MEDICAL POLICY

POLICY TITLE	EXTRACORPOREAL SHOCK WAVE TREATMENT FOR PLANTAR FASCIITIS AND OTHER MUSCULOSKELETAL CONDITIONS
POLICY NUMBER	MP-2.034

Original Issue Date (Created):	**7/1/2002**
Most Recent Review Date (Revised):	**3/23/2020**
Effective Date:	**6/1/2020**

I. POLICY

Extracorporeal shock wave therapy (ESWT) using either a high- or low-dose protocol or radial ESWT, is considered **investigational** as a treatment of musculoskeletal conditions, including but not limited to plantar fasciitis; tendinopathies including tendinitis of the shoulder, tendinitis of the elbow (lateral epicondylitis), Achilles tendinitis and patellar tendinitis; stress fractures; avascular necrosis of the femoral head; delayed union and non-union of fractures; and spasticity. There is insufficient evidence to support a conclusion concerning the health outcomes or benefits associated with this procedure.

II. PRODUCT VARIATIONS

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This policy is only applicable to certain programs and products administered by Capital BlueCross and subject to benefit variations as discussed in Section VI. Please see additional information below.

FEP PPO: Refer to FEP Medical Policy Manual MP-2.01.40, Extracorporeal Shock Wave Treatment for Plantar Fasciitis and Other Musculoskeletal Conditions. The FEP Medical Policy Manual can be found at: https://www.fepblue.org/benefit-plans/medical-policies-and-utilization-management-guidelines/medical-policies.

III. DESCRIPTION/BACKGROUND

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CHRONIC MUSCULOSKELETAL CONDITIONS

Chronic musculoskeletal conditions (e.g., tendinitis) can be associated with a substantial degree of scarring and calcium deposition. Calcium deposits may restrict motion and encroach on other structures, such as nerves and blood vessels, causing pain and decreased function. One

hypothesis is that disruption of calcific deposits by shock waves may loosen adjacent structures and promote resorption of calcium, thereby decreasing pain and improving function.

Plantar Fasciitis

Plantar fasciitis is a common ailment characterized by deep pain in the plantar aspect of the heel, particularly on arising from bed. While the pain may subside with activity, in some patients the pain persists, interrupting activities of daily living. On physical examination, firm pressure will elicit a tender spot over the medial tubercle of the calcaneus. The exact etiology of plantar fasciitis is unclear, although repetitive injury is suspected. Heel spurs are a common associated finding, although it is unproven that heel spurs cause the pain. Asymptomatic heel spurs can be found in up to 10% of the population.

Tendinitis and Tendinopathies

Common tendinitis and tendinopathy syndromes are summarized in Table 1. Many tendinitis and tendinopathy syndromes are related to overuse injury.

Table 1. Tendinitis and Tendinopathy Syndromes

Disorder	Location	Symptoms	Conservative Therapy	Other Therapies
Lateral epicondylitis ("tennis elbow")	Lateral elbow (insertion of wrist extensors)	Tenderness over lateral epicondyle and proximal wrist extensor muscle mass; pain with resisted wrist extension with elbow in full extension; pain with passive terminal wrist flexion with elbow in full extension	□ Rest □ Activity modification □ NSAIDs □ Physical therapy □ Orthotic devices	Corticosteroid injections; joint débridement (open or laparoscopic)
Shoulder tendinopathy	Rotator cuff muscle tendons, most commonly supraspinatus	Pain with overhead activity	□ Rest □ Ice □ NSAIDs □ Physical therapy	Corticosteroid injections
Achilles tendinopathy	Achilles tendon	Pain or stiffness 2-6 cm above the posterior calcaneus	□ Avoidance of aggravating	Surgical repair for tendon

			activities □ Ice when symptomatic □ NSAIDs □ Heel lift	rupture
Patellar tendinopathy ("jumper's knee")	Proximal tendon at lower pole of patella	Pain over anterior knee and patellar tendon; may progress to tendon calcification and/or tear	□ Ice □ Supportive taping □ Patellar tendon straps □ NSAIDs	

Fracture Nonunion and Delayed Union

The definition of a fracture nonunion remains controversial, particularly the duration necessary to define nonunion. One proposed definition is a failure of progression of fracture healing for at least 3 consecutive months (and at least 6 months after the fracture) accompanied by clinical symptoms of delayed/nonunion (pain, difficulty weight bearing). The following criteria to define nonunion were used to inform this review:

- at least 3 months 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; and
- the patient can be adequately immobilized and is of an age likely to comply with nonweight bearing.

The delayed union can be 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 show no evidence of healing.)

Other Musculoskeletal and Neurologic Conditions

Other musculoskeletal conditions include medial tibial stress syndrome, osteonecrosis (avascular necrosis) of the femoral head, coccydynia, and painful stump neuromas. Neurologic conditions include spasticity, which refers to a motor disorder characterized by increased velocity-dependent stretch reflexes. It is a characteristic of upper motor neuron dysfunction, which may be due to a variety of pathologies.

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Treatment
Most cases of plantar fasciitis are treated with conservative therapy, including rest or minimization of running and jumping, heel cups, and nonsteroidal-anti-inflammatory drugs. Local steroid injection may also be used. Improvement may take up to 1 year in some cases.

For tendinitis and tendinopathy syndromes, conservative treatment often involves rest, activity modifications, physical therapy, and anti-inflammatory medications (see Table 1).

Extracorporeal Shock Wave Therapy
Also known as orthotripsy, extracorporeal shock wave therapy (ESWT) has been available since the early 1980s for the treatment of renal stones and has been widely investigated for the treatment of biliary stones. ESWT uses externally applied shock waves to create a transient pressure disturbance, which disrupts solid structures, breaking them into smaller fragments, thus allowing spontaneous passage and/or removal of stones. The mechanism by which ESWT might have an effect on musculoskeletal conditions is not well-defined.

Other mechanisms are also thought to be involved in ESWT. Physical stimuli are known to activate endogenous pain control systems, and activation by shock waves may "reset" the endogenous pain receptors. Damage to endothelial tissue from ESWT may result in increased vessel wall permeability, causing increased diffusion of cytokines, which may, in turn, promote healing. Microtrauma induced by ESWT may promote angiogenesis and thus aid healing. Finally, shock waves have been shown to stimulate osteogenesis and promote callous formation in animals, which is the basis for trials of ESWT in delayed union or nonunion of bone fractures.

There are 2 types of ESWT: focused and radial. Focused ESWT sends medium- to high-energy shockwaves of single pressure pulses lasting microseconds, directed on a specific target using ultrasound or radiographic guidance. Radial ESWT (RSW) transmits low- to medium-energy shockwaves radially over a larger surface area. The Food and Drug Administration (FDA) approval was first granted in 2002 for focused ESWT devices and in 2007 for RSW devices.

REGULATORY STATUS
Currently, 6 focused ESWT devices have been approved by FDA through the premarket approval process for orthopedic use (see Table 2). FDA product code: NBN.

Table 2. FDA-Approved Extracorporeal Shock Wave Therapy Devices

Device Name	Approval Date	Delivery System Type	Indication
OssaTron® device (HealthTronics)	2000	Electrohydraulic delivery system	□ Chronic proximal plantar fasciitis, ie, pain persisting >6 mo and unresponsive to conservative management □ Lateral epicondylitis
Epos™ Ultra	2002	Electromagnetic	Plantar fasciitis

(Dornier)		delivery system	
Sonocur® Basic (Siemens)	2002	Electromagnetic delivery system	Chronic lateral epicondylitis (unresponsive to conservative therapy for >6 mo)
Orthospec™ Orthopedic ESWT (Medispec)	2005	Electrohydraulic spark-gap system	Chronic proximal plantar fasciitis in patients ≥18 y
Orbasone™ Pain Relief System (Orthometrix)	2005	High-energy sonic wave system	Chronic proximal plantar fasciitis in patients ≥18 y
Duolith® SD1 Shock Wave Therapy Device (Storz Medical AG)	2016	Electromagnetic delivery system	Chronic proximal plantar fasciitis in patients ≥18 y with history of failed alternative conservative therapies >6 mo

FDA: Food and Drug Administration

Both high-dose and low-dose protocols have been investigated. A high-dose protocol consists of a single treatment of high-energy shock waves (1300 mJ/mm^2). This painful procedure requires anesthesia. A low-dose protocol consists of multiple treatments, spaced 1 week to 1 month apart, in which lower dose shock waves are applied. This protocol does not require anesthesia. The FDA-labeled indication for the OssaTron® and Epos™ Ultra devices specifically describes a high-dose protocol, while the labeled indication for the Sonocur® device describes a low-dose protocol.

In 2007, Dolorclast® (EMS Electro Medical Systems), a radial ESWT, was approved by FDA through the premarket approval process. Radial ESWT is generated ballistically by accelerating a bullet to hit an applicator, which transforms the kinetic energy into radially expanding shock waves. Radial ESWT is described as an alternative to focused ESWT and is said to address larger treatment areas, thus providing potential advantages in superficial applications like tendinopathies. The FDA-approved indication is for the treatment of patients 18 years and older with chronic proximal plantar fasciitis and a history of unsuccessful conservative therapy. FDA product code: NBN.

IV. RATIONALE

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Summary of Evidence

For individuals who have plantar fasciitis who receive ESWT, the evidence includes 2 recent systematic reviews containing 9 RCTs each (8 overlapping RCTs). Relevant outcomes are symptoms, functional outcomes, quality of life, medication use, and treatment-related morbidity. While most of the same trials were included in both meta-analyses, pooled results were inconsistent. One meta-analysis reported that ESWT was beneficial in reducing pain, while the other reported nonsignificant findings in pain reduction. Reasons for the differing results include

lack of uniformity in the definitions of outcomes, and heterogeneity in ESWT protocols (focused vs radial, number and duration of shocks per treatment, number of treatments). The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have lateral epicondylitis who receive ESWT, the evidence includes small RCTs. Relevant outcomes are symptoms, functional outcomes, quality of life, medication use, and treatment-related morbidity. Overall, although some RCTs have demonstrated benefits in pain and functional outcomes associated with ESWT, the limited amount of high-quality RCT evidence precludes conclusions about the efficacy of ESWT for lateral epicondylitis. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have shoulder tendinopathy who receive ESWT, the evidence includes 2 network meta-analyses as well as several systematic reviews and meta-analyses of RCTs. Relevant outcomes are symptoms, functional outcomes, quality of life, medication use, and treatment-related morbidity. The network meta-analyses focused on 3 outcomes: pain reduction, functional assessment, and change in calcific deposits. One network meta-analysis separated trials using high-energy focused ESWT (H-FSW), low-energy ESWT, and radial ESWT (RSW). This analysis reported the most effective treatment for pain reduction was ultrasound-guided needling, followed by RSW and H-FSW. The only treatment showing a benefit in functional outcomes was H-FSW. For the largest change in calcific deposits, the most effective treatment was ultrasound-guided needling, followed by RSW, then H-FSW. Many of the RCTs were judged of poor quality. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have Achilles tendinopathy who receive ESWT, the evidence includes systematic reviews of RCTs, an RCT published after the systematic review, and nonrandomized studies. Relevant outcomes are symptoms, functional outcomes, quality of life, medication use, and treatment-related morbidity. In the most recent systematic review, a pooled analysis found that ESWT reduced both short- and long-term pain compared with nonoperative treatments, although reviewers warned that results were inconsistent across the RCTs and that there was heterogeneity across studies (e.g., patient populations, treatment protocols). An RCT published after the systematic review compared ESWT with hyaluronan injections and reported improvements in both treatment groups, although the improvements were significantly higher in the injection group. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have patellar tendinopathy who receive ESWT, the evidence includes systematic reviews of small studies, an RCT published after the systematic review, and a nonrandomized study. Relevant outcomes are symptoms, functional outcomes, quality of life, medication use, and treatment-related morbidity. The studies reported inconsistent results. Many had methodologic deficiencies such as small numbers, short follow-up periods, and heterogeneous treatment protocols. Results from a nonrandomized study suggested that the location of the patellar tendinopathy might impact the response to ESWT (patients with retropatella fat extension did not respond to RSW compared with patients with tendon

involvement). The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have medial tibial stress syndrome who receive ESWT, the evidence includes a small RCT and a small nonrandomized cohort study. Relevant outcomes are symptoms, functional outcomes, quality of life, medication use, and treatment-related morbidity. The RCT reported no difference in self-reported pain between study groups. The cohort study reported improvements with ESWT, although selection bias impacted the strength of the conclusions. The available evidence is limited and inconsistent; it does not permit conclusions about the benefits of ESWT for medial tibial stress syndrome. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have osteonecrosis of the femoral head who receive ESWT, the evidence includes 2 systematic reviews of small, mostly nonrandomized studies. Relevant outcomes are symptoms, functional outcomes, quality of life, medication use, and treatment-related morbidity. While many of the studies have suggested that ESWT might be effective in improving motor function and reducing pain, particularly in patients with early-stage osteonecrosis, the studies were judged of low quality based on lack of blinding, lack of comparators, small sample sizes, short follow-up, and variations in treatment protocols. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have nonunion or delayed union who receive ESWT, the evidence includes a systematic review of an RCT and several case series, as well as 2 RCTs published after the systematic review. Relevant outcomes are symptoms, functional outcomes, quality of life, medication use, and treatment-related morbidity. Reviewers concluded that the evidence was inconsistent and of poor quality. Data pooling was not possible due to the heterogeneity of outcome definitions and treatment protocols. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have spasticity who receive ESWT, the evidence includes RCTs and systematic reviews. Relevant outcomes are symptoms, functional outcomes, quality of life, medication use, and treatment-related morbidity. As a treatment for spasticity, several small studies have demonstrated ESWT provides short-term improvements in Modified Ashworth Scale scores, but direct evidence on the effect of ESWT on more clinically meaningful measures (e.g., pain, function) are lacking. Differences in treatment parameters among studies, including energy dosage, method of generating and directing shock waves, and use or absence of anesthesia, limit generalizations about the evidence base. The evidence is insufficient to determine the effects of the technology on health outcomes.

V. DEFINITIONS

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FASCIOTOMY refers to a surgical incision into an area of fascia (connective tissue).

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VI. BENEFIT VARIATIONS

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The existence of this medical policy does not mean that this service is a covered benefit under the member's health benefit plan. Benefit determinations should be based in all cases on the applicable health benefit plan language. Medical policies do not constitute a description of benefits. A member's health benefit plan governs which services are covered, which are excluded, which are subject to benefit limits and which require preauthorization. There are different benefit plan designs in each product administered by Capital BlueCross. Members and providers should consult the member's health benefit plan for information or contact Capital BlueCross for benefit information.

VII. DISCLAIMER

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Capital BlueCross's medical policies are developed to assist in administering a member's benefits, do not constitute medical advice and are subject to change. Treating providers are solely responsible for medical advice and treatment of members. Members should discuss any medical policy related to their coverage or condition with their provider and consult their benefit information to determine if the service is covered. If there is a discrepancy between this medical policy and a member's benefit information, the benefit information will govern. If a provider or a member has a question concerning the application of this medical policy to a specific member's plan of benefits, please contact Capital BlueCross' Provider Services or Member Services. Capital BlueCross considers the information contained in this medical policy to be proprietary and it may only be disseminated as permitted by law.

VIII. CODING INFORMATION

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Note: This list of codes may not be all-inclusive, and codes are subject to change at any time. The identification of a code in this section does not denote coverage as coverage is determined by the terms of member benefit information. In addition, not all covered services are eligible for separate reimbursement.

Investigational; therefore, not covered:

CPT Codes®								
0101T	0102T	20999	28890					

IX. REFERENCES

TOP

1. *Blue Cross and Blue Shield Association Technology Evaluation Center (TEC). Extracorporeal shockwave treatment for musculoskeletal indications. TEC Assessments. 2001;Volume 16:Tab 20.*

2. *Blue Cross and Blue Shield Association Technology Evaluation Center (TEC). Extracorporeal shock wave treatment for musculoskeletal indications TEC Assessments. 2003;Volume 18:Tab 5.*
3. *Blue Cross and Blue Shield Association Technology Evaluation Center (TEC). Extracorporeal shock wave treatment for chronic plantar fasciitis. TEC Assessments. 2004;Volume 19:Tab 18.*
4. *Blue Cross and Blue Shield Association Technology Evaluation Center (TEC). Extracorporeal shock wave treatment for chronic tendonitis of the elbow TEC Assessments. 2004;Volume 19:Tab 16.*
5. *Canadian Agency for Drugs and Technologies in Health (CADTH). Rapid Response Report: Shockwave Therapy for Pain Associated with Upper Extremity Orthopedic Disorders: A Review of the Clinical and Cost-Effectiveness. 2016; https://www.cadth.ca/sites/default/files/pdf/htis/2016/RC0808-ShockwaveTx-Final.pdf. Accessed March 24, 2020.*
6. *Sun J, Gao F, Wang Y, et al. Extracorporeal shock wave therapy is effective in treating chronic plantar fasciitis: A meta-analysis of RCTs. Medicine (Baltimore). Apr 2017;96(15):e6621. PMID 28403111.*
7. *Dizon JN, Gonzalez-Suarez C, Zamora MT, et al. Effectiveness of extracorporeal shock wave therapy in chronic plantar fasciitis: a meta-analysis. Am J Phys Med Rehabil. Jul 2013;92(7):606-620. PMID 23552334.*
8. *Aqil A, Siddiqui MR, Solan M, et al. Extracorporeal shock wave therapy is effective in treating chronic plantar fasciitis: a meta-analysis of RCTs. Clin Orthop Relat Res. Nov 2013;471(11):3645-3652. PMID 23813184.*
9. *Zhiyun L, Tao J, Zengwu S. Meta-analysis of high-energy extracorporeal shock wave therapy in recalcitrant plantar fasciitis. Swiss Med Wkly. Jul 07 2013;143:w13825. PMID 23832373.*
10. *Lou J, Wang S, Liu S, et al. Effectiveness of extracorporeal shock wave therapy without local anesthesia in patients with recalcitrant plantar fasciitis: a meta-analysis of randomized controlled trials. Am J Phys Med Rehabil. Aug 2017;96(8):529-534. PMID 27977431.*
11. *Yin MC, Ye J, Yao M, et al. Is extracorporeal shock wave therapy clinical efficacy for relief of chronic, recalcitrant plantar fasciitis? A systematic review and meta-analysis of randomized placebo or active-treatment controlled trials. Arch Phys Med Rehabil. Aug 2014;95(8):1585-1593. PMID 24662810.*
12. *Gollwitzer H, Saxena A, DiDomenico LA, et al. Clinically relevant effectiveness of focused extracorporeal shock wave therapy in the treatment of chronic plantar fasciitis: a randomized, controlled multicenter study. J Bone Joint Surg Am. May 6 2015;97(9):701-708. PMID 25948515.*
13. *Food and Drug Administration. Summary of safety and effectiveness: Orbasone Pain Relief System. 2005; https://www.accessdata.fda.gov/cdrh_docs/pdf4/P040039b.pdf. Accessed March 24, 2020.*

14. *Food and Drug Administration. Summary of safety and effectiveness data: OrthospecTM Orthopedic ESWT. 2005; https://www.accessdata.fda.gov/cdrh_docs/pdf4/P040026b.pdf. Accessed March 24, 2020.*
15. *Gerdesmeyer L, Frey C, Vester J, et al. Radial extracorporeal shock wave therapy is safe and effective in the treatment of chronic recalcitrant plantar fasciitis: results of a confirmatory randomized placebo-controlled multicenter study. Am J Sports Med. Nov 2008;36(11):2100-2109. PMID 18832341.*
16. *Gollwitzer H, Diehl P, von Korff A, et al. Extracorporeal shock wave therapy for chronic painful heel syndrome: a prospective, double blind, randomized trial assessing the efficacy of a new electromagnetic shock wave device. J Foot Ankle Surg. Sep-Oct 2007;46(5):348-357. PMID 17761319.*
17. *Greve JM, Grecco MV, Santos-Silva PR. Comparison of radial shockwaves and conventional physiotherapy for treating plantar fasciitis. Clinics (Sao Paulo). Feb 2009;64(2):97-103. PMID 19219314.*
18. *Ibrahim MI, Donatelli RA, Schmitz C, et al. Chronic plantar fasciitis treated with two sessions of radial extracorporeal shock wave therapy. Foot Ankle Int. May 2010;31(5):391-397. PMID 20460065.*
19. *Ibrahim MI, Donatelli RA, Hellman M, et al. Long-term results of radial extracorporeal shock wave treatment for chronic plantar fasciopathy: A prospective, randomized, placebo-controlled trial with two years follow-up. J Orthop Res. Jul 2017;35(7):1532-1538. PMID 27567022.*
20. *Eslamian F, Shakouri SK, Jahanjoo F, et al. Extra corporeal shock wave therapy versus local corticosteroid injection in the treatment of chronic plantar fasciitis, a single blinded randomized clinical trial. Pain Med. Sep 2016;17(9):1722-1731. PMID 27282594.*
21. *Lai TW, Ma HL, Lee MS, et al. Ultrasonography and clinical outcome comparison of extracorporeal shock wave therapy and corticosteroid injections for chronic plantar fasciitis: A randomized controlled trial. J Musculoskelet Neuronal Interact. Mar 1 2018;18(1):47-54. PMID 29504578.*
22. *Cinar E, Saxena S, Uygur F. Combination therapy versus exercise and orthotic support in the management of pain in plantar fasciitis: a randomized controlled trial. Foot Ankle Int. Apr 2018;39(4):406-414. PMID 29327602.*
23. *Park JW, Yoon K, Chun KS, et al. Long-term outcome of low-energy extracorporeal shock wave therapy for plantar fasciitis: comparative analysis according to ultrasonographic findings. Ann Rehabil Med. Aug 2014;38(4):534-540. PMID 25229032.*
24. *Food and Drug Administration. Summary of safety and effectiveness: SONOCUR Basic. 2002; https://www.accessdata.fda.gov/cdrh_docs/pdf/P010039b.pdf. Accessed June 4, 2018.*
25. *Rompe JD, Decking J, Schoellner C, et al. Repetitive low-energy shock wave treatment for chronic lateral epicondylitis in tennis players. Am J Sports Med. Apr-May 2004;32(3):734-743. PMID 15090392.*
26. *Food and Drug Administration. Summary of safety and effectiveness: HealthTronicsTM OssaTron 2000; https://www.accessdata.fda.gov/cdrh_docs/pdf/P990086b.pdf. Accessed March 24, 2020.*

27. *Haake M, Konig IR, Decker T, et al. Extracorporeal shock wave therapy in the treatment of lateral epicondylitis : a randomized multicenter trial. J Bone Joint Surg Am. Nov 2002;84-A(11):1982-1991. PMID 12429759.*
28. *Buchbinder R, Green SE, Youd JM, et al. Shock wave therapy for lateral elbow pain. Cochrane Database Syst Rev. Oct 19 2005(4):CD003524. PMID 16235324.*
29. *Dingemanse R, Randsdorp M, Koes BW, et al. Evidence for the effectiveness of electrophysical modalities for treatment of medial and lateral epicondylitis: a systematic review. Br J Sports Med. Jun 2014;48(12):957-965. PMID 23335238.*
30. *Yang TH, Huang YC, Lau YC, et al. Efficacy of radial extracorporeal shock wave therapy on lateral epicondylosis, and changes in the common extensor tendon stiffness with pretherapy and posttherapy in real- time sonoelastography: a randomized controlled study. Am J Phys Med Rehabil. Feb 2017;96(2):93-100. PMID 27323324.*
31. *Capan N, Esmaeilzadeh S, Oral A, et al. Radial extracorporeal shock wave therapy is not more effective than placebo in the management of lateral epicondylitis: a double-blind, randomized, placebo-controlled trial. Am J Phys Med Rehabil. Jul 2016;95(7):495-506. PMID 26544854.*
32. *Lizis P. Analgesic effect of extracorporeal shock wave therapy versus ultrasound therapy in chronic tennis elbow. J Phys Ther Sci. Aug 2015;27(8):2563-2567. PMID 26357440.*
33. *Gunduz R, Malas FU, Borman P, et al. Physical therapy, corticosteroid injection, and extracorporeal shock wave treatment in lateral epicondylitis. Clinical and ultrasonographical comparison. Clin Rheumatol. May 2012;31(5):807-812. PMID 22278162.*
34. *Staples MP, Forbes A, Ptasznik R, et al. A randomized controlled trial of extracorporeal shock wave therapy for lateral epicondylitis (tennis elbow). J Rheumatol. Oct 2008;35(10):2038-2046. PMID 18792997.*
35. *Pettrone FA, McCall BR. Extracorporeal shock wave therapy without local anesthesia for chronic lateral epicondylitis. J Bone Joint Surg Am. Jun 2005;87(6):1297-1304. PMID 15930540.*
36. *Notarnicola A, Quagliarella L, Sasanelli N, et al. Effects of extracorporeal shock wave therapy on functional and strength recovery of handgrip in patients affected by epicondylitis. Ultrasound Med Biol. Dec 2014;40(12):2830- 2840. PMID 25308950.*
37. *Alessio-Mazzola M, Repetto I, Biti B, et al. Autologous US-guided PRP injection versus US-guided focal extracorporeal shock wave therapy for chronic lateral epicondylitis: A minimum of 2-year follow-up retrospective comparative study. J Orthop Surg (Hong Kong). Jan-Apr 2018;26(1):2309499017749986. PMID 29320964.*
38. *Wu YC, Tsai WC, Tu YK, et al. Comparative effectiveness of non-operative treatments for chronic calcific tendinitis of the shoulder: A systematic review and network meta-analysis of randomized-controlled trials. Arch Phys Med Rehabil. Aug 2017;98(8):1678-1692 e1676. PMID 28400182.*
39. *Arirachakaran A, Boonard M, Yamaphai S, et al. Extracorporeal shock wave therapy, ultrasound-guided percutaneous lavage, corticosteroid injection and combined treatment*

for the treatment of rotator cuff calcific tendinopathy: a network meta-analysis of RCTs. Eur J Orthop Surg Traumatol. Apr 2017;27(3):381-390. PMID 27554465.

40. *Ioppolo F, Tattoli M, Di Sante L, et al. Clinical improvement and resorption of calcifications in calcific tendinitis of the shoulder after shock wave therapy at 6 months' follow-up: a systematic review and meta-analysis. Arch Phys Med Rehabil. Sep 2013;94(9):1699-1706. PMID 23499780.*
41. *Verstraelen FU, In den Kleef NJ, Jansen L, et al. High-energy versus low-energy extracorporeal shock wave therapy for calcifying tendinitis of the shoulder: which is superior? A meta-analysis. Clin Orthop Relat Res. Sep 2014;472(9):2816-2825. PMID 24872197.*
42. *Bannuru RR, Flavin NE, Vaysbrot E, et al. High-energy extracorporeal shock-wave therapy for treating chronic calcific tendinitis of the shoulder: a systematic review. Ann Intern Med. Apr 15 2014;160(8):542-549. PMID 24733195.*
43. *Huisstede BM, Gebremariam L, van der Sande R, et al. Evidence for effectiveness of Extracorporal Shock-Wave Therapy (ESWT) to treat calcific and non-calcific rotator cuff tendinosis--a systematic review. Man Ther. Oct 2011;16(5):419-433. PMID 21396877.*
44. *Kvalvaag E, Roe C, Engebretsen KB, et al. One year results of a randomized controlled trial on radial Extracorporeal Shock Wave Treatment, with predictors of pain, disability and return to work in patients with subacromial pain syndrome. Eur J Phys Rehabil Med. Jun 27 2017. PMID 28655271.*
45. *Kvalvaag E, Brox JI, Engebretsen KB, et al. Effectiveness of radial extracorporeal shock wave therapy (rESWT) when combined with supervised exercises in patients with subacromial shoulder pain: a double-masked, randomized, sham-controlled trial. Am J Sports Med. Sep 2017;45(11):2547-2554. PMID 28586628.*
46. *Kim EK, Kwak KI. Effect of extracorporeal shock wave therapy on the shoulder joint functional status of patients with calcific tendinitis. J Phys Ther Sci. Sep 2016;28(9):2522-2524. PMID 27799684.*
47. *Kim YS, Lee HJ, Kim YV, et al. Which method is more effective in treatment of calcific tendinitis in the shoulder? Prospective randomized comparison between ultrasound-guided needling and extracorporeal shock wave therapy. J Shoulder Elbow Surg. Nov 2014;23(11):1640-1646. PMID 25219475.*
48. *Schofer MD, Hinrichs F, Peterlein CD, et al. High- versus low-energy extracorporeal shock wave therapy of rotator cuff tendinopathy: a prospective, randomised, controlled study. Acta Orthop Belg. Aug 2009;75(4):452- 458. PMID 19774810.*
49. *Liu S, Zhai L, Shi Z, et al. Radial extracorporeal pressure pulse therapy for the primary long bicipital tenosynovitis a prospective randomized controlled study. Ultrasound Med Biol. May 2012;38(5):727-735. PMID 22425375.*
50. *Mani-Babu S, Morrissey D, Waugh C, et al. The effectiveness of extracorporeal shock wave therapy in lower limb tendinopathy: a systematic review. Am J Sports Med. Mar 2015;43(3):752-761. PMID 24817008.*

51. *Al-Abbad H, Simon JV. The effectiveness of extracorporeal shock wave therapy on chronic achilles tendinopathy: a systematic review. Foot Ankle Int. Jan 2013;34(1):33-41. PMID 23386759.*
52. *Costa ML, Shepstone L, Donell ST, et al. Shock wave therapy for chronic Achilles tendon pain: a randomized placebo-controlled trial. Clin Orthop Relat Res. Nov 2005;440:199-204. PMID 16239807.*
53. *Rasmussen S, Christensen M, Mathiesen I, et al. Shockwave therapy for chronic Achilles tendinopathy: a double-blind, randomized clinical trial of efficacy. Acta Orthop. Apr 2008;79(2):249-256. PMID 18484252.*
54. *Lynen N, De Vroey T, Spiegel I, et al. Comparison of peritendinous hyaluronan injections versus extracorporeal shock wave therapy in the treatment of painful Achilles' tendinopathy: a randomized clinical efficacy and safety study. Arch Phys Med Rehabil. Jan 2017;98(1):64-71. PMID 27639439.*
55. *Wu Z, Yao W, Chen S, et al. Outcome of extracorporeal shock wave therapy for insertional Achilles tendinopathy with and without Haglund's deformity. Biomed Res Int. Nov 2016;2016:6315846. PMID 28042570.*
56. *Li S, Wang K, Sun H, et al. Clinical effects of extracorporeal shock-wave therapy and ultrasound-guided local corticosteroid injections for plantar fasciitis in adults: A meta-analysis of randomized controlled trials. Medicine (Baltimore). 2018 Dec;97(50):e13687. PMID: 30558080.*
57. *van Leeuwen MT, Zwerver J, van den Akker-Scheek I. Extracorporeal shockwave therapy for patellar tendinopathy: a review of the literature. Br J Sports Med. Mar 2009;43(3):163-168. PMID 18718975.*
58. *Thijs KM, Zwerver J, Backx FJ, et al. Effectiveness of shockwave treatment combined with eccentric training for patellar tendinopathy: a double-blinded randomized study. Clin J Sport Med. Mar 2017;27(2):89-96. PMID 27347857.*
59. *Smith J, Sellon JL. Comparing PRP injections With ESWT for athletes with chronic patellar tendinopathy. Clin J Sport Med. Jan 2014;24(1):88-89. PMID 24366015.*
60. *Williams H, Jones SA, Lyons C, et al. Refractory patella tendinopathy with failed conservative treatment-shock wave or arthroscopy? J Orthop Surg (Hong Kong). Jan 2017;25(1):2309499016684700. PMID 28118806.*
61. *Newman P, Waddington G, Adams R. Shockwave treatment for medial tibial stress syndrome: A randomized double blind sham-controlled pilot trial. J Sci Med Sport. Mar 2017;20(3):220-224. PMID 27640922.*
62. *Rompe JD, Cacchio A, Furia JP, et al. Low-energy extracorporeal shock wave therapy as a treatment for medial tibial stress syndrome. Am J Sports Med. Jan 2010;38(1):125-132. PMID 19776340.*
63. *Barnes M. Letter to the editor. "Low-energy extracorporeal shock wave therapy as a treatment for medial tibial stress syndrome". Am J Sports Med. Nov 2010;38(11):NP1; author reply NP1-2. PMID 20971968*

64. *Liao CD, Xie GM, Tsauo JY, et al. Efficacy of extracorporeal shock wave therapy for knee tendinopathies and other soft tissue disorders: a meta-analysis of randomized controlled trials. BMC Musculoskelet Disord. 2018 Aug 2;19(1):278. PMID: 30068324.*
65. *Zhang Q, Liu L, Sun W, et al. Extracorporeal shockwave therapy in osteonecrosis of femoral head: A systematic review of now available clinical evidences. Medicine (Baltimore). Jan 2017;96(4):e5897. PMID 28121934.*
66. *Alves EM, Angrisani AT, Santiago MB. The use of extracorporeal shock waves in the treatment of osteonecrosis of the femoral head: a systematic review. Clin Rheumatol. Nov 2009;28(11):1247-1251. PMID 19609482.*
67. *Han Y, Lee JK, Lee BY, et al. Effectiveness of lower energy density extracorporeal shock wave therapy in the early stage of avascular necrosis of the femoral head. Ann Rehabil Med. Oct 2016;40(5):871-877. PMID 27847717.*
68. *Zelle BA, Gollwitzer H, Zlowodzki M, et al. Extracorporeal shock wave therapy: current evidence. J Orthop Trauma. Mar 2010;24(Suppl 1):S66-70. PMID 20182240.*
69. *Wang CJ, Liu HC, Fu TH. The effects of extracorporeal shockwave on acute high-energy long bone fractures of the lower extremity. Arch Orthop Trauma Surg. Feb 2007;127(2):137-142. PMID 17053946.*
70. *Cacchio A, Giordano L, Colafarina O, et al. Extracorporeal shock-wave therapy compared with surgery for hypertrophic long-bone nonunions. J Bone Joint Surg Am. Nov 2009;91(11):2589-2597. PMID 19884432.*
71. *Zhai L, Ma XL, Jiang C, et al. Human autologous mesenchymal stem cells with extracorporeal shock wave therapy for nonunion of long bones. Indian J Orthop. Sep 2016;50(5):543-550. PMID 27746499.*
72. *Vidal X, Morral A, Costa L, et al. Radial extracorporeal shock wave therapy (rESWT) in the treatment of spasticity in cerebral palsy: A randomized, placebo-controlled clinical trial. NeuroRehabilitation. Jan 1 2011;29(4):413-419. PMID 22207070.*
73. *Santamato A, Micello MF, Panza F, et al. Extracorporeal shock wave therapy for the treatment of poststroke plantar-flexor muscles spasticity: a prospective open-label study. Top Stroke Rehabil. 2014;21(Suppl 1):S17-24. PMID 24722040.*
74. *Marwan Y, Husain W, Alhajii W, et al. Extracorporeal shock wave therapy relieved pain in patients with coccydynia: a report of two cases. Spine J. Jan 2014;14(1):e1-4. PMID 24094989.*
75. *Jung YJ, Park WY, Jeon JH, et al. Outcomes of ultrasound-guided extracorporeal shock wave therapy for painful stump neuroma. Ann Rehabil Med. Aug 2014;38(4):523-533. PMID 25229031.*
76. *Furia JP, Rompe JD, Maffulli N, et al. Radial extracorporeal shock wave therapy is effective and safe in chronic distal biceps tendinopathy. Clin J Sport Med. Sep 2017;27(5):430-437. PMID 27893487.*
77. *Hao Y, Guo H, Xu Z, et al. Meta-analysis of the potential role of extracorporeal shockwave therapy in osteonecrosis of the femoral head. J Orthop Surg Res. 2018 Jul 3;13(1):166. PMID: 29970103.*

78. *Thomas JL, Christensen JC, Kravitz SR, et al. The diagnosis and treatment of heel pain: a clinical practice guideline-revision 2010. J Foot Ankle Surg. May-Jun 2010;49(3 Suppl):S1-19. PMID 20439021.*
79. *National Institute for Health and Care Excellence (NICE). Extracorporeal shockwave lithotripsy for calcific tendonitis (tendonopathy) of the shoulder [IPG21]. 2003; https://www.nice.org.uk/guidance/ipg21. Accessed March 24, 2020*
80. *National Institute for Health and Care Excellence (NICE). Extracorporeal shockwave therapy for refractory tennis elbow [IPG313]. 2009; https://www.nice.org.uk/guidance/ipg313. Accessed March 24, 2020.*
81. *National Institute for Health and Care Excellence (NICE). Extracorporeal shockwave therapy for refractory plantar fasciitis: guidance [IPG311]. 2009; https://www.nice.org.uk/guidance/ipg311. Accessed March 24, 2020.*
82. *National Institute for Health and Care Excellence (NICE). Extracorporeal shockwave therapy for refractory greater trochanteric pain syndrome [IPG376]. 2011; https://www.nice.org.uk/guidance/ipg376. Accessed March 24, 2020.*
83. *National Institute for Health and Care Excellence (NICE). Extracorporeal shockwave therapy for Achilles tendinopathy [IPG571]. 2016; https://www.nice.org.uk/guidance/ipg571. Accessed March 24, 2020.*
84. *Ho C. Extracorporeal shock wave treatment for chronic plantar fasciitis (heel pain). Issues Emerg Health Technol. Jan 2007(96 part 1):1-4. PMID 17302019.*
85. *Ho C. Extracorporeal shock wave treatment for chronic lateral epicondylitis (tennis elbow). Issues Emerg Health Technol. Jan 2007(96 part 2):1-4. PMID 17302021.*
86. *Ho C. Extracorporeal shock wave treatment for chronic rotator cuff tendonitis (shoulder pain). Issues Emerg Health Technol. Jan 2007(96 part 3):1-4. PMID 17302022.*
90. *Blue Cross Blue Shield Association Medical Policy Reference Manual. 2.01.40, Extracorporeal Shock Wave Treatment for Plantar Fasciitis and Other Musculoskeletal Conditions. June 2018.*

X. POLICY HISTORY

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MP 2.034	**CAC 3/25/03**
	CAC 5/31/05
	CAC 4/25/06
	CAC 3/27/07
	CAC 5/27/08
	CAC 5/26/09
	CAC 5-25-10 Adopted BCBSA Medical Policy. No change in policy statement.
	CAC 4/26/11 Consensus
	CAC 6/26/12 Consensus review; no changes, references updated. **7/9/12-** FEP variation revised to refer to the FEP policy manual.

POLICY TITLE	EXTRACORPOREAL SHOCK WAVE TREATMENT FOR PLANTAR FASCIITIS AND OTHER MUSCULOSKELETAL CONDITIONS
POLICY NUMBER	MP-2.034

	02/13/2013- Removed unlisted cod e from policy
	7.16.13 Admin Review Complete
	CAC 9/24/13 Consensus review. References updated but no changes to the policy statements**.** Rationale added.
	CAC 7/22/14 Consensus. No change to policy statements. References updated.
	CAC 7/21/15 Consensus review**.** Editorial changes made for clarity to the policy statements; intent of policy statements unchanged. Background, reference and rationale update. Codes reviewed.
	CAC 7/26/16 Consensus review. No change to policy statements. Background, references and rationale updated. Coding reviewed.
	Administrative Update 11/23/16 Variation reformatting
	Administrative Update 1/1/17: Removed end dated code 0019T and added 20999 to replace; effective 1/1/17.
	CAC 9/26/17 Consensus review. No change to the policy statement. Background, references and rationale updated**.** Medicare variation added to L35094 Services That are Not Reasonable and Necessary as Medicare considers this procedure not reasonable or necessary**.** Coding reviewed.
	1/1/18 Admin Update: Medicare variations removed from Commercial Policies.
	7/02/18 Consensus review. Policy statement language reordered, but position unchanged. Description/Background, Rationale and Reference sections updated.
	4/25/19 Consensus review. No change to policy statements. Description/Background, summary of evidence and references reviewed.
	3/24/2020 Consensus Review. References updated. No changes to policy statement.

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