Protocol

Neurofeedback

(20128)

Medical Benefit		Effective Date: 04/01/09	Next Review Date: 09/14
Preauthorization	No	Review Dates: 11/08, 09/09, 09/10, 09/11, 09/12, 09/13	

The following Protocol contains medical necessity criteria that apply for this service. It is applicable to Medicare Advantage products unless separate Medicare Advantage criteria are indicated. If the criteria are not met, reimbursement will be denied and the patient cannot be billed. ***Preauthorization is not required but is recommended if, despite this Protocol position, you feel this service is medically necessary; supporting documentation must be submitted to behavioral health services vendor.*** *Please note that payment for covered services is subject to eligibility and the limitations noted in the patient's contract at the time the services are rendered.*

Description

Neurofeedback describes techniques of providing feedback about neuronal activity, as measured by electroencephalogram (EEG) biofeedback or functional magnetic resonance imaging (fMRI), in order to teach patients to self-regulate brain activity. Neurofeedback may utilize several techniques in an attempt to normalize unusual patterns of brain function in patients with central nervous system (CNS) disorders, such as attention deficit/hyperactivity disorder (ADHD), autism spectrum disorder, substance abuse, epilepsy, and insomnia.

Background

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 traditional forms of biofeedback in that the information fed back to the patient (via EEG tracings or fMRI) is a direct measure of global neuronal activity, or brain state, compared to feedback of the centrally regulated physiologic processes, such as tension of specific muscle groups or skin temperature. The patient may be trained to either increase or decrease the prevalence, amplitude, or frequency of specified EEG waveforms (e.g., 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 CNS functioning can help train patients to modify or control their abnormal brain activity. Upregulating or downregulating neural activity with real-time feedback of fMRI signals is also being explored.

Neurofeedback is being investigated for the treatment of a variety of disorders including attention deficit/hyperactivity disorder (ADHD), learning disabilities, Tourette syndrome, autism spectrum disorder traumatic brain injury, seizure disorders, menopausal hot flashes, panic and anxiety disorders, fibromyalgia, tinnitus, substance abuse disorders, depression, stress management, migraine headaches, Parkinson's disease and sleep disorders. Two EEG training protocols, training of SCPs and theta/beta training, are typically used in children with ADHD. For training of SCPs, surface-negative SCPs 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 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 hertz [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.

Related Protocols:

Biofeedback as a Treatment of Urinary Incontinence in Adults

Biofeedback as a Treatment of Headache

Biofeedback as a Treatment of Chronic Pain

Biofeedback for Miscellaneous Indications

Biofeedback as a Treatment of Fecal Incontinence or Constipation

Corporate Medical Guideline

Neurofeedback is considered **investigational**.

Services that are the subject of a clinical trial do not meet our Technology Assessment Protocol criteria and are considered investigational. *For explanation of experimental and investigational, please refer to the Technology Assessment Protocol.*

It is expected that only appropriate and medically necessary services will be rendered. We reserve the right to conduct prepayment and postpayment reviews to assess the medical appropriateness of the above-referenced procedures. **Some of this Protocol may not pertain to the patients you provide care to, as it may relate to products that are not available in your geographic area.**

References

We are not responsible for the continuing viability of web site addresses that may be listed in any references below.

1. Blue Cross and Blue Shield Association Technology Evaluation Center (TEC). Neurofeedback. TEC Assessments 1997; Volume 12, Tab 21.
2. Graap K, Freides D. Regarding the database for the Peniston alpha-theta EEG biofeedback protocol. Appl Psychophysiol Biofeedback 1998; 23(4):265-72; 73-5.
3. Swingle PG. Neurofeedback treatment of pseudoseizure disorder. Biol Psychiatry 1998; 44(11):1196-9.
4. Thompson L, Thompson M. Neurofeedback combined with training in metacognitive strategies: effectiveness in students with ADD. Appl Psychophysiol Biofeedback 1998; 23(4):243-63.
5. Egner T, Strawson E, Gruzelier JH. EEG signature and phenomenology of alpha/theta neurofeedback training versus mock feedback. Appl Psychophysiol Biofeedback 2002; 27(4):261-70.
6. Fuchs T, Birbaumer N, Lutzenberger W et al. Neurofeedback treatment for attention-deficit/hyperactivity disorder in children: a comparison with methylphenidate. Appl Psychophysiol Biofeedback 2003; 28(1):1-12.
7. Heinrich H, Gevensleben H, Strehl U. Annotation: neurofeedback - train your brain to train behaviour. J Child Psychol Psychiatry 2007; 48(1):3-16.

8. Arns M, de Ridder S, Strehl U et al. Efficacy of neurofeedback treatment in ADHD: the effects on inattention, impulsivity and hyperactivity: a meta-analysis. Clin EEG Neurosci 2009; 40(3):180-9.
9. Monastra VJ, Lynn S, Linden M et al. Electroencephalographic biofeedback in the treatment of attention-deficit/hyperactivity disorder. Appl Psychophysiol Biofeedback 2005; 30(2):95-114.
10. Rossiter T. The effectiveness of neurofeedback and stimulant drugs in treating AD/HD: part II. Replication. Appl Psychophysiol Biofeedback 2004; 29(4):233-43.
11. Levesque J, Beauregard M, Mensour B. Effect of neurofeedback training on the neural substrates of selective attention in children with attention-deficit/hyperactivity disorder: a functional magnetic resonance imaging study. Neurosci Lett 2006; 394(3):216-21.
12. Gevensleben H, Holl B, Albrecht B et al. Is neurofeedback an efficacious treatment for ADHD? A randomised controlled clinical trial. J Child Psychol Psychiatry 2009; 50(7):780-9.
13. Skokauskas N, McNicholas F, Masaud T et al. Complementary medicine for children and young people who have attention deficit hyperactivity disorder. Curr Opin Psychiatry 2011; 24(4):291-300.
14. Gevensleben H, Rothenberger A, Moll GH et al. Neurofeedback in children with ADHD: validation and challenges. Expert Rev Neurother 2012; 12(4):447-60.
15. Bakhshayesh AR, Hansch S, Wyschkon A et al. Neurofeedback in ADHD: a single-blind randomized controlled trial. Eur Child Adolesc Psychiatry 2011; 20(9):481-91.
16. Drechsler R, Straub M, Doehnert M et al. Controlled evaluation of a neurofeedback training of slow cortical potentials in children with Attention Deficit/Hyperactivity Disorder (ADHD). Behav Brain Funct 2007; 3:35.
17. 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 2010; 19(9):715-24.
18. 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 2012; 12:107.
19. Rossignol DA. Novel and emerging treatments for autism spectrum disorders: a systematic review. Ann Clin Psychiatry 2009; 21(4):213-36.
20. Jarusiewicz B. Efficacy of neurofeedback for children in the autism spectrum: a pilot study. J Neurotherapy 2002; 6(4):39-49.
21. Angelakis E, Stathopoulou S, Frymiare JL et al. EEG neurofeedback: a brief overview and an example of peak alpha frequency training for cognitive enhancement in the elderly. Clin Neuropsychol 2007; 21(1):110-29.
22. Linden DE, Habes I, Johnston SJ et al. Real-time self-regulation of emotion networks in patients with depression. PLoS One 2012; 7(6):e38115.
23. Tan G, Thornby J, Hammond DC et al. Meta-analysis of EEG biofeedback in treating epilepsy. Clin EEG Neurosci 2009; 40(3):173-9.
24. Kayiran S, Dursun E, Dursun N et al. Neurofeedback intervention in fibromyalgia syndrome; a randomized, controlled, rater blind clinical trial. Appl Psychophysiol Biofeedback 2010; 35(4):293-302.
25. 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 2010; 35(2):125-34.
26. 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 2013; 67(4):210-23.

27. Subramanian L, Hindle JV, Johnston S et al. Real-time functional magnetic resonance imaging neurofeedback for treatment of Parkinson's disease. J Neurosci 2011; 31(45):16309-17.
28. 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 2008; 33(1):1-28.
29. 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 2011; 20(4):197-207.
30. Walker JE. QEEG-guided neurofeedback for recurrent migraine headaches. Clin EEG Neurosci 2011; 42(1):59-61.
31. 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. 2011. Available online at: http://www.informaworld.com/smpp/content~db=all?content=10.1080/10874208.2010.545760. Last accessed 2011, June.
32. American Psychology Association. Getting in touch with your inner brainwaves through biofeedback. 2003. Available online at: http://www.apa.org/research/action/biofeedback.aspx. Last accessed June, 2011.
33. Association for Applied Psychophysiology & Biofeedback. Home page. Available online at: http://www.aapb.org/. Last accessed June, 2011.