

Cigna Medical Coverage Policies – Musculoskeletal Radiofrequency Joint Ablations/Denervations

Effective August 1, 2024



Instructions for use

The following coverage policy applies to health benefit plans administered by Cigna. Coverage policies are intended to provide guidance in interpreting certain standard Cigna benefit plans and are used by medical directors and other health care professionals in making medical necessity and other coverage determinations. Please note the terms of a customer's particular benefit plan document may differ significantly from the standard benefit plans upon which these coverage policies are based. For example, a customer's benefit plan document may contain a specific exclusion related to a topic addressed in a coverage policy.

In the event of a conflict, a customer's benefit plan document always supersedes the information in the coverage policy. In the absence of federal or state coverage mandates, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of:

1. The terms of the applicable benefit plan document in effect on the date of service
2. Any applicable laws and regulations
3. Any relevant collateral source materials including coverage policies
4. The specific facts of the particular situation

Coverage policies relate exclusively to the administration of health benefit plans. Coverage policies are not recommendations for treatment and should never be used as treatment guidelines.

This evidence-based medical coverage policy has been developed by eviCore, Inc. Some information in this coverage policy may not apply to all benefit plans administered by Cigna.

CPT® (Current Procedural Terminology) is a registered trademark of the American Medical Association (AMA). CPT® five digit codes, nomenclature and other data are copyright 2024 American Medical Association. All Rights Reserved. No fee schedules, basic units, relative values or related listings are included in the CPT® book. AMA does not directly or indirectly practice medicine or dispense medical services. AMA assumes no liability for the data contained herein or not contained herein.

©Copyright 2024 eviCore healthcare

CMM-208: Radiofrequency Joint Ablations/Denervations

Definitions

General Guidelines

Indications

Non-Indications

Procedure (CPT®) Codes (CMM-208)

References (CMM-208)

Definitions

- **Axial:** Relating to or situated in the central part of the body, in the head and trunk as distinguished from the limbs, e.g., axial skeleton.
- **Cervical Facet Pain:** Pain located in the cervical spine, which may be characterized by chronic headaches, restricted motion, and axial neck pain, which may radiate sub-occipitally to the shoulders or mid-back.
- **Facet Joint Pain:** A set of concurrent signs or symptoms to describe the facet joint as the pain generator. The typical clinical signs or symptoms may include local paraspinal tenderness; pain that is brought about or increased on hyperextension, rotation, and lateral bending; low back stiffness; absence of neurologic deficit; absence of root tension signs (non- radiating below the knee, absence of paresthesia).
- **Facet (Zygapophyseal) Joints:** paired, diarthrodial synovial joints located between the superior and inferior articular pillars in the posterior spinal column, innervated by medial branch nerves, from C2-3 to L5–S1.
 - ◆ **Note:** The following articulations are not facet joints:
 - Alanto-occipital articulation (located between occiput – atlas [C1])
 - Alanto-axial articulation (located between atlas [C1] and the axis [C2])
 - Below L5–S1 (sacrum)
- **Facet Level:** the zygapophyseal joint or the two medial branch (MB) nerves that innervate that zygapophyseal joint. Each level has a pair of facet joints: one on the right side and one of the left side of the spine.
- **Positive Response (to a diagnostic facet joint injection/medial branch block):** at least 80% relief of facet mediated pain for at least the expected minimum duration of the effect of the local anesthetic used.
- **Radiofrequency Joint Denervation/Ablation (RFA)** (i.e., facet neurotomy, facet rhizotomy): Traditional or standard RFA involves the insertion of a radiofrequency probe (under fluoroscopic guidance) towards the medial branch of the posterior primary rami, which supplies the innervation to the facet joints. The radiofrequency electrode is then utilized to create a “continuous” heat lesion by coagulating the nerve supplying the joint with the intention of providing pain relief by denervating the painful facet joint.
 - ◆ **Note:** The radiofrequency joint denervation/ablation applies directly to the facet joint(s) denervated/ablated and not to the number of nerves denervated/ablated that innervate the facet joint(s).
- **Region:** describes the segments of the spine as follows:
 - ◆ Cervical/Thoracic region= C1-C7/T1-T12
 - ◆ Lumbar/Sacral region= L1-L5/S1-S5

- **Session:** a time period, which includes all procedures (i.e., medial branch block [MBB], intra-articular [IA] facet joint injection, and radiofrequency ablation [RFA]) performed on a single date of service.

General Guidelines

Application of Guideline

- This guideline only applies to radiofrequency joint denervation/ablation for facet-mediated pain and not for other indications/conditions that are not in scope of management for this guideline (i.e., third occipital Nerve [TON] ablation for cervicogenic headaches).
 - ◆ Radiofrequency joint denervation/ablation should only be performed for axial cervical, thoracic, or lumbar pain in the absence of an untreated radiculopathy.
- This guideline is applicable to requests for codes listed in the **Procedure Codes** section **and** only for conditions specifically addressed in this guideline. Use of these CPT codes for any other indication or condition is not in scope for this guideline.
- The determination of medical necessity for the performance of radiofrequency joint denervations/ablations is always made on a case-by-case basis.

Image Guidance

- Radiofrequency joint denervation/ablation should be performed with CT or fluoroscopic guidance.

Frequency & Number of Procedures

- Only one invasive modality or procedure will be performed on the same date of service (e.g., facet joint injection, medial branch block, epidural steroid injection, and sacroiliac joint injection).
- When criteria have been met, no more than two (2) radiofrequency joint denervation/ablation procedures at the same level(s) are permitted during a rolling 12 month period of time.
 - ◆ **Note:** At least six (6) months is required between radiofrequency joint denervation/ablation procedures

Levels

- Radiofrequency joint denervations/ablations are permitted on no more than three (3) contiguous facet joint levels (whether unilateral or bilateral), during the same session.
 - ◆ If performed bilaterally during the same session, up to a total of six (6) radiofrequency joint denervations/ablations at contiguous facet levels may be performed during that session.
- When criteria have been met, radiofrequency joint denervations/ablations are only permitted from levels C2-3 to L5-S1.

- ◆ **Note:** The radiofrequency joint denervation/ablation applies directly to the facet joint(s) denervated/ablated and not to the number of nerves that innervate the facet joint(s).
- Radiofrequency joint denervations/ablations are only permitted when performed at an unfused posterior spinal motion segment(s).
 - ◆ **Criteria exception:** An exception is allowed for individuals with clinically suspected pseudoarthrosis at the posteriorly-fused spinal motion segment(s).

Indications

Initial Radiofrequency Joint Denervation/ Ablation

- A radiofrequency joint denervation/ablation is considered **medically necessary** for facet-mediated axial cervical, thoracic, or lumbar pain resulting from disease, injury, or surgery when **ALL** of the following criteria have been met:
 - ◆ Pain has persisted for at least 3 months
 - ◆ In the past 3 months, pain has persisted despite at least four (4) weeks of conservative therapy (e.g., exercise, physical therapy, chiropractic care, or medications to include nonsteroidal anti-inflammatory drugs [NSAID's] or analgesics)
 - **Note:** If conservative treatment is contraindicated, the reason(s) for the contraindication(s) is/are required to be documented in the medical record
 - ◆ There has been a documented positive response with two (2) sequential diagnostic facet joint injections/medial branch blocks at the same level(s)
 - Positive response is evidenced by at least 80% relief of facet-mediated pain for at least the expected minimum duration of the effect of the local anesthetic used.
 - ◆ Clinical findings and imaging studies suggest no other obvious cause of the pain (e.g., central spinal stenosis with neurogenic claudication/myelopathy; foraminal stenosis or disc herniation with concordant radicular pain/radiculopathy; infection; tumor; fracture; pseudoarthrosis; pain related to spinal instrumentation)
 - ◆ The spinal motion segment(s) is not posteriorly-fused at the requested level(s)
 - **Criteria exception:** An exception is allowed for individuals with clinically suspected pseudoarthrosis at the posteriorly-fused spinal motion segment(s)
- For an individual with a prior spinal fusion, radiofrequency joint denervation/ablation performed at an unfused spinal segment located either above or below the posterior fused spinal segment is considered **medically necessary** when the above criteria have been met.

Repeat Radiofrequency Joint Denervation/Ablation

- A repeat radiofrequency joint denervation/ablation is considered **medically necessary** when **BOTH** of the following criteria have been met:
 - ◆ The procedure is performed at a minimum of six (6) months following the prior denervation/ablation
 - ◆ There is documented pain relief of at least 50% which has lasted for a minimum of 12 weeks
- **Note:** When performing a repeat radiofrequency joint denervation/ablation at the same spinal level(s) as a prior successful denervation/ablation procedure, further diagnostic facet joint injections/medial branch blocks at that spinal level(s) are not necessary.

Non-Indications

Not Medically Necessary

- Radiofrequency joint denervations/ablations performed without meeting the criteria listed in the Definitions, the General Guidelines, and the Indications sections are considered **not medically necessary**.

Techniques for Denervation/Ablations of Facet Joints

- Facet joint radiofrequency denervation/ablation performed using **ANY** of the following techniques is considered **not medically necessary**:
 - ◆ Pulsed radiofrequency ablation
 - ◆ Endoscopic radiofrequency denervation/endoscopic dorsal ramus rhizotomy
 - ◆ Cryoablation/cryoneurolysis/cryodenervation
 - ◆ Chemical ablation (e.g., alcohol, phenol, glycerol)
 - ◆ Laser ablation
 - ◆ Cooled radiofrequency ablation

Conditions

- Facet joint radiofrequency denervation/ablation performed for the treatment of chronic pain syndromes is considered **not medically necessary**.

Experimental, Investigational, or Unproven (EIU)

- Radiofrequency denervation/ablation of the nerves innervating the sacroiliac joint for the treatment of sacroiliac (SI) joint pain is considered **experimental, investigational, or unproven (EIU)**.
 - ◆ For SI joint ablation refer to **CMM-203: Sacroiliac Joint Procedures**

Procedure (CPT®) Codes (CMM-208)

This guideline relates to the CPT® code set below. Codes are displayed for informational purposes only. Any given code’s inclusion on this list does not necessarily indicate prior authorization is required.

CPT®	Code Description/Definition
64633	Destruction by neurolytic agent, paravertebral facet joint nerve(s), with imaging guidance (fluoroscopy or CT), cervical or thoracic, single facet joint
+64634	Destruction by neurolytic agent, paravertebral facet joint nerve(s), with imaging guidance (fluoroscopy or CT), cervical or thoracic, each additional facet joint (List separately in addition to code for primary procedure)
64635	Destruction by neurolytic agent, paravertebral facet joint nerve(s), with imaging guidance (fluoroscopy or CT), lumbar or sacral, single facet joint
+64636	Destruction by neurolytic agent, paravertebral facet joint nerve(s), with imaging guidance (fluoroscopy or CT), lumbar or sacral, each additional facet joint (List separately in addition to code for primary procedure)

This list may not be all-inclusive and is not intended to be used for coding/billing purposes. The final determination of reimbursement for services is the decision of the health plan and is based on the individual’s policy or benefit entitlement structure as well as claims processing rules.

References (CMM-208)

1. American College of Occupational and Environmental Medicine. *Occupational Medicine Practice Guideline*. 2nd ed. 2008.
2. American Medical Association. *Current Procedural Terminology – 2016 Professional Edition*.
3. Abejon D, Garcia-del-Valle S, Fuentes M, et al. Pulsed radiofrequency in lumbar radicular pain: clinical effects in various etiological groups. *Pain Pract*. 2007;7(1):21-26.
4. Bailey J, Liebenberg E, Degmetich S, Lotz J. Innervation patterns of PGP 9.5-positive nerve fibers within the human lumbar vertebra. *J Anat*. 2011;218:263-70.
5. Barnsley L. Percutaneous radiofrequency neurotomy for chronic neck pain: outcomes in a series of consecutive patients. *Pain Med*. 2005;6(4):282-286.
6. Barret S, Nickerson D, Elison P, et al. *The Association of Extremity Nerve Surgeons (AENS) Clinical Practice Guidelines*. 1st ed. Wimberly, TX: Association of Extremity Nerve Surgeons (AENS). 2014:1-20.
7. Becker S, Hadjipavlou A, Heggeness MH. Ablation of the basivertebral nerve for treatment of back pain: a clinical study. *Spine J*. 2017;17:218-23.
8. Bhatia A, Hoydonckx Y, Peng P, Cohen S. Radiofrequency Procedures to Relieve Chronic Hip Pain. *Reg Anesth Pain Med*. 2018;43(1):72-83.
9. Bland J. *Anatomy and biomechanics*. In: *Disorders of the Cervical Spine*. Philadelphia. WB Saunders. 1987:9–63.
10. Boswell M, Colson J, Sehgal N, et al. A systematic review of therapeutic facet joint interventions in chronic spinal pain. *Pain Physician* 2007;10:229-253.
11. Boswell MV, Manchikanti L, Kaye AD, et al. A best-evidence systematic appraisal of the diagnostic accuracy and utility of facet (zygapophysial) joint injections in chronic spinal pain. *Pain Physician*. 2015;18:E497-E533.
12. Boswell M, Shah R, Everett C, et al. Interventional techniques in the management of chronic spinal pain: evidence-based practice guidelines. *Pain Physician*. 2005;8(1):1-47.
13. Buijs EJ, van Wijk RM, Geurts JW, Weeseman RR, Stolker RJ, Groen GG. Radiofrequency lumbar facet denervation: A comparative study of the reproducibility of lesion size after 2 current radiofrequency techniques. *Reg Anesth Pain Med*. 2004;29(5):400-407. doi: 10.1016/j.rapm.2004.06.004.
14. Cahana A, Van Zundert J, Macrea L, et al. Pulsed radiofrequency: current clinical and biological literature available. *Pain Med*. 2006;7(5):411-423.
15. Chen A, Mullen K, Casambre F, Visvabharathy V, Brown G. Thermal Nerve Radiofrequency Ablation for the Nonsurgical Treatment of Knee Osteoarthritis: A Systematic Literature Review. *JAAOS*. 2021;29(9):387-396.
16. Choi W, Hwang S, Song J, et al. Radiofrequency treatment relieves chronic knee osteoarthritis pain: A double-blind randomized controlled trial. *Pain*. 2011;152(3):481-487.
17. Civelek E, Cansever T, Kabatas S, et al. Comparison of effectiveness of facet joint injection and radiofrequency denervation in chronic low back pain. *Turk Neurosurg*. 2012; 22:200-206.
18. Cohen S, Bhaskar A, Bhatia A et al. Consensus practice guidelines on interventions for lumbar facet joint pain from a multispecialty, international working group. *Reg Anesth Pain Med*. 2020;45(6):424-467. doi:10.1136/rapm-2019-101243.
19. Cohen S, Hurley R, Buckenmaier C, et al. Randomized placebo-controlled study evaluating lateral branch radiofrequency denervation for sacroiliac joint pain. *Anesthesiology*. 2008; 109(2): 279–288.
20. Cohen S, Hurley R, Christo P, Winkley et al. Clinical predictors of success and failure for lumbar facet radiofrequency denervation. *Clin J Pain*. 2007;23:45-52.
21. Cohen S, Raja S. Pathogenesis, diagnosis, and treatment of lumbar zygapophysial (facet) joint pain. *Anesthesiology* 2007;106:591-614.
22. Cohen SP, Williams KA, Kurihara C, et al. Multicenter, randomized, comparative cost-effectiveness study comparing 0, 1, and 2 diagnostic medial branch (facet joint nerve) block treatment paradigms before lumbar facet radiofrequency denervation. *Anesthesiology*. 2010;113:395-405.
23. Conlin A, Bhogal S, Sequeira K, Teasell R. Treatment of whiplash-associated disorders -part II: Medical and surgical interventions. *Pain Res Manag*. 2005;10(1):33-40.
24. Davis T, Loudermilk E, DePalma M, et al. Twelve-month analgesia and rescue, by cooled radiofrequency ablation treatment of osteoarthritic knee pain: results from a prospective, multicenter, randomized, cross-over trial. *Reg Anesth Pain Med*. 2019;44(4):499-506.
25. Davis T, Loudermilk E, DePalma M, et al. Prospective, Multicenter, Randomized, Crossover Clinical Trial Comparing the Safety and Effectiveness of Cooled Radiofrequency Ablation With Corticosteroid Injection in the Management of Knee Pain From Osteoarthritis. *Reg Anesth Pain Med*. 2018;43(1):84-91.
26. Dobrogowski J, Wrzosek A, Wordliczek J. Radiofrequency denervation with or without addition of pentoxifylline or methylprednisolone for chronic lumbar zygapophysial joint pain. *Pharmacol Rep*. 2005;57:475-480.
27. Dreyfuss P, Halbrook B, Pauza K, et al. Efficacy and validity of radiofrequency neurotomy for chronic lumbar zygapophysial joint pain. *Spine*. 2000;25(10):1270-1277.
28. Eyigor C, Eyigor S, Korkmaz O, Uyar M. Intra-articular Corticosteroid Injections Versus Pulsed Radiofrequency in Painful Shoulder. *Clin J Pain*. 2010;26(5):386-392.

29. 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 doubleblind sham controlled multicenter study. *Int J Spine Surg.* 2019;13:110–119.
30. Frasc C, Kravetz P, Mody D, Heggeness M. Substance P-containing nerves within the human vertebral body: an immunohistochemical study of the basivertebral nerve. *Spine J.* 2003;3:63–67.
31. Geurts J, van Wijk R, Stolker R, Groen G. Efficacy of radiofrequency procedures for the treatment of spinal pain: a systematic review of randomized clinical trials. *Reg Anesth Pain Med.* 2001; 26(5):394-400.
32. Gofeld M, Jitendra J, Faclier G. Radiofrequency denervation of the lumbar zygapophysial joints: 10-year prospective clinical audit. *Pain Physician.* 2007;10:291-300.
33. Haldeman S, Carroll L, Cassidy JD, et al. Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. The Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders: executive summary. *Spine.* 2008;33(4 Suppl):S5-A7.
34. Hancock M, Maher C, Latimer J, et al. Systematic review of tests to identify the disc, SIJ or facet joint as the source of low back pain. *Eur Spine J.* 2007;16(10):1539-1550.
35. Heggeness M, Becker S, Hadjipavlou A, et al. Ablation of the basivertebral nerve for the treatment of back pain: a pilot clinical study. *Spine J.* 2011;11:65S-66S.
36. Helbig T, Lee C. The Lumbar Facet Syndrome. *Spine (Phila Pa 1976).* 1988;13(1):61-64. doi:10.1097/00007632-198801000-00015.
37. Hong T, Wang H, Li G, Yao P, Ding Y. Systematic Review and Meta-Analysis of 12 Randomized Controlled Trials Evaluating the Efficacy of Invasive Radiofrequency Treatment for Knee Pain and Function. *BioMed Res Int.* 2019;1-14.
38. Hooten W, Martin D, Huntoon M. Radiofrequency neurotomy for low back pain: evidence-based procedural guidelines. *Pain Med.* 2005;6(2):129-138.
39. Ikeuchi M, Ushida T, Izumi M, Tani T. Percutaneous Radiofrequency Treatment for Refractory Anteromedial Pain of Osteoarthritic Knees. *Pain Med.* 2011;12(4):546-551.
40. King W, Ahmed SU, Baisden J, et al. Diagnosis and treatment of posterior sacroiliac complex pain: a systematic review with comprehensive analysis of the published data. *Pain Med.* 2015;16(2):257.
41. Koizuka S, Saito S, Kawachi C, et al. Percutaneous radiofrequency lumbar facet rhizotomy guided by computed tomography fluoroscopy. *J Anesth.* 2005;19(2):167-169.
42. Jackson D. Reproduction of published research results remains a challenge for physicians. Editorial. *Orthop Today.* 2012. Available at: <https://www.healio.com/orthopedics/business-of-orthopedics/news/>.
43. Jasny BR, Chin G, Chong L, Vignieri S. Again, and again, and again. *Science.* 2011;334(6060):1225. doi: 10.1126/science.334.6060.1225.
44. Joo YC, Park JY, Kim KH. Comparison of alcohol ablation with repeated thermal radiofrequency ablation in medial branch neurotomy for the treatment of recurrent thoracolumbar facet joint pain. *J Anesth.* 2013;27:390-395.
45. Lakemeier S, Lind M, Schultz W, et al. A comparison of intraarticular lumbar facet joint steroid injections and lumbar facet joint radiofrequency denervation in the treatment of low back pain: A randomized, controlled, double-blind trial. *Anesth Analg.* 2013;117:228-235.
46. Landsman A, Catanese, D, Wiener, S, Richie, D, Hanft, J. A Prospective, Randomized, Double-blinded Study with Crossover to Determine the Efficacy of Radio-frequency Nerve Ablation for the Treatment of Heel Pain. *J Am Podiatr Med Assoc.* 2013;103(1):8-15.
47. Laslett M, McDonald B, Aprill C, et al. Clinical predictors of screening lumbar zygapophysial joint blocks: development of clinical prediction rules. *Spine J.* 2006;6(4):370-379.
48. Laslett M, Oberg B, Aprill C, McDonald B. Zygapophysial joint blocks in chronic low back pain: a test of Revel's model as a screening test. *BMC Musculoskelet Disord.* 2004;5:43.
49. LCD Facet Joint Interventions for Pain Management (L38803) effective 04/25/2021. CMS.gov. <https://www.cms.gov/medicare-coverage-database/view/lcd.aspx?lclid=38803&ver=6&>.
50. Leclaire R, Fortin L, Lambert R, et al. Radiofrequency facet joint denervation in the treatment of low back pain: a placebo-controlled clinical trial to assess efficacy. *Spine.* 2001;26(13):1411-1416.
51. Lee CH, Chung CK, Kim CH. The efficacy of conventional radiofrequency denervation in patients with chronic low back pain originating from the facet joints: a meta-analysis of randomized controlled trials. *Spine J.* 2017;17(11):1770-1780.
52. Lennard T, Vivian D, Walkowski S, Singla A. *Pain Procedures In Clinical Practice.* London: Elsevier Health Sciences; 2011.
53. Lord S, Barnsley L, Wallis B, McDonald G, Bogduk N. Percutaneous radio-frequency neurotomy for chronic cervical zygapophysial-joint pain. *N Engl J Med.* 1996;335:1721-1726.
54. Maas ET, Ostelo RW, Niemisto L, Jousimaa J, Hurri H, Malmivaara A, van Tulder MW. Radiofrequency denervation for chronic low back pain. *Cochrane Database Syst Rev.* 2015;(10):CD008572. doi: 10.1002/14651858.CD008572.pub2.
55. MacVicar J, Borowczyk JM, MacVicar AM, Loughnan BM, Bogduk N. Cervical medial branch radiofrequency neurotomy in New Zealand. *Pain Med.* 2012;13:647-654.

56. MacVicar J, Kreiner DS, Duszynski B, Kennedy DJ. Appropriate use criteria for fluoroscopically guided diagnostic and therapeutic sacroiliac interventions: results from the spine intervention society convened multispecialty collaborative. *Pain Med*. 2017;18(11):2081-2095.
57. Manchikanti L, Abdi S, Atluri S, et al. An update of comprehensive evidence-based guidelines for interventional techniques of chronic spinal pain: Part II: Guidance and recommendations. *Pain Physician*. 2013;16:S49-S283.
58. Manchikanti L, Cash K, Pampati V, Fellows B. Influence of psychological variables on the diagnosis of facet joint involvement in chronic spinal pain. *Pain Physician*. 2008;11(2):145-160.
59. Manchikanti L, Kaye AD, Boswell MV, et al. A systematic review and best evidence synthesis of the effectiveness of therapeutic facet joint interventions in managing chronic spinal pain. *Pain Physician*. 2015;18:E535-E582.
60. Manchikanti L, Kaye AD, Soin A, et al. Comprehensive Evidence-Based Guidelines for Facet Joint Interventions in the Management of Chronic Spinal Pain: American Society of Interventional Pain Physicians (ASIPP) Guidelines Facet Joint Interventions 2020 Guidelines. *Pain Physician*. 2020;23:S1-S127.
61. Manchikanti L, Manchukonda R, Pampati V, et al. Prevalence of facet joint pain in chronic low back pain in postsurgical patients by controlled comparative local anesthetic blocks. *Arch Phys Med Rehabil*. 2007;88(4):449-455.
62. Manchikanti L, Staats P, Singh V, et al. Evidence-based practice guidelines for interventional techniques in the management of chronic spinal pain. *Pain Phys*. 2003;6:3-81.
63. Manchukonda R, Manchikanti K, Cash K, et al. Facet joint pain in chronic spinal pain: an evaluation of prevalence and false-positive rate of diagnostic blocks. *J Spinal Disord Tech*. 2007;20(7):539-545.
64. McCormick Z, Choi H, Reddy R et al. Randomized prospective trial of cooled versus traditional radiofrequency ablation of the medial branch nerves for the treatment of lumbar facet joint pain. *Reg Anesth Pain Med*. 2019;44(3):389-397. doi:10.1136/rapm-2018-000035.
65. McDonald G, Lord S, Bogduk N. Long-term follow-up of patients treated with cervical radiofrequency neurotomy for chronic neck pain. *Neurosurgery* 1999;45(1):61-68.
66. Mikeladze G, Espinal R, Finnegan R, et al. Pulsed radiofrequency application in treatment of chronic zygapophyseal joint pain. *Spine J*. 2003;3(5):360-362.
67. Michalik A, Conger A, Smuck M, Maus T, McCormick Z. Intraosseous Basivertebral Nerve Radiofrequency Ablation for the Treatment of Vertebral Body Endplate Low Back Pain: Current Evidence and Future Directions. *Pain Med*. 2021;22(Supplement_1):S24-S30.
68. Moon JY, Lee PB, Kim YC, Choi SP, Sim WS. An alternative distal approach for the lumbar medial branch radiofrequency denervation: A prospective randomized comparative study. *Anesth Analg*. 2013;116:1133-1140.
69. Nath S, Nath C, Pettersson K. Percutaneous lumbar zygapophysial (Facet) joint neurotomy using radiofrequency current, in the management of chronic low back pain: a randomized double-blind trial. *Spine*. 2008;33(12):1291-1298.
70. Niemisto L, Kalso E, Malmivaara A, et al. Radiofrequency denervation for neck and back pain. *The Cochrane Database of Systematic Reviews*. 2006;Issue 3.
71. North American Spine Society (NASS). *NASS Coverage Policy Recommendation. Facet Joint Intervention*. Copyright ©2016 North American Spine Society.
72. Oh W, Shim J. A randomized controlled trial of radiofrequency denervation of the ramus communicans nerve for chronic discogenic low back pain. *Clin J Pain*. 2004;20(1):55-60.
73. Orhurhu V, Akinola O, Grandhi R, Urits I, Abd-Elsayed A. Radiofrequency Ablation for Management of Shoulder Pain. *Curr Pain Headache Rep*. 2019;23(8):56. Published 2019 Jul 10. doi: 10.1007/s11916-019-0791-z.
74. Patel N, Gross A, Brown L, Gekht G. A randomized, placebo-controlled study to assess the efficacy of lateral branch neurotomy for chronic sacroiliac joint pain. *Pain Med*. 2012;13:383-398.
75. Sanders M, Zuurmond W. Percutaneous intra-articular lumbar facet joint denervation in the treatment of low back pain: a comparison with percutaneous extra-articular lumbar facet denervation. *Pain Clinic*. 1999;11(4):329-335.
76. Qudsi-Sinclair S, Borrás-Rubio E, Abellan-Guillén J, Padilla del Rey M, Ruiz-Merino G. A Comparison of Genicular Nerve Treatment Using Either Radiofrequency or Analgesic Block with Corticosteroid for Pain after a Total Knee Arthroplasty: A Double-Blind, Randomized Clinical Study. *Pain Pract*. 2016;17(5):578-588.
77. Sapor DA, Gorup JM. Radiofrequency medial branch neurotomy in litigant and non-litigant patients with cervical whiplash. *Spine (Phila Pa 1976)*. 2001;26:E268-E273.
78. Schneider H, Baca J, Carpenter B, Dayton P, Fleischer A, Sachs B. American College of Foot and Ankle Surgeons Clinical Consensus Statement: Diagnosis and Treatment of Adult Acquired Infracalcaneal Heel Pain. *J Foot Ankle Surg*. 2018;57(2):370-381.
79. Schofferman J, Kine G. Effectiveness of repeated radiofrequency neurotomy for lumbar facet pain. *Spine*. 2004;29(21):2471-2473.
80. Schuster N, Clements N, Suri P, Stojanovic M. Is this spine pain facetogenic? Addressing diagnostic myths. *Pain Med*. 2021;22(S1):S31-35.
81. Scott JW. Scott's parabola: the rise and fall of a surgical technique. *Br Med J*. 2001;323:1477.
82. Slipman C, Bhat A, Gilchrist R, et al. A critical review of the evidence for the use of zygapophysial injections and radiofrequency denervation in the treatment of low back pain, *Spine J*. 2003;3(4):310-316.

83. Speldewinde GC. Outcomes of percutaneous zygapophysial and sacroiliac joint neurotomy in a community setting. *Pain Med.* 2011;12:209-218.
84. Tekin I, Mirzai H, Ok G, Erbuyun K, Vatansever D. A comparison of conventional and pulsed radiofrequency denervation in the treatment of chronic facet joint pain. *Clin J Pain.* 2007;23(6):524-529. doi:10.1097/AJP.0b013e318074c99c.
85. Thomas J, Christensen J, Kravitz S, et al. The Diagnosis and Treatment of Heel Pain: A Clinical Practice Guideline—Revision 2010. *J Foot Ankle Surg.* 2010;49(3):S1-S19.
86. Tzaan W, Tasker R. Percutaneous radiofrequency facet rhizotomy—experience with 118 procedures and reappraisal of its value. *Can J Neurol Sci.* 2000;27(2):125-130.
87. Vallejo R, Benyamin R, Kramer J, et al. Pulsed radiofrequency denervation for the treatment of sacroiliac joint syndrome. *Pain Med.* 2006;7(5):429-434.
88. van Eerd M, de Meij N, Kessels A et al. Efficacy and Long-term Effect of Radiofrequency Denervation in Patients with Clinically Diagnosed Cervical Facet Joint Pain. *Spine (Phila Pa 1976).* 2020;46(5):285-293. doi:10.1097/brs.0000000000003799.
89. van Kleef M, Barendse G, Kessels A, et al. Randomized trial of radiofrequency lumbar facet denervation for chronic low back pain. *Spine.* 1999;24(18):1937-1942.
90. van Wijk R, Geurts J, Wynne H, et al. Radiofrequency denervation of lumbar facet joints in the treatment of chronic low back pain: a randomized, double-blind, sham lesion-controlled trial. *Clin J Pain.* 2005;21(4):335-344.
91. van Zundert J, Patih J, Kessels A, et al. Pulsed radiofrequency adjacent to the cervical dorsal root ganglion in chronic cervical radicular pain: a double-blind sham controlled randomized clinical trial. *Pain.* 2007;127:173-182.
92. Washington State Department of Labor and Industries. Guideline on diagnostic facet medial nerve branch blocks and facet neurotomy. *Provider Bull.* 2005;(PB 05-11):1-6.
93. Workloss Data Institute. Official Disability Guidelines 2008.
94. Yang AJ, McCormick ZL, Zheng PZ, Schneider BJ. Radiofrequency ablation for the posterior sacroiliac joint complex pain: a narrative review. *PMR.* 2019;11(Suppl 1):S105–S113. doi: 10.1002/pmrj.12200.
95. Yang A, Wagner G, Burnham T, McCormick Z, Schneider B. Radiofrequency Ablation for Chronic Posterior Sacroiliac Joint Complex Pain: A Comprehensive Review. *Pain Med.* 2021;22(Supplement_1):S9-S13. doi:10.1093/pm/pnab021.