

8.01.57 Baroreflex Stimulation Devices	
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Section: 8.0 Therapy	Page: Page 1 of 14

Policy Statement

- I. Use of baroreflex stimulation implanted devices is considered **investigational** in all situations, including but not limited to treatment of hypertension and heart failure.

NOTE: Refer to [Appendix A](#) to see the policy statement changes (if any) from the previous version.

Policy Guidelines

Coding

The following are category III CPT codes for implantation of the baroreflex activation device:

- **0266T:** Implantation or replacement of carotid sinus baroreflex activation device; total system (includes generator placement, unilateral or bilateral lead placement, intra-operative interrogation, programming, and repositioning, when performed)
- **0267T:** Implantation or replacement of carotid sinus baroreflex activation device; lead only, unilateral (includes intra-operative interrogation, programming, and repositioning, when performed)
- **0268T:** Implantation or replacement of carotid sinus baroreflex activation device; pulse generator only (includes intra-operative interrogation, programming, and repositioning, when performed)
- **0269T:** Revision or removal of carotid sinus baroreflex activation device; total system (includes generator placement, unilateral or bilateral lead placement, intra-operative interrogation, programming, and repositioning, when performed)
- **0270T:** Revision or removal of carotid sinus baroreflex activation device; lead only, unilateral (includes intra-operative interrogation, programming, and repositioning, when performed)
- **0271T:** Revision or removal of carotid sinus baroreflex activation device; pulse generator only (includes intra-operative interrogation, programming, and repositioning, when performed)
- **0272T:** Interrogation device evaluation (in person), carotid sinus baroreflex activation system, including telemetric iterative communication with the implantable device to monitor device diagnostics and programmed therapy values, with interpretation and report (e.g., battery status, lead impedance, pulse amplitude, pulse width, therapy frequency, pathway mode, burst mode, therapy start/stop times each day)
- **0273T:** Interrogation device evaluation (in person), carotid sinus baroreflex activation system, including telemetric iterative communication with the implantable device to monitor device diagnostics and programmed therapy values, with interpretation and report (e.g., battery status, lead impedance, pulse amplitude, pulse width, therapy frequency, pathway mode, burst mode, therapy start/stop times each day); with programming

Description

Baroreflex stimulation devices provide electrical stimulation of the baroreceptors in the carotid arteries using an implanted device. Activation of the baroreflex inhibits the sympathetic nervous system, resulting in various physiologic changes, including slowed heart rate and lower blood pressure.

Related Policies

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

Benefit Application

Benefit determinations should be based in all cases on the applicable contract language. To the extent there are any conflicts between these guidelines and the contract language, the contract language will control. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

Some state or federal mandates (e.g., Federal Employee Program [FEP]) prohibits plans from denying Food and Drug Administration (FDA)-approved technologies as investigational. In these instances, plans may have to consider the coverage eligibility of FDA-approved technologies on the basis of medical necessity alone.

Regulatory Status

In 2014, the Barostim Neo™ Legacy System received a humanitarian device exemption from the U.S. Food and Drug Administration for use in patients with treatment-resistant hypertension who received Rheos® Carotid Sinus leads as part of the Rheos pivotal trial and were considered responders in that trial.¹

In 2019, Barostim Neo was granted premarket approval (PMA P180050) and is indicated for the improvement of symptoms of heart failure (i.e., quality of life, six-minute hall walk, and functional status) for patients who remain symptomatic despite treatment with guideline-directed medical therapy, are New York Heart Association (NYHA) Class III or Class II (with a recent history of Class III), and have a left ventricular ejection fraction $\leq 35\%$ and a N-terminal pro-B-type natriuretic peptide (NT-proBNP) < 1600 pg/ml, excluding patients indicated for Cardiac Resynchronization Therapy according to the American Heart Association/American College of Cardiology/ European Society of Cardiology guidelines.

It was the first device to be granted approval via the Expedited Access Pathway.^{2,3} The Expedited Access Pathway will hasten the approval of novel therapies that target life-threatening conditions.

Rationale

Background

Baroreceptors are pressure sensors contained within the walls of the carotid arteries. They are part of the autonomic nervous system that regulates basic physiologic functions such as heart rate and blood pressure. When these receptors are stretched, which occurs with increases in blood pressure, the baroreflex is activated. Activation of the baroreflex signals the brain, which responds by inhibiting sympathetic nervous system output and increasing parasympathetic nervous system output. The effect of this activation is to reduce heart rate and blood pressure, thereby helping to maintain homeostasis of the circulatory system.

The use of baroreflex stimulation devices (also known as baroreflex activation therapy) is a potential alternative treatment for resistant hypertension and heart failure. Both hypertension and heart failure are relatively common conditions, and are initially treated with medications and lifestyle changes. A substantial portion of patients are unresponsive to conventional therapy

and treating these patients is often challenging, expensive, and can lead to adverse events. As a result, there is a large unmet need for additional treatments.

Literature Review

Evidence reviews assess the clinical evidence to determine whether the use of a technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function including benefits and harms. Every clinical condition has specific outcomes that are important to patients and to managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of a technology, 2 domains are examined: the relevance and the quality and credibility. To be relevant, studies must represent one or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial (RCT) is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. Randomized controlled trials are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.

Treatment Resistant Hypertension

Clinical Context and Therapy Purpose

The purpose of baroreflex stimulation devices is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as medical therapy or other anti-hypertensive treatments (e.g., radiofrequency ablation of renal sympathetic nerves), in patients with treatment-resistant hypertension.

The question addressed in this evidence review is: Does the use of baroreflex stimulation devices improve the net health outcome in individuals with treatment-resistant hypertension?

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals with treatment-resistant hypertension.

Interventions

The therapy being considered is baroreflex stimulation (also known as baroreflex activation therapy). Implanted devices provide electrical stimulation of the baroreceptors in the carotid arteries. Activating the baroreflex inhibits the sympathetic nervous system, causing various physiologic changes, including lowering blood pressure (BP).

Comparators

Comparators of interest include optimal medical therapy and other hypertension treatments (e.g., radiofrequency ablation of renal sympathetic nerves).

Outcomes

The general outcomes of interest are overall survival (OS), functional outcomes, quality of life, hospitalizations, medication use, and treatment-related morbidity.

Available literature has followed patients for up to 28 months, but in practice, patients with treatment-resistant hypertension would require long-term follow-up by cardiologists.

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs.
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

Review of Evidence

Randomized Controlled Trials

Randomized controlled trials are important in determining the efficacy of baroreflex stimulation devices due to the natural variability in BP, the heterogeneity of the patient populations with high BP, and the presence of many potential outcome confounders. Case series have limited utility for determining efficacy. They can be useful for demonstrating the potential of the technique, to determine the rate of short- and long-term adverse events of treatment, and to evaluate the durability of treatment response.

The Rheos pivotal RCT evaluated the efficacy of baroreflex stimulation for lowering BP.⁴ Bisognano et al (2011) reported on this double-blind trial, which included patients with treatment-resistant hypertension defined as at least 1 systolic BP (SBP) measurement of 160 mm Hg or more with diastolic BP (DBP) measurement of 80 mm Hg or more after at least 1 month of maximally tolerated medical therapy. A total of 322 patients had the Rheos system implanted, and 265 patients underwent randomization. Participants were randomized in a 2:1 fashion to the device turned on or off for a 6-month period. After 6 months, all patients had the device turned on. The primary efficacy endpoints were the percentage of patients achieving at least a 10 mm Hg decrease in SBP at 6 months (acute efficacy) and the percentage of patients who maintained their BP response over the 6- to 12-month study period (sustained efficacy). Primary safety outcomes were defined thresholds for procedural safety (at least 82% of patients free from procedural adverse events at 30 days), therapy safety (not more than 15% excess treatment-related adverse events in the experimental group), and device safety (at least 72% of patients free from procedural or therapy-related adverse events at 12 months). At baseline, mean age was about 53 years, 70% to 81% of patients were White, and 17% to 21% of patients were Black.

At 6 months, 54% of patients in the stimulation group had an SBP decrease of 10 mm Hg or more compared with 46% of patients in the control group ($p=.97$), indicating that the primary acute efficacy outcome was not met.⁴ The primary sustained efficacy outcome was met, with 88% of patients who responded at 6 months maintaining a response at 12 months. A secondary efficacy outcome (the percentage of patients reaching target SBP) showed a significant between-group difference. A total of 42% of the patients in the active treatment group reached a target SBP of 140 mm Hg compared with 24% in the control group ($p=.005$). For the primary procedural safety endpoint, the predefined threshold of 82% was not met. At 30 days, the percentage of patients free of procedural adverse events was 74.8%. The primary safety endpoint for therapy safety was met, with a similar percentage of patients free of treatment-related adverse events at 6 months (91.7% vs. 89.3%; $p<.001$ for noninferiority). The primary safety endpoint for device safety was also met, with 87.2% of patients free of device-related adverse events at 12 months, exceeding the predefined threshold of 72%.

Bakris et al (2012) reported on additional data in an extension of the Rheos trial.⁵ A total of 276 (86%) of the 322 implanted patients consented to long-term open-label follow-up. After a mean follow-up of 28 months, 244 (88%) of 276 were considered to be clinically significant responders. Response was defined as sustained achievement of the target SBP (≤ 140 mm Hg, or ≤ 130 mm Hg for patients with diabetes or renal disease), or a reduction in SBP of 20 mm Hg or more from device activation. Alternatively, patients could qualify as responders if their implanted device

was deactivated and if they had an increase in SBP of at least 20 mm Hg in the 30 days after device deactivation. The extension study lacked a comparison group.

Observational Studies

Several uncontrolled observational studies have also been published.^{6,7,8,9} Scheffers et al (2010) reported on the largest of these, the Device Based Therapy in Hypertension Extension Trial (DEBuT-HT), which was a multicenter, single-arm feasibility study of the Rheos baroreflex activation therapy system.⁸ This trial enrolled 45 patients with treatment-resistant hypertension defined as a BP greater than 160/90 mm Hg despite treatment with at least 3 antihypertensive drugs, including a diuretic. The planned follow-up was 3 months, with a smaller number of patients followed up to 2 years. In 37 patients completing the 3-month protocol, office SBP was reduced by 21 mm Hg ($p < .001$) and DBP was reduced by 12 mm Hg ($p < .001$). There was a smaller reduction in 24-hour ambulatory BP ($n = 26$), with a decrease of 6 mm Hg in SBP ($p = .10$) and a decrease of 4 mm Hg in DBP ($p = .04$). In 26 patients followed for 1 year, the declines in office BP were 30 mm Hg for systolic ($p < .001$) and 20 mm Hg for diastolic ($p < .001$). For ambulatory BP ($n = 15$), the 1-year declines were 13 mm Hg for systolic ($p < .001$) and 8 mm Hg for diastolic ($p = .001$). A total of 7 (16.7%) of 42 patients experienced adverse events. Three patients required device removal due to infection, 1 experienced perioperative stroke, 1 experienced tongue palsy due to hypoglossal nerve injury, 1 had postoperative pulmonary edema, and 1 required reintervention for device explantation.

Wallbach et al (2016) published a single-arm study using the second-generation Neo device to treat uncontrolled hypertension.⁹ The study reported on 44 patients with resistant hypertension, defined as an office BP ≥ 140 mm Hg or ≥ 130 mm Hg for patients with chronic kidney disease and proteinuria, despite treatment with at least 3 antihypertensive medications including a diuretic. Mean baseline office BP was 171/91 mm Hg. After 6 months of baroreflex activation therapy, mean office BP decreased to 151 mm Hg over 82 mm Hg (pre to post, $p < .001$). At 6 months, the mean number of BP medications used per patient decreased from 6.5 at baseline to 6.0 ($p < .03$). One procedure-related major adverse event occurred, a contralateral stroke. Ten (23%) of the 44 patients experienced a minor procedure-related complication. The most common minor adverse events were disturbance of wound healing ($n = 5$ [11%]) and postoperative hematoma ($n = 4$ [9%]). One patient had revision surgery but explantation was not needed.

Section Summary: Treatment Resistant Hypertension

One RCT has evaluated baroreflex stimulation devices. This trial, which compared the first-generation Rheos device plus medical management with medical management alone, met some but not all of its efficacy endpoints. Baroreflex stimulation-treated patients were no more likely to achieve at least a 10 mm Hg decrease in SBP at 6 months, but were more likely to reach the target SBP of 140 mm Hg or less at 6 months. The trial met 2 of its 3 predefined safety endpoints (therapy safety and device safety but not procedural safety). In addition, several uncontrolled studies have reported short-term reductions in BP, together with adverse events such as infection, hypoglossal nerve injury, and wound complications. Additional RCTs, particularly those using the second-generation device, are needed to draw conclusions about safety and efficacy.

Treatment-Resistant Heart Failure

Clinical Context and Therapy Purpose

The purpose of baroreflex stimulation devices is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as medical therapy in patients with treatment-resistant heart failure.

The question addressed in this evidence review is: Does the use of baroreflex stimulation devices improve the net health outcome in individuals with treatment-resistant heart failure?

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals with treatment-resistant heart failure.

Interventions

The therapy being considered is baroreflex stimulation (also known as baroreflex activation therapy). Implanted devices provide electrical stimulation of the baroreceptors in the carotid arteries. Activating the baroreflex inhibits the sympathetic nervous system, causing various physiologic changes, including lowering BP.

Comparators

Comparators of interest include optimal medical therapy, implantable devices, and transplantation.

Outcomes

The general outcomes of interest are OS, functional outcomes, quality of life, hospitalizations, medication use, and treatment-related morbidity.

Available literature has followed patients for up to 12 months, but in practice, patients with treatment-resistant heart failure would be followed by cardiologists for the rest of their lives.

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs.
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

Review of Evidence**Systematic Reviews**

In 2020, Cai et al published a meta-analysis evaluating the efficacy of baroreflex activation therapy for heart failure.¹⁰ The meta-analysis included 4 RCTs and concluded that baroreflex activation therapy significantly improves quality of life score, 6-minute hall walk distance, New York Heart Association (NYHA) class, N-terminal pro-B-type natriuretic peptide (NT-proBNP), and duration of hospitalization compared to control. However, the 4 RCTs included in the analysis all represented the same patient population from the Hope for Heart Failure (HOPE4HF) study (NCT01471860 and NCT01720160), and did not account for the overlapping population between studies. Therefore, this meta-analysis likely overestimated the true effect of baroreflex activation therapy. The HOPE4HF RCT and post hoc/subgroup analyses are summarized below.

Randomized Controlled Trials

In 2019, the Barostim Neo System was the first device to receive premarket approval through the U.S. Food and Drug Administration's (FDA's) Expedited Access Pathway (see Regulatory section).² The safety and effectiveness data reviewed by the FDA was reported in the Barostim Neo-Baroreflex Activation Therapy for Heart Failure (BeAT-HF) trial.^{3,11}

BeAT-HF examined the safety and effectiveness of baroreflex activation therapy in heart failure patients with reduced ejection fraction using an Expedited and Extended Phase design. In the Expedited Phase, baroreflex activation therapy plus guideline-directed medical therapy was compared at 6 months post-implant to guideline-directed medical therapy alone using 3 intermediate end points: 6-minute hall walk distance, Minnesota Living with Heart Failure Questionnaire, and NT-proBNP.¹¹ The rate of heart failure morbidity and cardiovascular mortality was compared between the arms to evaluate early trending using predictive probability modeling.

In the Expedited Phase, investigators randomized 264 intended use patients (White, 73%; Black, 17%; Asian, 1.9%).¹¹ The primary safety endpoint was major adverse neurological and cardiovascular event free rate, which was only measured in the baroreflex group; the lower bound of the one-sided 95% confidence interval (CI) of the event-free rate had to be >85%. Results analysts were blinded to arm assignment. At 6 months, the major adverse neurological and cardiovascular event-free rate was 96.8% (121 of 125 patients), and the one-sided 95% CI lower bound was 92.8% ($p < .001$). Effectiveness endpoint results are summarized in Table 1. The FDA concluded from these results that the system was safe for the intended use population, and all effectiveness endpoints showed a statistically significant benefit for baroreflex activation therapy plus guideline-directed medical therapy compared to guideline-directed medical therapy alone.

Table 1. 6-Month Change from Baseline for Effectiveness Endpoints in the BeAT-HF Expedited Phase Trial

	6MHWd		QOL ^a		NT-proBNP	
	BAT + GDMT	GDMT	BAT + GDMT	GDMT	BAT + GDMT	GDMT
n	118	120	120	125	120	123
Mean (SD)	48.6 (66.3)	-7.9 (88.4)	-20.7 (25.4)	-6.2 (20.1)	-21.1% (0.4)	3.3% (0.3)
95% CI	36.5 to 60.7	-23.9 to 8.1	-25.3 to -16.1	-9.8 to -2.7	-32.3% to -8.2%	-8.9% to 17.2%
Difference	60.1		-14.1		-24.6%	
95% CI	40.3 to 79.9		-19.2 to -8.9		-37.6% to -8.7%	
p-value	<.001		<.001		.004	

6MHWd: 6-minute hall walk distance; BAT: Barostim therapy; BeAT-HF: Barostim Neo-Baroreflex Activation Therapy for Heart Failure; CI: confidence interval; GDMT: guideline based medical treatment; NA: not applicable; NT-proBNP: N-terminal pro-B-type natriuretic peptide; QOL: quality of life; SD: standard deviation.

^a Measured by the Minnesota Living With Heart Failure Quality of Life questionnaire.

BeAT-HF includes an extended phase in which the heart failure morbidity and cardiovascular mortality end point is based on an expected event rate of 0.4 events/patient/year in the guideline-directed medical therapy arm. This trial is ongoing.

Abraham et al (2015) reported on 1 RCT, the HOPE4HF study, that evaluated baroreflex stimulation for the treatment of heart failure. This trial was nonblinded and included 146 patients (White, 81.7% and 89.9% in treatment and control groups, respectively) with NYHA class III heart failure and an ejection fraction of $\leq 35\%$ despite guideline-directed medical therapy.¹² Patients were randomized to baroreflex stimulation (Barostim Neo System) plus medical therapy ($n=76$) or to continued medical therapy alone ($n=70$) for 6 months. The primary safety outcome was the proportion of patients free from major adverse neurologic and cardiovascular events. The trialists specified 3 primary efficacy endpoints: changes in NYHA functional class, quality of life score, and 6-minute walk distance.

The overall major adverse neurologic and cardiovascular events-free rate was 97.2%; rates were not reported separately for the baroreflex stimulation and control groups.¹² In terms of the efficacy outcomes, there was significant improvement in the baroreflex stimulation group versus the control group on each of the 3 outcomes. Significantly more patients in the treatment group (55%) improved by at least 1 level in NYHA functional class than in the control group (24%; $p < .002$). Mean quality of life scores, as assessed by the Minnesota Living with Heart Failure Questionnaire, improved significantly more in the treatment group (-17.4 points) than in the control group (2.1 points; $p < .001$). Similarly, mean 6-minute walk distance improved significantly more in the treatment group (59.6 meters) than in the control group (1.5 meters; $p = .004$).

Weaver et al (2016) reported 12-month results for 101 (69%) of 146 patients from this RCT.¹³ No additional system- or procedure-related major adverse neurologic and cardiovascular events occurred between 6 and 12 months. Moreover, outcomes for NYHA functional class improvement, quality of life score, and 6-minute walk distance were all significantly better in the

treatment group than in the control group at 12 months. This analysis had a substantial amount of missing data.

Halbach et al (2018) published a post hoc subgroup analysis from HOPE4HF evaluating baroreflex activation treatment for heart failure in patients with and without coronary artery disease (CAD).¹⁴ Patients (N=146) from 45 centers with left ventricular ejection fraction <35% and NYHA Class III were randomized to the baroreflex activation treatment group (n=76) or control group (n=70). The rate of system- or procedure-related major adverse neurological or cardiovascular events was 3.8% for the CAD group and 0% for no-CAD group (p>.99), while the system- or procedure-related complication rate was 11.5% for patients with CAD and 21.1% for those without CAD (p=.44). In the baroreflex activation group, from baseline to 6 months, quality of life scores decreased by 16.8 ± 3.4 points for CAD patients and by 18.9 ± 5.3 for no-CAD patients; NYHA Class decreased by 0.6 ± 0.1 for CAD patients and by 0.4 ± 0.2 for no-CAD patients. Left ventricular ejection fraction increased by 1.2 ± 1.4 for the CAD group and 5.2 ± 1.9 for the no-CAD group. No interaction was found between the presence of CAD and effect of baroreflex activation therapy (p>.05). The study was limited by its small sample size and by the subgroup analysis not being prespecified.

Overall, the limitations of this RCT included a relatively small sample size for a common condition, relatively short intervention period, and lack of blinding; some of the positive findings on the subjective patient-reported outcomes might have been due at least in part to a placebo effect. Additional RCTs with larger sample sizes and longer follow-up are needed to confirm these positive findings.

Section Summary: Treatment Resistant Heart Failure

The available evidence for baroreflex activation therapy for heart failure includes 2 RCTs and a post hoc subgroup analysis of a RCT. All trials compared baroreflex stimulation plus medical therapy with medical therapy alone in patients with heart failure. The 2019 RCT, the expedited trial that was used by the FDA to approve the Barostim Neo System, demonstrated that the system is safe and effective for its intended use population; however, the extended trial is still underway, and longer-term outcomes have not yet been determined. A 2018 RCT found a low rate of major adverse events and met all 3 efficacy endpoints (improvements in NYHA functional class, quality of life, and 6-minute walk distance). However, the study had methodologic limitations, including lack of blinding, a relatively small sample size for a common condition, and relatively short intervention period.

Summary of Evidence

For individuals who have treatment-resistant hypertension who receive baroreflex stimulation therapy, the evidence includes a RCT and several small uncontrolled studies. Relevant outcomes are OS, functional outcomes, quality of life, hospitalizations, medication use, and treatment-resistant morbidity. The uncontrolled studies have reported short-term reductions in BP in patients treated with baroreflex stimulation devices, as well as adverse events such as infection, hypoglossal nerve injury, and wound complications. The RCT comparing baroreflex stimulation with continued medical management met some efficacy endpoints but not others, as well as 2 of its 3 predefined safety endpoints. Additional RCTs are needed to permit conclusions on efficacy and safety. Baroreflex stimulation for treatment-resistant hypertension is accessible only through a Humanitarian Device Exemption for patients who previously participated in a pivotal trial. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have treatment-resistant heart failure who receive baroreflex stimulation therapy, the evidence includes 2 RCTs and a post hoc subgroup analysis of a RCT. Relevant outcomes are OS, functional outcomes, quality of life, hospitalizations, medication use, and treatment-resistant morbidity. The expedited phase of the 2019 RCT was used by the U.S. FDA to approve the Barostim Neo System. The trial demonstrated that the system is safe and effective for its intended use population in the short term; however the extended trial is still underway, and

longer-term outcomes have not been determined. A 2018 RCT met all 3 efficacy endpoints but had methodologic limitations, incomplete blinding, a relatively small sample size for a common condition, and a short intervention period. A second, larger, RCT designed to assess the effects of the intervention on mortality, safety, function, and quality of life outcomes is underway. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Supplemental Information

The purpose of the following information is to provide reference material. Inclusion does not imply endorsement or alignment with the evidence review conclusions.

Practice Guidelines and Position Statements

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

American Heart Association

In 2017, the American Heart Association issued a joint guideline for the management of high blood pressure in adults with the American College of Cardiology and multiple other organizations.¹⁵ This guideline notes that studies have not provided sufficient evidence to support the use of baroreceptor pacing for managing resistant hypertension.

In 2022, the American Heart Association, American College of Cardiology, and multiple other organizations published a guideline on management of heart failure.¹⁶ The guideline states that baroreceptor stimulation has produced mixed results and data regarding mortality and hospitalization are lacking.

National Institute for Health and Care Excellence

In 2015, the National Institute for Health and Care Excellence (NICE) issued guidance that stated: "Current evidence on the safety and efficacy of implanting a baroreceptor stimulation device for resistant hypertension is inadequate. Therefore, this procedure should only be used in the context of research."¹⁷

U.S. Preventive Services Task Force Recommendations

Not applicable.

Medicare National Coverage

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

Ongoing and Unpublished Clinical Trials

Some currently ongoing and unpublished trials that might influence this review are listed in Table 2.

Table 2. Summary of Key Ongoing and Unpublished Trials

NCT No.	Trial Name	Planned Enrollment	Completion Date
<i>Ongoing</i>			
NCT01720160 ^a	Barostim HOPE4HF Study	98	Mar 2021 (status is unknown)
NCT02627196 ^a	Barostim Neo®-Baroreflex Activation Therapy® for Heart Failure (BeAT-HF)	1200	Dec 2021
NCT03730519	Investigation of the Efficacy and Safety of Baroreflex Activation Therapy in Patients With Refractory Hypertension	25	June 2022

NCT No.	Trial Name	Planned Enrollment	Completion Date
	and Those With Highly Variable Blood Pressure Due to Peripheral Baroreflex Failure		
NCT01679132^a	CVRx Barostim NEO Hypertension Pivotal Trial	10	Mar 2026 (suspended; company resources only allows adequate oversight for 1 pivotal trial at a time); last update posted Dec 2021
NCT04502316^a	BAROSTIM THERAPY™ in Heart Failure With Reduced Ejection Fraction: A Post-Market Registry With the Barostim™ System	5000	Jun 2028
NCT02876042^a	BAROSTIM THERAPY™ in Heart Failure With Preserved Ejection Fraction: A Post-Market Registry With the CE-Marked BAROSTIM NEO™ System	70	Jul 2024
NCT02880618^a	BAROSTIM THERAPY™ in Heart Failure With Reduced Ejection Fraction: A Post-Market Registry With the CE-Marked BAROSTIM NEO™ System	500	Jul 2024
NCT02880631^a	BAROSTIM THERAPY™ In Resistant Hypertension: A Post-Market Registry With the CE-Marked BAROSTIM NEO™ System	500	Jul 2024
NCT01471834^a	Neo Non-Randomized Hypertension Study	40	Aug 2026

NCT: national clinical trial.

^a Denotes industry-sponsored or cosponsored trial.

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Documentation for Clinical Review

- No records required

Coding

This Policy relates only to the services or supplies described herein. Benefits may vary according to product design; therefore, contract language should be reviewed before applying the terms of the Policy.

The following codes are included below for informational purposes. Inclusion or exclusion of a code(s) does not constitute or imply member coverage or provider reimbursement policy. Policy Statements are intended to provide member coverage information and may include the use of some codes for clarity. The Policy Guidelines section may also provide additional information for how to interpret the Policy Statements and to provide coding guidance in some cases.

Type	Code	Description
CPT®	0266T	Implantation or replacement of carotid sinus baroreflex activation device; total system (includes generator placement, unilateral or bilateral lead placement, intra-operative interrogation, programming, and repositioning, when performed)

Type	Code	Description
	0267T	Implantation or replacement of carotid sinus baroreflex activation device; lead only, unilateral (includes intra-operative interrogation, programming, and repositioning, when performed)
	0268T	Implantation or replacement of carotid sinus baroreflex activation device; pulse generator only (includes intra-operative interrogation, programming, and repositioning, when performed)
	0269T	Revision or removal of carotid sinus baroreflex activation device; total system (includes generator placement, unilateral or bilateral lead placement, intra-operative interrogation, programming, and repositioning, when performed)
	0270T	Revision or removal of carotid sinus baroreflex activation device; lead only, unilateral (includes intra-operative interrogation, programming, and repositioning, when performed)
	0271T	Revision or removal of carotid sinus baroreflex activation device; pulse generator only (includes intra-operative interrogation, programming, and repositioning, when performed)
	0272T	Interrogation device evaluation (in person), carotid sinus baroreflex activation system, including telemetric iterative communication with the implantable device to monitor device diagnostics and programmed therapy values, with interpretation and report (e.g., battery status, lead impedance, pulse amplitude, pulse width, therapy frequency, pathway mode, burst mode, therapy start/stop times each day)
	0273T	Interrogation device evaluation (in person), carotid sinus baroreflex activation system, including telemetric iterative communication with the implantable device to monitor device diagnostics and programmed therapy values, with interpretation and report (e.g., battery status, lead impedance, pulse amplitude, pulse width, therapy frequency, pathway mode, burst mode, therapy start/stop times each day); with programming
HCPCS	None	

Policy History

This section provides a chronological history of the activities, updates and changes that have occurred with this Medical Policy.

Effective Date	Action
10/31/2014	BCBSA medical policy adoption
01/01/2017	Policy revision without position change
07/01/2017	Policy revision without position change
07/01/2018	Policy revision without position change
07/01/2019	Policy revision without position change
07/01/2020	Annual review. No change to policy statement. Literature review updated.
07/01/2021	Annual review. No change to policy statement. Literature review updated.
07/01/2022	Annual review. No change to policy statement. Literature review updated.

Definitions of Decision Determinations

Medically Necessary: Services that are Medically Necessary include only those which have been established as safe and effective, are furnished under generally accepted professional standards to treat illness, injury or medical condition, and which, as determined by Blue Shield, are: (a) consistent with Blue Shield medical policy; (b) consistent with the symptoms or diagnosis;

(c) not furnished primarily for the convenience of the patient, the attending Physician or other provider; (d) furnished at the most appropriate level which can be provided safely and effectively to the patient; and (e) not more costly than an alternative service or sequence of services at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of the Member's illness, injury, or disease.

Investigational/Experimental: A treatment, procedure, or drug is investigational when it has not been recognized as safe and effective for use in treating the particular condition in accordance with generally accepted professional medical standards. This includes services where approval by the federal or state governmental is required prior to use, but has not yet been granted.

Split Evaluation: Blue Shield of California/Blue Shield of California Life & Health Insurance Company (Blue Shield) policy review can result in a split evaluation, where a treatment, procedure, or drug will be considered to be investigational for certain indications or conditions, but will be deemed safe and effective for other indications or conditions, and therefore potentially medically necessary in those instances.

Prior Authorization Requirements (as applicable to your plan)

Within five days before the actual date of service, the provider must confirm with Blue Shield that the member's health plan coverage is still in effect. Blue Shield reserves the right to revoke an authorization prior to services being rendered based on cancellation of the member's eligibility. Final determination of benefits will be made after review of the claim for limitations or exclusions.

Questions regarding the applicability of this policy should be directed to the Prior Authorization Department at (800) 541-6652, or the Transplant Case Management Department at (800) 637-2066 ext. 3507708 or visit the provider portal at www.blueshieldca.com/provider.

Disclaimer: This medical policy is a guide in evaluating the medical necessity of a particular service or treatment. Blue Shield of California may consider published peer-reviewed scientific literature, national guidelines, and local standards of practice in developing its medical policy. Federal and state law, as well as contract language, including definitions and specific contract provisions/exclusions, take precedence over medical policy and must be considered first in determining covered services. Member contracts may differ in their benefits. Blue Shield reserves the right to review and update policies as appropriate.

Appendix A

POLICY STATEMENT (No changes)	
BEFORE	AFTER
<p>Baroreflex Stimulation Devices 8.01.57</p> <p>Policy Statement: Use of baroreflex stimulation implanted devices is considered investigational in all situations, including but not limited to treatment of hypertension and heart failure.</p>	<p>Baroreflex Stimulation Devices 8.01.57</p> <p>Policy Statement:</p> <ul style="list-style-type: none">I. Use of baroreflex stimulation implanted devices is considered investigational in all situations, including but not limited to treatment of hypertension and heart failure.