



## MASSACHUSETTS

Blue Cross Blue Shield of Massachusetts is an Independent Licensee of the Blue Cross and Blue Shield Association

### Medical Policy

## Radiofrequency Ablation of the Renal Sympathetic Nerves as a Treatment for Resistant Hypertension

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### Policy Number: 919

BCBSA Reference Number: 7.01.136 (For Plan internal use only)

### Related Policies

Baroreflex Stimulation Devices, #[595](#)

### Policy

#### Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity Medicare HMO Blue<sup>SM</sup> and Medicare PPO Blue<sup>SM</sup> Members

Radiofrequency ablation of the renal sympathetic nerves for the treatment of resistant hypertension is considered [INVESTIGATIONAL](#).

### Prior Authorization Information

#### Inpatient

- For services described in this policy, precertification/preauthorization **IS REQUIRED** for all products if the procedure is performed **inpatient**.

#### Outpatient

- For services described in this policy, see below for products where prior authorization **might be required** if the procedure is performed **outpatient**.

	Outpatient
Commercial Managed Care (HMO and POS)	This is <b>not</b> a covered service.
Commercial PPO and Indemnity	This is <b>not</b> a covered service.
Medicare HMO Blue <sup>SM</sup>	This is <b>not</b> a covered service.
Medicare PPO Blue <sup>SM</sup>	This is <b>not</b> a covered service.

### CPT Codes / HCPCS Codes / ICD Codes

*Inclusion or exclusion of a code does not constitute or imply member coverage or provider reimbursement. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage as it applies to an individual member.*

*Providers should report all services using the most up-to-date industry-standard procedure, revenue, and diagnosis codes, including modifiers where applicable.*

## **CPT Codes**

There is no specific CPT code for this service.

## **Diagnosis Codes**

Investigational for the diagnoses described in the medical policy statement.

## **Description**

### **Resistant Hypertension**

Hypertension is estimated to affect approximately 30% of the population in the U.S.<sup>1</sup> It accounts for a high burden of morbidity related to strokes, ischemic heart disease, kidney disease, and peripheral arterial disease. Resistant hypertension is defined as elevated blood pressure, despite treatment with at least 3 antihypertensive agents at optimal doses. Resistant hypertension is also a relatively common condition, given a large number of individuals with hypertension. In large clinical trials of hypertension treatment, 20% to 30% of participants meet the definition for resistant hypertension, and in tertiary care hypertension clinics, the prevalence is estimated at 11% to 18%.<sup>1</sup> Resistant hypertension is associated with a higher risk for adverse outcomes such as stroke, myocardial infarction, heart failure, and kidney failure.

A number of factors may contribute to uncontrolled hypertension, and they should be considered and addressed in all patients with hypertension before labeling a patient resistant. They include nonadherence to medications, excessive salt intake, inadequate doses of medications, excess alcohol intake, volume overload, drug-induced hypertension, and other forms of secondary hypertension.<sup>2</sup> Also, sometimes it is necessary to address comorbid conditions (ie, obstructive sleep apnea) to control blood pressure adequately.

### **Treatment**

Treatment for resistant hypertension is mainly intensified drug therapy, sometimes with the use of nontraditional antihypertensive medications such as spironolactone and/or minoxidil. However, control of resistant hypertension with additional medications is often challenging and can lead to high costs and frequent adverse events of treatment. As a result, there is a large unmet need for additional treatments that can control resistant hypertension. Nonpharmacologic interventions for resistant hypertension include modulation of the baroreflex receptor and/or radiofrequency (RF) denervation of the renal nerves.

### **Radiofrequency Denervation of the Renal Sympathetic Nerves**

Increased sympathetic nervous system activity has been linked to essential hypertension. Surgical sympathectomy has been shown to be effective in reducing blood pressure but is limited by the adverse events of surgery and was largely abandoned after effective medications for hypertension became available. The renal sympathetic nerves arise from the thoracic nerve roots and innervate the renal artery, the renal pelvis, and the renal parenchyma. Radiofrequency ablation (RFA) is thought to decrease both the afferent sympathetic signals from the kidney to the brain and the efferent signals from the brain to the kidney. This procedure decreases sympathetic activation, decreases vasoconstriction, and decreases activation of the renin-angiotensin system.<sup>3</sup>

The procedure is performed percutaneously with access at the femoral artery. A flexible catheter is threaded into the renal artery, and a controlled energy source, most commonly low-power RF energy, is delivered to the arterial walls where the renal sympathetic nerves are located. Once adequate RF energy has been delivered to ablate the sympathetic nerves, the catheter is removed.

## Summary

Radiofrequency ablation (RFA) of the renal sympathetic nerves is thought to decrease both the afferent sympathetic signals from the kidney to the brain and the efferent signals from the brain to the kidney. This procedure decreases sympathetic activation, decreases vasoconstriction, and decreases activation of the renin-angiotensin system. RFA of the renal sympathetic nerves may act as a nonpharmacologic treatment for hypertension and has been proposed as a treatment option for patients with resistant hypertension.

For individuals who have hypertension resistant to standard medical management who receive RFA of the renal sympathetic nerves, the evidence includes numerous RCTs, numerous systematic reviews of the RCTs, as well as multiple nonrandomized comparative studies and case series. Relevant outcomes are symptoms, change in disease status, morbid events, medication use, and treatment-related morbidity. The largest trial, the Symplicity HTN-3 trial, used a sham-controlled design to reduce the likelihood of placebo effect and demonstrated no significant differences between renal denervation and sham control patients in office-based or ambulatory blood pressure at 6-month follow-up. The Symplicity HTN-3 results were in contrast to other studies not using a sham control design, including Symplicity HTN-2 and the Renal Denervation for Hypertension (DENERHTN) trial, which reported efficacy in reducing blood pressure over a 6 month period compared with a control group. However, results from Symplicity HTN-3 have been supported by a number of subsequent smaller sham-controlled trials. Meta-analyses of the RCTs have also reported inconsistent findings, with most analyses showing no significant benefit in blood pressure measurements following RFA. Single-arm studies with overlapping populations have reported improvements in blood pressure and related physiologic parameters, such as echocardiographic measures of left ventricular hypertrophy, that appear to be durable up to 24 months of follow-up. The strongest evidence comes from sham-controlled trials, the largest of which found no significant benefits with renal denervation. The evidence is insufficient to determine the effects of the technology on health outcomes.

## Policy History

Date	Action
10/2021	Annual policy review. Policy statements unchanged.
2/2021	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
11/2020	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
10/2019	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
10/2018	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
10/2016	Annual policy review. New references added.
11/2015	Annual policy review. New references added.
12/2013	Annual policy review. New references added.
3/2013	New policy describing non-coverage. Effective 3/1/2013.

## Information Pertaining to All Blue Cross Blue Shield Medical Policies

Click on any of the following terms to access the relevant information:

[Medical Policy Terms of Use](#)

[Managed Care Guidelines](#)

[Indemnity/PPO Guidelines](#)

[Clinical Exception Process](#)

[Medical Technology Assessment Guidelines](#)

## References

1. Acelajado MC, Calhoun DA. Resistant hypertension, secondary hypertension, and hypertensive crises: diagnostic evaluation and treatment. *Cardiol Clin.* Nov 2010; 28(4): 639-54. PMID 20937447

2. Doumas M, Papademetriou V, Douma S, et al. Benefits from treatment and control of patients with resistant hypertension. *Int J Hypertens*. Dec 22 2010; 2011: 318549. PMID 21234402
3. Zile MR, Little WC. Effects of autonomic modulation: more than just blood pressure. *J Am Coll Cardiol*. Mar 06 2012; 59(10): 910-2. PMID 22381426
4. Bohm M, Kario K, Kandzari DE, et al. Efficacy of catheter-based renal denervation in the absence of antihypertensive medications (SPYRAL HTN-OFF MED Pivotal): a multicentre, randomised, sham-controlled trial. *Lancet*. May 02 2020; 395(10234): 1444-1451. PMID 32234534
5. Azizi M, Sapoval M, Gosse P, et al. Optimum and stepped care standardised antihypertensive treatment with or without renal denervation for resistant hypertension (DENERHTN): a multicentre, open-label, randomised controlled trial. *Lancet*. May 16 2015; 385(9981): 1957-65. PMID 25631070
6. Courand PY, Pereira H, Del Giudice C, et al. Abdominal Aortic Calcifications Influences the Systemic and Renal Hemodynamic Response to Renal Denervation in the DENERHTN (Renal Denervation for Hypertension) Trial. *J Am Heart Assoc*. Oct 10 2017; 6(10). PMID 29018027
7. Gosse P, Cremer A, Pereira H, et al. Twenty-Four-Hour Blood Pressure Monitoring to Predict and Assess Impact of Renal Denervation: The DENERHTN Study (Renal Denervation for Hypertension). *Hypertension*. Mar 2017; 69(3): 494-500. PMID 28115517
8. Rosa J, Widimsky P, Tousek P, et al. Randomized comparison of renal denervation versus intensified pharmacotherapy including spironolactone in true-resistant hypertension: six-month results from the Prague-15 study. *Hypertension*. Feb 2015; 65(2): 407-13. PMID 25421981
9. Bhatt DL, Kandzari DE, O'Neill WW, et al. A controlled trial of renal denervation for resistant hypertension. *N Engl J Med*. Apr 10 2014; 370(15): 1393-401. PMID 24678939
10. Bakris GL, Townsend RR, Liu M, et al. Impact of renal denervation on 24-hour ambulatory blood pressure: results from SYMPLICITY HTN-3. *J Am Coll Cardiol*. Sep 16 2014; 64(11): 1071-8. PMID 24858423
11. Bakris GL, Townsend RR, Flack JM, et al. 12-month blood pressure results of catheter-based renal artery denervation for resistant hypertension: the SYMPLICITY HTN-3 trial. *J Am Coll Cardiol*. Apr 07 2015; 65(13): 1314-1321. PMID 25835443
12. Mahfoud F, Bakris G, Bhatt DL, et al. Reduced blood pressure-lowering effect of catheter-based renal denervation in patients with isolated systolic hypertension: data from SYMPLICITY HTN-3 and the Global SYMPLICITY Registry. *Eur Heart J*. Jan 07 2017; 38(2): 93-100. PMID 28158510
13. Kario K, Bhatt DL, Brar S, et al. Effect of Catheter-Based Renal Denervation on Morning and Nocturnal Blood Pressure: Insights From SYMPLICITY HTN-3 and SYMPLICITY HTN-Japan. *Hypertension*. Dec 2015; 66(6): 1130-7. PMID 26558819
14. Lu D, Wang K, Liu Q, et al. Reductions of left ventricular mass and atrial size following renal denervation: a meta-analysis. *Clin Res Cardiol*. Aug 2016; 105(8): 648-656. PMID 26838292
15. Flack JM, Bhatt DL, Kandzari DE, et al. An analysis of the blood pressure and safety outcomes to renal denervation in African Americans and Non-African Americans in the SYMPLICITY HTN-3 trial. *J Am Soc Hypertens*. Oct 2015; 9(10): 769-779. PMID 26362830
16. Esler MD, Krum H, Sobotka PA, et al. Renal sympathetic denervation in patients with treatment-resistant hypertension (The Symplicity HTN-2 Trial): a randomised controlled trial. *Lancet*. Dec 04 2010; 376(9756): 1903-9. PMID 21093036
17. Esler MD, Krum H, Schlaich M, et al. Renal sympathetic denervation for treatment of drug-resistant hypertension: one-year results from the Symplicity HTN-2 randomized, controlled trial. *Circulation*. Dec 18 2012; 126(25): 2976-82. PMID 23248063
18. Esler MD, Bohm M, Sievert H, et al. Catheter-based renal denervation for treatment of patients with treatment-resistant hypertension: 36 month results from the SYMPLICITY HTN-2 randomized clinical trial. *Eur Heart J*. Jul 2014; 35(26): 1752-9. PMID 24898552
19. Kario K, Ogawa H, Okumura K, et al. SYMPLICITY HTN-Japan - First Randomized Controlled Trial of Catheter-Based Renal Denervation in Asian Patients -. *Circ J*. 2015; 79(6): 1222-9. PMID 25912693
20. de Jager RL, de Beus E, Beeftink MM, et al. Impact of Medication Adherence on the Effect of Renal Denervation: The SYMPATHY Trial. *Hypertension*. Apr 2017; 69(4): 678-684. PMID 28264922
21. de Jager RL, van Maarseveen EM, Bots ML, et al. Medication adherence in patients with apparent resistant hypertension: findings from the SYMPATHY trial. *Br J Clin Pharmacol*. Jan 2018; 84(1): 18-24. PMID 28815689

22. Schmieder RE, Ott C, Toennes SW, et al. Phase II randomized sham-controlled study of renal denervation for individuals with uncontrolled hypertension - WAVE IV. *J Hypertens*. Mar 2018; 36(3): 680-689. PMID 29035942
23. Oliveras A, Armario P, Clara A, et al. Spironolactone versus sympathetic renal denervation to treat true resistant hypertension: results from the DENERVHTA study - a randomized controlled trial. *J Hypertens*. Sep 2016; 34(9): 1863-71. PMID 27327441
24. Mathiassen ON, Vase H, Bech JN, et al. Renal denervation in treatment-resistant essential hypertension. A randomized, SHAM-controlled, double-blinded 24-h blood pressure-based trial. *J Hypertens*. Aug 2016; 34(8): 1639-47. PMID 27228432
25. Desch S, Okon T, Heinemann D, et al. Randomized sham-controlled trial of renal sympathetic denervation in mild resistant hypertension. *Hypertension*. Jun 2015; 65(6): 1202-8. PMID 25824248
26. Schneider S, Promny D, Sinnecker D, et al. Impact of sympathetic renal denervation: a randomized study in patients after renal transplantation (ISAR-denerve). *Nephrol Dial Transplant*. Nov 2015; 30(11): 1928-36. PMID 26333545
27. Fadl Elmula FE, Hoffmann P, Larstorp AC, et al. Adjusted drug treatment is superior to renal sympathetic denervation in patients with true treatment-resistant hypertension. *Hypertension*. May 2014; 63(5): 991-9. PMID 24591332
28. Pokushalov E, Romanov A, Corbucci G, et al. A randomized comparison of pulmonary vein isolation with versus without concomitant renal artery denervation in patients with refractory symptomatic atrial fibrillation and resistant hypertension. *J Am Coll Cardiol*. Sep 25 2012; 60(13): 1163-70. PMID 22958958
29. Coppolino G, Pisano A, Rivoli L, et al. Renal denervation for resistant hypertension. *Cochrane Database Syst Rev*. Feb 21 2017; 2: CD011499. PMID 28220472
30. Chen XH, Kim S, Zeng XX, et al. Account for Clinical Heterogeneity in Assessment of Catheter-based Renal Denervation among Resistant Hypertension Patients: Subgroup Meta-analysis. *Chin Med J*. Jul 05 2017; 130(13): 1586-1594. PMID 28639575
31. Pappaccogli M, Covella M, Berra E, et al. Effectiveness of Renal Denervation in Resistant Hypertension: A Meta-Analysis of 11 Controlled Studies. *High Blood Press Cardiovasc Prev*. Jun 2018; 25(2): 167-176. PMID 29752703
32. Fadl Elmula FEM, Feng YM, Jacobs L, et al. Sham or no sham control: that is the question in trials of renal denervation for resistant hypertension. A systematic meta-analysis. *Blood Press*. Aug 2017; 26(4): 195-203. PMID 28443356
33. Sun D, Li C, Li M, et al. Renal Denervation vs Pharmacotherapy for Resistant Hypertension: A Meta-Analysis. *J Clin Hypertens (Greenwich)*. Aug 2016; 18(8): 733-40. PMID 26619813
34. Zhang X, Wu N, Yan W, et al. The effects of renal denervation on resistant hypertension patients: a meta-analysis. *Blood Press Monit*. Aug 2016; 21(4): 206-14. PMID 26901340
35. Yao Y, Zhang D, Qian J, et al. The effect of renal denervation on resistant hypertension: Meta-analysis of randomized controlled clinical trials. *Clin Exp Hypertens*. 2016; 38(3): 278-86. PMID 27018652
36. Fadl Elmula FE, Jin Y, Yang WY, et al. Meta-analysis of randomized controlled trials of renal denervation in treatment-resistant hypertension. *Blood Press*. 2015; 24(5): 263-74. PMID 26194721
37. Kwok CS, Loke YK, Pradhan S, et al. Renal denervation and blood pressure reduction in resistant hypertension: a systematic review and meta-analysis. *Open Heart*. 2014; 1(1): e000092. PMID 25332808
38. Pancholy SB, Shantha GP, Patel TM, et al. Meta-analysis of the effect of renal denervation on blood pressure and pulse pressure in patients with resistant systemic hypertension. *Am J Cardiol*. Sep 15 2014; 114(6): 856-61. PMID 25084693
39. Davis MI, Filion KB, Zhang D, et al. Effectiveness of renal denervation therapy for resistant hypertension: a systematic review and meta-analysis. *J Am Coll Cardiol*. Jul 16 2013; 62(3): 231-241. PMID 23644092
40. Shantha GP, Pancholy SB. Effect of renal sympathetic denervation on apnea-hypopnea index in patients with obstructive sleep apnea: a systematic review and meta-analysis. *Sleep Breath*. Mar 2015; 19(1): 29-34. PMID 24839239
41. Brandt MC, Mahfoud F, Reda S, et al. Renal sympathetic denervation reduces left ventricular hypertrophy and improves cardiac function in patients with resistant hypertension. *J Am Coll Cardiol*. Mar 06 2012; 59(10): 901-9. PMID 22381425

42. Mahfoud F, Cremers B, Janker J, et al. Renal hemodynamics and renal function after catheter-based renal sympathetic denervation in patients with resistant hypertension. *Hypertension*. Aug 2012; 60(2): 419-24. PMID 22733462
43. Ukena C, Mahfoud F, Kindermann I, et al. Cardiorespiratory response to exercise after renal sympathetic denervation in patients with resistant hypertension. *J Am Coll Cardiol*. Sep 06 2011; 58(11): 1176-82. PMID 21884958
44. Ewen S, Mahfoud F, Linz D, et al. Effects of renal sympathetic denervation on exercise blood pressure, heart rate, and capacity in patients with resistant hypertension. *Hypertension*. Apr 2014; 63(4): 839-45. PMID 24420550
45. Rosendorff C, Lackland DT, Allison M, et al. Treatment of hypertension in patients with coronary artery disease: a scientific statement from the American Heart Association, American College of Cardiology, and American Society of Hypertension. *Circulation*. May 12 2015; 131(19): e435-70. PMID 25829340
46. Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Hypertension*. Jun 2018; 71(6): 1269-1324. PMID 29133354
47. Carey RM, Calhoun DA, Bakris GL, et al. Resistant Hypertension: Detection, Evaluation, and Management: A Scientific Statement From the American Heart Association. *Hypertension*. Nov 2018; 72(5): e53-e90. PMID 30354828
48. James PA, Oparil S, Carter BL, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *JAMA*. Feb 05 2014; 311(5): 507-20. PMID 24352797