02-61000-20

Original Effective Date: 09/15/01

Reviewed: 07/24/25

Revised: 08/15/25

Subject: Percutaneous Intradiscal Electrothermal Annuloplasty, Radiofrequency Annuloplasty, Biacuplasty, and Intraosseous Basivertebral Nerve Ablation

THIS MEDICAL COVERAGE GUIDELINE IS NOT AN AUTHORIZATION, CERTIFICATION, EXPLANATION OF BENEFITS, OR A GUARANTEE OF PAYMENT, NOR DOES IT SUBSTITUTE FOR OR CONSTITUTE MEDICAL ADVICE. ALL MEDICAL DECISIONS ARE SOLELY THE RESPONSIBILITY OF THE PATIENT AND PHYSICIAN. BENEFITS ARE DETERMINED BY THE GROUP CONTRACT, MEMBER BENEFIT BOOKLET, AND/OR INDIVIDUAL SUBSCRIBER CERTIFICATE IN EFFECT AT THE TIME SERVICES WERE RENDERED. THIS MEDICAL COVERAGE GUIDELINE APPLIES TO ALL LINES OF BUSINESS UNLESS OTHERWISE NOTED IN THE PROGRAM EXCEPTIONS SECTION.

Position Statement	Billing/Coding	Reimbursement	Program Exceptions	<u>Definitions</u>	Related Guidelines
<u>Other</u>	References	<u>Updates</u>			

DESCRIPTION:

Discogenic low back pain is a common, multifactorial pain syndrome that involves low back pain without radicular symptoms findings, in conjunction with radiologically confirmed degenerative disc disease.

Electrothermal intradiscal annuloplasty therapies use radiofrequency energy sources to treat discogenic low back pain arising from annular tears. These annuloplasty techniques are purported to decrease pain arising from the annulus by thermocoagulating nerves in the disc and tightening annular tissue.

Vertebral body endplates have been proposed as a source of lower back pain, caused by intraosseous nerves. The basivertebral nerve enters the posterior vertebral body and sends branches to the superior and inferior endplates. Vertebrogenic pain, transmitted via the basivertebral nerve, has been purported to occur with endplate damage or degeneration.

The Intracept® Intraosseous Nerve Ablation System is intended to be used in conjunction with radiofrequency (RF) generators for the ablation of basivertebral nerves of the L3 through S1 vertebrae for the relief of chronic low back pain of at least 6 months duration, that has not responded to at least 6 months of conservative care.

Summary and Analysis of Evidence: Two RCTs on intradiscal electrothermal annuloplasty have reported conflicting results, with one RCT (Pauza et al, 2004) finding a benefit for intradiscal electrothermal annuloplasty, and the other RCT (Freeman et al, 2005) finding no benefit. The most recent RCT identified was from 2005. No recent literature on intradiscal electrothermal annuloplasty has been identified.

For percutaneous intradiscal radiofrequency thermocoagulation, two sham-controlled randomized trials showed no evidence of a benefit. One found trial that only 1 of 14 patients was considered a treatment success (Barendse et al, 2001). The other was terminated after a blinded interim analysis showed no trend to benefit compared with sham (Kvarstein et al, 2009).

Two industry-sponsored RCTs have assessed use of biacuplasty to treat chronic low back pain. In one, only 6% of subjects screened met the strict inclusion and exclusion criteria for the study (Kapural et al, 2013). Significant differences in outcomes were observed at 6 months, but not at 1 month or 3 months, and the definition of successful treatment appears to have been post hoc. Kapural et al (2015) reported on the unblinded 12-month follow-up from this trial in 2015. Improvements continued through 12 months. However, the change in Oswestry Disability Index score was modest. Opioid usage did not decrease significantly. In the second multicenter RCT (Desai et al, 2016), 63 patients met inclusion criteria, which included a positive result on provocation discography. There was a significant treatment effect for the primary outcome measure, but not the secondary outcome measures. This trial was not sham-controlled, and it was not reported whether it was adequately powered. Additional sham-controlled trials in a broader population of patients are needed to determine the effect of this treatment with greater certainty.

Md MY et al (2023) conducted a prospective case series study with forty-one patients suffering from chronic discogenic lower back pain for more than six months. These patients subsequently received lumbar cool radiofrequency IDB and were enrolled in the study. Thirty-seven patients completed followup questionnaires at 1, 3, 6, and 12 months. The surgical outcomes were reported using visual analogue scale (VAS), Oswestry disability index (ODI), and the consumption of nonsteroidal anti-inflammatory drugs (NSAID). Furthermore, a univariate analysis was performed to identify prognostic factors associated with pain relief from age, gender, body mass index (BMI), and pre-operative lumbar magnetic resonance imaging reading. Significant reductions were found in estimated VAS and ODI at the postoperative period at 1, 3, 6, and 12 months. The NSAID dosage was significantly decreased at 3-month and 1-year follow-up. No procedure-related complications were detected. The prognosis of IDB was not related to disc height, Pfirrmann grading or Modic endplate change. However, disc extrusions were associated with promising outcomes (VAS improvement \geq 50%) on pain relief (P < 0.05). The authors concluded "IDB is a good alternative choice for treating lumbar DDD. Patients with a painful extrusion lumbar disc may gain some benefits after receiving IDB following a period of failed conservative treatment. These findings may also add some references for physicians in the decision making when treating lumbar DDD." The authors noted "many limitations", including the lack of randomization and a control group, a small number of cases, short follow-up period, and lack of long-term evaluation of the prognostic factors.

Fischgrund et al (2018) conducted a randomized, double-blind, sham controlled study (SMART trial) of basivertebral nerve ablation using the Intracept system in 225 participants from the U.S. and Europe. Patients had chronic isolated lumbar pain that had not responded to at least 6 months of nonoperative management. Additional study inclusion criteria were a minimum Oswestry Disability Index of 30 points (on a 100 point scale), a minimum visual analog scale of 4, and Modic type 1 or 2 changes at the vertebral endplates of the levels targeted for treatment. Treatment was limited to a minimum of 2 and a maximum of 3 consecutive vertebral levels from L3 to S1. The active treatment group (n=147) received radiofrequency and the sham group (n=78) underwent the same protocol for the same overall duration as the treatment group; however, the radiofrequency treatment was simulated. Patients were blinded

to the group assignment for 1 year, at which time those in the sham arm were allowed to cross over [57] (73%) elected to do so] and receive the Intracept treatment. The primary endpoint of the original study was comparative change in Oswestry Disability Index from baseline to 3 months, and in the intent-totreat analysis there was no statistically significant difference in this outcome between groups at this time point. There was a difference between groups in the 3-month per protocol analysis (mean Oswestry Disability Index improved 20.5 and 15.2 points in the treatment and sham arms, respectively; p=.019). However, at the 12 month per protocol analysis, the difference in mean Oswestry Disability Index between groups was no longer statistically significant. Pain severity, measured by visual analog scale, was not significantly different between groups at 3 months (p=.083) but there was significantly greater improvement in the treatment group at 6 and 12 months. The 24 month follow-up results were reported for the active treatment group from the SMART trial (Fischgrund et al, 2019). Of the per protocol population treated with ablation (treatment arm), 106 (83%) completed a 24-month follow-up visit. A durable Oswestry Disability Index mean improvement was observed (23.4 points). Data for Oswestry Disability Index outcomes were not available for the sham group because of the high crossover rate. Therefore, long-term comparative outcomes are not available. Five year results were reported for the 100 U.S. patients from the treatment arm from the original SMART trial who were available for follow-up (Fischgrund et al, 2020). Mean Oswestry Disability Index scores improved from 42.8 to 16.9 at 5 years, a reduction of 25.9 points. Mean reduction in visual analog scale score was 4.4 points (baseline 6.7, p<.001).

The INTRACEPT trial was an open-label RCT conducted at 20 U.S. sites (Khalil et al, 2019). A total of 140 patients with lower back pain of at least 6 months duration, with Modic Type 1 or 2 vertebral endplate changes between L3 and S1, were randomized to undergo radiofrequency ablation of the basivertebral nerve or continue standard care. Standard care consisted of pain medications, physical therapy, exercise, chiropractic treatment, acupuncture, and spinal injections; the specific treatment(s) administered were determined by the treating investigator in conjunction with the patient. Treatment of up to 4 vertebrae in non-consecutive levels from L3 to S1 was allowed. The primary study endpoint was change in Oswestry Disability Index at 3 months. A pre-planned interim analysis was undertaken when 60% of participants reached the 3 month follow-up (n=51 in the treatment group and n=53 in the standard care group), and reported statistically significant differences between groups on all patientreported outcome measures, favoring the treatment group. The study was halted and the individuals were allowed to cross over to the treatment arm. Study limitations include short term follow-up, lack of a sham group, and allowance of crossover at 3 months. Twelve month follow-up results were reported from the INTRACEPT trial; after a median of 175 days post-randomization, 92% of patients initially randomized to the standard care arm elected to receive early treatment with basivertebral nerve ablation (Smuck et al, 2021). Six month results for the Oswestry Disability Index were significantly improved with basivertebral nerve ablation (n=66) compared to standard care (n=74) (least squares mean difference between groups, -24.5; 95% CI, -29.4 to -19.6; p=.0001). Improvements in the Oswestry Disability index and mean visual analog scale that were reported among patients initially treated with basivertebral nerve ablation were maintained throughout the 12-month study period, with reported reductions of -25.7±18.5 points, and -3.8±2.6 cm, respectively (p<.001 for both comparisons to baseline). Improvements in pain, function, and quality of life were reported at 24 months; however, these results were also not comparative (Koreckij et al, 2021). The lack of comparative data beyond 6 months due to the high rate of crossover is a limitation of this trial.

Mekhail et al (2023) conducted a systematic review and meta-analysis to determine the relative effectiveness and safety profiles of percutaneous and minimally invasive interventions for chronic low back pain. Twenty-seven studies were included. BVN ablation was found to provide statistically significant improvements in VAS and ODI scores for 6-, 12- and 24-month follow-up (P ≤0.05). Biological therapy and multifidus muscle stimulation were the only 2 treatments with both VAS and ODI outcomes not significantly different from BVN ablation at 6-, 12-, and 24-month follow-up. All outcomes found to be statistically significant represented inferior results to those of BVN ablation. Insufficient data precluded meaningful comparisons of SF-36 and EQ-5D scores. The serious adverse event (SAE) rates for all therapies and all reported time points were not significantly different from BVN ablation except for biological therapy and multifidus muscle stimulation at the 6-month follow-up. The authors concluded that "BVN ablation, biological therapy, and multifidus stimulation all provide significant, durable improvements in both pain and disability compared with other interventions, which provided only shortterm pain relief. Studies on BVN ablation reported no SAEs, a significantly better result than for studies of biological therapy and multifidus stimulation". The authors stated that limitations of this review included the ability of this study to estimate accurate effects for each tested treatment, and to determine significant differences between BVN and other treatments, was dependent on the state of the published literature on these topics. This systematic review/meta-analysis reached a conclusion regarding the effectiveness of the Intracept procedure by providing weight to lower quality studies; however, the only sham-controlled study of the Intracept procedure failed to achieve its primary endpoint.

A systematic review (Nwosu et al, 2023) examined the effectiveness of intraosseous basivertebral nerve RFA in treating non-radiating axial chronic LBP compared to standard therapy, sham, or without contrast. There were 286 articles in total; however, only 11 publications with extensive data on 413 participants matched the inclusion criteria and were used for this review. The authors stated that "a good number of patients in the basivertebral nerve ablation (BVNA) arm reported complete pain resolution demonstrating therapy success and the superiority of BVNA over sham and standard treatment". However, they further stated that "the findings of the existing investigations require confirmation by non-industry-funded, large-scale, high-quality trials using generalizable study participants".

Schnapp et al (2023) published the clinical outcomes for 16 consecutively treated patients with basivertebral nerve ablations utilizing in the INTRACEPT® device in a community practice setting. Evaluations were performed at baseline, 1 month, 3 months, and 6 months. The Oswestry Disability Index (ODI), Visual Analog Scale (VAS), and SF-36 were recorded in Medrio electronic data capture software. All patients (n = 16) completed the baseline, 1 month, 3 months, and 6 months follow-up. The authors concluded that "basivertebral nerve ablation appears to be a durable, minimally invasive treatment for the relief of chronic low back pain that can be successfully implemented in a community practice setting". The authors acknowledged several limitations of their study: 1) small study size, following only 16 patients; 2) absence of controls; and 3) other therapeutic procedures were not specifically withheld post-BVNA.

Smuck et al (2023) reported on 3-year aggregate results from two prospective studies of BVNA-treated patients. Pooled results at 3 years post-BVNA were reported for two studies with similar inclusion and exclusion criteria and outcomes measurements: 1) a prospective, open label, single-arm follow-up of the treatment arm of a randomized controlled trial (RCT) comparing BVNA to standard care (INTRACEPT

Trial), and 2) a prospective, open label, single cohort long-term follow-up study of BVNA-treated patients. Paired datasets (baseline and 3-years) for mean changes in Oswestry disability index (ODI) and numeric pain scores (NPS) were analyzed using a two-sided t-test with a 0.05 level of significance. There were 95/113 (84%) BVNA patients who completed a 3-year visit across 22 study sites. At baseline, 71% of patients reported back pain for ≥5 years, 28% were taking opioids, 34% had spinal injections in the prior 12 months, and 14% had prior low back surgery. Pain and functional improvements were significant at 3 years with a mean reduction in NPS of 4.3 points from 6.7 at baseline, and a mean reduction in ODI of 31.2 points from 46.1 at baseline. Responder rates, using minimal clinically important differences of ≥15-points for ODI and ≥50% reduction in NPS from baseline to three years, were 85.3% and 72.6%, respectively (combined response 69.5%), with 26.3% of patients reporting 100% pain relief at 3 years. There was a 74% reduction in the use of opioids and 84% reduction in the use of therapeutic spinal interventions from baseline to 3 years. There were no serious device or deviceprocedure related adverse events reported through three years. The authors concluded that (i)ntraosseous BVNA demonstrates statistically significant, clinically meaningful, and durable improvements in pain and function through 3 years in patients with primary vertebrogenic low back pain. BVNA-treated patients significantly reduced opioid use and interventions for low back pain."

POSITION STATEMENT:

Percutaneous annuloplasty (eg, intradiscal electrothermal annuloplasty, intradiscal radiofrequency annuloplasty, or intradiscal biacuplasty) for the treatment of chronic discogenic back pain or other indications is considered **experimental or investigational.**

Intraosseous radiofrequency ablation of the basivertebral nerve (e.g., Intracept® system) for the treatment of vertebrogenic back pain is considered **experimental or investigational**.

There is insufficient published clinical evidence to support the safety and effectiveness of these procedures.

BILLING/CODING INFORMATION:

CPT Coding:

22526	Percutaneous intradiscal electrothermal annuloplasty, unilateral or bilateral including
	fluoroscopic guidance; single level (investigational)
22527	Percutaneous intradiscal electrothermal annuloplasty, unilateral or bilateral including
	fluoroscopic guidance; 1 or more levels (list separately in addition to code for primary
	procedure) (investigational)
64628	Thermal destruction of intraosseous basivertebral nerve, including all imaging
	guidance; first 2 vertebral bodies, lumbar or sacral (investigational)
64629	Thermal destruction of intraosseous basivertebral nerve, including all imaging
	guidance; each additional vertebral body, lumbar or sacral (List separately in addition
	to code for primary procedure) (investigational)

REIMBURSEMENT INFORMATION:

Refer to Section entitled **POSITION STATEMENT**.

PROGRAM EXCEPTIONS:

Federal Employee Program (FEP): Follow FEP guidelines.

State Account Organization (SAO): Follow SAO guidelines.

Medicare Advantage products: The following National Coverage Determination (NCD) was reviewed on the last guideline reviewed date: Thermal Intradiscal Procedures (TIPS) (150.11) located at cms.gov.

If this Medical Coverage Guideline contains a step therapy requirement, in compliance with Florida law 627.42393, members or providers may request a step therapy protocol exemption to this requirement if based on medical necessity. The process for requesting a protocol exemption can be found at Coverage Protocol Exemption Request.

DEFINITIONS:

Electrothermal: an electrosurgical appliance used for cutting.

Intracept procedure: uses a radiofrequency probe to ablate the intraosseous basivertebral nerve in chronic low back pain.

RELATED GUIDELINES:

<u>Automated Percutaneous Discectomy, Laser Discectomy, Percutaneous Endoscopic Discectomy, and DISC Nucleoplasty, 02-61000-32</u>

OTHER:

Note: The use of specific product names is illustrative only. It is not intended to be a recommendation of one product over another, and is not intended to represent a complete listing of all products available.

Other terms associated with thermal intradiscal procedures:

Accutherm

Baylis Pain Management Cooled Probe

discTRODE

Oratec Nucleotomy Catheter

Radionics Disc Catheter System

SpineCath® Intradiscal Catheter,

TransDiscal electrodes

REFERENCES:

1. American Society of Anesthesiologists Task Force on Chronic Pain Management, American Society of Regional Anesthesia and Pain Medicine. Practice guidelines for chronic pain management: an updated report by the American Society of Anesthesiologists Task Force on Chronic Pain

- Management and the American Society of Regional Anesthesia and Pain Medicine. Anesthesiology. 2010 Apr; 112(4):810-33.
- 2. American Society of Interventional Pain Physicians An Update of Comprehensive Evidence-Based Guidelines for Interventional Techniques in Chronic Spinal Pain. Part II: Guidance and Recommendations. Pain Physician 2013; 16:S49-S283.
- An H, Boden, SD, Kang J, Sandhu HS, Abdu W, Weinstein J. Summary statement: emerging techniques for treatment of degenerative lumbar disc disease. Spine. 2003 Aug 1: 28(15 Suppl): S24-5.
- 4. Andersson GB, Mekhail NA, Block JE. A randomized, double-blind, controlled trial: intradiscal electrothermal therapy versus placebo for the treatment of chronic discogenic low back pain. Spine. 2006 Jun 15; 31(14): 1637-8; author reply 1638.
- 5. Andersson GB, Mekhail NA, Block JE. Treatment Of Intractable Discogenic Low Back Pain. A Systematic Review Of Spinal Fusion And Intradiscal Electrothermal Therapy (IDET). Pain Physician. 2006 Jul; 9(3):237-48.
- 6. Bailey JF, Liebenberg E, Degmetich S, Lotz JC. Innervation patterns of PGP 9.5-positive nerve fibers within the human lumbar vertebra. J Anat. 2011 Mar;218(3):263-70. doi: 10.1111/j.1469-7580.2010.01332.x. Epub 2011 Jan 12.
- Barendse GA, van Den Berg SG, Kessels AH, Weber WE, van Kleef M. Randomized controlled trial
 of percutaneous intradiscal radiofrequency thermocoagulation for chronic discogenic back pain: lack
 of effect from a 90-second 70 C lesion. Spine (Phila Pa 1976). 2001 Feb 1;26(3):287-92. doi:
 10.1097/00007632-200102010-00014.
- 8. Becker S, Hadjipavlou A, Heggeness MH. Ablation of the basivertebral nerve for treatment of back pain: a clinical study. Spine J. 2017 Feb;17(2):218-223. doi: 10.1016/j.spinee.2016.08.032. Epub 2016 Sep 1.
- 9. Biyani A, Andersson GB, Chaudhary H, An HS. Intradiscal Electrothermal therapy: a treatment option in patients with internal disc disruption. Spine. 2003 Aug 1; 28(15 Suppl): S8-14
- Blue Cross Blue Shield Association Technology Evaluation Center "Percutaneous Intradiscal Radiofrequency Thermocoagulation for Chronic Discogenic Low Back Pain", Volume 18, No. 19 February 2004.
- 11. Blue Cross Blue Shield Association Evidence Positioning System®. 7.01.72 Percutaneous Intradiscal Electrothermal Annuloplasty, Radiofrequency Annuloplasty, Biacuplasty and Intraosseous Basivertebral Nerve Ablation, 05/25.
- 12. Boody BS, Sperry BP, Harper K, Macadaeg K, McCormick ZL. The Relationship Between Patient Demographic and Clinical Characteristics and Successful Treatment Outcomes After Basivertebral Nerve Radiofrequency Ablation: A Pooled Cohort Study of Three Prospective Clinical Trials. Pain Med. 2022 Jul 20;23(Suppl 2):S2-S13. doi: 10.1093/pm/pnac050.
- 13. Boswell MV, Trescot AM, Datta S, Schultz DM, Hansen HC, Abdi S, Sehgal N, Shah RV, Singh V, Benyamin RM, Patel VB, Buenaventura RM, Colson JD, Cordner HJ, Epter RS, Jasper JF, Dunbar EE, Atluri SL, Bowman RC, Deer TR, Swicegood JR, Staats PS, Smith HS, Burton AW, Kloth DS, Giordano J, Manchikanti L; American Society of Interventional Pain Physicians. Interventional techniques: evidence-based practice guidelines in the management of chronic spinal pain. Pain Physician. 2007 Jan; 10(1): 7-111.
- 14. California Technology Assessment Forum (CTAF). IDET-Intradiscal Electrothermal Therapy for Treatment of Back Pain. Technology Assessment. San Francisco, CA: October 8, 2003.
- Canadian Coordinating Office for Health Technology Assessment. Intradiscal electrothermal therapy (IDET) for the treatment of chronic, discogenic low back pain. Ottawa: Canadian Coordinating Office for Health Technology Assessment (CCOHTA), 2003.

- Centers for Medicare and Medicaid Services (CMS). Palmetto GBA [Alabama, Georgia, Tennessee, South Carolina, Virginia, West Virginia, North Carolina]. Local Coverage Determination (LCD) Thermal Destruction of the Intraosseous Basivertebral Nerve (BVN) for Vertebrogenic Lower Back Pain (L39420) (03/05/23).
- 17. Centers for Medicare and Medicaid Services (CMS). Noridian Healthcare Solutions, Inc. [California, American Samoa, Guam, Hawaii, Northern Mariana Islands, Nevada]. Local Coverage Determination (LCD) Intraosseous Basivertebral Nerve Ablation (L39642) (01/28/24).
- 18. Centers for Medicare and Medicaid Services (CMS). Noridian Healthcare Solutions, Inc. [Alaska, Idaho, Oregon, Washington, Arizona, Montana, North Dakota, South Dakota, Utah, Wyoming]. Local Coverage Determination (LCD) Intraosseous Basivertebral Nerve Ablation (L39644) (01/28/24).
- 19. Centers for Medicare and Medicaid Services (CMS). National Coverage Determination for Thermal Intradiscal Procedures (TIPS) (150.11) (09/29/08).
- 20. ClinicalTrials.gov. NCT05660512: Intracept Intraosseous Basivertebral Nerve Ablation (May 2024). Sponsor: University of Utah.
- 21. ClinicalTrials.gov. NCT03246061: INTRACEPT: Prospective, Randomized, Multi-center Study Intraosseous Basivertebral Nerve Ablation for Treatment of CLBP (CLBP) (August 2022). Sponsor: Relievant Medsystems, Inc.
- 22. ClinicalTrials.gov. NCT01446419: SMART Clinical Study: Surgical Multi-center Assessment of RF Ablation for the Treatment of Vertebrogenic Back Pain (SMART) (October 2016). Sponsor: Relievant Medsystems, Inc.
- 23. ClinicalTrials.gov. NCT05207813: CLBP Single-Arm Long-Term Follow-up Study (June 2022). Sponsor: Relievant Medsystems, Inc.
- 24. ClinicalTrials.gov. NCT03266107: Study of Basivertebral Nerve Ablation Treatment of Chronic Low Back Pain (December 2020). Sponsor: Relievant Medsystems, Inc.
- 25. ClinicalTrials.gov. NCT03658018: Intraosseous Basivertebral Nerve Ablation for Treatment of Chronic Low Back Pain (CLBP) (August 2019). Sponsor: Relievant Medsystems, Inc.
- 26. ClinicalTrials.gov. NCT03630133: Intraosseous Basivertebral Nerve Ablation for the Treatment of Chronic Low Back Pain (CLBP) (June 2020). Sponsor: Relievant Medsystems, Inc.
- 27. ClinicalTrials.gov. NCT03997825: Five-Plus Year Follow-Up of SMART Randomized Controlled Trial (SMART) (January 2021). Sponsor: Relievant Medsystems, Inc.
- 28. Cohen SP, Larkin T, Abdi S, Chang A, Stojanovic M. Risk factors for failure and complications of intradiscal electrothermal therapy: a pilot study. Spine. 2003 Jun 1; 28(11): 1142-7.
- 29. Conger A, Burnham TR, Clark T, Teramoto M, McCormick ZL. The Effectiveness of Intraosseous Basivertebral Nerve Radiofrequency Ablation for the Treatment of Vertebrogenic Low Back Pain: An Updated Systematic Review with Single-Arm Meta-analysis. Pain Med. 2022 Jul 20;23(Suppl 2):S50-S62. doi: 10.1093/pm/pnac070.
- 30. Conger A, Schuster NM, Cheng DS, Sperry BP, Joshi AB, Haring RS, Duszynski B, McCormick ZL. The effectiveness of intraosseous basivertebral nerve radiofrequency neurotomy for the treatment of chronic low back pain in patients with Modic changes: a systematic review. Pain Medicine. 2021 May 1;22(5):1039-54.
- 31. Conger A, Smuck M, Truumees E, Lotz JC, DePalma MJ, McCormick ZL. Vertebrogenic Pain: A Paradigm Shift in Diagnosis and Treatment of Axial Low Back Pain. Pain Med. 2022 Jul 20;23(Suppl 2):S63-S71. doi: 10.1093/pm/pnac081.
- 32. Danish Centre for Evaluation and Health Technology Assessment. Intradiscal electrocoagulation therapy (IDET) for chronic back pain Early Warning on New Health Technology 2003 2(7). Copenhagen: Danish Centre for Evaluation and Health Technology Assessment (DACEHTA), 2003

- 33. Desai MJ, Kapural L, et al. Twelve-Month Follow-up of a Randomized Clinical Trial Comparing Intradiscal Biacuplasty to Conventional Medical Management for Discogenic Lumbar Back Pain. Pain Medicine 2017; 18: 751–763.
- 34. Desai MJ, Kapural L, Petersohn JD, Vallejo R, Menzies R, Creamer M, Gofeld M. A Prospective, Randomized, Multicenter, Open-label Clinical Trial Comparing Intradiscal Biacuplasty to Conventional Medical Management for Discogenic Lumbar Back Pain. Spine (Phila Pa 1976). 2016 Jul 1;41(13):1065-1074. doi: 10.1097/BRS.0000000000001412. PMID: 26689579.
- 35. DesRochers J, DesRochers R, Patel D, Andruszka C, Manchanda S, Ernazarov A, Mobley A. Mesenchymal stem cells and thermal annular procedures for discogenic pain: a systematic review with pooled analysis. Pain Manag. 2024 Feb;14(2):101-114. doi: 10.2217/pmt-2023-0107. Epub 2024 Jan 26. PMID: 38275178.
- 36. De Vivo AE, D'Agostino G, D'Anna G, Al Qatami H, Gil I, Ventura F, Manfrè L. Intra-osseous basivertebral nerve radiofrequency ablation (BVA) for the treatment of vertebrogenic chronic low back pain. Neuroradiology. 2021 May;63(5):809-815. doi: 10.1007/s00234-020-02577-8. Epub 2020 Oct 13. PMID: 33051706.
- 37. Dudli S, Fields AJ, Samartzis D, Karppinen J, Lotz JC. Pathobiology of Modic changes. European Spine Journal. 2016 Nov;25:3723-34.
- 38. ECRI Health Technology Assessment Information Services. Custom Hotline Response. Intradiscal Electrothermal Therapy (IDET) for Discogenic Pain. Updated 07/10/06.
- 39. ECRI. Emerging Technology (TARGET) Evidence Report. Intradiscal Electrothermal Annuloplasty for discogenic pain. Plymouth Meeting, PA: ECRI. February 2008.
- 40. ECRI Product Brief. Intradiscal Electrothermal Therapy (NeuroTherm, Inc.) for Treating Discogenic Pain (09/2012).
- 41. Falowski, S., Sayed, D. (2022). Back Pain: Vertebrogenic. In: Mostoufi, S.A., George, T.K., Tria Jr., A.J. (eds) Clinical Guide to Musculoskeletal Medicine. Springer, Cham. https://doi.org/10.1007/978-3-030-92042-5_7.
- 42. Fields AJ, Ballatori A, Han M, Bailey JF, McCormick ZL, O'Neill CW, Demir-Deviren S, Krug R, Lotz JC. Measurement of vertebral endplate bone marrow lesion (Modic change) composition with waterfat MRI and relationship to patient-reported outcome measures. Eur Spine J. 2021 Sep;30(9):2549-2556. doi: 10.1007/s00586-021-06738-y. Epub 2021 Feb 6.
- 43. Fields AJ, Liebenberg EC, Lotz JC. Innervation of pathologies in the lumbar vertebral end plate and intervertebral disc. Spine J. 2014 Mar 1;14(3):513-21. doi: 10.1016/j.spinee.2013.06.075. Epub 2013 Oct 18.
- 44. Fischgrund JS, Rhyne A, Franke J, et al. Intraosseous Basivertebral Nerve Ablation for the Treatment of Chronic Low Back Pain: 2-Year Results From a Prospective Randomized Double-Blind Sham-Controlled Multicenter Study. Int J Spine Surg. 2019 Apr 30;13(2):110-119. doi: 10.14444/6015.
- 45. Fischgrund JS, Rhyne A, Franke J, et al. Intraosseous basivertebral nerve ablation for the treatment of chronic low back pain: a prospective randomized double-blind sham-controlled multi-center study. Eur Spine J. 2018 May;27(5):1146-1156. doi: 10.1007/s00586-018-5496-1. Epub 2018 Feb 8.
- 46. Fischgrund JS, Rhyne A, Macadaeg K, et al. Long-term outcomes following intraosseous basivertebral nerve ablation for the treatment of chronic low back pain: 5-year treatment arm results from a prospective randomized double-blind sham-controlled multi-center study. Eur Spine J. 2020 Aug;29(8):1925-1934. doi: 10.1007/s00586-020-06448-x. Epub 2020 May 25.
- 47. Fishchenko IV, Garmish AR, Kravchuk LD, Saponenko AI. Radiofrequency ablation of the basivertebral nerve in the treatment of chronic low back pain: analysis of a small clinical series. Хирургия позвоночника. 2021;18(3 (eng)):61-7.

- 48. Fras C, Kravetz P, Mody DR, Heggeness MH. Substance P-containing nerves within the human vertebral body. an immunohistochemical study of the basivertebral nerve. Spine J. 2003 Jan-Feb;3(1):63-7. doi: 10.1016/s1529-9430(02)00455-2. PMID: 14589248.
- 49. Freeman BJ, Fraser RD, Cain CM, Hall DJ, Chapple DC. A randomized, double-blind, controlled trial: intradiscal electrothermal therapy versus placebo for the treatment of chronic discogenic low back pain. Spine. 2005 Nov 1; 30(21): 2369-77.
- 50. Gelalis I, Gkiatas I, Spiliotis A, et al. Current Concepts in Intradiscal Percutaneous Minimally Invasive Procedures for Chronic Low Back Pain. Asian J Neurosurg. 2019 Jul-Sep;14(3):657-669. doi: 10.4103/ajns.AJNS_119_17.
- 51. Gibson JNA, Waddell G. Surgery for degenerative lumbar spondylosis. Cochrane Database of Systematic Reviews 2005, Issue 4. Art. No.: CD001352. DOI: 10.1002/14651858.CD001352.pub3.
- 52. HAYES Medical Technology Directory. "Intradiscal Electrothermal Therapy" (05/06/03), Update performed 01/30/08.
- 53. Hayes, Inc. Hayes, Inc., Disc Nucleoplasty® (Perc™-D® SpineWand™) (ArthroCare Corp.) for Percutaneous disc Decompression, 04/25/07.
- 54. Heary RF. Intradiscal Electrothermal Annuloplasty: the IDET procedure. J Spinal Disord. 2001 Aug; 14(4): 353-60.
- 55. Heggli I, Laux CJ, Mengis T, et al. Modic type 2 changes are fibroinflammatory changes with complement system involvement adjacent to degenerated vertebral endplates. JOR Spine. 2022 Dec 23;6(1):e1237. doi: 10.1002/jsp2.1237.
- 56. Hegmann KT, ed. Low back disorders. In: Glass LS, editor(s). Occupational medicine practice guidelines: evaluation and management of common health problems and functional recovery in workers. 2nd ed. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2007. p. 366.
- 57. Helm S, Hayek SM, Benyamin RM, Manchikanti L. Systematic review of the effectiveness of thermal annular procedures in treating discogenic low back pain. Pain Physician. 2009 Jan-Feb;12(1):207-32.
- 58. Helm S, Deer TR, Manchikanti L, Datta S, Chopra P, Singh V, Hirsch JA. Effectiveness of thermal annular procedures in treating discogenic low back pain. Pain Physician. 2012 May-Jun;15(3):E279-304.
- 59. Huang J, Delijani K, Jones J, Di Capua J, El Khudari H, Gunn AJ, Hirsch J. Basivertebral Nerve Ablation. Semin Intervent Radiol. 2022 Jun 30;39(2):162-166. doi: 10.1055/s-0042-1745794. Erratum in: Semin Intervent Radiol. 2022 Sep 01;39(2):e1.
- 60. Institute for Clinical Systems Improvement. Health Care Guideline: Assessment and Management of Chronic Pain. Bloomington, MN: Institute for Clinical Systems Improvement (ICSI), November 2005.
- 61. Institute for Clinical Systems Improvement. Intradiscal electrothermal therapy (IDET) for low back pain. Technology Assessment Report #62. Bloomington, MN: Institute for Clinical Systems Improvement (ICSI), 2002.
- 62. International Society for Advancement of Spine Surgery. ISASS Guideline Intraosseous Ablation of the Basivertebral Nerve for the Relief of Chronic Low Back Pain (December 2019). Accessed at https://www.isass.org/isass-guideline-intraosseous-ablation-of-the-basivertebral-nerve-for-the-reliefof-chronic-low-back-pain/.
- 63. Järvinen J, Karppinen J, Niinimäki J, Haapea M, Grönblad M, Luoma K, Rinne E. Association between changes in lumbar Modic changes and low back symptoms over a two-year period. BMC Musculoskelet Disord. 2015 Apr 22:16:98. doi: 10.1186/s12891-015-0540-3.
- 64. Jensen TS, Karppinen J, Sorensen JS, Niinimäki J, Leboeuf-Yde C. Vertebral endplate signal changes (Modic change): a systematic literature review of prevalence and association with non-specific low back pain. Eur Spine J. 2008 Nov;17(11):1407-22. doi: 10.1007/s00586-008-0770-2. Epub 2008 Sep 12.

- 65. Kapural L, Hayek S, Malak O, Arrigain S, Mekhail N. Intradiscal thermal annuloplasty versus intradiscal radiofrequency ablation for the treatment of discogenic pain: a prospective matched control trial. Pain Med. 2005 Nov-Dec; 6(6): 425-31.
- 66. Kapural L, Mekhail N. A randomized, double-blind, controlled trial: intradiscal electrothermal therapy versus placebo for the treatment of chronic discogenic low back pain. Spine. 2006 Jun 15; 31(14): 1636; author reply 1636-7.
- 67. Kapural L, Vrooman B, Sarwar S, Krizanac-Bengez L, Rauck R, Gilmore C, North J, Girgis G, Mekhail N. A randomized, placebo-controlled trial of transdiscal radiofrequency, biacuplasty for treatment of discogenic lower back pain. Pain Med. 2013 Mar;14(3):362-73. doi: 10.1111/pme.12023. Epub 2012 Dec 28.
- 68. Kapural L, Vrooman B, Sarwar S, Krizanac-Bengez L, Rauck R, Gilmore C, North J, Mekhail N. Radiofrequency intradiscal biacuplasty for treatment of discogenic lower back pain: a 12-month follow-up. Pain Med. 2015 Mar;16(3):425-31. doi: 10.1111/pme.12595. Epub 2014 Oct 23.
- 69. Karaman H, Tüfek A, Kavak GÖ, Kaya S, Yildirim ZB, Uysal E, Celik F. 6-month results of TransDiscal Biacuplasty on patients with discogenic low back pain: preliminary findings. Int J Med Sci. 2010 Dec 14;8(1):1-8.
- 70. Khalil JG, Smuck M, Koreckij T, Keel J, Beall D, Goodman B, Kalapos P, Nguyen D, Garfin S, INTRACEPT Trial Investigators. A prospective, randomized, multicenter study of intraosseous basivertebral nerve ablation for the treatment of chronic low back pain. The Spine Journal. 2019 Oct 1;19(10):1620-32.
- 71. Khalil JG, Truumees E, Macadaeg K, Nguyen DTD, Moore GA, Lukes D, Fischgrund J. Intraosseous basivertebral nerve ablation: A 5-year pooled analysis from three prospective clinical trials. Interv Pain Med. 2024 Dec 13;3(4):100529. doi: 10.1016/j.inpm.2024.100529.
- 72. Kim HS, Adsul N, Yudoyono F, Paudel B, Kim KJ, Choi SH, Kim JH, Chung SK, Choi JH, Jang JS, Jang IT, Oh SH. Transforaminal Epiduroscopic Basivertebral Nerve Laser Ablation for Chronic Low Back Pain Associated with Modic Changes: A Preliminary Open-Label Study. Pain Res Manag. 2018 Aug 14;2018:6857983. doi: 10.1155/2018/6857983.
- 73. Koreckij T, Kreiner S, Khalil JG, Smuck M, Markman J, Garfin S; INTRACEPT Trial Investigators. Prospective, randomized, multicenter study of intraosseous basivertebral nerve ablation for the treatment of chronic low back pain: 24-Month treatment arm results. N Am Spine Soc J. 2021 Oct 26;8:100089. doi: 10.1016/j.xnsj.2021.100089.
- 74. Khalil JG, Smuck M, Koreckij T, Keel J, Beall D, Goodman B, Kalapos P, Nguyen D, Garfin S; INTRACEPT Trial Investigators. A Prospective, Randomized, Multi-Center Study of Intraosseous Basivertebral Nerve Ablation for the Treatment of Chronic Low Back Pain. The Spine Journal (2019), doi:https://doi.org/10.1016/j.spinee.2019.05.598
- 75. Kvarstein G, Måwe L, Indahl A, Hol PK, Tennøe B, Digernes R, Stubhaug A, Tønnessen TI, Beivik H. A randomized double-blind controlled trial of intra-annular radiofrequency thermal disc therapy--a 12-month follow-up. Pain. 2009 Oct;145(3):279-286. doi: 10.1016/j.pain.2009.05.001. Epub 2009 Aug 3. PMID: 19647940.
- Lee E, Kim J, Rahman S, Daksla N, Caldwell W, Bergese S. Basivertebral Nerve Ablation for Treatment of Lower Back Pain. Biomedicines. 2024 Sep 9;12(9):2046. doi: 10.3390/biomedicines12092046.
- 77. Lin GX, Jhang SW, Chen CM. An Effectiveness Evaluation of Nucleo-Annuloplasty for Lumbar Discogenic Lesions Using Disc-FX: A Scoping Review. Medicina (Kaunas). 2023 Jul 13;59(7):1291. doi: 10.3390/medicina59071291.
- 78. Lin GX, Sharma S, Liu Y, Jabri H, Kim JS. Changes in Temperature Following Radiofrequency Thermal Ablation of the Nucleus Pulposus and Annulus Fibrosus: A Cadaveric Study. Pain Physician. 2022 Oct;25(7):E1073-E1079.

- 79. Loan AJ, Kieser DC. Intraosseous radiofrequency ablation of the basivertebral nerve in chronic low back pain: a meta-analysis. Open Journal of Radiology, 2021 Jul 2:11(3):81-90.
- 80. Lorio M, Clerk-Lamalice O, Beall DP, Julien T. International Society for the Advancement of Spine Surgery Guideline-Intraosseous Ablation of the Basivertebral Nerve for the Relief of Chronic Low Back Pain. Int J Spine Surg. 2020 Feb 29;14(1):18-25. doi: 10.14444/7002.
- 81. Lorio M, Clerk-Lamalice O, Rivera M, Lewandrowski KU. ISASS Policy Statement 2022: Literature Review of Intraosseous Basivertebral Nerve Ablation. Int J Spine Surg. 2022 Oct 20:8362. doi: 10.14444/8362. Epub ahead of print.
- 82. Lotz JC, Fields AJ, Liebenberg EC. The role of the vertebral end plate in low back pain. Global Spine J. 2013 Jun;3(3):153-64. doi: 10.1055/s-0033-1347298. Epub 2013 May 23.
- 83. Luoma K, Vehmas T, Kerttula L, Grönblad M, Rinne E. Chronic low back pain in relation to Modic changes, bony endplate lesions, and disc degeneration in a prospective MRI study. Eur Spine J. 2016 Sep;25(9):2873-81. doi: 10.1007/s00586-016-4715-x. Epub 2016 Aug 1. PMID: 27480265.
- 84. Macadaeg K, Truumees E, Boody B, Pena E, Arbuckle J 2nd, Gentile J, Funk R, Singh D, Vinayek S. A prospective, single arm study of intraosseous basivertebral nerve ablation for the treatment of chronic low back pain: 12-month results. N Am Spine Soc J. 2020 Sep 18;3:100030. doi: 10.1016/j.xnsj.2020.100030. Erratum in: N Am Spine Soc J. 2020 Dec 01;4:100039.
- 85. Manchikanti L, Boswell MV, SinghV, Benyamin RM, Fellows B, Abdi S, Buenaventura R, Conn A, Datta S, Derby R, Falco F, Erhart S, Diwan S, Hayek S, Helm II S, Parr AT, Schultz D, Smith H, Wolfer LR, Hirsch JA. Comprehensive Evidence-Based Guidelines for Interventional Techniques in the Management of Chronic Spinal Pain. Pain Physician 2009; 12:699-802.
- 86. Manchikanti L, Abdi S, Atluri S, Benyamin RM, Boswell MV, Buenaventura RM, Bryce DA, Burks PA, Caraway DL, Calodney AK, Cash KA, Christo PJ, Cohen SP, Colson J, Conn A, Cordner H, Coubarous S, Datta S, Deer TR, Diwan S, Falco FJ, Fellows B, Geffert S, Grider JS, Gupta S, Hameed H, Hameed M, Hansen H, Helm S 2nd, Janata JW, Justiz R, Kaye AD, Lee M, Manchikanti KN, McManus CD, Onyewu O, Parr AT, Patel VB, Racz GB, Sehgal N, Sharma ML, Simopoulos TT, Singh V, Smith HS, Snook LT, Swicegood JR, Vallejo R, Ward SP, Wargo BW, Zhu J, Hirsch JA. An update of comprehensive evidence-based guidelines for interventional techniques in chronic spinal pain. Part II: guidance and recommendations. Pain Physician. 2013 Apr;16(2 Suppl):S49-S283.
- 87. McCormick ZL. Vertebrogenic Pain: A Phenomenon Driving New Understanding of Chronic Axial Low Back Pain. Pain Med. 2022 Jul 20;23(Suppl 2):S1. doi: 10.1093/pm/pnac051.
- 88. McCormick ZL, Conger A, Smuck M, Lotz JC, Hirsch JA, Hickman C, Harper K, Burnham TR. Magnetic Resonance Imaging Characteristics Associated with Treatment Success from Basivertebral Nerve Ablation: An Aggregated Cohort Study of Multicenter Prospective Clinical Trials Data. Pain Med. 2022 Jul 20;23(Suppl 2):S34-S49. doi: 10.1093/pm/pnac093.
- 89. McCormick ZL, Curtis T, Cooper A, Wheatley M, Smuck M. Low back pain-related healthcare utilization following intraosseous basivertebral nerve radiofrequency ablation: a pooled analysis from three prospective clinical trials. Pain Med. 2024 Jan 4;25(1):20-32. doi: 10.1093/pm/pnad114.
- 90. McCormick ZL, Sperry BP, Boody BS, Hirsch JA, Conger A, Harper K, Lotz JC, Burnham TR. Pain Location and Exacerbating Activities Associated with Treatment Success Following Basivertebral Nerve Ablation: An Aggregated Cohort Study of Multicenter Prospective Clinical Trial Data. Pain Med. 2022 Jul 20;23(Suppl 2):S14-S33. doi: 10.1093/pm/pnac069.
- 91. Md MY, Md CG, Md CW, MSc YC, MSc HJ, Md IH, Md CC. An Analysis of the Clinical and Radiological Prognostic Factors Affecting the Outcomes of Lumbar Intradiscal Biacuplasty. Int J Med Sci. 2023 Jul 9;20(8):1115-1122. doi: 10.7150/ijms.85777.
- 92. Medina-Pérez JJ, Vega-Rosas A, Coubert-Pelayo SG, Rosas-Barcelo LS. Cooled Radiofrequency Treatment for Radicular Pain Related to Lumbar Disc Herniation. Cureus. 2023 Sep 30;15(9):e46255. doi: 10.7759/cureus.46255.

- 93. Mekhail N, Eldabe S, Templeton E, Costandi S, Rosenquist R. Pain Management Interventions for the Treatment of Chronic Low Back Pain: A Systematic Review and Meta-Analysis. Clin J Pain. 2023 Jul 1;39(7):349-364. doi: 10.1097/AJP.000000000001116.
- 94. Michalik A, Conger A, Smuck M, Maus TP, McCormick ZL. Intraosseous Basivertebral Nerve Radiofrequency Ablation for the Treatment of Vertebral Body Endplate Low Back Pain: Current Evidence and Future Directions. Pain Med. 2021 Jul 25;22(Suppl 1):S24-S30. doi: 10.1093/pm/pnab117.
- 95. National Guideline Clearinghouse. Low back disorders. Occupational medicine practice guidelines: evaluation and management of common health problems and functional recovery in workers. 2nd ed. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2007. Updated by ECRI Institute 04/13/11.
- 96. National Institute for Health and Clinical Excellence. IPG83 Percutaneous intradiscal radiofrequency thermocoagulation for lower back pain. 2004; Available online at: http://guidance.nice.org.uk/IPG83.
- 97. National Institute for Health and Clinical Excellence. IPG319 Percutaneous intradiscal electrothermal therapy for low back pain: guidance. 2009; Available online at: http://guidance.nice.org.uk/IPG319/Guidance/pdf/English.
- 98. National Institute for Health and Care Excellence. Percutaneous electrothermal treatment of the intervertebral disc annulus for low back pain and sciatica [IPG544]. 2016; https://www.nice.org.uk/guidance/IPG544.
- 99. National Institute for Health and Care Excellence. Percutaneous intradiscal radiofrequency treatment of the intervertebral disc nucleus for low back pain [IPG545]. 2016; https://www.nice.org.uk/guidance/ipg545.
- 100. North American Spine Society. Diagnosis and treatment of lumbar disc herniation with radiculopathy. Burr Ridge (IL): North American Spine Society; 2012. 100 p.
- 101. Nwosu M, Agyeman WY, Bisht A, Gopinath A, Cheema AH, Chaludiya K, Khalid M, Yu AK. The Effectiveness of Intraosseous Basivertebral Nerve Ablation in the Treatment of Nonradiating Vertebrogenic Pain: A Systematic Review. Cureus. 2023 Apr 4;15(4):e37114. doi: 10.7759/cureus.37114.
- 102. Ohio Bureau of Workers' Compensation (BWC). Position Paper on Intradiscal Electrothermal (IDET) Treatment for Low Back Pain. Medical Position Papers. Columbus, OH: Ohio BWC; December 2005
- 103. Park CH, Lee KK, Lee SH. Efficacy of transforaminal laser annuloplasty versus intradiscal radiofrequency annuloplasty for discogenic low back pain. Korean J Pain. 2019;32(2):113–119. doi:10.3344/kjp.2019.32.2.113.
- 104. Park SY, Moon SH, Park MS, Kim HS, Choi YJ, Lee HM. Intradiscal electrothermal treatment for chronic lower back pain patients with internal disc disruption. Yonsei Med J. 2005 Aug 31; 46(4): 539-45
- 105. Pauza KJ, Howell S, Dreyfuss P, Peloza JH, Dawson K, Bogduk N. A randomized, placebocontrolled trial of intradiscal electrothermal therapy for the treatment of discogenic low back pain. Spine J. 2004 Jan-Feb; 4(1):27-35.
- 106. Santoro GC, Kulkarni S, Dhillon D, Lien K. Case report: Basivertebral nerve block during vertebral augmentation: an alternative approach to intraprocedural pain management. Front Radiol. 2023 Jun 7;3:1179023. doi: 10.3389/fradi.2023.1179023.
- 107. Sayed D, Naidu RK, Patel KV, Strand NH, Mehta P, Lam CM, Tieppo Francio V, Sheth S, Giuffrida A, Durkin B, Khatri N, Vodapally S, James CO, Westerhaus BD, Rupp A, Abdullah NM, Amirdelfan K, Petersen EA, Beall DP, Deer TR. Best Practice Guidelines on the Diagnosis and Treatment of Vertebrogenic Pain with Basivertebral Nerve Ablation from the American Society of Pain and Neuroscience. J Pain Res. 2022 Sep 14;15:2801-2819. doi: 10.2147/JPR.S378544.

- 108. Schnapp W, Martiatu K, Delcroix GJ. Basivertebral Nerve Ablation for the Treatment of Chronic Low Back Pain: A Scoping Review of the Literature. Pain Physician. 2022 Jul;25(4):E551-E562.
- 109. Schnapp W, Martiatu K, Delcroix GJ. Basivertebral nerve ablation for the treatment of chronic low back pain in a community practice setting: 6 Months follow-up. North American Spine Society Journal (NASSJ). 2023 Jun 1;14:100201.
- 110. Schnapp W, Martiatu K, Delcroix GJ. Basivertebral Nerve Ablation for the Treatment of Chronic Low Back Pain: A Scoping Review of the Literature. Pain Physician. 2022 Jul;25(4):E551-E562.
- 111. Schnapp W, Schnapp M, Gottlieb J, Alexandre LC, Martiatu K, Delcroix GJ. Prospective cohort study of basivertebral nerve ablation for chronic low back pain in a real-world setting: 12 months follow-up. Interv Pain Med. 2024 Nov 25;3(4):100446. doi: 10.1016/j.inpm.2024.100446.
- 112. Smuck M, Khalil J, Barrette K, Hirsch JA, Kreiner S, Koreckij T, Garfin S, Mekhail N; INTRACEPT Trial Investigators. Prospective, randomized, multicenter study of intraosseous basivertebral nerve ablation for the treatment of chronic low back pain: 12-month results. Reg Anesth Pain Med. 2021 Aug;46(8):683-693. doi: 10.1136/rapm-2020-102259. Epub 2021 May 24.
- 113. Smuck M, McCormick ZL, Gilligan C, Hailey MK, Quinn ML, Bentley A, Metcalfe K, Bradbury B, Lukes DJ, Taylor RS. A cost-effectiveness analysis of intraosseous basivertebral nerve ablation for the treatment of chronic low back pain. Spine J. 2025 Feb;25(2):201-210. doi: 10.1016/j.spinee.2024.09.016.
- 114. Smuck M, Truumees E, Macadaeg K, Jaini AM, Chatterjee S, Levin J. Intraosseous basivertebral nerve ablation: Pooled long-term outcomes from two prospective clinical trials. Interv Pain Med. 2023 Jun 10;2(2):100256. doi: 10.1016/j.inpm.2023.100256.
- 115. Tieppo Francio V, Sherwood D, Twohey E, Barndt B, Pagan-Rosado R, Eubanks J, Sayed D. Developments in Minimally Invasive Surgical Options for Vertebral Pain: Basivertebral Nerve Ablation A Narrative Review. J Pain Res. 2021 Jun 23;14:1887-1907. doi: 10.2147/JPR.S287275.
- 116. Truumees E, Macadaeg K, Pena E, Arbuckle J 2nd, Gentile J 2nd, Funk R, Singh D, Vinayek S. A prospective, open-label, single-arm, multi-center study of intraosseous basivertebral nerve ablation for the treatment of chronic low back pain. Eur Spine J. 2019 Jul;28(7):1594-1602. doi: 10.1007/s00586-019-05995-2. Epub 2019 May 21.
- 117. U.S. Food & Drug Administration (FDA). 510(k) Premarket Notification K153272: Intracept Intraosseous Nerve Ablation System (July 9, 2016).
- 118. UpToDate. Subacute and chronic low back pain: Management. 2025. Accessed at uptodate.com.
- 119. UpToDate. Subacute and chronic low back pain: Nonsurgical interventional treatment. 2025. Accessed at uptodate.com.
- 120. Urits I, Noor N, Johal AS, Leider J, Brinkman J, Fackler N, Vij N, An D, Cornett EM, Kaye AD, Viswanath O. Basivertebral Nerve Ablation for the Treatment of Vertebrogenic Pain. Pain Ther. 2021 Jun;10(1):39-53. doi: 10.1007/s40122-020-00211-2. Epub 2020 Oct 31.
- 121. U.S. Food and Drug Administration (FDA): K153272. Intracept Intraosseous Nerve Ablation System (July 9, 2016).
- 122. U.S. Food and Drug Administraiton (FDA): K190504. Intracept Intraosseous Nerve Ablation System (RF Probe), Intracept Intraosseous Nerve Ablation System (Access Instruments), Relievant RF Generator (May 3, 2019).
- 123. Viswanathan VK, Shetty AP, Rajasekaran S. Modic changes An evidence-based, narrative review on its patho-physiology, clinical significance and role in chronic low back pain. J Clin Orthop Trauma. 2020 Sep-Oct;11(5):761-769. doi: 10.1016/j.jcot.2020.06.025. Epub 2020 Jun 18. Erratum in: J Clin Orthop Trauma. 2020 Nov-Dec;11(6):1169-1171. doi: 10.1016/j.jcot.2020.09.032. Erratum in: J Clin Orthop Trauma. 2020 Nov-Dec;11(6):1178. doi: 10.1016/j.jcot.2020.10.026. Erratum in: J Clin Orthop Trauma. 2020 Nov-Dec;11(6):1172-1174. doi: 10.1016/j.jcot.2020.10.044. Erratum in: J Clin Orthop Trauma. 2021 Aug 05;21:101560. doi: 10.1016/j.jcot.2021.101560.

124. Wetzel FT, McNally TA, Phillips FM. Intradiscal electrothermal therapy used to manage chronic discogenic low back pain: new directions and interventions. Spine. 2002 Nov 15; 27(22): 2621-6.

COMMITTEE APPROVAL:

This Medical Coverage Guideline (MCG) was approved by the Florida Blue Medical Policy and Coverage Committee on 07/24/25.

GUIDELINE UPDATE INFORMATION:

04/17/00	New Medical Coverage Guideline – investigational.				
09/15/01	Annual review of investigational status – no changes.				
09/15/02	Reviewed – continue investigational.				
09/15/03	Reviewed – no change.				
07/01/04	3rd quarter HCPCS coding update; consisting of the addition of 0062T and 0063T.				
09/15/04	Review and revision to guideline; consisting of updated references, addition of PIRFT to				
	Description section; addition of investigational statement for PIRFT; and MCG name				
	changed from Intradiscal Electrothermal Annuloplasty (IDET) to Intradiscal Electrothermal				
	Annuloplasty (IDET™) and Percutaneous Intradiscal Radiofrequency Thermocoagulation				
	(PIRFT). No change to investigational status.				
10/01/04	4th quarter HCPCS coding update; consisting of deletion of HCPCS codes S2370 and				
	S2371.				
09/15/05	Review and revision of guideline; consisting of updated references.				
09/15/06	Review and revision of guideline; consisting of updated references.				
11/15/06	Revision of guideline.				
01/01/07	HCPCS coding update consisting of the revision of 0062T and the addition of 22526 and				
	22527.				
07/15/07	Annual review, investigational status maintained, reformatted guideline, references				
	updated.				
09/15/08	Review and revision of guideline consisting of updated references.				
10/15/09	Scheduled review; added position statement for IDB; changed title of guideline; updated				
	references.				
01/01/10	Annual HCPCS coding update: removed 0062T and 0063T; revised descriptor of 22527.				
09/15/11	Scheduled review; position statement unchanged; references updated.				
01/15/13	Scheduled review; position statement unchanged; references updated.				
02/15/14	Annual review; position statement unchanged; Program Exceptions section updated;				
	references updated.				
02/15/15	Annual review; formatting changes; position statement unchanged; Program Exceptions				
	section updated; references updated.				
11/01/15	Revision: ICD-9 Codes deleted.				
02/15/20	Scheduled review. Revised MCG title, description, and index terms. Maintained position				
	statement and updated references.				
02/15/22	Scheduled review. Revised description and added coverage statement for intraosseous				
	radiofrequency ablation (Intracept® procedure) (coverage statement moved from MCG				

	02-61000-34 Neurolysis/Ablation). Revised definitions and CPT coding. Updated
	references.
12/15/22	Revision. Updated references and maintained position statement.
05/25/23	Update to Program Exceptions section.
10/15/23	Scheduled review. Revised description. Maintained position statement and updated
	references.
08/15/24	Scheduled review. Revised description. Maintained position statement and updated
	references.
08/15/25	Scheduled review. Revised description, maintained position statement and updated
	references.