Neurofeedback with anxiety and affective disorders

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Neurofeedback with Anxiety and Affective Disorders

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(This article has been lightly edited by David Dubin, MD to make it more accessible to a general public.)

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Compelling evidence exists for a neurophysiologic basis for obsessive-compulsive disorder (OCD). There is also strong research evidence also indicates that there are functional brain abnormalities associated with anxiety and panic disorder [28–30] and post- traumatic stress disorder (PTSD) [31].

There is a strong reliance in psychiatry on the use of medication for the treatment of depression and anxiety, although some evidence currently suggests that medication may not be as effective in treating these conditions as has often been believed [44–48].

Similarly, Greist [49] estimated the degree of symptomatic improvement in OCD from treatment with serotonin drugs to only be 30%. Goodman et al [44] similarly found that symptom amelioration in OCD treatment with serotonin uptake inhibitors is approximately 35% on average and that only 50% of patients experience this partial improvement.

In light of this brief review and the fact that an increasing number of patients and parents seem interested in non- medication treatment alternatives that still address the underlying biologic factors associated with depression, anxiety, and obsessive compulsive disorder (OCD), it would be desirable to find a treatment that also would help address the biologic aspects of mental health disorders. Neurofeedback holds promise for offering such an alternative.

What is neurofeedback?

Neurofeedback is EEG biofeedback or brain wave training. Nothing intrusive is introduced into the brain. The sensors simply measure the ongoing brain wave activity.

Ordinarily we are unable to reliably influence our brain wave activity because we lack awareness of it. When we are able to see representations of our brain wave activity on a computer screen a few thousandths of a second after it occurs, however, it allows us to modify our brain wave patterns through operant

conditioning.

The patient is placed in front of a computer screen. The computer display may be as complex as a computer/video game type of display. It also may be as simple as two bar graphs, one representing slow and inefficient brain wave activity and the other representing efficient, beta brain wave activity. The patient concentrates on the screen. When the inappropriate activity decreases slightly and the appropriate activity increases slightly, a pleasant tone might be heard.

At first, changes in brain wave activity are transient. As sessions are repeated, enduring changes are gradually seen.

EEG biofeedback (neurofeedback) has been found to be effective in modifying brain function and producing significant improvements in clinical symptoms in children, adolescents, and adults who have several different biologic brain disorders.

These conditions include epilepsy, attention deficit disorder and attention deficit hyperactivity disorder (ADHD), and learning disabilities and have included up to 10-year follow-ups of patients [57].

Neurofeedback for anxiety

A review of the literature on the neurofeedback treatment of anxiety disorders by Moore [58] identify eight studies of generalized anxiety disorder.

The best studies of neurofeedback with anxiety were three outcome studies [59] with phobic (test) anxiety. In each study, the group that received alpha EEG enhancement training demonstrated significant reductions in test anxiety. In comparison, the untreated control group and the relaxation training group experienced no significant reduction.

In another study, with alpha training the anxiety scores dropped significantly compared with a non-treatment group. Moore [58] concluded in his review that a placebo effect was present in these neurofeedback studies but that alpha and theta enhancement training provided additional effects beyond placebo and are effective treatments for anxiety disorders.

Passini et al [70] used 10 hours of alpha neurofeedback training, comparing 25 anxious patients (23 of whom were alcoholics) with a control group of 25 anxious patients (22 of whom were also alcoholics), most of whom were seeking treatment at a Veterans Administration hospital brief treatment unit. The alpha neurofeedback training produced significant changes in state and trait anxiety compared with controls.

An 18-month follow-up of those patients was published, with virtually identical

results of lower anxiety still found, which validated that the anxiety changes from alpha neurofeedback were enduring [71].

Two neurofeedback outcome studies have focused on chronic PTSD. In a randomized, controlled group study [73], 30 30-minute sessions of alpha-theta EEG biofeedback training were added to the traditional Veterans Administration hospital treatment that was provided to a group of 15 Vietnam combat veterans with PTSD. The study compared them after treatment and at follow-up with a contrast group of 14 veterans who only received traditional treatment.

In addition to the posttreatment testing, on a monthly basis, patients and informers were contacted for a full 30-month follow-up period to determine if there had been PTSD symptoms (eg, flashbacks, nightmares, anxiety attacks, depression).

At follow-up, all 14 traditional treatment patients had experienced relapse, whereas only 3 of 15 neurofeedback training patients had experienced relapse.

All 14 patients who were treated with neurofeedback had decreased their medication requirements at follow-up, whereas in contrast, only 1 traditional treatment patient had decreased medication needs, 2 reported no change, and 10 required more medications.

Neurofeedback training patients improved significantly on all ten MMPI clinical scales—in many in- stances dramatically—but there were no significant improvements on any scales in the traditional treatment group.

In another Veterans Administration hospital uncontrolled study [74], 20 Vietnam veterans with chronic PTSD, all with alcohol abuse, were randomly selected. All patients showed frequent (eg, two to three times per week) episodes of PTSD and had been hospitalized for PTSD an average of five times.

They were treated with 30 30-minute sessions of alpha- theta neurofeedback training. Follow-up interviews occurred with the patients and their wives or family members on a monthly basis for 26 months. In that time, only 4 of the 20 patients reported a few (one to three) instances of recurrence of nightmares or flashbacks, and the other 16 patients had no recurrence of PTSD symptoms.

Neurofeedback for depression

Although reports to date on the application of neurofeedback to depression only represent uncontrolled case reports, they provide encouragement that neurofeedback may hold potential for treating mildly to severely depressed patients and that unlike medication, it may enduringly modify the functional brain abnormality associated with biologic predisposition to depression.

Clinical experience and further case examples

Based on clinical experience with more than 25 patients with dysthymia, in which most of them have been followed for between 6 and 24 months, neurofeedback has seemed to be successful in producing significant and enduring change in approximately 80% of the patients. There have been no published research or clinical reports on the use of neurofeedback in a pediatric depression sample. Because the biologic marker of a frontal alpha asymmetry has been found in multiple studies with children and infants [38–41] of depressed mothers, and because there is abundant evidence that children respond to neurofeedback training for other conditions, it is reasonable to expect that this approach would be beneficial with depressed children.

There are widespread clinical reports of improvements in mood among children treated with neurofeedback for ADHD, which further supports the expectation that neurofeedback may be effective with childhood depression. There also are reports of improvements in bipolar disorder.

Neurofeedback seems to involve minimal risk of side effects or adverse reactions [84], and it is less invasive than antidepressant medication or transcranial magnetic stimulation.

Anxiety and insomnia

In most cases, anxiety and insomnia are readily treated with neurofeedback [58,59,85–88]. One of the first improvements that parents often notice is that the child falls asleep more easily and remains asleep. With anxiety patients, neurofeedback training often is done eyes closed while listening to auditory feedback, and in a sense it resembles high-technologic meditation training.

As a case example, a patient was referred by a physician who was a headache specialist, indicating that everything that could be done with medication seemed to have been done. The patient had a lengthy history of several migraines weekly, which had progressed to daily migraines. She had been given a self-hypnosis tape to use for anxiety management, but she complained that her mind was so busy that she was unable to obtain much relaxation from the tape. After 20 30-minute sessions of inhibiting fast beta and reinforcing alpha activity in the parietal area, she was off all her prescription medications. She sensed a migraine trying to begin approximately twice weekly but would take over-the-counter medication and could use the self-hypnosis tape successfully to abort the headache. She felt more relaxed in general and reported no longer feeling compelled to do two things at once.

Summary

As reviewed in other articles, the neuroscience technology known as EEG biofeedback (or neurofeedback) has considerable research support in areas such as uncontrolled epilepsy and attention deficit disorder and ADHD. In evaluating the studies in the overall broad area of the neurofeedback treatment of anxiety disorders, EEG biofeedback qualifies for the evidence-based designation of being an efficacious treatment [62]. When separate anxiety disorders are individually evaluated, the areas of phobic anxiety, generalized anxiety, and PTSD each qualify for designation as being a probably efficacious treatment.

Currently there are only reports of cases and series of cases on the treatment of depression and OCD and no published reports thus far on treatment of bipolar disorder. Despite the lengthy follow-ups and use of objective measures, neurofeedback treatment for depression and OCD is not yet empirically supported. EEG biofeedback is an exciting, cutting-edge technology that offers an additional treatment alternative for modifying dysfunctional, biologic brain patterns that are associated with various psychiatric conditions.

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