



# MASSACHUSETTS

Blue Cross Blue Shield of Massachusetts is an Independent Licensee of the Blue Cross and Blue Shield Association

## Medical Policy Neurofeedback

### Table of Contents

- [Policy: Commercial](#)
- [Policy: Medicare](#)
- [Authorization Information](#)
- [Coding Information](#)
- [Description](#)
- [Policy History](#)
- [Information Pertaining to All Policies](#)
- [References](#)

### Policy Number: 515

BCBSA Reference Number: 2.01.28

NCD/LCD: NA

### Related Policies

- Biofeedback as a Treatment of Fecal Incontinence or Constipation #[308](#)
- Biofeedback for the Treatment of Headache #[152](#)
- Biofeedback as a Treatment of Urinary Incontinence #[173](#)
- Biofeedback for Miscellaneous Indications #[187](#)
- Biofeedback as a Treatment of Chronic Pain #[210](#)

### Policy

#### Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity Medicare HMO Blue<sup>SM</sup> and Medicare PPO Blue<sup>SM</sup> Members

Neurofeedback is [INVESTIGATIONAL](#).

### Prior Authorization Information

#### Inpatient

- For services described in this policy, precertification/preauthorization **IS REQUIRED** for all products if the procedure is performed **inpatient**.

#### Outpatient

- For services described in this policy, see below for products where prior authorization **might be required** if the procedure is performed **outpatient**.

|                                       | Outpatient                            |
|---------------------------------------|---------------------------------------|
| Commercial Managed Care (HMO and POS) | This is <b>not</b> a covered service. |
| Commercial PPO and Indemnity          | This is <b>not</b> a covered service. |
| Medicare HMO Blue <sup>SM</sup>       | This is <b>not</b> a covered service. |
| Medicare PPO Blue <sup>SM</sup>       | This is <b>not</b> a covered service. |

## CPT Codes / HCPCS Codes / ICD Codes

*Inclusion or exclusion of a code does not constitute or imply member coverage or provider reimbursement. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage as it applies to an individual member.*

*Providers should report all services using the most up-to-date industry-standard procedure, revenue, and diagnosis codes, including modifiers where applicable.*

### CPT Codes

| CPT codes: | Code Description  |
|------------|---|
| 90875      | Individual psychophysiological therapy incorporating biofeedback training by any modality (face-to-face with the patient), with psychotherapy; approx 20-30 minutes |
| 90876      | Individual psychophysiological therapy incorporating biofeedback training by any modality (face-to-face with the patient), with psychotherapy; approx 45-50 minutes |
| 90901      | Biofeedback training by any modality  |

### Description

#### DISORDERS OF THE CENTRAL NERVOUS SYSTEM

Various of disorders involve abnormal brain activity, including autism spectrum disorder, insomnia and sleep disorders, learning disabilities, Tourette syndrome, traumatic brain injury, seizure disorders, premenstrual dysphoric disorder, menopausal hot flashes, depression, stress management, panic and anxiety disorders, posttraumatic stress disorder, substance abuse disorders, eating disorders, migraine headaches, stroke, Parkinson disease, fibromyalgia, tinnitus, and attention-deficit/hyperactivity disorder.

#### Treatment

Neurofeedback is being investigated for the treatment of a variety of disorders. Neurofeedback may be conceptualized as a type of biofeedback that has traditionally used the electroencephalogram (EEG) as a source of feedback data. Neurofeedback differs from established forms of biofeedback in that the information fed back to the patient (via EEG tracings, functional magnetic resonance imaging, near-infrared spectroscopy) is a direct measure of global neuronal activity, or brain state, compared with feedback of the centrally regulated physiologic processes, such as tension of specific muscle groups or skin temperature. The patient may be trained to increase or decrease the prevalence, amplitude, or frequency of specified EEG waveforms (eg, alpha, beta, theta waves), depending on the changes in brain function associated with the particular disorder. It has been proposed that training of slow cortical potentials (SCPs) can regulate cortical excitability and that using the EEG as a measure of central nervous system functioning can help train patients to modify or control their abnormal brain activity. Upregulating or downregulating neural activity with real-time feedback of functional magnetic resonance imaging signals is also being explored.

Two EEG-training protocols (training of SCPs, theta/beta training) are typically used in children with attention-deficit/hyperactivity disorder. For training of SCPs, surface-negative and surface-positive SCPs are generated over the sensorimotor cortex. Negative SCPs reflect increased excitation and occur during states of behavioral or cognitive preparation, while positive SCPs are thought to indicate a reduction of cortical excitation of the underlying neural networks and appear during behavioral inhibition. In theta/beta training, the goal is to decrease activity in the EEG theta band (4-8 Hz) and increase activity in the EEG beta band (13-20 Hz), corresponding to an alert and focused but relaxed state. Alpha-theta neurofeedback is typically used in studies on substance abuse. Neurofeedback protocols for depression focus on alpha interhemispheric asymmetry and theta/beta ratio within the left prefrontal cortex. Neurofeedback for epilepsy has focused on sensorimotor rhythm up-training (increasing 12-15 Hz activity at motor strip) or altering SCPs. It has been proposed that learned alterations in EEG patterns in epilepsy are a result of operant conditioning and are not conscious or voluntary. A variety of protocols have been described for treatment of migraine headaches.

## Summary

For individuals who have ADHD who receive neurofeedback, the evidence includes RCTs and a meta-analysis. Relevant outcomes are symptoms, functional outcomes, and quality of life. At least 6 moderately sized RCTs (N range, 90-113 patients) have compared neurofeedback with methylphenidate, attention skills training, and/or cognitive therapy. These trials found either small or no benefit of neurofeedback. Studies that used active controls have suggested that, at least part of the effect of neurofeedback may be due to attention skills training, relaxation training, and/or other nonspecific effects. Also, the beneficial effects are more likely to be reported by evaluators unblinded to treatment (parents) than by evaluators blinded (teachers) to treatment, suggesting bias in the nonblinded evaluations. A meta-analysis also found no effect of neurofeedback on objective measures of attention and inhibition. Additional research with blinded evaluation of outcomes is needed to demonstrate an effect of neurofeedback on attention-deficit/hyperactivity disorder. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have disorders other than ADHD (eg, epilepsy, substance abuse, pediatric brain tumors) who receive neurofeedback, the evidence includes case reports, case series, comparative cohorts, and small RCTs. Relevant outcomes are symptoms, functional outcomes, and quality of life. For these other disorders, including psychiatric, neurologic, and pain syndromes, the evidence is poor, and several questions concerning clinical efficacy remain unanswered. Larger RCTs that include either a sham or active control are needed to evaluate the effect of neurofeedback for these conditions. The evidence is insufficient to determine the effects of the technology on health outcomes.

## Policy History

| Date           | Action   |
|----------------|--|
| 7/2018         | New references added from BCBSA National medical policy. Background and summary clarified.                     |
| 3/2017         | New references added from BCBSA National medical policy.   |
| 3/2016         | New references added from BCBSA National medical policy.   |
| 8/2015         | New references added from BCBSA National medical policy.   |
| 9/2014         | New references added from BCBSA National medical policy.   |
| 10/2013        | New references from BCBSA National medical policy.   |
| 11/2011-4/2012 | Medical policy ICD 10 remediation: Formatting, editing and coding updates.<br>No changes to policy statements. |
| 2/2011         | Reviewed - Medical Policy Group – Psychiatry and Ophthalmology.<br>No changes to policy statements.            |
| 1/2011         | Reviewed - Medical Policy Group – Neurology and Neurosurgery.<br>No changes to policy statements.              |
| 12/3/2010      | New policy describing ongoing non-coverage.  |

## Information Pertaining to All Blue Cross Blue Shield Medical Policies

Click on any of the following terms to access the relevant information:

[Medical Policy Terms of Use](#)

[Managed Care Guidelines](#)

[Indemnity/PPO Guidelines](#)

[Clinical Exception Process](#)

[Medical Technology Assessment Guidelines](#)

## References

1. Blue Cross and Blue Shield Association Technology Evaluation Center (TEC). Neurofeedback. *TEC Assessments* 1997;Volume 12:Tab 21.
2. Cortese S, Ferrin M, Brandeis D, et al. Neurofeedback for attention-deficit/hyperactivity disorder: meta-analysis of clinical and neuropsychological outcomes from randomized controlled trials. *J Am Acad Child Adolesc Psychiatry*. Jun 2016;55(6):444-455. PMID 27238063

3. Gevensleben H, Holl B, Albrecht B, et al. Is neurofeedback an efficacious treatment for ADHD? A randomised controlled clinical trial. *J Child Psychol Psychiatry*. Jul 2009;50(7):780-789. PMID 19207632
4. Gevensleben H, Holl B, Albrecht B, et al. Neurofeedback training in children with ADHD: 6-month follow-up of a randomised controlled trial. *Eur Child Adolesc Psychiatry*. May 25 2010;19(9):715-724. PMID 20499120
5. Steiner NJ, Frenette EC, Rene KM, et al. In-school neurofeedback training for ADHD: sustained improvements from a randomized control trial. *Pediatrics*. Mar 2014;133(3):483-492. PMID 24534402
6. Duric NS, Assmus J, Gundersen D, et al. Neurofeedback for the treatment of children and adolescents with ADHD: a randomized and controlled clinical trial using parental reports. *BMC Psychiatry*. Aug 2012;12:107. PMID 22877086
7. Bink M, van Nieuwenhuizen C, Popma A, et al. Behavioral effects of neurofeedback in adolescents with ADHD: a randomized controlled trial. *Eur Child Adolesc Psychiatry*. Sep 2015;24(9):1035-1048. PMID 25477074
8. Gelade K, Janssen TW, Bink M, et al. Behavioral effects of neurofeedback compared to stimulants and physical activity in attention-deficit/hyperactivity disorder: a randomized controlled trial. *J Clin Psychiatry*. Oct 2016;77(10):e1270-e1277. PMID 27631143
9. Duric NS, Assmus J, Elgen IB. Self-reported efficacy of neurofeedback treatment in a clinical randomized controlled study of ADHD children and adolescents. *Neuropsychiatr Dis Treat*. Sep 2014;10:1645-1654. PMID 25214789
10. Bink M, Bongers IL, Popma A, et al. 1-year follow-up of neurofeedback treatment in adolescents with attention-deficit hyperactivity disorder: randomised controlled trial. *BJPsych Open*. Mar 2016;2(2):107-115. PMID 27703763
11. Alegria AA, Wulff M, Brinson H, et al. Real-time fMRI neurofeedback in adolescents with attention deficit hyperactivity disorder. *Hum Brain Mapp*. Jun 2017;38(6):3190-3209. PMID 28342214
12. Dupaul DG, Power TJ, Anastopoulos AD, et al. *ADHD Rating Scale-IV: Checklists, Norms, and Clinical Interpretations*. New York, NY: Guilford; 1998.
13. Schönenberg M, Wiedemann E, Schneidt A, et al. Neurofeedback, sham neurofeedback, and cognitive-behavioural group therapy in adults with attention-deficit hyperactivity disorder: a triple-blind, randomised, controlled trial. *Lancet Psychiatry*. Sep 2017;4(9):673-684. PMID 28803030
14. Zilverstand A, Sorger B, Slaats-Willemse D, et al. fMRI neurofeedback training for increasing anterior cingulate cortex activation in adult attention deficit hyperactivity disorder: an exploratory randomized, single-blinded study. *PLoS One*. Jan 26 2017;12(1):e0170795. PMID 28125735
15. Tan G, Thornby J, Hammond DC, et al. Meta-analysis of EEG biofeedback in treating epilepsy. *Clin EEG Neurosci*. Jul 2009;40(3):173-179. PMID 19715180
16. Sokhadze TM, Cannon RL, Trudeau DL. EEG biofeedback as a treatment for substance use disorders: review, rating of efficacy, and recommendations for further research. *Appl Psychophysiol Biofeedback*. Mar 2008;33(1):1-28. PMID 18214670
17. de Ruiter MA, Oosterlaan J, Schouten-van Meeteren AY, et al. Neurofeedback ineffective in paediatric brain tumour survivors: Results of a double-blind randomised placebo-controlled trial. *Eur J Cancer*. Sep 2016;64:6273. PMID 27343714
18. Schoenberg PL, David AS. Biofeedback for psychiatric disorders: a systematic review. *Appl Psychophysiol Biofeedback*. Jun 2014;39(2):109-135. PMID 24806535
19. Jarusiewicz B. Efficacy of neurofeedback for children in the autism spectrum: a pilot study. *J Neurother*. Sep 8 2002;6(4):39-49. PMID
20. Sokhadze EM, El-Baz AS, Tasman A, et al. Neuromodulation integrating rTMS and neurofeedback for the treatment of autism spectrum disorder: an exploratory study. *Appl Psychophysiol Biofeedback*. Dec 2014;39(34):237-257. PMID 25267414
21. Kim DY, Yoo SS, Tegethoff M, et al. The inclusion of functional connectivity information into fMRI-based neurofeedback improves its efficacy in the reduction of cigarette cravings. *J Cogn Neurosci*. Mar 11 2015:1-21. PMID 25761006
22. Linden DE, Habes I, Johnston SJ, et al. Real-time self-regulation of emotion networks in patients with depression. *PLoS One*. Jun 2012;7(6):e38115. PMID 22675513
23. Young KD, Siegle GJ, Zotev V, et al. Randomized Clinical Trial of Real-Time fMRI Amygdala Neurofeedback for Major Depressive Disorder: Effects on Symptoms and Autobiographical Memory Recall. *Am J Psychiatry*. Aug 1 2017;174(8):748-755. PMID 28407727

24. Choobforoushzadeh A, Neshat-Doost HT, Molavi H, et al. Effect of neurofeedback training on depression and fatigue in patients with multiple sclerosis. *Appl Psychophysiol Biofeedback*. Mar 2015;40(1):1-8. PMID 25362584
25. Kayiran S, Dursun E, Dursun N, et al. Neurofeedback intervention in fibromyalgia syndrome; a randomized, controlled, rater blind clinical trial. *Appl Psychophysiol Biofeedback*. Dec 2010;35(4):293-302. PMID 20614235
26. Cortoos A, De Valck E, Arns M, et al. An exploratory study on the effects of tele-neurofeedback and tele-biofeedback on objective and subjective sleep in patients with primary insomnia. *Appl Psychophysiol Biofeedback*. Jun 2010;35(2):125-134. PMID 19826944
27. Walker JE. QEEG-guided neurofeedback for recurrent migraine headaches. *Clin EEG Neurosci*. Jan 2011;42(1):59-61. PMID 21309444
28. Moshkani Farahani D, Tavallaie SA, Ahmadi K, et al. Comparison of neurofeedback and transcutaneous electrical nerve stimulation efficacy on treatment of primary headaches: a randomized controlled clinical trial. *Iran Red Crescent Med J*. Aug 2014;16(8):e17799. PMID 25389484
29. Chirita-Emandi A, Puiu M. Outcomes of neurofeedback training in childhood obesity management: a pilot study. *J Altern Complement Med*. Nov 2014;20(11):831-837. PMID 25188371
30. Koprivova J, Congedo M, Raszka M, et al. Prediction of treatment response and the effect of independent component neurofeedback in obsessive-compulsive disorder: a randomized, sham-controlled, double-blind study. *Neuropsychobiology*. Apr 27 2013;67(4):210-223. PMID 23635906
31. Deng X, Wang G, Zhou L, et al. Randomized controlled trial of adjunctive EEG-biofeedback treatment of obsessive-compulsive disorder. *Shanghai Arch Psychiatry*. Oct 2014;26(5):272-279. PMID 25477720
32. Subramanian L, Hindle JV, Johnston S, et al. Real-time functional magnetic resonance imaging neurofeedback for treatment of Parkinson's disease. *J Neurosci*. Nov 9 2011;31(45):16309-16317. PMID 22072682
33. van der Kolk BA, Hodgdon H, Gapen M, et al. A Randomized Controlled Study of Neurofeedback for Chronic PTSD. *PLoS One*. 2016;11(12):e0166752. PMID 27992435
34. Cho HY, Kim K, Lee B, et al. The effect of neurofeedback on a brain wave and visual perception in stroke: a randomized control trial. *J Phys Ther Sci*. Mar 2015;27(3):673-676. PMID 25931705
35. Zhuo C, Li L. The application and efficacy of combined neurofeedback therapy and imagery training in adolescents with Tourette syndrome. *J Child Neurol*. Jul 2014;29(7):965-968. PMID 23481449
36. Subcommittee on Attention-Deficit/Hyperactivity Disorder, Steering Committee on Quality Improvement Management, Wolraich M, et al. ADHD: clinical practice guideline for the diagnosis, evaluation, and treatment of attention-deficit/hyperactivity disorder in children and adolescents. *Pediatrics*. Nov 2011;128(5):1007-1022. PMID 22003063
37. American Academy of Pediatrics. Evidence-Based Child and Adolescent Psychosocial Interventions. n.d.; <http://www.esc1.net/cms/lib/TX21000366/Centricity/Domain/100/Evidenced-Based%20Interventions.pdf>. Accessed May 18, 2018.
38. American Academy of Pediatrics. Press Release: Computer Feedback Can Help Students With ADHD Train Their Brains. 2014; <https://www.aap.org/en-us/about-the-aap/aap-press-room/pages/Computer-Feedback-Can-Help-Students-With-ADHD.aspx>. Accessed May 18, 2018.
39. National Institute for Health and Care Excellence. Efficacy of neurofeedback for children in the autism spectrum: a pilot study: management and support [CG170]. 2013; <https://www.nice.org.uk/guidance/cg170>. Accessed May 17, 2018.
40. Hammond DC, Bodenhamer-Davis G, Gerald Gluck G, et al. Standards of practice for neurofeedback and neurotherapy: a position paper of the International Society for Neurofeedback & Research. *J Neurother*. 26 Feb 2011;15(1):54-64. PMID
41. Verdellen C, van de Griendt J, Hartmann A, et al. European clinical guidelines for Tourette syndrome and other tic disorders. Part III: behavioural and psychosocial interventions. *Eur Child Adolesc Psychiatry*. Apr 2011;20(4):197-207. PMID 21445725
42. American Psychological Association. Getting in touch with your inner brainwaves through biofeedback. 2003; <http://www.apa.org/research/action/biofeedback.aspx>. Accessed May 17, 2018.