



## Medical Policy

# Electrical Bone Growth Stimulation of the Appendicular Skeleton

### Table of Contents

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

### Policy Number: 499

BCBSA Reference Number: 7.01.07

NCD/LCD: Local Coverage Determination (LCD): Osteogenesis Stimulators (L33796)

### Related Policies

- Ultrasound Accelerated Fracture Healing Device, [#497](#)
- Electrical Stimulation of the Spine as an Adjunct to Spinal Fusion Procedures, [#498](#)
- Bone Morphogenetic Protein, [#097](#)

### Policy

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

Noninvasive electrical bone growth stimulation may be **MEDICALLY NECESSARY** as treatment of fracture nonunions or congenital pseudarthrosis in the appendicular skeleton (the appendicular skeleton includes the bones of the shoulder girdle, upper extremities, pelvis, and lower extremities). The diagnosis of fracture nonunion must meet **ALL** of the following criteria:

- At least 3 months have passed since the date of fracture;
- Serial radiographs have confirmed that no progressive signs of healing have occurred;
- The fracture gap is 1 cm or less;
- The patient can be adequately immobilized; and
- The patient is of an age likely to comply with non-weight bearing for fractures of the pelvis and lower extremities.

**INVESTIGATIONAL** applications of electrical bone growth stimulation include, but are not limited to, delayed union, fresh fracture, stress fractures, immediate postsurgical treatment after appendicular skeletal surgery, arthrodesis or failed arthrodesis.

Implantable and semi-invasive electrical bone growth stimulators are **INVESTIGATIONAL**.

**Fracture Nonunion:** No consensus on the definition of fracture nonunion currently exists. One proposed definition is failure of progression of fracture healing for at least 3 consecutive months (and for at least 6 months following the fracture), accompanied by clinical symptoms of delayed union or nonunion (pain, difficulty bearing weight) (Bhandari et al, 2012).

The original U.S. Food and Drug Administration (FDA) labeling of fracture nonunions defined them as fractures not showing progressive healing after at least 9 months from the original injury. The labeling states: “A nonunion is considered to be established when a minimum of 9 months has elapsed since injury and the fracture site shows no visibly progressive signs of healing for minimum of 3 months.” This time frame is not based on physiologic principles but was included as part of the research design for FDA approval as a means of ensuring homogeneous populations of patients, many of whom were serving as their own controls. Others have contended that 9 months represents an arbitrary cutoff point that does not reflect the complicated variables present in fractures (ie, degree of soft tissue damage, alignment of the bone fragments, vascularity, quality of the underlying bone stock). Some fractures may show no signs of healing, based on serial radiographs as early as 3 months, while a fracture nonunion may not be diagnosed in others until well after 9 months. The current policy of requiring a 3-month timeframe for lack of progression of healing is consistent with the definition of nonunion as described in the clinical literature.

**Delayed Union:** Delayed union is defined as a decelerating healing process as determined by serial radiographs, together with a lack of clinical and radiologic evidence of union, bony continuity, or bone reaction at the fracture site for no less than 3 months from the index injury or the most recent intervention. In contrast, nonunion serial radiographs (described above) show no evidence of healing. When lumped together, delayed union and nonunion are sometimes referred to as “united fractures.”

**Fresh Fracture:** A fracture is most commonly defined as “fresh” for 7 days after its occurrence. Most fresh closed fractures heal without complications with the use of standard fracture care (ie, closed reduction, cast immobilization).

## Medicare HMO Blue<sup>SM</sup> and Medicare PPO Blue<sup>SM</sup> Members

Medical necessity criteria and coding guidance for **Medicare Advantage members living in Massachusetts** can be found through the link below.

[Local Coverage Determinations \(LCDs\) for National Government Services, Inc.](#)

Local Coverage Determination (LCD): Osteogenesis Stimulators (L33796)

**Note:** To review the specific LCD, please remember to click “accept” on the CMS licensing agreement at the bottom of the CMS webpage.

For medical necessity criteria and coding guidance for **Medicare Advantage members living outside of Massachusetts**, please see the Centers for Medicare and Medicaid Services website at <https://www.cms.gov> for information regarding your specific jurisdiction.

## 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)	Prior authorization is <b>not required</b> .
Commercial PPO and Indemnity	Prior authorization is <b>not required</b> .
Medicare HMO Blue <sup>SM</sup>	Prior authorization is <b>not required</b> .
Medicare PPO Blue <sup>SM</sup>	Prior authorization is <b>not required</b> .

## 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.*

**The above medical necessity criteria MUST be met for the following codes to be covered for Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity:**

### **CPT Codes**

<b>CPT codes:</b>	<b>Code Description</b>
20974	Electrical stimulation to aid bone healing; noninvasive (non-operative)
20975	Electrical stimulation to aid bone healing; invasive (operative)

### **HCPCS Codes**

<b>HCPCS codes:</b>	<b>Code Description</b>
E0747	Osteogenesis stimulator, electrical, noninvasive, other than spinal applications
E0749	Osteogenesis stimulator, electrical, surgically implanted

### **Description**

#### **Treatment of Delayed and Nonunion Fractures**

Individuals with recognized delayed fracture unions might begin by reducing the risk factors for delayed unions or nonunions but may progress to surgical repair if it persists.

#### **Electrical and Electromagnetic Bone Growth Stimulators**

Different applications of electrical and electromagnetic fields have been used to promote healing of delayed and nonunion fractures: invasive, noninvasive, and semi-invasive.

Invasive stimulation involves the surgical implantation of a cathode at the fracture site to produce direct current electrical stimulation. Invasive devices require surgical implantation of a current generator in an intramuscular or subcutaneous space, while an electrode is implanted within the fragments of bone graft at the fusion site. The implantable device typically remains functional for 6 to 9 months after implantation, and although the current generator is removed in a second surgical procedure when stimulation is completed, the electrode may or may not be removed. Implantable electrodes provide constant stimulation at the nonunion or fracture site but carry increased risks associated with implantable leads.

Noninvasive electrical bone growth stimulators generate a weak electrical current within the target site using pulsed electromagnetic fields, capacitive coupling, or combined magnetic fields. In capacitive coupling, small skin pads/electrodes are placed on either side of the fusion site and worn for 24 hours a day until healing occurs or up to 9 months. In contrast, pulsed electromagnetic fields are delivered via treatment coils placed over the skin and worn for 6 to 8 hours a day for 3 to 6 months. Combined magnetic fields deliver a time-varying magnetic field by superimposing the time-varying magnetic field onto an additional static magnetic field. This device involves a 30-minute treatment per day for 9 months. Patient compliance may be an issue with externally worn devices.

Semi-invasive (semi-implantable) stimulators use percutaneous electrodes and an external power supply, obviating the need for a surgical procedure to remove the generator when treatment is finished.

## Summary

In the appendicular skeleton, electrical stimulation with either implantable electrodes or noninvasive surface stimulators has been investigated to facilitate the healing of fresh fractures, stress fractures, delayed union, nonunion, congenital pseudarthrosis, and arthrodesis.

### Noninvasive Electrical Bone Growth Stimulation

For individuals who have fracture nonunion who receive noninvasive electrical bone growth stimulation, the evidence includes randomized controlled trials (RCTs) and systematic reviews of RCTs. Relevant outcomes are symptoms, change in disease status, and functional outcomes. The U.S. Food and Drug Administration (FDA) has approved noninvasive electrical bone growth stimulation for fracture nonunions and congenital pseudarthrosis in the appendicular skeleton, based largely on studies with patients serving as their controls. There is also evidence from 2 small sham-controlled randomized trials that noninvasive electrical stimulators improve fracture healing for patients with fracture nonunion. There are few nonsurgical options in this population, and the pre-post studies of patients with nonhealing fractures support the efficacy of the treatment. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have delayed fracture union who receive noninvasive electrical bone growth stimulation, the evidence includes RCTs and systematic reviews of RCTs. Relevant outcomes are symptoms, change in disease status, and functional outcomes. RCTs on the delayed union of fractures were limited by small sample sizes and did not show significant differences in outcomes between study groups. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have fresh fracture(s) who receive noninvasive electrical bone growth stimulation, the evidence includes RCTs and systematic reviews of RCTs. Relevant outcomes are symptoms, change in disease status, and functional outcomes. A meta-analysis of 5 RCTs found no statistically significant benefit of electrical bone growth stimulation for fresh fractures. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have stress fracture(s) who receive noninvasive electrical bone growth stimulation, the evidence includes an RCT. Relevant outcome are symptoms, change in disease status, and functional outcomes. This well-conducted RCT found that, although an increase in the hours of use per day was associated with a reduction in the time to healing, there was no difference in the rate of healing between treatment and placebo. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have had surgery of the appendicular skeleton who receive noninvasive electrical bone growth stimulation, the evidence includes 2 small RCTs. Relevant outcomes are symptoms, change in disease status, and functional outcomes. Although the results of 1 trial suggest benefits to the bone stimulation in decreased time to union, clinical outcomes were not assessed. The evidence is insufficient to determine the effects of the technology on health outcomes.

### Implantable and Semi-Invasive Bone Growth Stimulation

For individuals who have fracture, pseudarthrosis, or who have had surgery of the appendicular skeleton who receive implantable and semi-invasive electrical bone growth stimulation, the evidence includes a small number of case series. Relevant outcomes are symptoms, change in disease status, and functional outcomes. The evidence is insufficient to determine the effects of the technology on health outcomes.

## Policy History

Date	Action
6/2020	BCBSA National medical policy review. Pseudarthrosis added to the policy; statements otherwise unchanged.
5/2019	BCBSA National medical policy review. Description, summary and references updated. Policy statements unchanged.
5/2017	New references added from BCBSA National medical policy.

9/2016	Clarified coding information.
2/2015	New references added from BCBSA National medical policy.
7/2014	Updated Coding section with ICD10 procedure and diagnosis codes, effective 10/2015.
6/2014	BCBSA National medical policy review. New investigational indications described; medically necessary indications clarified. Effective 6/1/2014.
12/2013	Removed reference to NCD 150.2 as the LCD for Massachusetts (L11501) meets the intent of the policy. Removed ICD-9 diagnosis codes 966.49, V45.4 as these do not meet the intent of the policy.
4/2013	BCBSA National medical policy review. New investigational indications described. Effective 4/1/2013.
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 Medicine and Rheumatology. No changes to policy statements.
4/2011	BCBSA National medical policy review. No changes to policy statements.
7/2010	Reviewed - Medical Policy Group - Orthopedics, Rehabilitation Medicine and Rheumatology. No changes to policy statements.
12/2009	BCBSA National medical policy review. Changes to policy statements.
7/2009	Reviewed - Medical Policy Group - Orthopedics, Rehabilitation Medicine and Rheumatology. No changes to policy statements.
7/2008	Reviewed - Medical Policy Group - Orthopedics, Rehabilitation Medicine and Rheumatology. No changes to policy statements.
4/2008	BCBSA National medical policy review. No changes to policy statements.
2/2008	BCBSA National medical policy review. Changes to policy statements.
7/2007	Reviewed - Medical Policy Group - Orthopedics, Rehabilitation Medicine and Rheumatology. No changes to policy statements.
6/2007	BCBSA National medical policy review. Changes to policy statements.

## 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. Bhandari M, Fong K, Sprague S, et al. Variability in the definition and perceived causes of delayed unions and nonunions: a cross-sectional, multinational survey of orthopaedic surgeons. J Bone Joint Surg Am. Aug 1 2012;94(15):e1091-1096. PMID 22854998
2. Buza JA, 3rd, Einhorn T. Bone healing in 2016. Clin Cases Miner Bone Metab. May-Aug 2016;13(2):101-105. PMID 27920804
3. Ahl T, Andersson G, Herberts P, et al. Electrical treatment of non-united fractures. Acta Orthop Scand. Dec 1984;55(6):585-588. PMID 6335345
4. Connolly JF. Selection, evaluation and indications for electrical stimulation of ununited fractures. Clin Orthop Relat Res. Nov-Dec 1981(161):39-53. PMID 6975690
5. Connolly JF. Electrical treatment of nonunions. Its use and abuse in 100 consecutive fractures. Orthop Clin North Am. Jan 1984;15(1):89-106. PMID 6607443
6. de Haas WG, Beaupre A, Cameron H, et al. The Canadian experience with pulsed magnetic fields in the treatment of ununited tibial fractures. Clin Orthop Relat Res. Jul 1986(208):55-58. PMID 3720140
7. Sharrard WJ, Sutcliffe ML, Robson MJ, et al. The treatment of fibrous non-union of fractures by pulsing electromagnetic stimulation. J Bone Joint Surg Br. Jan 1982;64(2):189-193. PMID 6978339
8. Aleem IS, Aleem I, Evaniew N, et al. Efficacy of electrical stimulators for bone healing: a meta-analysis of randomized sham-controlled trials. Sci Rep. Aug 19 2016;6:31724. PMID 27539550

9. Simonis RB, Parnell EJ, Ray PS, et al. Electrical treatment of tibial non-union: a prospective, randomised, double-blind trial. *Injury*. Apr 2003;34(5):357-362. PMID 12719164
10. Barker AT, Dixon RA, Sharrard WJ, et al. Pulsed magnetic field therapy for tibial non-union. Interim results of a double-blind trial. *Lancet*. May 5 1984;1(8384):994-996. PMID 6143970
11. Scott G, King JB. A prospective, double-blind trial of electrical capacitive coupling in the treatment of non-union of long bones. *J Bone Joint Surg Am*. Jun 1994;76(6):820-826. PMID 8200888
12. Shi HF, Xiong J, Chen YX, et al. Early application of pulsed electromagnetic field in the treatment of postoperative delayed union of long-bone fractures: a prospective randomized controlled study. *BMC Musculoskelet Disord*. Jan 19 2013;14:35. PMID 23331333
13. Sharrard WJ. A double-blind trial of pulsed electromagnetic fields for delayed union of tibial fractures. *J Bone Joint Surg Br*. May 1990;72(3):347-355. PMID 2187877
14. Griffin XL, Warner F, Costa M. The role of electromagnetic stimulation in the management of established non- union of long bone fractures: what is the evidence? *Injury*. Apr 2008;39(4):419-429. PMID 18321512
15. Blue Cross and Blue Shield Association Technology Evaluation Center (TEC). Electrical bone growth stimulation for delayed union or nonunion of fractures. TEC Assessment. 1992:Volume 7:332-351.
16. Griffin XL, Costa ML, Parsons N, et al. Electromagnetic field stimulation for treating delayed union or non-union of long bone fractures in adults. *Cochrane Database Syst Rev*. Apr 13 2011(4):CD008471. PMID 21491410
17. Adie S, Harris IA, Naylor JM, et al. Pulsed electromagnetic field stimulation for acute tibial shaft fractures: a multicenter, double-blind, randomized trial. *J Bone Joint Surg Am*. Sep 7 2011;93(17):1569-1576. PMID 21915570
18. Faldini C, Cadossi M, Luciani D, et al. Electromagnetic bone growth stimulation in patients with femoral neck fractures treated with screws: prospective randomized double-blind study. *Curr Orthop Pract*. 2010;21(3):282- 287.
19. Hannemann PF, Gottgens KW, van Wely BJ, et al. The clinical and radiological outcome of pulsed electromagnetic field treatment for acute scaphoid fractures: a randomised double-blind placebo-controlled multicentre trial. *J Bone Joint Surg Br*. Oct 2012;94(10):1403-1408. PMID 23015569
20. Hannemann PF, van Wezenbeek MR, Kolkman KA, et al. CT scan-evaluated outcome of pulsed electromagnetic fields in the treatment of acute scaphoid fractures: a randomised, multicentre, double-blind, placebo-controlled trial. *Bone Joint J*. Aug 2014;96-B(8):1070-1076. PMID 25086123
21. Martinez-Rondanelli A, Martinez JP, Moncada ME, et al. Electromagnetic stimulation as coadjuvant in the healing of diaphyseal femoral fractures: a randomized controlled trial. *Colomb Med (Cali)*. Apr-Jun 2014;45(2):67-71. PMID 25100891
22. Beck BR, Matheson GO, Bergman G, et al. Do capacitively coupled electric fields accelerate tibial stress fracture healing? A randomized controlled trial. *Am J Sports Med*. Mar 2008;36(3):545-553. PMID 18055921
23. Borsalino G, Bagnacani M, Bettati E, et al. Electrical stimulation of human femoral intertrochanteric osteotomies. Double-blind study. *Clin Orthop Relat Res*. Dec 1988(237):256-263. PMID 3191636
24. Dhawan SK, Conti SF, Towers J, et al. The effect of pulsed electromagnetic fields on hindfoot arthrodesis: a prospective study. *J Foot Ankle Surg*. Mar-Apr 2004;43(2):93-96. PMID 15057855
25. Petrisor B, Lau JT. Electrical bone stimulation: an overview and its use in high risk and Charcot foot and ankle reconstructions. *Foot Ankle Clin*. Dec 2005;10(4):609-620, vii-viii. PMID 16297822
26. Lau JT, Stamatis ED, Myerson MS, et al. Implantable direct-current bone stimulators in high-risk and revision foot and ankle surgery: a retrospective analysis with outcome assessment. *Am J Orthop (Belle Mead NJ)*. Jul 2007;36(7):354-357. PMID 17694182
27. Saxena A, DiDomenico LA, Widtfeldt A, et al. Implantable electrical bone stimulation for arthrodeses of the foot and ankle in high-risk patients: a multicenter study. *J Foot Ankle Surg*. Nov-Dec 2005;44(6):450-454. PMID 16257674
28. Centers for Medicare & Medicaid Services. National Coverage Determination (NCD) for Osteogenic Stimulators (150.2). 2005; [https://www.cms.gov/medicare-coverage-database/details/ncd-details.aspx?NCDId=65&ncdver=2&DocID=150.2&ncd\\_id=150.2&ncd\\_version=2&basket=ncd%25253A150%25252E2%25253A2%25253AOsteogenic+Stimulators&bc=gAAAAABAAAA&](https://www.cms.gov/medicare-coverage-database/details/ncd-details.aspx?NCDId=65&ncdver=2&DocID=150.2&ncd_id=150.2&ncd_version=2&basket=ncd%25253A150%25252E2%25253A2%25253AOsteogenic+Stimulators&bc=gAAAAABAAAA&). Accessed February 24, 2020.