



## MASSACHUSETTS

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

### Medical Policy

## Biofeedback for Miscellaneous Indications

### Table of Contents

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

### Policy Number: 187

BCBSA Reference Number: 2.01.53 (For Plan internal use only)

### Related Policies

- Biofeedback as a Treatment of Chronic Pain, [#210](#)
- Biofeedback as a Treatment of Fecal Incontinence or Constipation, [#308](#)
- Biofeedback as a Treatment of Urinary Incontinence, [#173](#)
- Biofeedback for the Treatment of Headache, [#152](#)
- Treatment of Tinnitus, [#267](#)

### Policy

#### Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity

Biofeedback is [INVESTIGATIONAL](#) as a treatment of the following miscellaneous conditions:

- Anxiety disorders
- Asthma
- Bell's palsy
- Depression
- Hypertension
- Insomnia
- Movement disorders, such as motor function after stroke, injury, or lower-limb surgery
- Multiple sclerosis
- Orthostatic hypotension in individuals with spinal cord injury
- Pain management during labor
- Posttraumatic stress disorder
- Prevention of preterm birth
- Raynaud disease
- Sleep bruxism
- Tinnitus.

Neurofeedback is considered [INVESTIGATIONAL](#).

Individual psychophysiological therapy with biofeedback training is NOT MEDICALLY NECESSARY.

## 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.

## 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.*

*The following codes are included below for informational purposes only; this is not an all-inclusive list.*

**According to the policy statement above, the following CPT/HCPCS codes are considered investigational for the conditions listed for Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity:**

### CPT Codes

CPT codes:	Code Description
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); approximately 20-30 minutes
90876	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); approximately 45-50 minutes
90901	Biofeedback training by any modality

### HCPCS Codes

HCPCS codes:	Code Description
E0746	Electromyography (EMG), biofeedback device

## Description

Biofeedback is a technique intended to teach patients the self-regulation of certain unconscious or involuntary physiologic processes. Biofeedback equipment converts physiological signals into outputs given to patients. The technique involves the feedback of a variety of types of information not usually available to the patient, followed by a concerted effort on the part of the patient to use this feedback to help alter the physiologic process in a specific way.

Biofeedback has been proposed as a treatment for a variety of diseases and disorders including anxiety, headaches, hypertension, movement disorders, incontinence, pain, asthma, Raynaud disease, and insomnia. The type of feedback used in an intervention (eg, visual, auditory) depends on the nature of the disease or disorder being treated. This evidence review focuses on the use of biofeedback for the treatment

of hypertension, anxiety, asthma, movement disorders (eg, motor function after stroke, injury, or lower-limb surgery), and other applications (ie, conditions not addressed in other evidence reviews on biofeedback). In addition, this evidence review focuses on biofeedback devices that measure and provide information on physiologic processes such as heart rate, muscle tension, skin temperature, and blood flow.

Evidence pertaining to the use of biofeedback for chronic pain is addressed in policy #[210](#). Evidence pertaining to the use of biofeedback for headache is addressed in policy #[152](#). Evidence pertaining to the use of biofeedback for urinary incontinence is addressed in policy #[173](#). Evidence pertaining to the use of biofeedback for fecal incontinence or constipation is addressed in policy #[308](#).

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 ADHD. 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 to 8 Hz) and increase activity in the EEG beta band (13 to 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 to 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 the treatment of migraine headaches.

## Summary

### Description

Biofeedback is a technique intended to teach patients self-regulation of certain physiologic processes that are otherwise impossible or extremely difficult to control. This review focuses on the use of biofeedback for treating miscellaneous indications—specifically, indications other than urinary and fecal incontinence, headache, and chronic pain.

### Summary of Evidence

For individuals with anxiety disorders who receive biofeedback, the evidence includes 2 systematic reviews and 2 randomized controlled trials (RCTs) published after the review. Relevant outcomes are symptoms, functional outcomes, and quality of life (QOL). A systematic review on heart rate variability (HRV) biofeedback (HRVB) and an RCT on diaphragmatic breathing relaxation reported the positive effects of these treatments on anxiety. However, the trials in the systematic review had small sample sizes (median, 14 participants) and study quality was generally poor. Additional limitations included improper randomization, allocation concealment, and inadequate descriptions of randomization or missing data. The other RCT did not find a significant effect of biofeedback, possibly due to lack of power. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with asthma who receive biofeedback, the evidence includes a systematic review of 3 RCTs and 2 RCTs published after the review. Relevant outcomes are symptoms, functional outcomes, and QOL. Each RCT used a different biofeedback technique, which provided patients with information on carbon dioxide, heart rate, and respiratory sinus arrhythmia. While the trials reported improvements in each parameter for which the patients received biofeedback, the improvements did not impact clinical outcomes such as medication use and forced expiratory volume. However, the results of one RCT suggested that biofeedback has promise as a protective approach to aiding lung function and reducing stress-induced asthma exacerbation. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with Bell palsy who receive biofeedback, the evidence includes a systematic review of 4 RCTs. Relevant outcomes are symptoms, functional outcomes, and QOL. The RCTs evaluated the efficacy of adding a mirror and/or electromyography (EMG) biofeedback to facial exercises. The sample sizes were small, and there was heterogeneity across techniques used and length of treatments. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with depression who receive biofeedback, the evidence includes a systematic review and its 2017 update and 2 small RCTs published after the systematic review. Relevant outcomes are symptoms, functional outcomes, and QOL. The review and its update only identified 3 dissertations assessing the use of biofeedback for depression. One RCT found that respiratory and heart rate biofeedback plus usual care reduced Beck Depression Inventory scores compared to usual care alone, while the other found that respiratory sinus arrhythmia biofeedback plus usual care was associated with greater improvements in Hamilton Depression Rating Scale scores compared to usual care alone; however, these trials were limited by open-label designs, short follow-up periods, and small sample sizes. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with hypertension who receive biofeedback, the evidence includes 2 systematic reviews and 2 RCTs published after the review. Relevant outcomes are symptoms, functional outcomes, and QOL. The systematic review identified 36 RCTs, though sample sizes were small and overall study quality was poor. Various biofeedback techniques were used: thermal, galvanized skin response, pulse wave velocity, and HRV. Results across trials did not consistently show a benefit of biofeedback. Conclusions were limited due to the shortage of studies isolating the effect of biofeedback, the generally poor quality of trials, and heterogeneity across interventions used. The other systematic review was smaller (20 RCTs) but did find a significant effect of biofeedback on both systolic and diastolic blood pressure. The Mengden 2023 RCT demonstrated an acute change in blood pressure after a 10-min biofeedback session, but no longer term effects were demonstrated over the course of a week. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with motor dysfunction after stroke who receive biofeedback, the evidence includes systematic reviews and RCTs published after the systematic reviews. Relevant outcomes are symptoms, functional outcomes, and QOL. One systematic review identified 18 high-quality trials using the following biofeedback techniques: weight distribution on a platform sensor, muscle activity from EMG, linear gait parameters, and joint angle from a goniometer. Feedback was visual, auditory, or both. Outcome measures primarily assessed motor activity in research settings, rather than clinical outcomes such as rates of falls or the ability to perform activities of daily living. Pooled effects showed improvements in motor function in the short term. The evidence is limited due to the variability in type, duration, intensity of the interventions, and lack of long-term outcomes. The largest available studies published since the systematic reviews found no differences between biofeedback-assisted rehabilitation and conventional rehabilitation in terms of their impact on gait speed, balance, activities of daily living, fall rate, and return to work. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with motor dysfunction after lower-limb injury or surgery who receive biofeedback, the evidence includes 2 systematic reviews. Relevant outcomes are symptoms, functional outcomes, and QOL. One systematic review identified 4 RCTs evaluating the use of EMG biofeedback in patients undergoing postinjury knee rehabilitation. Sample sizes were small, with half of the trials reporting significant benefits

of biofeedback and the other half reporting no difference between study groups. The other systematic review identified 6 RCTs evaluating the use of EMG biofeedback in patients undergoing postsurgical knee rehabilitation. Biofeedback was associated with better range of motion outcomes in a meta-analysis of data from 5 RCTs but was not associated with a significant benefit in terms of pain or physical functioning. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with multiple sclerosis who receive biofeedback, the evidence includes 2 RCTs. Relevant outcomes are symptoms, functional outcomes, and QOL. One trial used vibrotactile biofeedback and the other provided patients with breathing rate and muscle tension biofeedback. The sample sizes were small, with no statistically significant differences between the biofeedback groups and control groups. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with orthostatic hypotension due to spinal cord injury who receive biofeedback, the evidence includes a systematic review, which included a case series and a case report. Relevant outcomes are symptoms, functional outcomes, and QOL. The case series and case report collectively provided information on 3 patients given visual and auditory feedback. Patients were able to raise their systolic blood pressure by an average of 39%. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who need pain management during labor who receive biofeedback, the evidence includes a systematic review of 4 RCTs. Relevant outcomes are symptoms, functional outcomes, and QOL. A Cochrane review graded the 4 trials as having a high risk of bias due to unclear descriptions of blinding and randomization methods. Due to the heterogeneity in biofeedback methods and outcomes measured, pooled analyses could not be performed. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with posttraumatic stress disorder (PTSD) who receive biofeedback, the evidence includes a 2014 systematic review and its 2017 update, and a 2024 systematic review. Relevant outcomes are symptoms, functional outcomes, and QOL. The 2014 systematic review included an RCT, a nonrandomized study, and 2 case series. The studies had small sample sizes and inconsistent results. The reviewers rated the evidence a grade C for conflicting scientific evidence. The 2017 systematic review update included 2 new RCTs, 1 of which demonstrated a faster decrease of PTSD symptoms with biofeedback and cognitive behavioral therapy (CBT) compared to CBT alone. However, the small sample size was a limitation. The other RCT found no differences between biofeedback and other treatment modalities. The 2024 systematic review found a moderate effect of biofeedback but none of the included studies had a control group. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who are susceptible to preterm birth who receive biofeedback, the evidence includes an RCT. Relevant outcomes are symptoms, functional outcomes, and QOL. In the RCT, women in the treatment group received HRVB. Patients receiving the treatment experienced a decrease in perceived chronic stress, but there was no significant difference in the number of preterm births, gestational duration, or birth weight. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with Raynaud disease who receive biofeedback, the evidence includes a systematic review. Relevant outcomes are symptoms, functional outcomes, and QOL. The systematic review identified 5 RCTs using biofeedback techniques. Pooled analysis was performed on 4 of these trials. The reduction in the frequency of attacks was significantly lower in the sham control group. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with sleep bruxism who receive biofeedback, the evidence includes 2 systematic reviews and an RCT published after the review. Relevant outcomes are symptoms, functional outcomes, and QOL. One systematic review identified 7 randomized and nonrandomized studies using biofeedback techniques,

and the most recent systematic review identified 6 additional studies. Studies were generally small, used different techniques, measured different outcomes, and were assessed as having either moderate or high risk of bias. Two studies reported the number of bruxism episodes per hour and a pooled analysis of these studies showed no significant differences between biofeedback groups and control groups. An RCT published after the reviews tested a full-occlusion biofeedback splint in 41 patients with sleep bruxism and temporomandibular disorder. The trial found that, compared to an adjusted occlusal splint, the biofeedback splint allowed for greater reductions in pain after 3 months of treatment. However, no significant differences in sleep bruxism episodes were observed. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with tinnitus who receive biofeedback, the evidence includes a single RCT. Relevant outcomes are symptoms, functional outcomes, and QOL. Treatment consisted of a biofeedback-based behavioral intervention over a 3-month period. The treatment group experienced improvements in tinnitus annoyance, loudness ratings, controllability, coping cognitions, and depressive symptoms. Additional studies are needed to confirm the results of this single trial. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

## Policy History

Date	Action
1/2025	Annual policy review. Policy updated with literature review through September 27, 2024; references added. Policy statements unchanged.
9/1/2024	Investigational indications transferred from policy #515 for Neurofeedback. Policy statements unchanged. 9/1/2024
1/2024	Annual policy review. Policy updated with literature review through October 2, 2023; references added. Minor editorial refinements to policy statements; intent unchanged.
1/2023	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
1/2022	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
1/2021	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
1/2021	Medicare information removed. See MP #132 Medicare Advantage Management for local coverage determination and national coverage determination reference.
7/2020	Not medically necessary statement on individual psychophysiological therapy with biofeedback training transferred from medical policy 423, Outpatient Psychotherapy.
1/2020	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
1/2019	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
10/2017	Annual policy review. Minor edits to the Policy section; statement otherwise unchanged. 10/1/2017
1/2016	Annual policy review. New investigational indications described. Autism removed from investigational statement. Effective 1/1/2016.
10/2014	Annual policy review. Investigational indications clarified. Effective 10/1/2014.
10/2013	New references from Annual policy review.
3/2013	Annual policy review. Changes to policy statement. Effective 3/1/2013.
11/2011-4/2012	Medical policy ICD 10 remediation: Formatting, editing and coding updates. No changes to policy statements.
6/2011	Reviewed - Medical Policy Group - Orthopedics, Rehabilitation and Rheumatology. No changes to policy statements.
7/2010	Reviewed - Medical Policy Group - Orthopedics, Rehabilitation Medicine and Rheumatology. No changes to policy statements.

5/2010	Medical policy 187 describing covered and non-covered indications. Effective 5/1/2010.
11/2009	National policy reviewed 11/2009. Revisions to coverage statement made, effective 11/2009
3/2009	Reviewed - Medical Policy Group - Pulmonology, Allergy/Asthma/Immunology and ENT/ Otolaryngology. No changes to policy statements.
3/2008	Reviewed - Medical Policy Group - Pulmonology, Allergy and ENT/Otolaryngology. No changes to policy statements.
3/2007	Reviewed - Medical Policy Group - Pulmonology, Allergy and ENT/Otolaryngology. No changes to policy statements.
10/2006	National policy reviewed 10/2006, no changes to policy statement.

## 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. Goessl VC, Curtiss JE, Hofmann SG. The effect of heart rate variability biofeedback training on stress and anxiety: a meta-analysis. *Psychol Med.* Nov 2017; 47(15): 2578-2586. PMID 28478782
2. Banerjee S, Argaez C. Neurofeedback and Biofeedback for Mood and Anxiety Disorders: A Review of Clinical Effectiveness and Guidelines [Internet]. Ottawa, ON: Canadian Agency for Drugs and Technologies in Health; 2017.
3. Ma CH, Chang HY, Lee HC, et al. The psychological and physiological effects of integrated cognitive-behavioral and biofeedback therapy on panic disorder: A randomized controlled trial. *J Formos Med Assoc.* Dec 2023; 122(12): 1305-1312. PMID 37453901
4. Chen YF, Huang XY, Chien CH, et al. The Effectiveness of Diaphragmatic Breathing Relaxation Training for Reducing Anxiety. *Perspect Psychiatr Care.* Oct 2017; 53(4): 329-336. PMID 27553981
5. Yorke J, Fleming S, Shuldham C, et al. Nonpharmacological interventions aimed at modifying health and behavioural outcomes for adults with asthma: a critical review. *Clin Exp Allergy.* Dec 2015; 45(12): 1750-64. PMID 25675860
6. Meuret AE, Ritz T, Wilhelm FH, et al. Targeting pCO<sub>2</sub> in asthma: pilot evaluation of a capnometry-assisted breathing training. *Appl Psychophysiol Biofeedback.* Jun 2007; 32(2): 99-109. PMID 17564826
7. Lehrer PM, Vaschillo E, Vaschillo B, et al. Biofeedback treatment for asthma. *Chest.* Aug 2004; 126(2): 352-61. PMID 15302717
8. Lehrer P, Carr RE, Smetankine A, et al. Respiratory sinus arrhythmia versus neck/trapezius EMG and incentive spirometry biofeedback for asthma: a pilot study. *Appl Psychophysiol Biofeedback.* Jun 1997; 22(2): 95-109. PMID 9341966
9. Taghizadeh N, Eslaminejad A, Raoufy MR. Protective effect of heart rate variability biofeedback on stress-induced lung function impairment in asthma. *Respir Physiol Neurobiol.* Apr 2019; 262: 49-56. PMID 30695733
10. Lehrer PM, Irvin CG, Lu SE, et al. Heart Rate Variability Biofeedback Does Not Substitute for Asthma Steroid Controller Medication. *Appl Psychophysiol Biofeedback.* Mar 2018; 43(1): 57-73. PMID 29124506
11. Cardoso JR, Teixeira EC, Moreira MD, et al. Effects of exercises on Bell's palsy: systematic review of randomized controlled trials. *Otol Neurotol.* Jun 2008; 29(4): 557-60. PMID 18520590
12. Neurofeedback and Biofeedback for Mood and Anxiety Disorders: A Review of the Clinical Evidence and Guidelines - An Update. Ottawa, ON: Canadian Agency for Drugs and Technologies in Health; 2014.
13. Maynard WHDC, Albuquerque MCDS, Santos RCS, et al. The use of biofeedback intervention in the improvement of depression levels: a randomised trial. *Acta Neuropsychiatr.* Jun 2021; 33(3): 126-133. PMID 33427129

14. Park SM, Jung HY. Respiratory sinus arrhythmia biofeedback alters heart rate variability and default mode network connectivity in major depressive disorder: A preliminary study. *Int J Psychophysiol*. Dec 2020; 158: 225-237. PMID 33148502
15. Jenkins S, Cross A, Osman H, et al. Effectiveness of biofeedback on blood pressure in patients with hypertension: systematic review and meta-analysis. *J Hum Hypertens*. Oct 2024; 38(10): 719-727. PMID 39138350
16. Greenhalgh J, Dickson R, Dundar Y. The effects of biofeedback for the treatment of essential hypertension: a systematic review. *Health Technol Assess*. Oct 2009; 13(46): 1-104. PMID 19822104
17. Wang MY, Chang NC, Hsieh MH, et al. Effect of Feedback Signal on Blood Pressure Self-regulation Capability in Individuals With Prehypertension or Stage I Hypertension: A Randomized Controlled Study. *J Cardiovasc Nurs*. 2016; 31(2): 166-72. PMID 25774838
18. Mengden T, Bachler M, Sehnert W, et al. Device-guided slow breathing with direct biofeedback of pulse wave velocity - acute effects on pulse arrival time and self-measured blood pressure. *Blood Press Monit*. Feb 01 2023; 28(1): 52-58. PMID 36606480
19. Stanton R, Ada L, Dean CM, et al. Biofeedback improves performance in lower limb activities more than usual therapy in people following stroke: a systematic review. *J Physiother*. Jan 2017; 63(1): 11-16. PMID 27989731
20. Stanton R, Ada L, Dean CM, et al. Biofeedback improves activities of the lower limb after stroke: a systematic review. *J Physiother*. 2011; 57(3): 145-55. PMID 21843829
21. Zijlstra A, Mancini M, Chiari L, et al. Biofeedback for training balance and mobility tasks in older populations: a systematic review. *J Neuroeng Rehabil*. Dec 09 2010; 7: 58. PMID 21143921
22. Ambrosini E, Peri E, Nava C, et al. A multimodal training with visual biofeedback in subacute stroke survivors: a randomized controlled trial. *Eur J Phys Rehabil Med*. Feb 2020; 56(1): 24-33. PMID 31556542
23. Ghanbari Ghoshchi S, De Angelis S, Morone G, et al. Return to Work and Quality of Life after Stroke in Italy: A Study on the Efficacy of Technologically Assisted Neurorehabilitation. *Int J Environ Res Public Health*. Jul 20 2020; 17(14). PMID 32698430
24. Kim JH. The effects of training using EMG biofeedback on stroke patients upper extremity functions. *J Phys Ther Sci*. Jun 2017; 29(6): 1085-1088. PMID 28626331
25. Yang DJ. Influence of biofeedback weight bearing training in sit to stand to sit and the limits of stability on stroke patients. *J Phys Ther Sci*. Nov 2016; 28(11): 3011-3014. PMID 27942111
26. Ghomashchi H. Investigating the effects of visual biofeedback therapy on recovery of postural balance in stroke patients using a complexity measure. *Top Stroke Rehabil*. Jun 2016; 23(3): 178-83. PMID 27077976
27. Silkman C, McKeon J. The effectiveness of electromyographic biofeedback supplementation during knee rehabilitation after injury. *J Sport Rehabil*. Aug 2010; 19(3): 343-51. PMID 20811082
28. Xie YJ, Wang S, Gong QJ, et al. Effects of electromyography biofeedback for patients after knee surgery: A systematic review and meta-analysis. *J Biomech*. May 07 2021; 120: 110386. PMID 33794414
29. Mackay AM, Buckingham R, Schwartz RS, et al. The Effect of Biofeedback as a Psychological Intervention in Multiple Sclerosis: A Randomized Controlled Study. *Int J MS Care*. 2015; 17(3): 101-8. PMID 26052255
30. van der Logt RP, Findling O, Rust H, et al. The effect of vibrotactile biofeedback of trunk sway on balance control in multiple sclerosis. *Mult Scler Relat Disord*. Jul 2016; 8: 58-63. PMID 27456875
31. Gillis DJ, Wouda M, Hjeltnes N. Non-pharmacological management of orthostatic hypotension after spinal cord injury: a critical review of the literature. *Spinal Cord*. Oct 2008; 46(10): 652-9. PMID 18542098
32. Barragán Loayza IM, Solà I, Juandó Prats C. Biofeedback for pain management during labour. *Cochrane Database Syst Rev*. Jun 15 2011; (6): CD006168. PMID 21678353
33. Wahbeh H, Senders A, Neuendorf R, et al. Complementary and Alternative Medicine for Posttraumatic Stress Disorder Symptoms: A Systematic Review. *J Evid Based Complementary Altern Med*. Jul 2014; 19(3): 161-175. PMID 24676593
34. Kenemore J, Benham G, Charak R, et al. Heart Rate Variability Biofeedback as a Treatment for Military PTSD: A Meta-Analysis. *Mil Med*. Aug 30 2024; 189(9-10): e1903-e1909. PMID 38287778
35. Siepmann M, Hennig UD, Siepmann T, et al. The effects of heart rate variability biofeedback in patients with preterm labour. *Appl Psychophysiol Biofeedback*. Mar 2014; 39(1): 27-35. PMID 24271650



36. Malenfant D, Catton M, Pope JE. The efficacy of complementary and alternative medicine in the treatment of Raynaud's phenomenon: a literature review and meta-analysis. *Rheumatology (Oxford)*. Jul 2009; 48(7): 791-5. PMID 19433434
37. Comparison of sustained-release nifedipine and temperature biofeedback for treatment of primary Raynaud phenomenon. Results from a randomized clinical trial with 1-year follow-up. *Arch Intern Med*. Apr 24 2000; 160(8): 1101-8. PMID 10789602
38. Wang LF, Long H, Deng M, et al. Biofeedback treatment for sleep bruxism: a systematic review. *Sleep Breath*. May 2014; 18(2): 235-42. PMID 23756884
39. Jokubauskas L, Baltrušaitytė A. Efficacy of biofeedback therapy on sleep bruxism: A systematic review and meta-analysis. *J Oral Rehabil*. Jun 2018; 45(6): 485-495. PMID 29577362
40. Bergmann A, Edelhoff D, Schubert O, et al. Effect of treatment with a full-occlusion biofeedback splint on sleep bruxism and TMD pain: a randomized controlled clinical trial. *Clin Oral Investig*. Nov 2020; 24(11): 4005-4018. PMID 32430774
41. Weise C, Heinecke K, Rief W. Biofeedback-based behavioral treatment for chronic tinnitus: results of a randomized controlled trial. *J Consult Clin Psychol*. Dec 2008; 76(6): 1046-57. PMID 19045972
42. Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. Oct 23 2018; 138(17): e426-e483. PMID 30354655
43. Winstein CJ, Stein J, Arena R, et al. Guidelines for Adult Stroke Rehabilitation and Recovery: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke*. Jun 2016; 47(6): e98-e169. PMID 27145936
44. Gelenberg A. Practice Guideline for the Treatment of Patients with Major Depressive Disorder. 2010; [https://psychiatryonline.org/pb/assets/raw/sitewide/practice\\_guidelines/guidelines/mdd.pdf](https://psychiatryonline.org/pb/assets/raw/sitewide/practice_guidelines/guidelines/mdd.pdf). Accessed September 27, 2024.
45. American Psychiatric Association, Work Group on ASD and PTSD, Ursano RJ, et al. Practice Guideline for the Treatment of Patients with Acute Stress Disorder and Posttraumatic Stress Disorder. 2004; [http://psychiatryonline.org/pb/assets/raw/sitewide/practice\\_guidelines/guidelines/acutestressdisorderp tsd.pdf](http://psychiatryonline.org/pb/assets/raw/sitewide/practice_guidelines/guidelines/acutestressdisorderp tsd.pdf). Accessed September 27, 2024.
46. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention. 2024; <https://ginasthma.org/2024-report/>. Accessed September 27, 2024.
47. U.S. Department of Veterans Affairs. VA/DoD Clinical Practice Guidelines. Updated September 24, 2024; <https://www.healthquality.va.gov/>. Accessed September 29, 2024.
48. U.S. Department of Veterans Affairs. VA/DoD Clinical Practice Guidelines for the management of major depressive disorder. 2022; <https://www.healthquality.va.gov/guidelines/MH/mdd/VADoDMDDCPGFinal508.pdf>. Accessed September 27, 2024.
49. U.S. Department of Veterans Affairs. VA/DoD Clinical Practice Guidelines for the management of stroke rehabilitation. 2024; [https://www.healthquality.va.gov/guidelines/Rehab/stroke/VADOD-2024-Stroke-Rehab-CPG-Full-CPG\\_final\\_508.pdf](https://www.healthquality.va.gov/guidelines/Rehab/stroke/VADOD-2024-Stroke-Rehab-CPG-Full-CPG_final_508.pdf) Accessed September 26, 2024.
50. Centers for Medicare and Medicaid Services. National Coverage Determination (NCD) for Biofeedback (30.1). n.d.; <https://www.cms.gov/medicare-coverage-database/details/ncd-details.aspx?NCDId=41>. Accessed September 27, 2024.