Regence

Medical Policy Manual Medicine, Policy No. 65

Neurofeedback

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Next Review: September 2025
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IMPORTANT REMINDER

Medical Policies are developed to provide guidance for members and providers regarding coverage in accordance with contract terms. Benefit determinations are based in all cases on the applicable contract language. To the extent there may be any conflict between the Medical Policy and contract language, the contract language takes precedence.

PLEASE NOTE: Contracts exclude from coverage, among other things, services or procedures that are considered investigational or cosmetic. Providers may bill members for services or procedures that are considered investigational or cosmetic. Providers are encouraged to inform members before rendering such services that the members are likely to be financially responsible for the cost of these services.

DESCRIPTION

Neurofeedback describes techniques for providing feedback about neuronal activity, as measured by electroencephalogram biofeedback, functional magnetic resonance imaging, or near-infrared spectroscopy, to teach patients to self-regulate brain activity. Neurofeedback may use several techniques in an attempt to normalize unusual patterns of brain function in patients with various psychiatric and central nervous system disorders.

MEDICAL POLICY CRITERIA

The use of neurofeedback as a treatment for any disorder is considered **investigational**.

NOTE: A summary of the supporting rationale for the policy criteria is at the end of the policy.

CROSS REFERENCES

1. Biofeedback, Allied Health, Policy No. 32
2. Sphenopalatine Ganglion Block for Headache and Pain, Medicine, Policy No. 160

BACKGROUND

Behavioral (non-drug) treatments, including neurofeedback, result in both nonspecific and

specific therapeutic effects. Nonspecific effects, sometimes called placebo effects, occur as a result of therapist contact, positive expectancies on the part of the patient and therapist, and other beneficial effects that occur as a result of being a patient in a therapeutic environment. Specific effects are those that occur only because of the active treatment, above any nonspecific effects that may be present.

In order to isolate the independent contribution of neurofeedback on health outcomes (specific effects) and properly control for nonspecific treatment effects, well-designed clinical trials with the following attributes are necessary:

- Randomization helps to achieve equal distribution of individual differences by randomly assigning patients to either neurofeedback or sham treatment groups. This promotes the equal distribution of patient characteristics across the two study groups. Consequently, any observed differences in the outcome may, with reasonable assuredness, be attributed to the treatment under investigation.
- A comparable sham control group helps control for placebo effects as well as for the variable natural history of the condition being treated.
- Blinding of study participants, caregivers, and investigators to the active or sham assignments helps control for bias for or against the treatment. Blinding assures that placebo effects do not get interpreted as true treatment effects.
- A large study population is needed to ensure the ability to rule out chance as an explanation of study findings.
- Follow-up periods must be long enough to determine the durability of any treatment effects.

REGULATORY STATUS

Several electroencephalogram (EEG) feedback systems (EEG hardware and computer software programs) have been cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process. For example, the BrainMaster™ 2E (BrainMaster Technologies) is "…indicated for relaxation training using alpha EEG Biofeedback. In the protocol for relaxation, BrainMaster™ provides a visual and/or auditory signal that corresponds to the patient's increase in alpha activity as an indicator of achieving a state of relaxation." Although devices used during neurofeedback may be subject to FDA regulation, the process of neurofeedback itself is a procedure, and, therefore, not subject to FDA approval. FDA product codes: HCC, GWQ.

EVIDENCE SUMMARY

ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)

Systematic Reviews

Louthrenoo (2022) published a systematic review (SR) with meta-analysis on the potential effects of neurofeedback to improve functional outcomes in people with Attention Deficit/Hyperactivity Disorder (ADHD).[1] The review focused on randomized controlled studies of children and adolescents aged 5 to 18 years. Data from 10 studies (n=383) were included in the review. Participants received 18 to 40 sessions of neurofeedback across 3 to 25 weeks. No significant effect of neurofeedback on response inhibition, sustained attention, or working memory domains was found. Meta-regression revealed a trend-level association between

response inhibition and number of neurofeedback sessions (p=0.06). Limitations to existing data are noted as small sample sizes and lack of appropriate control.

Lee (2022) published a SR with meta-analysis focusing on theta/beta-based neurofeedback (T/B NF) training in children and adolescents aged 6 to18 with ADHD. Nineteen studies (13 RCTs and 6 non-RCTs) met selection criteria for systematic review (n=1059), 12 of which (7 RCTs and 5 non-RCTs) were included in the meta-analysis. Methodological quality of the RCTs ranged from 4 to 10 on the PEDro scale, indicating fair-to-excellent quality. Risk of bias assessment of the RCTs found four had an overall low risk of bias, seven had some concern of bias, and two had high risk of bias. Within-group effects on attention were medium at post-treatment (pooled Hedge's g=0.65) and large at follow-up (pooled Hedge's g=0.87). Between-group analyses revealed neurofeedback had a larger effect than no treatment, waitlist control, physical activities, and sham neurofeedback, however, the effect of neurofeedback was not superior to stimulant medication (Hedge's g=-0.25).

Riesco-Matias (2021) published a SR of RCTs of neurofeedback applied to children with ADHD.[2] The review included 17 trials (16 RCTs) of neurofeedback compared to active and nonactive controls in children and adolescents with a primary diagnosis of ADHD. The study designs were unblinded evaluation in 11 trials (n=674) and blinded evaluation in nine trials (n=573). RCTs were found to support the efficacy of neurofeedback to improve inattention symptoms when blinded evaluators assess symptoms. The meta-analysis also found results suggesting stimulant medication is more effective than neurofeedback. Additional RCT data are needed to evaluate symptom measurement and longer-term outcomes.

A SR published by Sampedro Baena (2021) evaluated nine RCTs comparing neurofeedback to control or other interventions in 620 children and adolescents with ADHD.[3] This was a qualitative review of trials; no pooled analysis was conducted. Comparing neurofeedback to methylphenidate (MPH) treatment, teachers reported significantly lower ADHD symptoms in the MPH group, but there were no differences between groups in parental report. Combined treatment of neurofeedback and MPH improved ADHD symptoms (p=0.01), which was more effective compared to single medication treatment in one study. Mixed outcomes were found on the superiority of neurofeedback or medication with respect to attention, hyperactivity, impulsivity, and visual attention capacity. Small trial sample size, variability in the duration of the intervention and limited longer-term outcomes are noted limitations across trials.

Lambez (2020) published a SR with meta-analysis of the effectiveness of non-pharmacological interventions for in ADHD, with a specific focus on objective cognitive outcomes.[4] A total of 18 RCTs (n=618) were included in the analyses. Interventions were categorized into neurofeedback, cognitive-behavioral therapy, cognitive training, and physical exercises. Among these interventions, physical exercises had the highest average effect size (Morris d=0.93). Across trials, a homogenous, medium to large effect size of improvement across interventions was found, with inhibition having the largest average effect size (Morris d=0.685, standardized mean difference (SMD), 0.61 [-3.77 to 4.82], I^2 (p)=0% [<0.05]). Six trials (n=203) evaluated the domain of inhibition.

A SR with meta-analysis by Van Doren (2019) sustainability of neurofeedback and control treatment effects in RCTs which included neurofeedback or control treatment in children and adolescents with ADHD.[5] The analysis included data from ten studies on neurofeedback (n=256) and nine studies with control data (n=250). Parent behavior ratings were calculated and analyzed. Within-group neurofeedback effects on inattention were of medium in size (ES)

(SMD=0.64) at post-treatment and increased to a large effect size (SMD=0.80) at follow-up (range 2 to 12 months). For hyperactivity/impulsivity, effect sizes for neurofeedback were medium at post-treatment (SMD=0.50) and follow-up (SMD=0.61). Non-active control conditions yielded small significant effects on inattention at post-treatment (SMD=0.28) but no significant effects at follow-up. Active treatments (mainly methylphenidate) had large effects for inattention (post: SMD=1.08; follow-up: SMD=1.06) and medium effects for hyperactivity/impulsivity (post: SMD=0.74; follow-up: SMD=0.67). Between-group analyses favored neurofeedback over non-active controls [inattention (post: SMD=0.38; follow-up: SMD = 0.57); hyperactivity/impulsivity (post: SMD=0.25; follow-up: SMD=0.39)] and favored active controls for inattention only at pre-post (SMD=- 0.44). The authors note limitations in existing data including challenges in blinding the intervention and limited data on longer-term follow-up.

Yan (2019) published a SR with meta-analysis comparing neurofeedback and pharmacological treatment with methylphenidate (MPH) for the treatment of ADHD.[6] The analysis included data from 18 RCTs were included (778 individuals with ADHD in the neurofeedback arm and 757 in the MPH group, respectively) with follow-up ranging from one to six months. MPH was significantly more effective than neurofeedback on ADHD core symptoms (ADHD symptoms combined: SMD=-0.578, 95% confidence interval [CI] (-1.063 to -0.092)) and on neuropsychological parameters of inattention: -0.959 (-1.711 to -0.208) and inhibition: -0.469 (-0.872 to -0.066). Study attrition, however, was significantly lower in neurofeedback than MPH (odds ratio [OR]=0.412, 0.186 to 0.913). Removing Chinese studies and non-funded studies from the analysis resulted in no differences between MPH and neurofeedback. Treatment-specific outcomes at study follow-up were mixed, with no significant difference in neuropsychological measures between groups, teachers' evaluation favoring MPH in total score and HI (Hyperactivity/Impulsivity), but parents' evaluation favoring neurofeedback. Heterogeneity in drug dosing, feedback protocols, and outcome rating scales was noted as limiting. High risk of bias was found for allocation concealment and blinding of participants/personnel in all studies.

Catalá-López (2017) published a SR comparing pharmacological, psychological and alternative medicine treatments for ADHD, one of which was neurofeedback.[7] There was lack of methodologically sound evidence to support neurofeedback and results should be interpreted cautiously. In addition, the authors stated the balance between benefits, costs, and harm should be weighed when selecting therapies for ADHD.

Cortese (2016) published a SR evaluating RCT outcomes on the efficacy of neurofeedback, for attention deficit/hyperactivity disorder.[8] 13 RCTs, with 520 participants were included. Neurofeedback was not found to be an effective treatment for ADHD.

Micoulaud-Franchi (2014) published an updated SR with meta-analysis of RCTs published through August 2014.[9] Five studies[10-14] (n=263) that compared standard neurofeedback with either a semi-active or sham neurofeedback control group in children with ADHD met inclusion criteria. Parent assessment reported significant improvement in all scores with neurofeedback compared to controls; however, the authors noted that the parents were probably not blinded to the treatment assignments. In blinded teacher assessment, significant improvement with neurofeedback compared to controls was reported only in inattention scores. No significant effect was found for overall ADHD scores or hyperactivity/impulsivity scores. The methodological strengths of this meta-analysis were noted to be the stringent inclusion criteria and the inclusion of inattention and hyperactivity/impulsivity scores in addition to overall ADHD scores. The principal limitations included the small number of studies, the small number of

subjects enrolled in the individual studies, and the heterogeneous methodological protocols between studies. The authors also noted the inclusion of studies with somewhat non-standard protocols[10, 11] such as the use by Maruizio[11] of tomographic neurofeedback that is rarely used in the clinical setting, as well as the exclusion of a study[15] that was not based on the basic learning theory used in standard neurofeedback protocol. The authors concluded that the studies included in their meta-analysis reported efficacy of neurofeedback only for the inattention dimension of ADHD and recommended additional studies in which parents and teachers are blinded to the treatment assignments.

Randomized Controlled Trials

Purper-Ouakil (2022) published the results of the NEWROFEED trial, a prospective multicenter RCT of personalized at-home neurofeedback training versus methylphenidate in children aged 7 to 13 years with ADHD.[16] The trial randomized participants from nine study sites across five European countries to the neurofeedback and methylphenidate groups in a 3:2 ratio; the neurofeedback group (n=111) underwent eight visits and two treatment phases of 16 to 20 at-home sessions and the control group (n=67) received optimally titrated long-acting methylphenidate. Data from a total of 149 participants were included in the per-protocol analysis. Reduction in the Clinician ADHD-RS-IV total score was found between baseline and final visit for both groups, with 26.7% (SMD=0.89) in the neurofeedback and 46.9% (SMD = 2.03) in the control group. Noninferiority of neurofeedback versus methylphenidate was not demonstrated (mean between-group difference 8.09 90% CI [8.09; 10.56]). Study limitations include absence of sham neurofeedback or another nonactive group and lack of mid- or long-term follow-up.

Hasslinger (2022) published the results of a multi-arm RCT in 202 children and adolescents (age 9 to 17 years) with ADHD that evaluated two neurofeedback treatments (slow cortical potential [SCP, standard neurofeedback protocol] and Live Z-score (LZS, nonstandard neurofeedback protocol) compared to working memory training (WMT, active comparator) and treatment as usual (passive comparator).[17] The active conditions (SCP/LZS/WMT) consisted of daily working week sessions (five sessions/week) during five consecutive weeks (25 sessions in total). The prespecified primary outcome measure was the self-, teacher- and parent-reported assessment of ADHD symptoms post-treatment and at six months using the Conners 3rd Edition scale. Neither neurofeedback treatment was superior to working-memory training for these outcome measures. Significant differences between SCP and treatment as usual were observed post-treatment for teacher- and parent-rated inattention, with no difference for other outcome measures at either timepoint. A statistically significant difference in Live Z-score over treatment as usual was only observed at the six-month endpoint for teacher-rated inattention and hyperactivity/impulsivity. No other differences between Live Z-score and treatment as usual were observed. Secondary outcomes in this study included measures of teacher- and parent-rated executive function and self-assessed health-related quality of life using the Behavior Rating of Executive Functions (BRIEF) and KIDSCREEN-27 scales, respectively. There were no consistent differences between neurofeedback interventions and control interventions for these outcomes except for teacher-assessed executive function at six months follow-up, which found both neurofeedback interventions superior to working-memory training and treatment as usual. Limitations in the study include lack of blinding of parents of, presence of missing data, limited measures of functioning and impairment, and patients being drawn from a single site.

Arnold (2021) published the 13-month outcomes of a two-site double-blind RCT in 144 children with moderate to severe ADHD randomized to neurofeedback and sham control.[18] Both groups showed significant improvement ($p<0.001$, $d=1.5$) in parent/teacher-rated inattention from baseline to treatment end and 13-month follow-up and neurofeedback was not significantly superior to the control condition at either time point on this primary outcome ($d=0.01$, $p=0.965$ at treatment end; $d=0.23$, $p=0.412$ at 13-month follow-up). No significant difference in responder rate, defined as Clinical Global Impression-Improvement [CGI-I] = 1-2 was found between groups. At 13-month follow-up, a nonsignificant improvement from treatment end for was found for neurofeedback (d 0.1) and a mild deterioration was found for controls ($d=-0.07$). Neurofeedback participants required significantly less medication at follow-up ($p=0.012$). Longer-term (25-month) follow-up data are anticipated.

Aggensteiner (2019) published the six-month outcomes of a multisite RCT of slow cortical potential (SCP)-neurofeedback or electromyogram biofeedback (EMG-BF) in the treatment of ADHD in 144 children age 7 to 9.[19] Participants were not blinded to study condition. Both groups showed improvement of ADHD symptoms compared to baseline at six-months follow-up with large effect sizes for SCP-NF ($d=1.04$) and EMG-BF ($d=0.85$). No between-group differences were found. A group-by-time interaction was found with SCP-NF showing stable improvement following treatment up to six months, but EMG-BF showing a relapse from post-test timepoint one to post-test timepoint two, and subsequent remission at follow-up ($p<0.05$). Power estimates were not reported.

Lim (2019) published a RCT of 172 participants age 6 to 12 years old diagnosed with ADHD not receiving concurrent pharmacotherapy or behavioral intervention from a single site in Singapore.[20] The participants were randomized to eight weeks of neurofeedback attention training or untreated waitlist control for eight weeks followed by neurofeedback attention training for 20 weeks. Modified intention to treat analyzes conducted on 163 participants with at least one follow-up rating. At eight weeks, clinician-rated inattentive symptoms (ADHD-Rating Scale. ADHD-RS) was reduced by 3.5 (SD 3.97) in the intervention group compared to 1.9 (SD 4.42) in the waitlist-control group, which was a difference of 1.6; 95% CI 0.3 to 2.9 $p=0.018$). Patients, parents, and investigators were unblinded.

Lee and Jung (2017) published a small RCT that compared neurofeedback with medication to medication alone in 36 children 6 to12 years of age, with ADHD.[21] Neurofeedback consisted of 20 sessions. Outcome measures (cognitive performance scores, ADHD rating scores completed by parents, and brain indices) pre- post-treatment occurred. Neurofeedback patients had improved symptom variables and reduced theta waves, but no additional intelligent functioning when compared to patients on medication management alone. Although the authors stated neurofeedback can be considered a possible effective treatment option for ADHD, this study was limited in size. Larger RCTs, with longer follow-up times are needed.

In addition to the initial report from the RCT by Steiner[12] included in the meta-analyses above, a secondary analysis[22] was also reported. This article was excluded from the meta-analysis in order to ensure that patients were not included more than once. In this RCT,104 children with ADHD age 7 to 11 years were randomized to receive neurofeedback, cognitive training, or a no-intervention control condition in their elementary school. Both the neurofeedback and cognitive therapies were administered with commercially available computer programs (45-min sessions three times per week), monitored by a trained research assistant. The neurofeedback EEG sensor was embedded in a standard bicycle helmet with the grounding and reference sensors located on the chin straps on the mastoids. No data was presented on the technical

performance of this system. There were some differences in baseline measures between the groups, although these differences were not large. The slope of the change in scores over time was compared between groups. Children in the neurofeedback group showed a small improvement on the Conners 3-Parent Assessment Report (effect size [ES] = 0.34 for inattention, ES=0.25 for executive functioning, ES = 0.23 for hyperactivity/impulsivity) and subscales of the Behavior Rating Inventory of Executive Function Parent Form (BRIEF global executive composite, ES=0.23) when compared with baseline. Interpretation of these findings is limited by the use of a no-intervention control group and lack of parental blinding. Evaluator-blinded classroom observation (Behavioral Observation of Students in Schools) found no sustained change with a linear growth model but a significant improvement with a quadratic model. No between-group difference in change in medication was observed at the six-month follow-up.

In 2012, Duric reported a comparative study of neurofeedback versus methylphenidate in 91 children with ADHD.[23] The children were randomized into three groups, consisting of 30 sessions of neurofeedback, methylphenidate, or a combination of neurofeedback and methylphenidate. The neurofeedback sessions focused on the theta/beta ratio. Parental evaluations found improvements in ADHD core symptoms for all three groups, with no significant differences between groups. Alternative reasons for improvement with neurofeedback include the amount of time spent with the therapist and cognitive-behavioral training introduced under neurofeedback. In a 2014 publication of self-reports from this study, there was no improvement in attention, hyperactivity, or school achievement when adjusted for age and sex.[24] Only the neurofeedback group showed a significant improvement in self-reported school performance.

Nonrandomized Studies

Additional studies have compared neurofeedback to medication (stimulant) and/or behavioral therapy in patients with ADHD.[25-27] In these nonrandomized studies, patients in both groups reported improvements in various measures of attention; however, nonrandomized studies limit the ability to reach scientific conclusions concerning the efficacy of neurofeedback in the treatment of AD/HD due to the lack of design attributes described above.

Section Summary

Several systematic reviews and meta-analyses as well as additional moderately sized RCTs have compared neurofeedback with methylphenidate, biofeedback, cognitive behavioral therapy, cognitive training, or physical activity These studies found either small to moderate or no benefit of neurofeedback and sustained long-term benefit has not been consistently demonstrated. Studies using active controls have suggested that at least part of the effect of neurofeedback might be due to attention skills training, biofeedback, relaxation training, and/or other nonspecific effects. Two of the RCTs indicated that any beneficial effects were more likely to be reported by evaluators unblinded to treatment (parents), than by evaluators blinded (teachers) to treatment, which would suggest bias in the nonblinded evaluations. Moreover, a meta-analysis found no effect of neurofeedback on objective measures of attention and inhibition. Additional research with blinded evaluation of outcomes is needed to demonstrate the effect of neurofeedback on ADHD.

AUTISM SPECTRUM DISORDER

Systematic Reviews

Vasa (2014) published a SR that included studies of the safety and effectiveness of psychopharmacological and non-psychopharmacological treatments, including NF, for anxiety in children with autism spectrum disorder (ASD).[28] While neurofeedback showed a possible benefit, studies were small and short-term; outcomes must be verified in large RCTs with adequate blinding and appropriate controls.

Frye (2013) conducted a SR on the treatment of seizures in patients with autism spectrum disorder.[29] Studies were selected systematically from major electronic databases and then reviewed by a panel of ASD treatment experts. Authors concluded there was limited evidence to support the use of neurofeedback in patients with seizures associated with ASD.

In a 2009 single-author SR of novel and emerging treatments for ASD, neurofeedback received a grade C recommendation (Grade C recommendation: supported by one nonrandomized controlled trial).[30] The author reviewed literature in the PubMed and Google Scholar databases for clinical trial reports on numerous biological (e.g., nutritional supplements, special diets, medications) and nonbiological (e.g., neurofeedback, massage) treatments. Due to the extensive amount of literature, a critical analysis of the quality of the studies was not included. The study referenced for neurofeedback was a nonrandomized pilot study that included 12 children with ASD who received neurofeedback and an untreated control group of 12 children who were matched by sex, age, and disorder severity.[31] The study found a greater reduction in ASD symptoms based on the Autism Treatment Evaluation Checklists (A TEC) and parental assessments in the group treated with neurofeedback compared with the control group. While this trial is useful in informing hypothesis formation, it does not permit conclusions on efficacy due to the lack of randomized treatment allocation, small patient population, lack of a sham control group, and short-term follow-up period. Randomized sham-controlled trials in larger numbers of patients are required to validate these findings due to the possibility of nonspecific effects (e.g., attention training) and confounding variables (e.g., parental engagement and expectation).

Randomized Controlled Trials

Kouijzer (2013) performed a small RCT to evaluate the effects of EEG-neurofeedback in ASD.[32] Thirty-eight participants were randomly allocated to the EEG-biofeedback (n=13), skin conductance (SC)-biofeedback (n=12) or waiting list (sham control) group (n=13). At six months follow up, 54% of the patients in the EEG-biofeedback group were able to influence their own EEG activity, with significantly reduced delta and/or theta power during EEG-biofeedback sessions. However, within this group no statistically significant reductions of symptoms of ASD were observed, but they did show significant improvement in cognitive flexibility as compared to participants who managed to regulate SC. Overall, the EEG- and SC-biofeedback groups, regardless of whether they could regulate their own activity, showed no improvement in clinical symptoms of ASD.

COGNITIVE PERFORMANCE

Systematic Reviews

Renton (2017) published a SR evaluating the impact of neurofeedback therapy on cognitive rehabilitation for stroke patients.[33] Eight studies met inclusion criteria. The authors stated although cognitive benefits were found with neurofeedback, the studies had methodological limitations. Additional studies should attempt to standardize neurofeedback protocols, so that the relationship between neurofeedback and improved health outcomes can be understood.

Emmert (2016) published a review evaluating twelve studies that examined nine different target regions in the brain, for 175 subjects.[34] The studies showed real-time functional magnetic resonance imaging (fMRI) activates regions of the regulation network in the brain, but the authors stated it was unclear why and could have been related to successful regulation versus the regulation process. More studies are needed to determine if neurofeedback can impact the regulation network.

Randomized Controlled Trials

In a three arm, assessor-blinded RCT, Chen (2023) tested the effects of low-resolution tomography Z-score neurofeedback and theta/beta neurofeedback on cognitive impairment, return to productive activity, and quality of life in patients with traumatic brain injury.[35] Patients 20 to 65 years old received weekly one hour training sessions of six pre-designed animated games, ten minutes each, with a five to ten minute break between games. Training sessions occurred over 10-weeks. Participants were randomized to receive low-resolution tomography Z-score neurofeedback (n=29), theta/beta neurofeedback (n=31), or standard care for traumatic brain injury (n=27). Cognitive performance was assessed using the Ruff2 and 7 Test, Rey Complex Figure Test, and the Symbol Digit Modalities Test. The low-resolution Z-score neurofeedback group exhibited significantly greater improvements in immediate recall, delayed recall, recognition memory, and selective attention compared to the control group, while the theta/beta group exhibited improvements in immediate memory and selective attention only ($p<0.05$). This study is limited by lack of participant blinding, lack of a sham or placebo group and small sample size.

De Ruiter (2016) published a double-blinded placebo-controlled RCT that evaluated the impact of neurofeedback on neurocognitive function, for pediatric brain tumor survivors (PBTS).[36] Patients age 8 to 18 years old were given 30 sessions (two/week) of neurofeedback (n=40) or placebo feedback (n=40). An assessment was performed six months after the sessions ended. The authors stated neither neurofeedback nor placebo feedback was superior.

One small (n=6) quasi-randomized, double-blind pilot study was identified that examined whether increasing peak alpha frequency would improve cognitive performance in older adults (70 to 78 years of age).[37] Control subjects were trained to increase alpha amplitude or shown playback of one of the experimental subject's sessions. Compared to controls, the experimental group showed improvements in speed of processing for two of three cognitive tasks (Stroop, Go/No-Go) and executive function in two tasks (Go/No-Go, n-back); other functional measures, such as memory, were decreased relative to controls.

EPILEPSY

Systematic Reviews

Tan (2009) published a SR that identified 63 studies on neurofeedback for treatment of epilepsy.[38] Ten of the 63 studies met inclusion criteria; nine of these studies included fewer than 10 subjects. The studies were published between 1974 and 2001 and utilized a pre-post design in patients with epilepsy refractory to medical treatment; only one controlled study was included. The meta-analysis showed a small effect size for treatment (-0.233), with a likelihood of publication bias based on funnel plot. Randomized placebo-controlled trials are needed to evaluate the effect of neurofeedback on seizure frequency in patients with epilepsy.

Randomized Controlled Trials

A RCT by Morales-Quezada (2019) randomized 44 children with focal epilepsy to sensorimotor rhythm (SMR) neurofeedback (n=15), slow cortical potentials (SCP) neurofeedback (n=16), or sham neurofeedback (n=13) for 25 sessions over five weeks.[39] Outcomes including the attention switching task (AST), Liverpool Seizure Severity Scale (LSSS), seizure frequency (SF), EEG power spectrum, and coherence were measured at baseline, postintervention, and at three-month follow-up. At the end of the intervention period, only the sensorimotor rhythm neurofeedback group demonstrated significant improvement in the activity switching task and all groups demonstrated significant improvements in quality of life ($p<0.05$).

FIBROMYALGIA

Systematic Reviews

In 2015 a Cochrane SR evaluated therapies for fibromyalgia, identifying five RCTs on biofeedback, including the Kayiran study described below, as well as four studies published prior to 2010.[40] There were two studies, both ranked with very low quality of evidence, which compared biofeedback versus usual care.[41] Neither of these studies found significant advantage of using biofeedback versus usual care for any of the major outcomes assessed, including self-reported physical functioning, pain, mood and overall quality of life. Both studies only assessed outcomes post-intervention, and only one reported three-month follow-up. No long-term follow-up was reported. There only one study, ranked with very low quality of evidence, which compared biofeedback versus attention control.[42] Although this study found significant differences between groups in terms of self-reported functioning and pain, the sample size was small (n=30) for each outcome, and the outcomes were only assessed post-intervention (no three- and six-month follow-up was reported). Overall, the review concluded that no advantage was observed for biofeedback in comparison to usual care controls and no studies reported any adverse events, however the quality of the evidence was so low that it is uncertain if there is any effect or not.

Randomized Controlled Trials

Kayiran (2010) reported a randomized single blind study of neurofeedback versus escitalopram in 40 patients with fibromyalgia.[43] Patients in the neurofeedback group were instructed to widen a river on a computer monitor which corresponded to increasing sensory motor activity and decreasing theta activity. Patients received five sessions per week for four weeks. The control group received escitalopram for eight weeks. Outcome measures at baseline and at weeks two, four, eight, 16, and 24 included visual analog scale (VAS) for pain, Hamilton and Beck Depression and Anxiety Inventory Scales, Fibromyalgia Impact Questionnaire and Short Form-36. Mean amplitudes of EEG rhythms and the theta/sensory motor rhythms were also measured in the neurofeedback group. At baseline, the control group scored higher on the Hamilton and Beck Anxiety Scales and the Hamilton Depression Scale; all other baseline measures were similar between groups. Both groups showed improvements over time, with significantly better results in the neurofeedback group. There were no changes over time in mean amplitudes of EEG rhythms and essentially no change in the theta/sensory motor rhythm ratio (reduced only at week four). This study is limited by the difference in intensity of treatment and contact with investigators between the neurofeedback and escitalopram groups. As previously noted, sham-controlled trials are needed when assessing the effect of neurofeedback on subjective outcome measures.

FOOD CRAVING OR BINGE EATING

Systematic Reviews

No SRs have been identified using neurofeedback for food craving.

Randomized Controlled Trials

Hilbert (2024) published a single-center assessor-blinded feasibility RCT of neurofeedback for the treatment of binge-eating disorder.[44] The study included 72 patients who were randomly assigned to receive either functional near-infrared spectroscopy-based real-time neurofeedback (rtfNIRS-NF), high-beta electroencephalography-based NF (EEG-NF), or waitlist (WL). The results showed that NF was feasible in terms of recruitment, attrition, adherence, compliance, acceptance, and assessment completion. However, the study found no significant difference in binge-eating frequency between the NF and WL groups post-treatment. The study showed that neurofeedback was superior to the waitlist control group in reducing food craving, anxiety symptoms, and body mass index, but the overall effects were mostly small, and brain activity changes were near zero. The authors concluded that while neurofeedback may be a feasible treatment for binge-eating disorder, additional studies with a double-blind randomized design long-term follow-up are needed to assess neurofeedback for the treatment of binge-eating disorder.

Blume (2022) published a RCT that evaluated efficacy of two EEG neurofeedback paradigms in the reduction of binge eating.[45] Participants were 18 to 60 years old and had full syndrome binge eating disorder or binge eating disorder of low frequency and/or limited duration, and body mass index greater than or equal to 25. Participants were randomized to either food cue-specific (n=20) or control, general neurofeedback (n=19) training and received 10, 1 hour EEG neurofeedback sessions. Sessions occurred approximately two times per week in the first four weeks and once per week during weeks five and six. Participants were assessed at each session by a trained psychologist using the Eating Disorder Examination interview and a series of questionnaires to assess eating disorder and determine the number of objective binge-eating episodes. A significant reduction in binge-eating episodes was observed in both groups posttreatment, and there was no significant difference in the magnitude of reduction between the two groups. This study is limited by small sample size, short-term outcomes, and lack of blinding.

Imperatori (2017) evaluated how EEG power spectra associated with alpha/theta (A/T) training reduces food craving.[46] 50 participants were randomly assigned to receive 10 sessions of either EEG power spectra associated with A/T training [neurofeedback group (NFG)] or to a control group. All participants were administered the same questionnaires, at the end of 10 sessions. The NFG showed a statistically significant reduction in desire to consume food, up to four months post-treatment. Although A/T training appeared to positively affect areas of the brain associated with food desires, the remaining study data was self-reported. Therefore, additional RCTs are needed to evaluate objective long-term outcomes.

Schmidt (2016) published a small RCT evaluating the efficacy of neurofeedback on female binge eating.[47] 75 subclinical threshold participants were assigned to EEG neurofeedback, mental imagery, or a waitlist group. The EEG neurofeedback group was the only one that had reduced binge eating, at a three-month follow-up. The authors stated EEG neurofeedback should be tested as a potential treatment option for binge eating.

MEDICATION OVERUSE HEADACHES

Systematic Reviews

No SRs have been identified using neurofeedback for medication overuse headaches.

Randomized Controlled Trials

Rausa (2016) evaluated the effectiveness of electromyographic (EMG) biofeedback, for medication overuse headache (MOH).[48] Twenty-seven participants were randomly assigned to receive EMG biofeedback with prophylactic pharmacological therapy (n=15) or to a control group that received pharmacological treatment alone (n=12). At the end nine weekly sessions and at four months post-study, participants who received EMG biofeedback had longer symptom free periods and statistically significant improved outcomes, but as the authors noted, additional larger RCTs are needed to validate these findings and determine the long-term effects.

MAJOR DEPRESSIVE DISORDER

Systematic Reviews

González Méndez (2022) conducted a SR and meta-analysis of the effect of real-time fMRI neurofeedback (rtfMRI-NF) on symptom reduction in patients with clinical depression.[49] 11 reports on four RCTs including journal articles, pre-print articles, trial registries, and poster and conference abstracts were analyzed. Most sources reported positive effects of rtfMRI-NF on depression symptoms, but the authors' meta-analysis yielded a non-significant effect immediately after neurofeedback treatments (SMD: -0.32 [95% CI -0.73 to 0.10]) and at follow-up (SMD: -0.33 [95% CI -0.91 to 1.25]). The authors concluded that effects of rtfMRI-NF training on depression symptoms are based on low certainty evidence and that more studies are necessary to evaluate quality of life, acceptability, adverse effects, cognitive tasks, and physiology measures.

Trambaiolli (2021) published a SR of neurofeedback studies employing electroencephalography or functional magnetic resonance-based protocols in patients with major depressive disorder (MDD).[50] There were 24 studies included in the review (n=480 patients in experimental and n=194 in the control groups). While symptom improvements were found in the experimental group compared to control, the authors note that study quality and reporting practices were not stringent. High-quality studies that are adequately powered and appropriately controlled are needed to determine the impact of the technology on health outcomes for people with major depressive disorder.

Randomized Controlled Trials

Young (2017) evaluated the impact rtfMRI-NF had on amygdala hemodynamic response, which the authors stated is blunted in patients with depression.[51] In a small double-blinded, placebo-controlled RCT, unmedicated adults received either two sessions of rtfMRI-NF from the amygdala (n=19) or from a parietal control region (n=17). Clinical scores and autobiographical memory performance evaluations took place at baseline and one week after the last rtfMRI-NF session. No additional follow-up was found. Even though the authors stated rtfMRI-NF increases the amygdala response to positive memories and that data suggests amygdala may play a role in depression recovery, this study was limited in size and larger RCTs with longer follow-up timeframes are needed.

MIGRAINE HEADACHES

Systematic Reviews

Miro (2016) performed a SR to evaluate the efficacy of neurofeedback, meditation, and hypnosis for chronic pain in young participants.[52] Only one RCT and one case series were evaluated for neurofeedback. The additional articles evaluated meditation (n=5) and hypnosis (n=8). Participants for neurofeedback ranged from 9 to 21 years of age. The authors concluded that the neurofeedback RCT showed no statistically significant differences in migraine intensity or treatment regime, for those receiving neurofeedback. The study had methodological limitations limiting the conclusions that can be drawn.

Randomized Controlled Trials

Walker reported quantitative EEG (QEEG) for the treatment of migraine headaches in a RCT of 46 patients.[53] Results were compared with 25 patients who chose not to do neurofeedback and continued anti-migraine drug therapy. Since baseline QEEG assessment in all 71 patients showed a greater amount of the high frequency beta band (21 to 30 Hz), the five neurofeedback sessions focused on increasing 10 Hz activity and decreasing 21 to 30 Hz targeted individually to brain areas where high frequency beta was abnormally increased. Patient diaries of headache frequency showed a reduction in migraines in a majority of patients in the QEEG group but not the drug therapy group. Fifty-four percent of the QEEG group reported complete cessation of migraines over one year, with an additional 39% reporting a greater than 50% reduction. In comparison, no patients in the drug therapy group reported a cessation of headaches, and 8% had a reduction in headache frequency of greater than 50%. Limitations of this study include the patient self-report of headache status through diary logs which may not be the most reliable measure of symptom improvement. Randomized sham-controlled trials are needed to adequately evaluate this treatment approach.

OBSESSIVE-COMPULSIVE DISORDER (OCD)

Systematic Reviews

No SRs have been identified using neurofeedback for OCD.

Randomized Controlled Trials

Deng (2014) reported the outcomes of a randomized comparison of sertraline and weekly cognitive behavioral therapy with (n=40) versus without (n=39) NF.[54] Treatment was considered effective after eight weeks of therapy in 86.5% and 62.9% of participants, respectively (p=0.021). The authors concluded additional studies are needed to determine the long-term effects of neurofeedback for OCD including the need for booster sessions after the initial training period.

Koprivova (2013) reported a double-blind randomized sham-controlled trial of independent component neurofeedback in 20 patients with obsessive-compulsive disorder.[55] Independent component neurofeedback is based on the individual diagnosis of pathological EEG sources and was directed at down-training of abnormally high activity. All patients were hospitalized and participated in a six-week standard treatment program that included cognitive-behavioral therapy and 25 neurofeedback or sham biofeedback sessions. The neurofeedback group showed greater reduction of compulsions compared to the sham group (56% vs. 21%). However, clinical improvement was not associated with a change in EEG. Larger, long-term RCTs are needed in order to assess the efficacy of neurofeedback treatment on patients with OCD.

POST TRAUMATIC STRESS DISORDER

Systematic Reviews

Voigt (2024) published a systematic review and meta-analysis of 17 RCTs of adults, adolescents, and children (n=628, ages 10 to 77) with PTSD treated with neurofeedback.[56] Three RCTs compared neurofeedback with yoked feedback, four compared neurofeedback to a waitlist control group that received neurofeedback after the trial, five RCTs compared neurofeedback to standard of care, two RCTs compared neurofeedback to no treatment, and one RCT compared neurofeedback to biofeedback, one RCT compared neurofeedback with relaxation, and one RCT compared neurofeedback to a sham control. Treatment duration ranged from 3 to 20 weeks. 10 studies were included in the meta-analysis. The meta-analysis found significant reductions in PTSD symptoms using various health instruments, including the Beck Depression Inventory (BDI), Clinician-Administered PTSD Scale (CAPS-5), and PTSD Checklist (PCL-5). The effect size of neurofeedback was found to be clinically meaningful, with an increased effect size at follow-up. Study quality was rated as moderate to high quality evidence. Limitations of this review include small sample size of included studies, heterogeneity among study designs and outcome measures, and many studies included short follow-up times.

Hong (2022) conducted a systematic review and meta-analysis of seven RCTs of adults with post-traumatic stress disorder (PTSD) treated with neurofeedback.[57] Three studies used fMRI-based neurofeedback, and four studies used EEG-based neurofeedback. Pooled analysis of studies demonstrated a significant improvement in PTSD symptoms with neurofeedback compared to sham neurofeedback, no treatment, or other treatment. When analyzed by type of neurofeedback, EEG-based neurofeedback significantly improved PTSD symptoms, but fMRI-based neurofeedback did not. Five studies assessed anxiety and depression with various validated scales. Overall, there was no significant impact on anxiety and depression with neurofeedback compared to control groups. Two studies demonstrated a high risk of performance or detection bias, while all other studies demonstrated overall low risk of bias.

A meta-analysis by Steingrimsson (2020) evaluated four RCTs of 123 adults with PTSD treated with neurofeedback.[58] Follow-up ranged from four weeks to 30 months. Compared with sham neurofeedback, no treatment or other treatment, neurofeedback was associated with significant improvement in PTSD symptoms. Other primary outcomes were only reported in one trial each, and the authors conclude there is uncertainty regarding the ability of neurofeedback to improve PTSD symptoms, self-rated suicidality, executive cognitive functioning, or medication use. All studies were at moderate to high risk for bias and were assessed as having some indirectness and imprecision.

Reiter (2016) published a SR that evaluated five studies to determine neurofeedback's effectiveness and which protocol is preferred for patients with PTSD.[59] Neurobiological changes were noted in three of the studies. However, the authors stated that even though there differences and methodological limitations amongst the studies, neurofeedback may be an effective treatment for PTSD.

Randomized Controlled Trials

Zhao (2023) evaluated the efficacy of real-time fMRI neurofeedback to control amygdala activity following trauma recall in a double-blind RCT.[60] Twenty-five participants with PTSD

completed three sessions of neurofeedback training in which they attempted to downregulate the feedback signal after exposure to personalized trauma scripts. The active treatment group received the feedback signal from a functionally localized region of the amygdala associated with trauma recall (n=14). The control group received yoked-sham feedback recorded from a matched participant in the active treatment group (n=11). Participants were instructed to try different mental regulation strategies to control feedback signals. Activity in the amygdala region of interest was measured by fMRI before neurofeedback training sessions, immediately after training sessions, and 30 days after training sessions. In each session, participants completed four amygdala neurofeedback control tasks while listening to audio clips related to a specific traumatic event. There was no significant difference in amygdala activity control between the two treatment groups immediately after the neurofeedback training sessions. At 30-day follow-up, the active treatment group experienced a greater reduction in amygdala activity compared to the control group (p=0.047). PTSD symptoms were measured with the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5). Both treatment groups showed improvements in PTSD symptom scores. The active treatment group did not experience a significantly greater decrease in symptoms compared to the sham-neurofeedback control group. This study is limited by small sample size and heterogeneity in activity regulation strategies.

Van der Kolk (2016) evaluated neurofeedback and its effects on PTSD symptoms.[61] Fifty-two participants with chronic PTSD were randomly assigned to receive neurofeedback for 12 weeks or to a control group. Psychological and behavioral functioning were evaluated at baseline, six weeks, 12 weeks, and 16 weeks. The authors stated PTSD symptoms improved in individuals who received neurofeedback but concluded more long-term sham-controlled studies are needed.

PRIMARY INSOMNIA

Systematic Review

A systematic review by Melo (2019) of biofeedback techniques such as neurofeedback in adults with chronic insomnia included seven RCTs (N=244).[62] Conflicting results were found in comparisons of neurofeedback with other cognitive behavioral therapy techniques, placebo, and no treatment; a majority of outcomes demonstrated no significant differences between comparison groups. A majority of studies had high risk of bias related to blinding of participants and study personnel and incomplete outcome data. The authors conclude higher quality RCTs are needed to assess the effectiveness of biofeedback on chronic insomnia treatment.

Randomized Controlled Trials

Schabus (2017) published a double-blinded placebo-controlled study evaluating the efficacy of sensorimotor rhythm neurofeedback on sleep quality and memory.[63] Patients spent nine nights in the laboratory and received 12 sessions of neurofeedback and 12 sessions of placebo-feedback training (sham). The authors stated they did not find neurofeedback to be more effective than cognitive behavioral therapy.

Cortoos (2010) published a small (n=17) RCT on the effect of neurofeedback training or biofeedback training (placebo control) on objective and subjective sleep in patients with primary insomnia.[64] Of 158 subjects with sleep complaints who were interested in participating, 131 (89%) were excluded due to study criteria or unwillingness to remain medication free during the study period. Following polysomnograph (PSG) recorded sleep in

the laboratory, all subjects received 20 sessions of therapist-controlled telefeedback training at home over a period of eight weeks. The neurofeedback group was trained to increase the sensory-motor rhythm (12-15 Hz) and inhibit theta power (4-8 Hz) and high beta power (20-30 Hz). The biofeedback group was trained to decrease electromyographic (EMG) activity, which was equated with the reinforcement of relaxation (placebo control). Both treatments reduced sleep latency by 40% to 45% (22 minutes at baseline) on post-treatment PSG, measured two weeks after the end of training. Neurofeedback training reduced wake after sleep onset (54% vs. 13% decrease, respectively; however, no interaction was found on the two-way ANOVA) and increased total sleep time (40 minutes vs. less than 5 minutes, respectively, $p<0.05$). This study is limited by the small number of subjects, differences in sleep parameters at baseline, and short follow-up. Additional studies are needed to evaluate this novel treatment approach.

SUBSTANCE USE DISORDER

Systematic Reviews

A 2008 SR of neurofeedback as a treatment for substance abuse disorders described difficulties in assessing the efficacy of this and other substance abuse treatments, including the lack of clearly established outcome measures, differing effects of the various drugs, presence of comorbid conditions, absence of a gold standard treatment, and use as an add-on to other behavioral treatment regimens.[65] The authors concluded that alpha-theta training, when combined with an inpatient rehabilitation program for alcohol dependency or stimulant abuse, would be classified as level three or “probably efficacious.” This level is based on beneficial effects shown in multiple observational studies, clinical studies, wait-list control studies, or within-subject or between-subject replication studies. The authors also noted that few large-scale studies of neurofeedback in addictive disorders have been reported, and a shortcoming of the evidence for alpha-theta training is that it has not been shown to be superior to sham treatment.

Randomized Controlled Trials

Faridi (2022) published the results of a RCT that assessed efficacy of Low-Resolution Brain Electromagnetic Tomography (LORETA) Z Score Neurofeedback (LZNFB) compared to cognitive rehabilitation therapy combined with methadone maintenance treatment in reducing craving in patients with opioid use disorder.[66] Thirty male patients, 20 to 60 years old, with opioid use disorder, undergoing methadone maintenance treatment, were randomized to three groups: LZNFB (20 sessions) with methadone maintenance treatment (n=10), cognitive rehabilitation (15 sessions) with methadone maintenance treatment (n=10), and methadone maintenance treatment alone (n=10). At a one-month follow-up, multiple questionnaires were used to assess opioid cravings—The Leeds Dependence Questionnaire, Desire for Drug Questionnaire, the Obsessive-Compulsive Drug Use Scale question, and the recovery assessment scale, as well as the visual probe cognitive test. Based on questionnaire assessments, the LZNFB group and the cognitive rehabilitation group accomplished a greater reduction in opioid craving compared to the methadone maintenance treatment control group ($p<0.05$). The cognitive rehabilitation group experienced greater improvement in attentional bias towards opioid cues than the LZNFB group ($p=0.002$). Study limitations include small sample size, lack of blinding, and lack of sham or placebo groups to control for therapist intervention and neurofeedback technology.

Gabrielsen (2022) published the results of a RCT evaluating infralow neurofeedback (ILF-NF) in the treatment of substance use disorder.[67] Ninety-three patients age 19 to 66 years (mean

± SD 38 ± 11.7 years) with substance use disorder were recruited from an outpatient unit and randomized to receive 20 sessions (30 minutes each) of ILF-NF training combined with treatment as usual (TAU) or TAU alone. TAU consisted of cognitive behavioral techniques, psychosocial approaches, and motivational interviews. The primary study outcome was determined *a priori* to be quality of life as assessed by the QoL-5 instrument. Independent-sample t tests showed no significant difference between groups for the primary outcome measure (p=0.28).

TOURETTE SYNDROME

Systematic Reviews

In 2011, the working group of the European Society for the Study of Tourette Syndrome conducted a SR of behavioral and psychosocial interventions for Tourette syndrome and other tic disorders.[68] There were no randomized or comparative studies on neurofeedback for Tourette syndrome; the literature was limited to two case series.

Randomized Controlled Trials

Since the SR, no RCTs for neurofeedback for this indication have been published.

OTHER CONDITIONS

Literature searches have identified small studies (e.g., case reports, case series, comparative cohorts, RCTs) of neurofeedback for the following conditions:

- Aging-associated cognitive decline[69]
- Anxiety and panic disorders[70]
- Asperger syndrome[70]
- Childhood obesity[71]
- Cigarette cravings[72]
- Chronic pain[73]
- Depression (on its own, or in patients with multiple sclerosis or alcohol addiction)[70, 74, 75]
- Dissociative identity disorder[70]
- Fecal incontinence[76]
- Menopausal symptoms
- Parkinson's Disease[77-79]
- Primary headache[80]
- Schizophrenia[70, 81]
- Stress management and relaxation[82]
- Stroke[83, 84]
- Traumatic brain injury (TBI)[85]
- Tinnitus[86]
- Urinary incontinence[87]

PRACTICE GUIDELINE SUMMARY

AMERICAN ACADEMY OF PEDIATRICS (AAP)

The AAP's 2011 clinical practice guidelines on the diagnosis and treatment of ADHD did not include neurofeedback in the treatment recommendations.[88] EEG biofeedback was included

on the list of areas for future research. The AAP (2019) published an evidence-based guideline update to the 2011 guideline for the treatment of ADHD in children and adolescents.[89] The guideline states that EEG biofeedback is one of several nonmedication treatments that have either too little evidence to support their recommendation or have little or no benefit.

AMERICAN PSYCHIATRIC ASSOCIATION (APA)

Neurofeedback is not recommended in APA practice guidelines on treatment of substance use disorders (2007),[90] major depressive disorder (2010),[91] obsessive-compulsive disorder (2013),[92] Posttraumatic Stress Disorder (2009),[93] or panic disorder (2009).[94]

INSTITUTE FOR CLINICAL SYSTEMS IMPROVEMENT

Institute for Clinical Systems Improvement (ICSI) released a 2014 update of their clinical practice guideline for the diagnosis, evaluation and management of attention deficit hyperactivity disorder in children and adolescents.[95] The updated guideline does not mention neurofeedback as a treatment option.

INTERNATIONAL SOCIETY FOR NEUROFEEDBACK & RESEARCH (ISNR)

The ISNR 2012 guideline is related to standards for practice but does not address specific treatments, indications, or scientific evidence.[96]

SUMMARY

There is not enough research to show that neurofeedback improves health outcomes for people with any indication. In addition, no practice guidelines based on research recommend neurofeedback for any indication. Therefore, neurofeedback is considered investigational for all indications.

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CODES

Codes	Number	Description
CPT	90875	Individual psychophysiological therapy incorporating biofeedback training by any modality (face-to-face with the patient), with psychotherapy (eg, insight oriented, behavior modifying or supportive psychotherapy); 30 minutes
	90876	;45 minutes
	90901	Biofeedback training by any modality
HCPCS	None	

Date of Origin: *July 1998*