



## Ablation of Peripheral Nerves to Treat Pain

**Policy #** 00503

**Original Effective Date:** 05/18/2016

**Current Effective Date:** 05/13/2024

*Applies to all products administered or underwritten by Blue Cross and Blue Shield of Louisiana and its subsidiary, HMO Louisiana, Inc. (collectively referred to as the "Company"), unless otherwise provided in the applicable contract. Medical technology is constantly evolving, and we reserve the right to review and update Medical Policy periodically.*

*Note: Facet Radiofrequency Denervation is addressed separately in medical policy 00199.*

*Note: Spinal Cord Stimulation is addressed separately in medical policy 00260.*

*Note: Sacroiliac Joint Fusion is addressed separately in medical policy 00558.*

### Services Are Considered Investigational

*Coverage is not available for investigational medical treatments or procedures, drugs, devices or biological products.*

Based on review of available data, the Company considers radiofrequency ablation of peripheral nerves to treat pain associated with knee osteoarthritis or plantar fasciitis to be **investigational**.\*

Based on review of available data, the Company considers cryoneurolysis of peripheral nerves to treat pain associated with knee osteoarthritis or total knee arthroplasty to be **investigational**.\*

Based on review of available data, the Company considers radiofrequency ablation or cryoneurolysis of peripheral nerves to treat pain associated with occipital neuralgia or cervicogenic headache to be **investigational**.\*

Based on review of available data, the Company considers diagnostic block performed before planned ablation to be **investigational**.\*

Based on review of available data, the Company considers ablation of peripheral nerves to treat pain in all other conditions, with the exception of facet joint pain (see medical policy 00199) to be **investigational**.\*

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### **Background/Overview**

#### **Knee Osteoarthritis**

Knee osteoarthritis (OA) is common, and often the cause of substantial disability. Prevalence increases with age, from about 24% among those 60 to 64 years of age to as high as 40% in those 70 to 74 years of age. Knee osteoarthritis is characterized by pain upon initiation of movement or walking. As osteoarthritis progresses, the pain becomes continuous and joint functionality is severely impaired.

#### **Treatment**

Treatment for OA of the knee aims to alleviate pain and improve function. However, most treatments do not modify the natural history or progression of OA and are not considered curative. Nonsurgical modalities used include: exercise; weight loss; various supportive devices; acetaminophen or nonsteroidal anti-inflammatory drugs (eg, ibuprofen); nutritional supplements (glucosamine, chondroitin); and intra-articular viscosupplements. Corticosteroid injection may be considered when relief from nonsteroidal anti-inflammatory drugs is insufficient, or the patient is at risk of gastrointestinal adverse events. If symptom relief is inadequate with conservative measures, invasive treatments may be considered. Total knee arthroplasty is an operative treatment for symptomatic OA of the knee.

#### **Plantar Fasciitis**

Plantar fasciitis is a common cause of foot pain in adults, 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 individuals the pain persists and can impede 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 a repetitive injury is suspected. Heel spurs are a common associated finding, although it has never been proven that heel spurs cause the pain. Asymptomatic heel spurs can be found in up to 10% of the population.

#### **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.

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Policy # 00503

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### **Occipital Neuralgia**

Occipital neuralgia is a specific type of headache that is located on one side of the upper neck, back of the head, and behind the ears, and sometimes extending to the scalp, forehead, and behind the eyes. The pain, which may be piercing, throbbing, or electric-shock-like, follows the course of the greater and lesser occipital nerves. Occipital neuralgia is believed to occur due to pressure or irritation to the occipital nerves, which may result from injury, entrapment by tight muscles, or inflammation.

### **Treatment**

Treatment may include massage and rest, muscle relaxants, nerve blocks, and injection of steroids directly into the affected area.

### **Cervicogenic Headache**

Cervicogenic headache is a headache that is secondary to a disorder of the cervical spine. The pain may be referred from facet joints, intervertebral discs, or soft tissue. The pain is constant rather than throbbing, and may be aggravated by movements of the neck or pressure to certain areas on the neck. The first 3 cervical spinal nerves can refer pain to the head. The C1 suboccipital nerve innervates the atlanto-occipital joint; the C2 spinal nerve and the C3 dorsal ramus have close proximity to and innervate the C2-C3 facet joint. The C2-3 facet joint is the most frequent source of a cervicogenic headache. A diagnosis of a cervicogenic headache may be confirmed by an anesthetic block of the lateral atlanto-axial joint, the C2-3 facet joint, or the C3-4 facet joint.

### **Treatment**

Treatment may include nerve blocks, physical therapy, and exercise.

### **Nerve Radiofrequency Ablation**

Nerve radiofrequency ablation (RFA) is a minimally invasive method that involves the use of heat and coagulation necrosis to destroy tissue. A needle electrode is inserted through the skin and into the tissue to be ablated. A high-frequency electrical current is applied to the target tissue and a small sphere of tissue is coagulated around the needle by the heat generated. It is theorized that the thermal lesioning of the nerve destroys peripheral sensory nerve endings, resulting in the alleviation of pain. Cooled RFA is a variation of nerve RFA using a water-cooled probe that applies more energy at the desired location without excessive heat diffusing beyond the area, causing less tissue damage away from the nerve (see Table 1). The goal of ablating the nerve is the same.

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Policy # 00503

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Current Effective Date: 05/13/2024

RFA is also distinguished from pulsed radiofrequency (RF) treatment, which has been investigated for different types of pain. The mechanism of action of pulsed RF treatment is uncertain but it is thought not to destroy the nerve. It does produce some degree of nerve destruction but is thought to cause less damage than standard RFA. Some studies refer to pulsed RF treatment as ablation.

For the indications assessed in this medical policy, nerve RFA should be distinguished from RF energy applied to areas other than the nerve to cause tissue damage. Some individuals have been treated for plantar fasciitis with a fasciotomy procedure using an RF device. This procedure does not ablate a specific nerve.

**Table 1. Types of Radiofrequency Ablation**

Type	Procedure	Tissue Temperature	Key Differences
<b>Standard RFA</b>	Electrode tip provides thermal energy for 90 – 130 seconds	70 – 90° C	Longer term pain relief but with more adjacent thermal tissue injury and limitation in size and shape of lesion.
<b>Pulsed RFA</b>	Non-ablative - provides 20 ms pulses every 30 seconds	42° C	Limits tissue damage but results in shorter duration of pain relief.
<b>Cooled RFA</b>	Water circulates through RF electrode to cool the tip	60° C	Larger lesion with limited thermal injury to tissue. Longer term pain relief.

RF: radiofrequency; RFA: radiofrequency ablation

Adapted from Oladeji et al (2019)

### Cryoneurolysis

Cryoneurolysis is being investigated to alleviate pain. Temperatures of -20° to -100°C applied to a nerve cause Wallerian (anterograde axonal) degeneration, with disruption of nerve structure and conduction but maintenance of the perineural and epineural elements of the nerve bundle. Wallerian degeneration allows complete regeneration and recovery of nerve function in about 3 to 5 months.

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Ablation of Peripheral Nerves to Treat Pain

Policy # 00503  
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Current Effective Date: 05/13/2024

The iovera cryoablation system is a portable handheld device that applies percutaneous and targeted delivery of cold to superficial peripheral nerves.

**FDA or Other Governmental Regulatory Approval**

**U.S. Food and Drug Administration (FDA)**

A number of RF generators and probes for the peripheral nervous system have been cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process. Some examples are listed in Table 2.

In 2017, the COOLIEF Cooled Radiofrequency Probe (Avanos, previously known as Halyard Health) was cleared for marketing by the FDA through the 510(k) process to be used in conjunction with a radiofrequency generator to create lesions in nervous tissue (K163461). One of the indications is specifically for "creating radiofrequency lesions of the genicular nerves for the management of moderate to severe knee pain of more than 6 months with conservative therapy, including medication, in patients with radiologically-confirmed osteoarthritis (grade 2-4) and a positive response ( $\geq$  50% reduction in pain) to a diagnostic genicular nerve block."

**Table 2. Radiofrequency and Cryoneurolysis Devices**

Device	Manufacturer	Clearance	Date	FDA Product Code
SInergy <sup>®†</sup> /Bayless Pain Management Probe	Kimberly-Clark/Baylis	K053082	2005	GXD
NeuroTherm <sup>®†</sup> NT 2000	NeuroTherm	K111576	2011	GXD
iovera	Pacira (formerly Myoscience)	K133453	2014	GXH
COOLIEF <sup>®†</sup> Cooled Radiofrequency Kit	Avanos (formerly Halyard Health)	K163236	2016	GXI



Ablation of Peripheral Nerves to Treat Pain

Policy # 00503  
Original Effective Date: 05/18/2016  
Current Effective Date: 05/13/2024

COOLIEF <sup>®†</sup> Cooled RF Probe	Avanos (formerly Halyard Health)	K163461	2017	GXI
Rulo (TM) Radiofrequency Lesion Probe	Epimed International	K190256	2019	GXI

**Rationale/Source**

This medical policy was developed through consideration of peer-reviewed medical literature generally recognized by the relevant medical community, U.S. Food and Drug Administration approval status, nationally accepted standards of medical practice and accepted standards of medical practice in this community, technology evaluation centers, reference to federal regulations, other plan medical policies, and accredited national guidelines.

Radiofrequency ablation (RFA) and cryoneurolysis of nerves have been proposed as treatments for several different types of pain. RFA has been used to treat a number of clinical pain syndromes such as trigeminal neuralgia as well as cervical and lumbar pain. This review evaluates the application of RFA and cryoneurolysis in peripheral sites distant from the spine.

**Summary of Evidence**

For individuals who have knee osteoarthritis (OA) who receive radiofrequency ablation (RFA) of peripheral nerves, the evidence includes systematic reviews of randomized controlled trials (RCTs), RCTs with 24 to 200 individuals, and non-randomized comparative studies with up to 12 months of follow-up. Relevant outcomes include symptoms, functional outcomes, and quality of life (QOL). Knee OA is a common disorder in older adults. RFA of the genicular nerves has the potential to alleviate pain and improve function in this population, and might also delay or eliminate the need for TKA. At this time, there is high heterogeneity in methods and comparators. The systematic reviews generally found that RFA had a benefit on pain, function, and composite scores compared to the control treatments at 3 and 6-month follow-up; however, most estimates were determined to have moderate to high heterogeneity. The network meta-analysis compared multiple RFA modalities and found that cooled RFA had significantly improved efficacy for pain and function through 6 months follow-up than traditional or pulsed RFA. The 2 multicenter trials conducted in the U.S. used anesthetic nerve block under fluoroscopic guidance and compared efficacy of cooled RFA to either





## Ablation of Peripheral Nerves to Treat Pain

Policy # 00503

Original Effective Date: 05/18/2016

Current Effective Date: 05/13/2024

steroid injection or hyaluronic acid injection. Both studies reported a responder rate of approximately 70% at 6 months, which was significantly greater than the control conditions. A small, double-blind RCT of bipolar RFA with genicular nerve block compared to genicular nerve block and sham RFA found no differences between groups for visual analog score (VAS) pain or the Western Ontario and McMaster Universities Arthritis Index (WOMAC) scores through 12 months follow-up. Given that OA of the knee is a common condition; study in a larger number of individuals, preferably blinded with active and sham controls and follow-up of at least 12 months, is needed to determine the benefits and potential harms of this treatment. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have knee OA or total knee arthroplasty (TKA) who receive cryoneurolysis of peripheral nerves, the evidence includes 2 RCTs with a total of 304 participants and a comparative, retrospective cohort study of 57 participants. Relevant outcomes include symptoms, functional outcomes, and QOL. Cryoneurolysis in individuals with knee OA resulted in a greater decrease in WOMAC pain score, WOMAC total score, and VAS score at 30 days compared with sham-treated controls. However, subsequent measurements showed no significant benefit of cryoneurolysis on WOMAC score at 60 days or VAS scores at 60 or 90 days. Another RCT investigated cryoneurolysis compared to standard of care for patients with knee OA who were planning to undergo TKA. Cryoneurolysis resulted in a lower rate of opioid consumption, a reduction in numeric rating scale (NRS) pain scores, and Knee injury and Osteoarthritis Outcome Score for Joint Replacement (KOOS JR) functional performance at 12 weeks post discharge. The retrospective cohort study reported superiority of cryoneurolysis on the KOOS JR and Short Form-12 item (SF-12) mental score at 1 year follow-up; no significant differences were observed on the SF-12 physical score at 1 year follow-up or for any outcome at earlier 3 month assessment. Several technical issues including the optimal number of applications for each nerve, the duration of treatment, and the duration of thawing before moving the cannula have not been resolved. The most effective method for determining probe insertion location (eg, ultrasound-guided or based on anatomic landmarks) also need to be established. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have plantar fasciitis who receive RFA of peripheral nerves, the evidence includes 2 RCTs and a meta-analysis. Relevant outcomes include symptoms, functional outcomes, and QOL. The meta-analysis pooled evidence from 2 RCTs and did not demonstrate a significant improvement in pain outcomes compared to the control group. The analysis revealed significant

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## Ablation of Peripheral Nerves to Treat Pain

Policy # 00503

Original Effective Date: 05/18/2016

Current Effective Date: 05/13/2024

heterogeneity, and the overall quality of evidence was graded as low. One of the randomized trials only evaluated 17 individuals, and assessment of randomized outcomes was limited to 4 weeks post-treatment. A second RCT evaluated 36 individuals out to 12 weeks. Both trials found RFA associated with pain reduction, but to be more confident in the efficacy of this treatment, controlled trials with larger samples and longer follow-up would be necessary. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have occipital neuralgia or cervicogenic headache who receive RFA or cryoneurolysis of peripheral nerves, the evidence includes RCTs and systematic reviews of RCTs. Relevant outcomes are symptoms, functional outcomes, and QOL. No RCTs of RFA for chronic occipital neuralgia have been identified. Three RCTs of RFA for a cervicogenic headache have been published, none of which were high quality. Pain is a subjective, patient-reported measure that is particularly susceptible to a placebo effect. Randomized trials with sham or active-controls are needed to evaluate the efficacy of this treatment. One controlled trial found a temporary benefit of cryoneurolysis for cervicogenic headache, but the effect was not significantly better than injection of corticosteroid and local anesthetic. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

## **Supplemental Information**

### **Practice Guidelines and Position Statements**

Guidelines or position statements will be considered for inclusion in 'Supplemental Information' if they were issued by, or jointly by, a US professional society, an international society with US representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

### **American Academy of Orthopaedic Surgeons et al**

In 2021, the American Academy of Orthopaedic Surgeons published a clinical practice guideline, endorsed by the American Association of Hip and Knee Surgeons and the American Physical Therapy Association, on management of osteoarthritis (OA) of the knee. The guideline did not specifically address RFA or cryoneurolysis, but did include a guideline statement on denervation therapy that included various ablation techniques (e.g., RFA, cryoneurolysis, thermal ablation and chemical ablation). The guideline stated, "denervation therapy may reduce pain and improve

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Policy # 00503

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Current Effective Date: 05/13/2024

function in patients with symptomatic osteoarthritis of the knee" (strength of recommendation: limited).

### **American College of Rheumatology and Arthritis Foundation**

The 2019 Guidelines from the American College of Rheumatology and the Arthritis Foundation gave a conditional recommendation for radiofrequency ablation for the treatment of knee OA. The recommendation was based on evidence of a potential analgesic benefit, but the studies used heterogeneous techniques and there was a lack of long-term safety data.

### **American College of Foot and Ankle Surgeons**

The American College of Foot and Ankle Surgeons (2018) issued consensus guidelines on the diagnosis and treatment of acquired infracalcaneal heel pain. The safety and efficacy of bipolar radiofrequency were listed as uncertain (neither appropriate nor inappropriate).

### **American Society of Pain and Neuroscience**

The American Society of Pain and Neuroscience (2021) issued consensus guidelines using U.S. Preventive Services Task Force (USPSTF) grading criteria on the use of RFA to treat various pain conditions. The guidelines stated that genicular RFA may be used for the treatment of osteoarthritis-related and post-surgical knee joint pain (Grade B), and may be selectively offered for the treatment of occipital neuralgia pain when greater or lesser nerves have been identified as the etiology of pain via diagnostic blocks (Grade C).

### **U.S. Preventive Services Task Force Recommendations**

Not applicable.

### **Medicare National Coverage**

There is no national coverage determination. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

### **Ongoing and Unpublished Clinical Trials**

Some currently ongoing and unpublished trials that might influence this review are listed in Table 3.

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## Ablation of Peripheral Nerves to Treat Pain

Policy # 00503

Original Effective Date: 05/18/2016

Current Effective Date: 05/13/2024

**Table 3. Summary of Key Trials**

NCT No.	Trial Name	Planned Enrollment	Completion Date
<b>Ongoing</b>			
NCT05286996	Cryoneurolysis for TKA - a Pilot Study	20	Oct 2023
NCT05591768	Monopolar Versus Bipolar Radiofrequency in OA Knee Pain	70	Mar 2024
NCT05700253	Comparing Pain Outcomes of Treatment Strategies for Osteoarthritis Knee Patients	76	Sep 2024
NCT05920382	Radiofrequency Ablation for the Treatment of Post-knee Arthroplasty Chronic Pain	86	Dec 2027
<b>Unpublished</b>			
NCT02294864	A Controlled Comparison of Pulsed Radiofrequency Vs Physical Therapy on Treating Chronic Knee Osteoarthritis	50	Apr 2017 (unknown)
NCT02260869	Efficacy of Cooled and Monopolar Radiofrequency Ablation of the Geniculate Nerves for the Treatment of Chronic Osteoarthritic Knee Pain	78	Jun 2019 (terminated due to finances)
NCT02925442 <sup>a</sup>	Comparison Between Cooled (C-RFA) and Standard (t-RFA) Radiofrequency Ablation, and Control for Pain Management Following Unilateral Knee Arthroplasty: A Double-Blinded, Parallel-Grouped, Placebo-Controlled Randomized Clinical Trial	150	Feb 2020
NCT03818022	Effectiveness of Preoperative Cryoneurolysis (Iovera) for Postoperative Pain Control in Total Knee Arthroplasty	100	Dec 2020 (unknown)

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Policy # 00503

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Current Effective Date: 05/13/2024

NCT04145011 <sup>a</sup>	A Prospective, Multi-center, Randomized, Single Blind Clinical Trial Comparing COOLIEF* Cooled Radiofrequency to Conventional Radiofrequency Ablation of the Genicular Nerves in the Management of Knee Pain in an Osteoarthritic Patient Population	153	Aug 2022
NCT02915120	Ultrasound-Guided Pulsed Radiofrequency Of The Genicular Nerves In The Treatment Of Patients With Osteoarthritis Knee Pain: Randomized, Double-Blind, Placebo-Controlled Trial	142	Jul 2022

NCT: national clinical trial.

<sup>a</sup> Industry sponsored or partially sponsored.

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## Ablation of Peripheral Nerves to Treat Pain

Policy # 00503

Original Effective Date: 05/18/2016

Current Effective Date: 05/13/2024

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## Ablation of Peripheral Nerves to Treat Pain

Policy # 00503

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Current Effective Date: 05/13/2024

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## Ablation of Peripheral Nerves to Treat Pain

Policy # 00503

Original Effective Date: 05/18/2016

Current Effective Date: 05/13/2024

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# Louisiana

## Ablation of Peripheral Nerves to Treat Pain

Policy # 00503

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### **Policy History**

Original Effective Date: 05/18/2016

Current Effective Date: 05/13/2024

- |            |   |
|------------|---|
| 05/05/2016 | Medical Policy Committee review   |
| 05/18/2016 | Medical Policy Implementation Committee approval. New policy.   |
| 11/01/2016 | Coding update   |
| 01/01/2017 | Coding update: Removing ICD-9 Diagnosis Codes   |
| 05/04/2017 | Medical Policy Committee review   |
| 05/17/2017 | Medical Policy Implementation Committee approval. Coverage eligibility unchanged.   |
| 05/03/2018 | Medical Policy Committee review   |
| 05/16/2018 | Medical Policy Implementation Committee approval. Coverage eligibility unchanged.   |
| 11/08/2018 | Medical Policy Committee review   |
| 11/21/2018 | Medical Policy Implementation Committee approval. Title changed from "Radiofrequency Ablation of Peripheral Nerves to Treat Pain" to "Ablation of Peripheral Nerves to Treat Pain". Added four investigational statements as follows: cryoneurolysis of peripheral nerves to treat pain associated with knee osteoarthritis (OA) or total knee arthroplasty is considered to be investigational; radiofrequency ablation (RFA) of peripheral nerves to treat pain associated with occipital neuralgia or cervicogenic headache is considered to be investigational; diagnostic block performed before radiofrequency ablation (RFA) is considered to be investigational; and ablation of peripheral nerves to treat pain in all other conditions, with the exception of facet joint pain is considered to be investigational. |
| 11/07/2019 | Medical Policy Committee review   |

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## Ablation of Peripheral Nerves to Treat Pain

Policy # 00503

Original Effective Date: 05/18/2016

Current Effective Date: 05/13/2024

11/13/2019	Medical Policy Implementation Committee approval. Replaced “radiofrequency ablation” with “planned ablation”, so that diagnostic block before any ablation is investigational.
04/02/2020	Medical Policy Committee review
04/08/2020	Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
04/01/2021	Medical Policy Committee review
04/14/2021	Medical Policy Implementation Committee approval. Cryoneurolysis was added to the investigational statement on occipital neuralgia or cervicogenic headache.
05/24/2021	Coding update
10/01/2021	Coding update
11/29/2021	Coding update
12/20/2021	Coding update
04/07/2022	Medical Policy Committee review
04/13/2022	Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
04/06/2023	Medical Policy Committee review
04/12/2023	Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
08/02/2023	Coding update
04/04/2024	Medical Policy Committee review
04/10/2024	Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
12/12/2024	Coding update
Next Scheduled Review Date: 04/2025	

## **Coding**

*The five character codes included in the Blue Cross Blue Shield of Louisiana Medical Policy Coverage Guidelines are obtained from Current Procedural Terminology (CPT®)†, copyright 2023 by the American Medical Association (AMA). CPT is developed by the AMA as a listing of descriptive terms and five character identifying codes and modifiers for reporting medical services and procedures performed by physician.*

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Ablation of Peripheral Nerves to Treat Pain

Policy # 00503  
Original Effective Date: 05/18/2016  
Current Effective Date: 05/13/2024

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Codes used to identify services associated with this policy may include (but may not be limited to) the following:

Code Type	Code
CPT	0440T, 0441T, 0442T, 64405, 64450, 64454, 64624, 64640
HCPCS	Add code effective 01/01/2025: C9809
ICD-10 Diagnosis	All related diagnoses

\*Investigational – A medical treatment, procedure, drug, device, or biological product is Investigational if the effectiveness has not been clearly tested and it has not been incorporated into standard medical practice. Any determination we make that a medical treatment, procedure, drug, device, or biological product is Investigational will be based on a consideration of the following:

- A. Whether the medical treatment, procedure, drug, device, or biological product can be lawfully marketed without approval of the U.S. Food and Drug Administration (FDA) and whether such approval has been granted at the time the medical treatment, procedure, drug, device, or biological product is sought to be furnished; or
- B. Whether the medical treatment, procedure, drug, device, or biological product requires further studies or clinical trials to determine its maximum tolerated dose, toxicity, safety, effectiveness, or effectiveness as compared with the standard means of treatment or

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## Ablation of Peripheral Nerves to Treat Pain

Policy # 00503

Original Effective Date: 05/18/2016

Current Effective Date: 05/13/2024

diagnosis, must improve health outcomes, according to the consensus of opinion among experts as shown by reliable evidence, including:

1. Consultation with technology evaluation center(s);
2. Credible scientific evidence published in peer-reviewed medical literature generally recognized by the relevant medical community; or
3. Reference to federal regulations.

‡ Indicated trademarks are the registered trademarks of their respective owners.

**NOTICE:** If the Patient's health insurance contract contains language that differs from the BCBSLA Medical Policy definition noted above, the definition in the health insurance contract will be relied upon for specific coverage determinations.

**NOTICE:** Medical Policies are scientific based opinions, provided solely for coverage and informational purposes. Medical Policies should not be construed to suggest that the Company recommends, advocates, requires, encourages, or discourages any particular treatment, procedure, or service, or any particular course of treatment, procedure, or service.

**NOTICE:** Federal and State law, as well as contract language, including definitions and specific contract provisions/exclusions, take precedence over Medical Policy and must be considered first in determining eligibility for coverage.

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