to be related to his epilepsy. But compared to where he was only a few short years ago, his (and our) lives are much better because of neurofeedback.

## What is neurofeedback?

Neurofeedback (also known as EEG biofeedback) can be used as a treatment modality for epilepsy. People put electrodes on their heads and “play” computer games using their brainwaves to control

the games. Players earn points when their brainwave patterns are normal. By practicing and reinforcing normal brainwave patterns, people learn to generate and maintain normal patterns and prevent seizures even when they are not playing.

### What proof is there that neurofeedback works?

Over 30 years ago, researchers found that operant conditioning on EEG frequency distributions effected significant behavior alterations in cats. Researchers found that the cats that had been trained via neurofeedback had reduced susceptibility to chemically-induced seizures. There was little basis for understanding these startling results at the time. Since then, it has emerged that rhythmicity may be a general property of brain self-regulatory activity, and that operant conditioning on such rhythmic properties can significantly reduce seizure rates in patients with epilepsy.

Sterman[8] wrote a review of neurofeedback studies published in scientific journals. Results showed that neurofeedback caused clinically significant improvement for 82% of epilepsy patients studied. These promising results led to larger studies comparing neurofeedback to other treatments including new medications, behavioral interventions, and relaxation training. Tan and colleagues (2009) conducted a meta-analysis of all EEG biofeedback/neurofeedback studies published between 1970 and 2005. Results confirmed that EEG biofeedback produces a significant reduction in seizure frequency. This finding is especially noteworthy because the patients included in the studies reviewed were people with intractable epilepsy who had been unable to control their seizures with medical treatment.

### For whom is neurofeedback effective?

Effectiveness of neurofeedback does not depend on sex, age, education, seizure history, seizure rate, or medication. Patients who benefit most have been found to be those who have high emotional reactivity in situations of social stress. Patients who benefit least have epilepsy with a left temporal lobe focus. Nevertheless, approximately 1/3 of patients with left temporal lobe focus benefit from neurofeedback training. Further research is needed to help identify those patients who can gain the most from neurofeedback.

Outside of the epilepsy research domain, a number of elite performers use neurofeedback as a way to improve focus, mood, and sport or musical performance. For example, neurofeedback is one of the interventions available to athletes at the United States Military Academy through the Center for Enhanced Performance. Neurofeedback has also been used to treat anxiety, depression, and ADHD.

### Why isn't neurofeedback more widely used?

It is possible that neurofeedback's status as a non-traditional approach and the fact that large pharmaceutical companies do not reap profits from neurofeedback has affected the rate at which it is prescribed by neurologists. We think that if there were a drug available for epilepsy with a similar success rate and lack of harmful side effects, then it would be the first treatment drug of choice.

### What are the drawbacks of using neurofeedback?

Using neurofeedback is more time consuming than ingesting medication. It also takes about 10-20 sessions to have an effect. Aside from these minor drawbacks, the benefits of neurofeedback are effective treatment and an absence of harmful side effects[1-11].

### Conclusion

The epilepsy situation with our son still has its ups and downs. He occasionally has behavioral outbursts, which we believe are related to brainwave problems. Things are much better, but they are not perfect. We continue to help our son deal with epilepsy. After seeing the effectiveness of neurofeedback for our family, we bought a neurofeedback training set-up and used it at home. Our son did over 3000 sessions of neurofeedback and trained daily until he was 16. After so many sessions, neurofeedback became pretty boring for him, so we are confident that he continued with the treatment because it worked.

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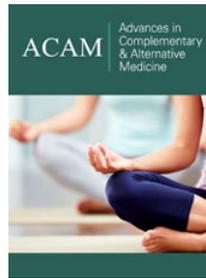
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