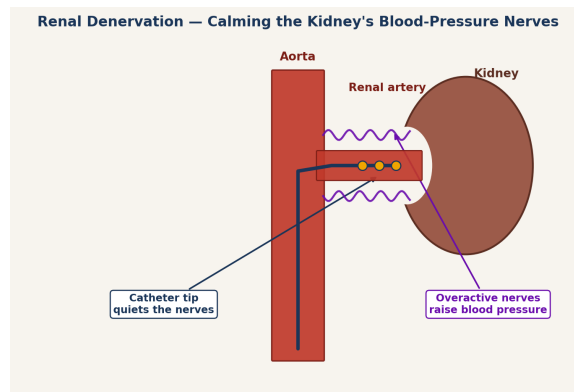


Understanding Renal Denervation

A catheter procedure that calms overactive kidney nerves to help lower hard-to-control blood pressure

When pills and lifestyle are not enough, a one-time procedure may help bring your numbers down.



Online: <https://go.riasalimd.com/rdn-guide>

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Names & Terms You Will Hear

Term	Meaning
Renal denervation (RDN)	A catheter procedure that uses gentle energy to quiet the nerves running along the kidney arteries. Those nerves can drive blood pressure up.
Renal nerve ablation	Another name for the same idea. 'Ablation' means using energy to calm or interrupt a small set of nerves.
Radiofrequency RDN (Symplicity Spyral)	One FDA-approved system. It uses heat energy from radio waves through a catheter. Studied in the SPYRAL trials.
Ultrasound RDN (Paradise / ReCor)	The other FDA-approved system. It uses ultrasound energy to reach the nerves. Studied in the RADIANCE trials.
Sympathetic nerves	The 'gas pedal' nerves of the body. Around the kidney, an overactive set of them raises blood pressure.
Uncontrolled hypertension	Blood pressure that stays high even with medication and lifestyle changes. This is the group RDN is meant for.
Resistant hypertension	High blood pressure that needs three or more medicines, including a water pill, and still is not at goal.
Renal arteries	The two blood vessels that carry blood from the aorta into each kidney. The catheter works from inside these vessels.



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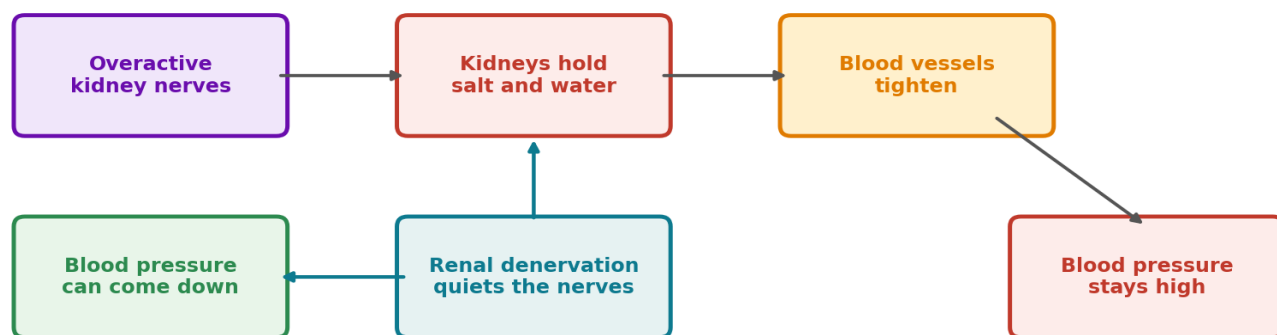


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What Is Renal Denervation?

- Renal denervation (RDN) is a catheter procedure. A thin tube is guided through a blood vessel to the arteries that feed the kidneys.
- Nerves run along these kidney arteries. When they are overactive, they make the body hold salt and water and tighten blood vessels. Both raise blood pressure.
- During RDN, the tip of the catheter sends short, gentle energy pulses to calm those nerves. The goal is a steady, lasting drop in blood pressure.
- It is not surgery and there are no cuts. The tube goes in through the wrist or groin, much like a heart catheterization.
- The FDA approved two RDN systems in 2023: a radiofrequency (heat) system and an ultrasound system. Both are now available in the United States.
- RDN does not replace your medicines or healthy habits. It is meant to work alongside them when blood pressure stays high.

How Kidney Nerves Drive Blood Pressure — and Where RDN Steps In



The catheter interrupts the signal between the brain and the kidneys.

Overactive kidney nerves make the body hold salt and water and tighten vessels, raising pressure. RDN quiets those nerves so pressure can come down.



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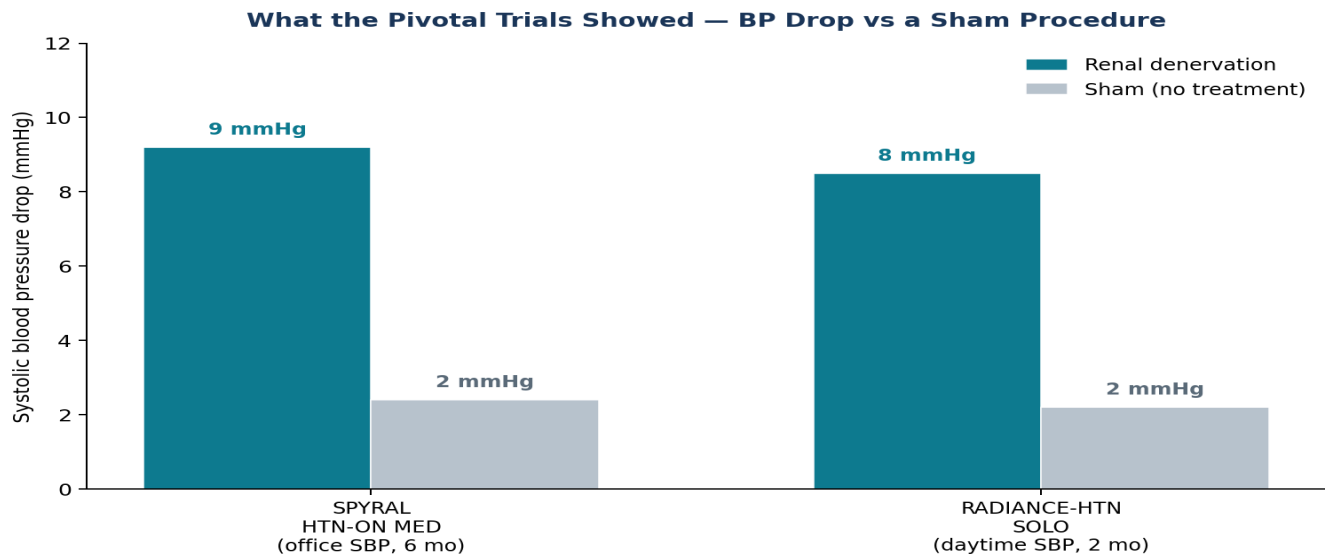
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Why It Matters

- High blood pressure is one of the biggest causes of stroke, heart attack, heart failure, and kidney disease. Even a few points lower lowers that risk.
- Many people take their pills and still cannot get to goal. Side effects, cost, and simply forgetting doses all get in the way.
- RDN works in the background, all day and night, without a daily pill. For the right patient, that steady effect is the main appeal.
- In the pivotal trials, RDN lowered blood pressure more than a sham (pretend) procedure. The chart below shows the size of that drop.
- Guidelines now list RDN as an option to consider for selected patients with uncontrolled blood pressure, after a careful talk about the trade-offs.



In two sham-controlled trials, blood pressure fell more with renal denervation than with a pretend procedure. Results vary from person to person.



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The Two FDA-Approved Systems (2023)

System	Energy used	Trial program	Good to know
Symplicity Spyral (Medtronic)	Radiofrequency (heat)	SPYRAL HTN-ON MED and HTN-OFF MED	Heat from radio waves; treats the main and branch arteries.
Paradise (ReCor)	Ultrasound	RADIANCE program (SOLO, II, TRIO)	Ultrasound energy with water cooling to protect the artery wall.



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Risk Factors

Some patients are more likely to develop this condition. Knowing your risk helps your care team take extra precautions.

Risk Factor	Why It Increases Risk
Blood pressure still high on 3 or more medicines	This is the classic 'resistant' pattern. RDN is studied most in people who cannot reach goal despite several drugs.
Real trouble taking daily pills	Side effects, many medicines, or a hard time remembering doses. A background procedure may help when pills are not sticking.
High overall heart and stroke risk	Diabetes, prior stroke, kidney disease, or known heart disease. The higher your risk, the more even a modest BP drop matters.
Strong preference to avoid more pills	Some patients want fewer daily medicines. After a shared talk, RDN may fit that goal in selected cases.
Confirmed high readings, not white-coat	Home and 24-hour monitor readings confirm the pressure is truly high. This rules out readings that only spike in the office.

Who Is - and Is Not - a Candidate

May Be a Good Candidate	Workup Needed First	Usually Not a Candidate
• Confirmed high readings on home or 24-hour monitor • Pressure high despite several medicines • Or real trouble taking daily pills • Kidney function good enough for the procedure • Wants a shared talk about trade-offs	• Pills not yet fully optimized • Water pill or spironolactone not tried • Untreated sleep apnea • Possible secondary cause not ruled out • Only office readings are high (white-coat)	• Very low kidney function (eGFR under 40) • Kidney arteries too small, narrowed, or unusual • A single working kidney in some cases • A clearly fixable secondary cause • Readings are not truly high once confirmed



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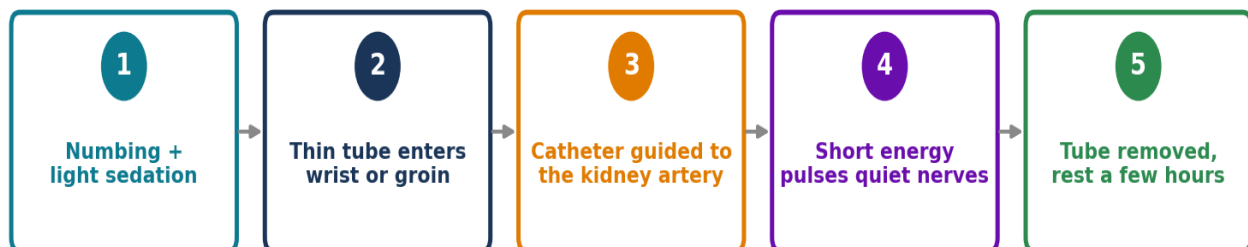


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Treatment Options

- RDN is an add-on, not a stand-alone cure. Your medicines and lifestyle plan continue before and after the procedure.
- The procedure itself takes about an hour. You are awake but relaxed with light sedation. The diagram below shows each step.
- Two FDA-approved systems exist: radiofrequency (heat) and ultrasound. Your team picks based on your anatomy and the device available.
- Blood pressure does not drop all at once. The full effect builds over weeks to a few months as the nerves settle.
- Keep taking your medicines unless your doctor tells you to change them. Over time, some patients lower a dose. Never stop a BP pill on your own.
- Alternatives come first: confirming the diagnosis, checking for secondary causes, optimizing pills (including a water pill and spironolactone), and treating sleep apnea. RDN is considered when these are not enough.

The Procedure, Step by Step — About One Hour



Most patients go home the same day or the next morning.

The procedure takes about an hour. You are awake but relaxed. Most people go home the same day or the next morning.



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What to Expect - Before, During, and After

- **Before:** Your team confirms your blood pressure is truly high with home and 24-hour readings, reviews your medicines, and images your kidney arteries. You may pause certain blood thinners as instructed.
- **Getting ready:** You arrive that morning without eating for a few hours. An IV is placed. You get light sedation, so you are relaxed but not fully asleep.
- **During:** A thin tube enters at the wrist or groin and is guided to each kidney artery. Short energy pulses calm the nerves. The procedure takes about an hour. You may feel brief pressure but should not feel sharp pain.
- **Right after:** You rest a few hours while the access site seals. Most people go home the same day or the next morning. Keep the wrist or groin still as directed.
- **Recovery:** Avoid heavy lifting and hard exercise for about a week. The site may be bruised and sore. Walking is fine and encouraged.
- **Follow-up:** Keep taking your medicines. Blood pressure falls gradually over weeks to months. Bring home readings to each visit so your team can fine-tune your plan.

How RDN Fits With Your Other Treatment

- **Step 1 - Confirm:** Make sure the pressure is truly high using home and 24-hour monitors, not just office visits.
- **Step 2 - Optimize:** Get the most from medicines, including a water pill and often spironolactone, and treat sleep apnea.
- **Step 3 - Lifestyle:** Cut salt, lose extra weight, move more, and limit alcohol. These lower pressure and help the whole body.
- **Step 4 - Consider RDN:** When pressure stays high or pills are not tolerated, talk through RDN as an add-on, weighing the modest, gradual benefit against the small procedure risk.
- See our Hypertension guide for the basics and our Resistant Hypertension guide for the medicine ladder that comes before RDN.

Do not stop your blood pressure pills. Renal denervation works alongside your medicines, not instead of them. The effect builds slowly over weeks to months. Your team checks your numbers and decides if any dose can change. Stopping a pill on your own can let pressure spike dangerously.



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Comfort Measures at Home (No Medication Needed)

These simple steps support healing and ease symptoms. Use them alongside any medication your doctor prescribes.

- Cut back on salt. Aim for less than 1,500 mg of sodium a day. Most of it hides in bread, canned soup, deli meat, and restaurant food.
- Move most days. Even a brisk 30-minute walk lowers blood pressure over time.
- Lose extra weight if you carry it. Every 2 pounds lost can shave about 1 point off your blood pressure.
- Limit alcohol to one drink a day or less. Heavy drinking pushes pressure up.
- Get tested for sleep apnea if you snore or wake unrefreshed. Untreated sleep apnea keeps nighttime pressure high.
- Take readings at home and bring the log to visits. Home numbers guide care better than office readings alone.



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Risks, Benefits, and Alternatives

Every choice has trade-offs. Use this table to start the shared decision conversation.

Option	Risks	Benefits	Alternatives
Renal denervation (RDN)	Bruise or bleeding at the wrist or groin. Rare artery injury. Soreness. Small radiation and dye exposure. Results vary person to person.	A one-time, background drop in blood pressure that does not depend on a daily pill. Works all day and night. May ease pill burden over time.	Keep optimizing medicines. Spironolactone add-on. Treat sleep apnea. Lifestyle changes. See our Resistant Hypertension guide.
Adding or adjusting medicines	Side effects such as cough, swelling, dizziness, or fatigue. More pills to remember. Cost.	Proven to lower blood pressure and cut stroke and heart risk. Easy to start and to stop. Low cost for many drugs.	RDN when pills are not enough or not tolerated. Combination single-pill formulas to cut pill count.
Water pill plus spironolactone	Low potassium or high potassium, dehydration, breast tenderness in men. Needs lab checks.	Often the single most effective add-on for resistant high blood pressure. Inexpensive.	RDN if still uncontrolled or not tolerated. Other add-on drug classes.
Lifestyle changes alone	Hard to sustain. May not be enough by itself for very high readings.	No drug side effects. Helps the whole body, not just blood pressure. Free.	Add medicines and, when needed, RDN. Cardiac rehab or a structured program for support.



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Common Misconceptions

Myth	Reality
Renal denervation cures high blood pressure so I can stop my pills.	RDN is not a cure. It lowers pressure on top of your medicines. Most people keep taking their pills. Some lower a dose later, but only with their doctor's guidance. Never stop a BP medicine on your own.
It is major surgery with a long recovery.	It is not surgery. There are no cuts. A thin tube goes in through the wrist or groin, like a heart catheterization. Most people go home the same day or the next morning.
RDN damages my kidneys.	The energy targets only the small nerves on the outside of the kidney arteries, not the kidney itself. In the trials, kidney function stayed stable. It is avoided when kidney function is already very low.
The blood pressure drop happens right away.	It does not. The nerves settle slowly. The full effect builds over weeks to a few months. Your team keeps checking your numbers during that time.
It works the same for everyone.	Results vary. Some people get a big drop, some a modest one, and a few get little change. That is why careful selection and a shared decision matter.
Anyone with high blood pressure can get it.	No. RDN is for selected patients with confirmed, uncontrolled pressure. People with very low kidney function or certain artery shapes may not qualify. A workup comes first.
RDN replaces a healthy lifestyle.	It does not. Salt, weight, exercise, alcohol, and sleep apnea all still matter. RDN works best alongside these, not instead of them.



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Possible Complications

Knowing what can go wrong helps you spot problems early. Most complications are uncommon, especially with treatment.

Where / What	What Can Happen
Access site (wrist or groin)	A bruise, soreness, or small bleeding where the tube went in is the most common issue. Larger bleeding or a blood collection is uncommon and usually managed without surgery.
Kidney arteries	Injury to the artery wall, a tear, or later narrowing is rare in the trials. The team images the arteries before and during the procedure to lower this risk.
Kidneys	Kidney function stayed stable in the studies. A small dye load is used; people with weaker kidneys are watched closely and may get extra fluids.
Blood pressure response	The drop varies. Some people see little change. A few may feel light-headed if pressure falls and medicines are not adjusted. Report dizziness to your team.
Radiation and contrast dye	A small amount of X-ray and dye is used, as in any catheter procedure. The exposure is low. Tell your team about any dye allergy beforehand.



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Points to Know

If you remember nothing else, remember these key points.

- RDN is a catheter procedure that calms overactive kidney nerves to help lower blood pressure. It is not surgery.
- It is an add-on. Keep taking your medicines and your healthy habits unless your doctor changes them.
- The FDA approved two systems in 2023: a heat (radiofrequency) system and an ultrasound system.
- It is meant for selected patients whose pressure stays high despite medicine, after a careful workup.
- In trials, RDN lowered blood pressure more than a sham procedure. The effect builds over weeks to months.
- Before RDN, your team optimizes pills (including a water pill and spironolactone) and treats sleep apnea.
- Most people go home the same day or the next morning and return to normal activity within about a week.
- Ask whether you are a candidate. Confirmed high readings and a shared, honest talk about trade-offs come first.



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When to Call Us - and When to Call 911

If you are not sure, call. We would rather hear from you twice than miss a real problem.

- Heavy bleeding, a fast-growing lump, or severe pain at the wrist or groin site after the procedure - call us today; if bleeding will not stop, call 911.
- A cold, pale, numb, or very painful hand or leg below the access site - call 911.
- Fever over 100.4 F, spreading redness, or drainage at the site - call us today.
- Repeated dizziness or fainting, especially when standing - call us today; if you faint or cannot stay awake, call 911.
- Home blood pressure that drops very low (for example, top number under 90) with symptoms - call us this week so we can adjust medicines.
- Blood pressure that climbs very high (for example, 180 or higher over 120 or higher) with headache, chest pain, vision change, or trouble speaking - call 911.
- Chest pain or pressure, or sudden shortness of breath - call 911.

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Trusted Resources

The links below are the trusted resources Dr. Ali used to write this guide and that he recommends you visit for more information. Each is a clickable link in the digital version and a Short.io tracked URL on the printed version.

- [Cleveland Clinic - Renal Denervation](#) - Patient-friendly overview of the procedure, who qualifies, and what to expect.
- [Mayo Clinic - High Blood Pressure \(Hypertension\)](#) - Plain-language guide to blood pressure goals, causes, and treatment that RDN supports.
- [American Heart Association - High Blood Pressure](#) - AHA hub on understanding, measuring, and managing blood pressure.
- [Our Hypertension guide](#) - Start here for the basics: what the numbers mean, goals, and first-line treatment.
- [Our Resistant Hypertension guide](#) - For pressure that stays high on three or more medicines - the group RDN is designed for.



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Sources Used to Build This Guide

Every recommendation in this guide is grounded in one or more of the studies, guidelines, or trusted resources below. Short links are tracked so Dr. Ali can see which references patients are reading; nothing personally identifying is captured.

- [SPYRAL HTN-ON MED Pivotal — Catheter-Based Renal Denervation on Medication \(Lancet 2018; 3-yr update 2025\)](#) [Clinical Trial]
Pivotal sham-controlled RCT showing office blood pressure lowering with radiofrequency RDN on top of medication; 3-year data show a sustained ~18 mmHg office systolic drop.
- [RADIANCE-HTN SOLO — Endovascular Ultrasound Renal Denervation \(Lancet 2018, PMID 29803590\)](#) [Clinical Trial]
Pivotal sham-controlled RCT for the ultrasound RDN system (Paradise/ReCor): daytime ambulatory systolic fell 8.5 mmHg with RDN vs 2.2 mmHg with sham.
- [FDA Approval — Medtronic Symplicity Spyral Renal Denervation System \(Nov 17, 2023\)](#) [Guideline]
Documents the FDA approval of the radiofrequency RDN system for uncontrolled hypertension.
- [FDA Approval — ReCor Paradise Ultrasound Renal Denervation System \(Nov 2023\)](#) [Guideline]
Documents the FDA approval of the ultrasound RDN system, the second device cleared for hypertension in 2023.
- [2024 ESC Guidelines for the Management of Elevated Blood Pressure and Hypertension](#) [Guideline]
Gives RDN a Class IIb recommendation (may be considered) for high-risk uncontrolled hypertension after shared decision-making; not first-line; avoid if eGFR is below 40.
- [Cleveland Clinic — Renal Denervation: A New Treatment Option for Hypertension](#) [Clinical]
Patient-facing explainer of the catheter procedure and which patients qualify.
- [American Heart Association — High Blood Pressure \(Hypertension\)](#) [Clinical]
Plain-language framing of blood pressure goals, lifestyle, and medication that RDN is meant to complement.



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About This Guide

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Reviewer note: Reviewed: Cleveland Clinic, Mayo Clinic, and American Heart Association patient pages. This guide adds a plain-language mechanism diagram, a side-by-side trial-results chart (SPYRAL HTN-ON MED and RADIANCE-HTN SOLO), a step-by-step procedure visual, candidate and not-a-candidate cards, and an honest risks-benefits-alternatives table.

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