

# Renal Denervation in Hypertension

Usman S Ansari, DO<sup>a</sup>; Benjamin J Lee, MD, MAS<sup>b</sup>

<sup>a</sup>HOUSTON METHODIST HOSPITAL, HOUSTON, TEXAS; <sup>b</sup>HOUSTON KIDNEY CONSULTANTS, HOUSTON, TEXAS

The column in this issue is supplied by Drs. Benjamin Lee, MD, and Usman Ansari, DO. Dr. Lee is an assistant professor of clinical medicine at the Houston Methodist Institute for Academic Medicine and Weill Cornell Medical College. After earning his medical degree at Harvard Medical School, Dr. Lee completed a residency in internal medicine and a nephrology fellowship at the University of California San Francisco (UCSF) while simultaneously obtaining a master of advanced study in clinical research from the UCSF departments of Epidemiology and Biostatistics. He maintains his clinical practice with the Houston Kidney Consultants. Dr. Ansari earned a Doctor of Osteopathy from Touro University College of Osteopathic Medicine in California and is completing his internal medicine residency at Houston Methodist.

Hypertension is a significant cause of morbidity and mortality worldwide. However, many individuals fail to achieve proper blood pressure control despite lifestyle modifications and maximal medical therapy. Renal sympathetic overactivity has been proposed as a significant driver in such cases. One potential treatment is renal denervation (RDN), a minimally invasive catheter-based technology that uses radiofrequency energy to obliterate the renal nerves adjacent to the afferent and efferent renal arteries. While RDN was initially developed as a potential strategy to treat resistant hypertension, several studies have investigated its use as an adjunctive therapy for hypertension. The following are 10 points to remember about the use of RDN in hypertension.

- SYMPLICITY HTN-2, the first prospective randomized clinical trial evaluating RDN in treatment-resistant hypertension (systolic blood pressure > 160 mm Hg despite  $\geq 3$  antihypertensive medications, including a diuretic), showed promising results but was vulnerable to bias due to lack of blinding and use of office-based rather than ambulatory blood pressure measurements.<sup>1</sup>
- Subsequent studies of RDN in treatment-resistant hypertension have shown mixed results. Notably, the SYMPLICITY HTN-3 trial was negative but was limited by significant procedural issues (post-hoc analysis suggested incomplete denervation for many enrollees).<sup>2</sup>
- More recently, several sham-controlled clinical trials suggest that RDN may be effective in lowering blood pressure even in the absence of medications.<sup>3,4</sup>
- Catheter-based ultrasound ablation has been proposed as an alternative to radiofrequency ablation due to deeper penetration of ultrasound energy and more complete renal nerve ablation.<sup>4,5</sup>

- While medications tend to have inconsistent effects due to their limited pharmacokinetic profiles and dosing regimens, RDN causes a continuous reduction in blood pressure; thus, RDN may be particularly effective for individuals with labile blood pressures.<sup>6</sup>
- Despite evidence that renal sympathetic re-innervation occurs after RDN, it is unclear whether the restoration of sympathetic function is complete.<sup>7</sup>
- Among patients with atrial fibrillation and hypertension, the recent ERADICATE-AF trial suggests that RDN performed at the same time as catheter ablation increases the likelihood of maintaining freedom from atrial fibrillation at 12 months compared with catheter ablation alone.<sup>8</sup>
- RDN does not adversely affect renal function, even in the presence of advanced kidney disease.<sup>9</sup>
- RDN is associated with reduced urinary albumin excretion, which may be explained by reduced hyperfiltration in the glomeruli.<sup>10</sup>
- RDN is also being studied in patients with heart failure, and one recent study suggests that RDN may reduce left ventricular hypertrophy and improve diastolic dysfunction.<sup>11</sup>

Corresponding author:

blee@houstonkidney.com

Conflict of Interest Disclosure:

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