**Medicare Advantage Medical Policy** # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

Applies to all products administered or underwritten by the Health Plan, unless otherwise provided in the applicable contract. Medical technology is constantly evolving, and we reserve the right to review and update Medical Policy periodically.

# When Services Are Eligible for Coverage

Coverage for eligible medical treatments or procedures, drugs, devices or biological products may be provided only if:

- Benefits are available in the member's contract/certificate, and
- Medical necessity criteria and guidelines are met.

Based on review of available data, the Health Plan may consider the use of processed nerve allografts (e.g., Avance nerve allograft) for the repair and closure of peripheral nerve gaps up to 70 mm when direct primary repair is not feasible (see Policy Guidelines) to be **eligible for coverage.**\*\*

Based on review of available data, the Health Plan may consider the use of synthetic nerve conduits (e.g., NeuraGen synthetic conduit [Integra]) for the repair and closure of peripheral nerve gaps in the following scenarios (see Policy Guidelines):

- Repair of digital nerve injuries with gaps <15 mm; **OR**
- Repair of digital nerve injuries with gaps 15-25 mm, where allograft nerve is not available; **OR**
- Repair of major nerves with small gaps not exceeding 6 mm, where allograft nerve is not available; **OR**
- In the context of conduit-assisted repair as a technique for tension-relief at the peripheral nerve repair site or major nerve with a gap not exceeding 6 mm.

# When 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 Health Plan considers all other uses of processed nerve allografts and synthetic nerve conduits for individuals with peripheral nerve gaps to be investigational.\*

# **Policy Guidelines**

Feasibility of direct repair may be limited in individuals with large nerve gaps, segmental nerve loss, or chronic and complex injuries. While there are mixed data regarding comparability of autograft versus allograft repair, allograft repair offers the benefit of avoiding donor site morbidity. This is of particular importance where the primary consideration is the management or prevention of neuropathic pain. For larger sensory, motor, or mixed nerves, autograft repair should be considered

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

the standard intervention except if there is insufficient donor material for autografting. The maximum available allograft length is 70 mm, and there is no data to support the technique of connecting allografts end-to-end.

For digital nerve injuries with gaps 15-25 mm, conduit repair yields acceptable sensory outcomes but is inferior to allograft repair. Therefore, conduit repair should only be used in such scenarios when allograft nerve is not immediately available (e.g. in the context of urgent traumatic injuries).

Nerve wraps are bioresorbable surgical implants designed to protect and support peripheral nerve healing following end-to-end repair with no gap (e.g., Axoguard<sup>®‡</sup> Nerve Protector by AxoGen, indicated for the repair of peripheral nerve injuries where there is no gap, derived from porcine source). These devices provide a physical barrier that purports to reduce scar formation, reduce mechanical irritation, and promote a favorable environment for nerve regeneration. These materials are addressed in - Bioengineered Skin and Soft Tissue Substitutes (see Related Policies).

#### **Contraindications**

Both allograft and conduit repair are contraindicated in a surgical field with active infection. Synthetic conduits are contraindicated for individuals with a history of an allergic reaction or sensitivity to any component of the synthetic conduit (e.g., bovine, porcine, or chondroitin materials).

# **Background/Overview**

#### **Peripheral Nerve Injury**

Injuries to the peripheral nerves are common and occur in approximately 2.5% of trauma patients in the United States, with an average incidence of over 550,000 annually. Based on hospital ICD-9 coding, the most commonly injured peripheral nerves reported by hospitals were the upper extremity digital nerves, ulnar nerve, radial nerve, and the brachial plexus. Functional regeneration of injured nerves requires peripheral nerve surgery to allow axon regrowth and remyelination.

#### **Conventional Treatment**

Direct surgical repair (e.g. end-to-end coaptation or neurorrhaphy) is the standard of care for transected nerves when the gap distance permits tensionless suturing. However, when the size of the peripheral nerve gap precludes tensionless direct surgical repair, the standard of care is nerve autograft. Alternatives to autografting are being investigated to bridge nerve discontinuities to avoid complications from harvesting (e.g., pain or numbness) at the donor site as well as issues such as nerve fascicle mismatch and damage to the autograft from tissue handling.

#### **Alternative Treatments**

Allogenic nerve grafts (Avance, AxoGen, Inc) are derived from human donors and are generally used to bridge gaps resulting from peripheral nerve injuries that are > 5 mm. Allogenic grafts are preferred for their potential to minimize donor site morbidity, as they eliminate the need for autografts. Allogenic grafts also address the challenge of obtaining a sufficient graft length as they

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

are available in multiple lengths and diameters; this is particularly relevant in cases where the injury site is extensive. Before transplantation, allografts undergo processing to ensure immunological compatibility and reduce the risk of rejection, allowing for successful integration into the recipient's nervous system.

Synthetic nerve conduits are hollow tubular structures designed to bridge nerve gaps caused by injury or trauma, providing a supportive environment for the regrowth of damaged nerve fibers. They are available in various biocompatible materials, lengths, and diameters and are designed to degrade over time. The conduits serve as guidance channels for regenerating nerves, facilitating directional growth, and preventing scar tissue formation. Conduits are generally used for nerve gap repairs of < 5 mm.

# FDA or Other Governmental Regulatory Approval

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

The U.S. Food and Drug Administration (FDA) regulates human cells and tissues intended for implantation, transplantation, or infusion through the Center for Biologics Evaluation and Research, under Code of Federal Regulation, title 21, parts 1270 and 1271. Avance Nerve Grafts are subject to these regulations.

Avance nerve graft (Axogen) is a sterile, processed human nerve allograft that is indicated for the repair of peripheral nerve discontinuities to support axonal regeneration across the gap. A proprietary cleansing process removes specific proteins, cells, and cellular debris but spares the extracellular matrix (ECM), providing structural support for cellular migration and regenerating axons.<sup>5</sup>, Avance is available in multiple lengths from 5 to 70 mm, and multiple diameters. The allograft is stored frozen with a shelf life of up to three years, but upon thawing, it must be transplanted within 12 hours. Surgical implantation of the allograft connects the distal and proximal ends of a severed peripheral nerve via suturing. Post-surgery, the allograft is revascularized and remodeled into the patient's own tissue.

A number of processed nerve allografts and synthetic conduits have been approved through the FDA 510k process for individuals undergoing peripheral nerve repair (Table 1). This list includes products for which this reference medical policy did not find any published, peer-reviewed research that satisfied the PICO (Population, Intervention, Comparison, Outcome) criteria.

Axoguard nerve connector $^{\otimes \ddagger}$  is a semi-translucent coaptation aid designed for connector-assisted repair of a transected nerve with a gap up to 5 mm.

NeuraGen is a resorbable hollow nerve conduit designed for the repair of peripheral nerve discontinuities where gap closure is achievable by flexion of the extremity.(<u>Integra, Lifesciences</u>) The device received FDA 510k approval on April 24, 2014.(<u>NeuraGen FDA 510(k)</u>) It provides a protective environment for peripheral nerve repair after injury.(<u>NeuraGen®‡ Nerve Guide (integralife.com)</u> The NeuraGen Nerve Guide is designed to be an interface between the nerve and

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

surrounding tissue, creating a conduit for axonal growth across a nerve gap. NeuraGen's semi-permeable type 1 collagen membrane allows for controlled resorption, appropriate nutrient diffusion, and retention of representative Nerve Growth Factor. It is available in different lengths and diameters to meet varied implantation needs. Conduits are generally used most commonly for nerve gap repairs of  $< 1 \text{ cm.}^4$ ,

Neuroflex is a resorbable, flexible type I collagen conduit that encases peripheral nerve injuries and protects the neural environment. (Stryker Neuroflex) It is designed to prevent the ingrowth of scar tissue and the formation of neuromas. The corrugated walls of the conduit allow it to bend up to approximately 60 degrees without forming an occlusion. The device received FDA 410k approval on April 03, 2014, and is indicated for peripheral nerve discontinuities where gap closure can be achieved by flexion of the extremity or at the end of the nerve in the foot to reduce the formation of symptomatic or painful neuroma. (Neuroflex FDA 510(k)) The device is available in differing lengths and diameters.

Neurolac is a synthetic nerve guide designed for the reconstruction of peripheral nerve discontinuities up to 20 mm.(Polyganics B.V.) It received FDA 510k approval on October 20, 2011 and is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete nerve division.(Neurolac FDA 510(k)) Neurolac provides guidance and protection to regenerated axons and prevents the ingrowth of fibrous tissue into the nerve gap during nerve regeneration. It retains its initial mechanical properties up to 10 weeks, providing support and protection to the healing nerve, and after this period, rapid loss of mechanical strength and gradual reduction in mass occurs. The final degraded products are resorbed, metabolized, and excreted by the body. Neurolac is available in different internal diameters, making it suitable for small nerves that require precise suturing in a small and defined area.

The Neurotube (Synovis Micro) is an absorbable woven polyglycolic acid mesh tube designed for primary or secondary peripheral nerve repair or reconstruction.(Synovis Micro) It received FDA 510k approval on August 28, 1998, for the indication of peripheral nerve injuries where the nerve gap is more than or equal to 8 mm, but less than or equal to 30 mm.(Neurotube FDA 510(k)). The device is contraindicated for anyone with a known allergy to polyglycolic acid. The walls of the Neurotube are corrugated for strength and flexibility, preventing the tube from collapsing under normal physiological soft tissue pressures.

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

Table 1. FDA 510K Approved Processed Nerve Allografts and Synthetic Conduits for Peripheral Nerve Repair

Thermal Nerve Repuir				
Product (manufacturer)	Year	510(k)	<b>Product Code</b>	
NeuraGen nerve guide (Integra LifeSciences, Corp)	2001	<u>K011168</u>	JXI	
Neuroflex collagen conduit (Stryker Orthopedics)	2014	<u>K131541</u>	JXI	
Neurolac nerve guide (Polyganics BV)	2003	<u>K103081</u>	JXI	
Neuromatrix (Stryker Orthopedics)	2001	<u>K012814</u>	JXI	
Reaxon Plus Nerve Guide (Medovent, GmbH)	2018	<u>K180222</u>	JXI	
Rebuilder nerve guidance conduit (CelestRay Biotech Company, LLC.)	2024	<u>K230794</u>	JXI	

# 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.

Peripheral nerve injuries are common traumatic events for which the conventional treatment is the microsurgical repair for gaps <5 mm in length. Autologous grafting is used for repairing nerve gaps of greater length. Because autologous grafts must be harvested from the patient, there is a risk of donor site complications, and the overall success rate of autografting may be limited. Therapies such as processed nerve allografts and synthetic nerve conduits are being investigated to provide improved treatment alternatives.

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

#### **Summary of Evidence**

For individuals with peripheral nerve injury requiring repair and closure of the nerve gap who receive processed nerve allografts, the evidence includes 2 meta-analyses, 2 randomized controlled trials (RCTs) comparing allograft to collagen conduit repair with NeuraGen, 1 comparative case series, 1 retrospective cohort study, 1 case series, and 1 registry study. All studies, with the exception of 1 non-randomized controlled trial, used Avance allografts. The evidence base consisted primarily of peripheral nerve injuries to the fingers or upper extremities. Relevant outcomes were sensory and motor function changes, quality of life, and treatment-related morbidity. In 1 RCT that compared allograft to NeuraGen synthetic conduit, allograft patients had a greater return of protective sensation rate on the static 2-point discrimination (S2PD) score but did not differ on overall S2PD score or other outcome measures. The second RCT comparing allograft to Neuragen found that S2PD favored the Avance allograft group at 1-year follow-up, but no differences were noted in moving 2-point discrimination (M2PD), Semmes Weinstein Monofilament (SWMF) test, or the Disability of the Arm and Shoulder (DASH) questionnaire. Limitations in the RCT evidence base included a lack of intention to treat (ITT) analysis, high loss to follow-up, lack of reporting power calculations, and insufficient follow-up duration. Three non-randomized comparative studies found no difference between NeuraGen (n=2) and direct surgical repair (n=2) in sensory or functional outcomes and complications compared to allograft. One meta-analysis found comparable pooled rates of S2PD and M2PD across assessed interventions, including allograft, autograft, artificial conduits, and direct surgical repair, but all estimates had extreme heterogeneity. Another meta-analysis found that meaningful recovery (>S3 on the British Medical Research Council [BMRC] recovery grading system) was significantly higher in allograft and autografting than for synthetic conduits. Data from the ongoing Avance registry study suggested durability of outcomes and safety at more than 2 years of follow-up. There is an absence of comparison of Avance to autografting in the included literature, which is a significant limitation as this is the current standard of care for repairing peripheral nerve gap discontinuities larger than 5 mm. Additionally, substantial interventional, comparator, and outcome heterogeneity across the evidence base make it challenging to compare outcomes across studies reliably. Randomized comparisons of allograft to autograft with sufficient follow-up using validated outcome measures are needed to evaluate the relative risk-benefit of allografting. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with peripheral nerve injury requiring repair and closure of the nerve gap who receive synthetic nerve conduits, the evidence includes 3 meta-analyses, 8 RCTs (2 comparing NeuraGen to allograft, 1 comparing Neurotube to autologous vein grafting, and 4 comparing conduit [1 Neurolac, 1 Polyhydroxybutyrate {PHB}, 1 polyglycolic acid {PGA}, and 1 silicone tube] to direct surgical repair), 1 non-randomized clinical trial, 1 comparative retrospective cohort study, 1 comparative case series, and 1 non-comparative case series. The evidence base consisted primarily of peripheral nerve injuries to the fingers or upper extremities. NeuraGen was evaluated in 3 studies, and all other synthetic conduits were represented by a single study (Neuromatrix, Neuroflex, Neurotube, Neurolac, PHB conduit, PGA conduit, and collagen-filled conduit). In 1 RCT that compared Avance allograft to NeuraGen, allograft patients had a greater return of protective sensation rate on static 2-

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

point discrimination (S2PD), but did not differ on overall S2PD score or other outcome measures. The second RCT comparing Avance allograft to Neuragen found that S2PD favored the allograft group at 1-year follow-up, but no differences were noted in moving 2-point discrimination (M2PD), Semmes Weinstein Monofilament (SWMF) test, or the Disability of the Arm and Shoulder (DASH) questionnaire. One RCT compared Neurotube conduit to an autologous vein conduit and found similar outcomes at a 2-year follow-up, but at 1-year analysis, the motor domain of the Rosen Model Instrument (RMI) favored the autologous treatment arm. Five other trials compared different types of conduits to direct surgical repair with generally equivalent outcomes; one RCT observed a significant difference in cold intolerance, which favored the synthetic conduit group, and another found that at short (<4 mm) and long nerve gaps (> 8 mm) M2PD was better in the PGA conduit group than in direct surgical repair or autograft. Major limitations identified in the trial evidence base included an absence of participant blinding, lack of intention to treat analysis, high loss to follow-up, absence of power calculations, and short duration of follow-up. Three non-randomized comparative studies found no difference between synthetic conduits and Avance (n=2), direct surgical repair (n=1), or autograft (n=1) in sensory or functional outcomes as well as complications. A Cochrane review found that there is no clear benefit to patients treated with artificial nerve conduits or nerve wraps over direct surgical repair, and that complications may be greater for participants treated with synthetic nerve conduits or wraps. The overall evidence base was considered very uncertain, with few outcomes having more than 1 included study. One other metaanalysis found comparable pooled rates of S2PD and M2PD across assessed interventions, but all estimates had extreme heterogeneity. The third meta-analysis found that meaningful recovery (>S3 on the British Medical Research Council [BMRC] recovery grading system) was significantly higher in allograft and autografting than for synthetic conduits. No guideline evidence was identified for synthetic nerve conduits for the treatment of peripheral nerve injuries. Many of the included trials have significant limitations, and the substantial heterogeneity in patient and intervention characteristics makes it challenging to compare outcomes reliably across studies. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

#### **2025 Input**

Clinical input was sought to help determine whether the use of processed nerve allograft or synthetic nerve conduit in individuals with peripheral nerve injuries requiring repair and closure of a nerve gap would provide a clinically meaningful improvement in net health outcome and whether the use is consistent with generally accepted medical practice. In response to requests, clinical input was received from 3 respondents, including 1 specialty society-level response.

For individuals with peripheral nerve injuries requiring repair and closure of a nerve gap who receive processed nerve allograft or synthetic nerve conduit, clinical input supports this use provides a clinically meaningful improvement in net health outcomes and indicates this use is consistent with generally accepted medical practice.

Clinical input noted that synthetic conduit repair is best used to repair digital nerve injuries with gaps <15 mm. Data shows that outcomes under these conditions are similar to allograft nerve repair. For digital nerve injuries with gaps 15-25 mm, conduit repair yields acceptable outcomes but inferior to

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

allograft repair. Conduit repair should only be used in these circumstances if allograft nerve is not available. Any gap exceeding 25 mm is not appropriate for conduit repair. There are insufficient data to support the use of conduit repair for major nerves (any nerve aside from digital nerves) and collective experience and opinion of the group is that conduit repair is not appropriate for major nerves except for very short gaps (<5-6 mm).

Conduit-assisted repair as a technique for tension-relief is appropriate for any nerve repair where there is thought to be mild to moderate tension at the repair site (where tension is displaced off of the nerve ends and onto the conduit as a technique for tension-relief). There are no high-quality human studies examining conduit-assisted repair as a tension-relieving strategy. This is a commonly accepted practice and one frequently employed in situations where there is moderate tension at a repair site. Experience shows that this is a viable technique for relieving tension and helps facilitate nerve repairs that may otherwise be infeasible. For larger nerves (any nerve aside from digital nerves), there are few data to support the use of conduits and our collective experience does not support the use of conduits for this indication, except for the specific application of conduit-assisted repair for tension-relief. It may be reasonable to use conduits for repair of very short gaps (<5-6 mm) for major nerves, with no consistent practice pattern in that regard.

# **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.

#### **National Institute for Health and Care Excellence (NICE)**

In 2017, NICE published guidance on processed nerve allografting to repair peripheral nerve discontinuities. The evidence base evaluated by NICE included the RCT by Means et al (2016) and the non-randomized trial by He et al (2013), which are discussed in this medical reference policy. NICE also evaluated two other smaller case series, which were not included in our evidence review due to the availability of higher-quality evidence. The following were among the recommendations issued:

- Current evidence on the safety and efficacy of processed nerve allografts to repair peripheral nerve discontinuities is adequate to support the use of this procedure for digital nerves, provided that standard arrangements are in place for clinical governance, consent, and audit.
- The evidence on the safety of processed nerve allografts to repair peripheral nerve discontinuities in other sites raises no major safety concerns. However, current evidence on its efficacy in these sites is limited in quantity. Therefore, for indications other than digital nerve repair, this procedure should only be used with special arrangements for clinical governance, consent, and audit or research.

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

- This procedure should only be done by surgeons with training and experience in peripheral nerve repair.
- Patient selection should take into consideration the site, type of nerve (motor, sensory, mixed), and the size of the defect.
- NICE encourages further research into processed nerve allografts to repair peripheral nerve discontinuities. This should include information on the type of nerve repaired, the anatomical site, the size of the defect, patient-reported outcome measures, functional outcomes, time to recovery, and long-term outcomes (12 months to 18 months).

#### **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 unpublished trials that might influence this review are listed in Table 2.

**Table 2. Summary of Key Trials** 

NCT No.	Trial Name	Planned Enrollment	Completion Date
Ongoing			
NCT04865679 <sup>a</sup>	Tolerability and Feasibility Pilot Clinical Study of a Large-Diameter Nerve Cap for Protecting and Preserving Terminated Nerve Ends (REPOSE-XL <sup>SM</sup> )‡	15	Dec 2026
NCT01526681 <sup>a</sup>	Registry of Avance <sup>®‡</sup> Nerve Graft's Utilization and Recovery Outcomes Post Peripheral Nerve Reconstruction	5000	Dec 2025
NCT05339594 <sup>a</sup>	REINVENT Registry (Registry of the Nerve Gap Repair From Integra)	350	June 2027
Unpublished			
NCT05199155	Use of a Nerve Regeneration Conduit (NerVFIX®)‡ in the Treatment of Nerve Section of the Wrist	15	Dec 2023 (terminated)
NCT05343143 <sup>a</sup>	NeuraGen 3D Pilot Study	10	July 2024 (terminated)

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

NCT: national clinical trial.

# References

- Brattain, K. Analysis of the peripheral nerve repair market in the United States. Magellan Med Technol Consult, Inc. 2014. Available at: http://content.stockpr.com/axogeninc/files/docs/Magellan\_Study\_-Analysis Of The Peripheral Nerve Repair Market In The United States.pdf.
- 2. Karsy M, Watkins R, Jensen MR, et al. Trends and Cost Analysis of Upper Extremity Nerve Injury Using the National (Nationwide) Inpatient Sample. World Neurosurg. Mar 2019; 123: e488-e500. PMID 30502477
- 3. Mankavi F, Ibrahim R, Wang H. Advances in Biomimetic Nerve Guidance Conduits for Peripheral Nerve Regeneration. Nanomaterials (Basel). Sep 10 2023; 13(18). PMID 37764557
- 4. Buncke, G. Peripheral nerve allograft: how innovation has changed surgical practice. Plastic and Aesthetic Research 2022; 9(5).
- 5. Axogen, Inc. Avance Nerve Graft. Available at: https://www.axogeninc.com/products/avance-nerve-graft/. Accessed, Nov 15, 2024.
- 6. Parker BJ, Rhodes DI, O'Brien CM, et al. Nerve guidance conduit development for primary treatment of peripheral nerve transection injuries: A commercial perspective. Acta Biomater. Nov 2021; 135: 64-86. PMID 34492374
- 7. Zhang Y, Hou N, Zhang J, et al. Treatment options for digital nerve injury: a systematic review and meta-analysis. J Orthop Surg Res. Sep 12 2023; 18(1): 675. PMID 37700356
- 8. Lans J, Eberlin KR, Evans PJ, et al. A Systematic Review and Meta-Analysis of Nerve Gap Repair: Comparative Effectiveness of Allografts, Autografts, and Conduits. Plast Reconstr Surg. May 01 2023; 151(5): 814e-827e. PMID 36728885
- 9. Arnaout A, Fontaine C, Chantelot C. Sensory recovery after primary repair of palmar digital nerves using a Revolnerv(®) collagen conduit: a prospective series of 27 cases. Chir Main. Sep 2014; 33(4): 279-85. PMID 25169199
- 10. Battiston B, Geuna S, Ferrero M, et al. Nerve repair by means of tubulization: literature review and personal clinical experience comparing biological and synthetic conduits for sensory nerve repair. Microsurgery. 2005; 25(4): 258-67. PMID 15934044
- 11. Bushnell BD, McWilliams AD, Whitener GB, et al. Early clinical experience with collagen nerve tubes in digital nerve repair. J Hand Surg Am. Sep 2008; 33(7): 1081-7. PMID 18762101
- 12. Chiriac S, Facca S, Diaconu M, et al. Experience of using the bioresorbable copolyester poly(DL-lactide-ε-caprolactone) nerve conduit guide Neurolac<sup>TM</sup> for nerve repair in peripheral nerve defects: report on a series of 28 lesions. J Hand Surg Eur Vol. May 2012; 37(4): 342-9. PMID 21987277
- 13. Guo Y, Chen G, Tian G, et al. Sensory recovery following decellularized nerve allograft transplantation for digital nerve repair. J Plast Surg Hand Surg. Dec 2013; 47(6): 451-3. PMID 23848418
- 14. Haug A, Bartels A, Kotas J, et al. Sensory recovery 1 year after bridging digital nerve defects with collagen tubes. J Hand Surg Am. Jan 2013; 38(1): 90-7. PMID 23261191

<sup>&</sup>lt;sup>a</sup> Denotes industry-sponsored or cosponsored trial.

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

- 15. He B, Zhu Q, Chai Y, et al. Safety and efficacy evaluation of a human acellular nerve graft as a digital nerve scaffold: a prospective, multicentre controlled clinical trial. J Tissue Eng Regen Med. Mar 2015; 9(3): 286-95. PMID 23436764
- 16. Karabekmez FE, Duymaz A, Moran SL. Early clinical outcomes with the use of decellularized nerve allograft for repair of sensory defects within the hand. Hand (N Y). Sep 2009; 4(3): 245-9. PMID 19412640
- 17. Kusuhara H, Hirase Y, Isogai N, et al. A clinical multi-center registry study on digital nerve repair using a biodegradable nerve conduit of PGA with external and internal collagen scaffolding. Microsurgery. Jul 2019; 39(5): 395-399. PMID 30562848
- 18. Leckenby JI, Vögelin E. Reply: A Retrospective Case Series Reporting the Outcomes of Avance Nerve Allografts in the Treatment of Peripheral Nerve Injuries. Plast Reconstr Surg. Feb 01 2021; 147(2): 351e. PMID 33177470
- 19. Lohmeyer JA, Kern Y, Schmauss D, et al. Prospective clinical study on digital nerve repair with collagen nerve conduits and review of literature. J Reconstr Microsurg. May 2014; 30(4): 227-34. PMID 24338485
- 20. Lohmeyer JA, Siemers F, Machens HG, et al. The clinical use of artificial nerve conduits for digital nerve repair: a prospective cohort study and literature review. J Reconstr Microsurg. Jan 2009; 25(1): 55-61. PMID 19037847
- 21. Lohmeyer J, Zimmermann S, Sommer B, et al. [Bridging peripheral nerve defects by means of nerve conduits]. Chirurg. Feb 2007; 78(2): 142-7. PMID 17165008
- 22. Mackinnon SE, Dellon AL. Clinical nerve reconstruction with a bioabsorbable polyglycolic acid tube. Plast Reconstr Surg. Mar 1990; 85(3): 419-24. PMID 2154831
- 23. Means KR, Rinker BD, Higgins JP, et al. A Multicenter, Prospective, Randomized, Pilot Study of Outcomes for Digital Nerve Repair in the Hand Using Hollow Conduit Compared With Processed Allograft Nerve. Hand (N Y). Jun 2016; 11(2): 144-51. PMID 27390554
- 24. Neubrech F, Heider S, Otte M, et al. [Nerve Tubes for the Repair of Traumatic Sensory Nerve Lesions of the Hand: Review and Planning Study for a Randomised Controlled Multicentre Trial]. Handchir Mikrochir Plast Chir. Jun 2016; 48(3): 148-54. PMID 27311073
- 25. Rbia N, Bulstra LF, Saffari TM, et al. Collagen Nerve Conduits and Processed Nerve Allografts for the Reconstruction of Digital Nerve Gaps: A Single-Institution Case Series and Review of the Literature. World Neurosurg. Jul 2019; 127: e1176-e1184. PMID 31003028
- 26. Rinker B, Liau JY. A prospective randomized study comparing woven polyglycolic acid and autogenous vein conduits for reconstruction of digital nerve gaps. J Hand Surg Am. May 2011; 36(5): 775-81. PMID 21489720
- 27. Rinker BD, Ingari JV, Greenberg JA, et al. Outcomes of short-gap sensory nerve injuries reconstructed with processed nerve allografts from a multicenter registry study. J Reconstr Microsurg. Jun 2015; 31(5): 384-90. PMID 25893633
- 28. Rinker B, Zoldos J, Weber RV, et al. Use of Processed Nerve Allografts to Repair Nerve Injuries Greater Than 25 mm in the Hand. Ann Plast Surg. Jun 2017; 78(6S Suppl 5): S292-S295. PMID 28328632

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

- Safa B, Shores JT, Ingari JV, et al. Recovery of Motor Function after Mixed and Motor Nerve Repair with Processed Nerve Allograft. Plast Reconstr Surg Glob Open. Mar 2019; 7(3): e2163. PMID 31044125
- 30. Saeki M, Tanaka K, Imatani J, et al. Efficacy and safety of novel collagen conduits filled with collagen filaments to treat patients with peripheral nerve injury: A multicenter, controlled, openlabel clinical trial. Injury. Apr 2018; 49(4): 766-774. PMID 29566987
- 31. Salomon D, Miloro M, Kolokythas A. Outcomes of Immediate Allograft Reconstruction of Long-Span Defects of the Inferior Alveolar Nerve. J Oral Maxillofac Surg. Dec 2016; 74(12): 2507-2514. PMID 27376182
- 32. Schmauss D, Finck T, Liodaki E, et al. Is nerve regeneration after reconstruction with collagen nerve conduits terminated after 12 months? the long-term follow-up of two prospective clinical studies. J Reconstr Microsurg. Oct 2014; 30(8): 561-8. PMID 25184617
- 33. Taras JS, Jacoby SM, Lincoski CJ. Reconstruction of digital nerves with collagen conduits. J Hand Surg Am. Sep 2011; 36(9): 1441-6. PMID 21816545
- 34. Taras JS, Amin N, Patel N, et al. Allograft reconstruction for digital nerve loss. J Hand Surg Am. Oct 2013; 38(10): 1965-71. PMID 23998191
- 35. Thomsen L, Bellemere P, Loubersac T, et al. Treatment by collagen conduit of painful post-traumatic neuromas of the sensitive digital nerve: a retrospective study of 10 cases. Chir Main. Sep 2010; 29(4): 255-62. PMID 20727807
- 36. Zuniga JR, Williams F, Petrisor D. A Case-and-Control, Multisite, Positive Controlled, Prospective Study of the Safety and Effectiveness of Immediate Inferior Alveolar Nerve Processed Nerve Allograft Reconstruction With Ablation of the Mandible for Benign Pathology. J Oral Maxillofac Surg. Dec 2017; 75(12): 2669-2681. PMID 28495410
- 37. Isaacs J, Nydick JA, Means KR, et al. A Multicenter Prospective Randomized Comparison of Conduits Versus Decellularized Nerve Allograft for Digital Nerve Repairs. J Hand Surg Am. Sep 2023; 48(9): 904-913. PMID 37530686
- 38. Isaacs J, Browne T. Overcoming short gaps in peripheral nerve repair: conduits and human acellular nerve allograft. Hand (N Y). Jun 2014; 9(2): 131-7. PMID 24839412
- 39. Ducic I, Safa B, DeVinney E. Refinements of nerve repair with connector-assisted coaptation. Microsurgery. Mar 2017; 37(3): 256-263. PMID 28035702
- 40. Brooks DN, Weber RV, Chao JD, et al. Processed nerve allografts for peripheral nerve reconstruction: a multicenter study of utilization and outcomes in sensory, mixed, and motor nerve reconstructions. Microsurgery. Jan 2012; 32(1): 1-14. PMID 22121093
- 41. Cho MS, Rinker BD, Weber RV, et al. Functional outcome following nerve repair in the upper extremity using processed nerve allograft. J Hand Surg Am. Nov 2012; 37(11): 2340-9. PMID 23101532
- 42. Dunn JC, Tadlock J, Klahs KJ, et al. Nerve Reconstruction Using Processed Nerve Allograft in the U.S. Military. Mil Med. May 03 2021; 186(5-6): e543-e548. PMID 33449099
- 43. Zhu S, Liu J, Zheng C, et al. Analysis of human acellular nerve allograft reconstruction of 64 injured nerves in the hand and upper extremity: a 3 year follow-up study. J Tissue Eng Regen Med. Aug 2017; 11(8): 2314-2322. PMID 27098545

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

- 44. Carlson TL, Wallace RD, Konofaos P. Cadaveric Nerve Allograft: Single Center's Experience in a Variety of Peripheral Nerve Injuries. Ann Plast Surg. Jun 2018; 80(6S Suppl 6): S328-S332. PMID 29847373
- 45. Safa B, Jain S, Desai MJ, et al. Peripheral nerve repair throughout the body with processed nerve allografts: Results from a large multicenter study. Microsurgery. Jul 2020; 40(5): 527-537. PMID 32101338
- 46. Peters BR, Wood MD, Hunter DA, et al. Acellular Nerve Allografts in Major Peripheral Nerve Repairs: An Analysis of Cases Presenting With Limited Recovery. Hand (N Y). Mar 2023; 18(2): 236-243. PMID 33880944
- 47. Jain SA, Nydick J, Leversedge F, et al. Clinical Outcomes of Symptomatic Neuroma Resection and Reconstruction with Processed Nerve Allograft. Plast Reconstr Surg Glob Open. Oct 2021; 9(10): e3832. PMID 34616638
- 48. Leversedge FJ, Zoldos J, Nydick J, et al. A Multicenter Matched Cohort Study of Processed Nerve Allograft and Conduit in Digital Nerve Reconstruction. J Hand Surg Am. Dec 2020; 45(12): 1148-1156. PMID 33010972
- 49. Thomson SE, Ng NY, Riehle MO, et al. Bioengineered nerve conduits and wraps for peripheral nerve repair of the upper limb. Cochrane Database Syst Rev. Dec 07 2022; 12(12): CD012574. PMID 36477774
- 50. Aberg M, Ljungberg C, Edin E, et al. Clinical evaluation of a resorbable wrap-around implant as an alternative to nerve repair: a prospective, assessor-blinded, randomised clinical study of sensory, motor and functional recovery after peripheral nerve repair. J Plast Reconstr Aesthet Surg. Nov 2009; 62(11): 1503-9. PMID 18938119
- 51. Bertleff MJ, Meek MF, Nicolai JP. A prospective clinical evaluation of biodegradable neurolac nerve guides for sensory nerve repair in the hand. J Hand Surg Am. May 2005; 30(3): 513-8. PMID 15925161
- 52. Boeckstyns ME, Sørensen AI, Viñeta JF, et al. Collagen conduit versus microsurgical neurorrhaphy: 2-year follow-up of a prospective, blinded clinical and electrophysiological multicenter randomized, controlled trial. J Hand Surg Am. Dec 2013; 38(12): 2405-11. PMID 24200027
- 53. Lundborg G. Alternatives to autologous nerve grafts. Handchir Mikrochir Plast Chir. Feb 2004; 36(1): 1-7. PMID 15083383
- 54. Weber RV, Mackinnon SE. Bridging the neural gap. Clin Plast Surg. Oct 2005; 32(4): 605-16, viii. PMID 16139631
- 55. Dienstknecht T, Klein S, Vykoukal J, et al. Type I collagen nerve conduits for median nerve repairs in the forearm. J Hand Surg Am. Jun 2013; 38(6): 1119-24. PMID 23707012
- 56. Farole A, Jamal BT. A bioabsorbable collagen nerve cuff (NeuraGen) for repair of lingual and inferior alveolar nerve injuries: a case series. J Oral Maxillofac Surg. Oct 2008; 66(10): 2058-62. PMID 18848102
- 57. Nakamura Y, Takanari K, Ebisawa K, et al. Repair of temporal branch of the facial nerve with novel polyglycolic acid-collagen tube: a case report of two cases. Nagoya J Med Sci. Feb 2020; 82(1): 123-128. PMID 32273640

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

- 58. Takeda S, Kurimoto S, Tanaka Y, et al. Mid-term outcomes of digital nerve injuries treated with Renerve® synthetic collagen nerve conduits: A retrospective single-center study. J Orthop Sci. May 04 2023. PMID 37149481
- 59. Li Q, Liu Z, Lu J, et al. [Transferring the ulnaris proper digital nerve of index finger and its dorsal branch to repair the thumb nerve avulsion]. Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi. Aug 15 2017; 31(8): 992-995. PMID 29806439
- 60. Patel NP, Lyon KA, Huang JH. An update-tissue engineered nerve grafts for the repair of peripheral nerve injuries. Neural Regen Res. May 2018; 13(5): 764-774. PMID 29862995
- 61. Wangensteen KJ, Kalliainen LK. Collagen tube conduits in peripheral nerve repair: a retrospective analysis. Hand (N Y). Sep 2010; 5(3): 273-7. PMID 19937145
- 62. National Institutes for Health and Care Excellence (NICE). Processed nerve allografts to repair peripheral nerve discontinuities [IPG597]. 2017. Available at: https://www.nice.org.uk/guidance/ipg597.
- 63. Wang Y, Sunitha M, Chung KC. How to measure outcomes of peripheral nerve surgery. Hand Clin. Aug 2013; 29(3): 349-61. PMID 23895715
- 64. Rosén B, Lundborg G. A model instrument for the documentation of outcome after nerve repair. J Hand Surg Am. May 2000; 25(3): 535-43. PMID 10811759

# **Policy History**

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

10/21/2025 Utilization Management Committee review/approval. New policy.

Next Scheduled Review Date: 10/2026

# **Coding**

The five character codes included in the Health Plan Medical Policy Coverage Guidelines are obtained from Current Procedural Terminology (CPT®)‡, copyright 2024 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.

The responsibility for the content of the Health Plan Medical Policy Coverage Guidelines is with the Health Plan and no endorsement by the AMA is intended or should be implied. The AMA disclaims responsibility for any consequences or liability attributable or related to any use, nonuse or interpretation of information contained in the Health Plan Medical Policy Coverage Guidelines. Fee schedules, relative value units, conversion factors and/or related components are not assigned by the AMA, are not part of CPT, and the AMA is not recommending their use. The AMA does not directly or indirectly practice medicine or dispense medical services. The AMA assumes no liability for data contained or not contained herein. Any use of CPT outside of the Health Plan Medical Policy Coverage Guidelines should refer to the most current Current Procedural Terminology which

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

contains the complete and most current listing of CPT codes and descriptive terms. Applicable FARS/DFARS apply.

CPT is a registered trademark of the American Medical Association.

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

Code Type	Code
CPT	64910, 64912, 64913, 64999
HCPCS	C9352, C9355
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 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.
- \*\*Medically Necessary (or "Medical Necessity") Health care services, treatment, procedures, equipment, drugs, devices, items or supplies that a Provider, exercising prudent clinical judgment, would provide to a patient for the purpose of preventing, evaluating, diagnosing or treating an illness, injury, disease or its symptoms, and that are:
  - A. In accordance with nationally accepted standards of medical practice;
  - B. Clinically appropriate, in terms of type, frequency, extent, level of care, site and duration, and considered effective for the patient's illness, injury or disease; and
  - C. Not primarily for the personal comfort or convenience of the patient, physician or other health care provider, and not more costly than an alternative service or sequence of services at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of that patient's illness, injury or disease.

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

For these purposes, "nationally accepted standards of medical practice" means standards that are based on credible scientific evidence published in peer-reviewed medical literature generally recognized by the relevant medical community, Physician Specialty Society recommendations and the views of Physicians practicing in relevant clinical areas and any other relevant factors.

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

**NOTICE:** If the Patient's health insurance contract contains language that differs from the Health Plan's 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 Health Plan 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.

**NOTICE:** All codes listed on the Medical Policy require prior authorization. This ensures appropriate utilization and alignment with current clinical guidelines.

#### **Medicare Advantage Members**

Established coverage criteria for Medicare Advantage members can be found in Medicare coverage guidelines in statutes, regulations, National Coverage Determinations (NCD)s, and Local Coverage Determinations (LCD)s. To determine if a National or Local Coverage Determination addresses coverage for a specific service, refer to the Medicare Coverage Database at the following link: <a href="https://www.cms.gov/medicare-coverage-database/search.aspx">https://www.cms.gov/medicare-coverage-database/search.aspx</a>. You may wish to review the Guide to the MCD Search here: <a href="https://www.cms.gov/medicare-coverage-database/help/mcd-benehelp.aspx">https://www.cms.gov/medicare-coverage-database/help/mcd-benehelp.aspx</a>.

When coverage criteria are not fully established in applicable Medicare statutes, regulations, NCDs or LCDs, internal coverage criteria may be developed. This policy is to serve as the summary of evidence, a list of resources and an explanation of the rationale that supports the adoption of this internal coverage criteria.

#### **InterQual®**

Interqual® is utilized as a source of medical evidence to support medical necessity and level of care decisions. InterQual® criteria are intended to be used in connection with the independent

Medical Policy # MA-157

Original Effective Date: 01/01/2026 Current Effective Date: 01/01/2026

professional medical judgment of a qualified health care provider. InterQual® criteria are clinically based on best practice, clinical data, and medical literature. The criteria are updated continually and released annually. InterQual® criteria are a first-level screening tool to assist in determining if the proposed services are clinically indicated and provided in the appropriate level or whether further evaluation is required. The utilization review staff does the first-level screening. If the criteria are met, the case is approved; if the criteria are not met, the case is referred to the medical director.