

# My Patient Has Resistant Hypertension: *Now what?*

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# PRESENTER FINANCIAL DISCLOSURE

I have the following financial relationships to report with ACCME defined ineligible companies.

| Name of Company | Nature of Relationship  | Current Status |
|-----------------|-------------------------|----------------|
| Medtronic       | Site PI – SPYRAL AFFIRM | Ongoing        |

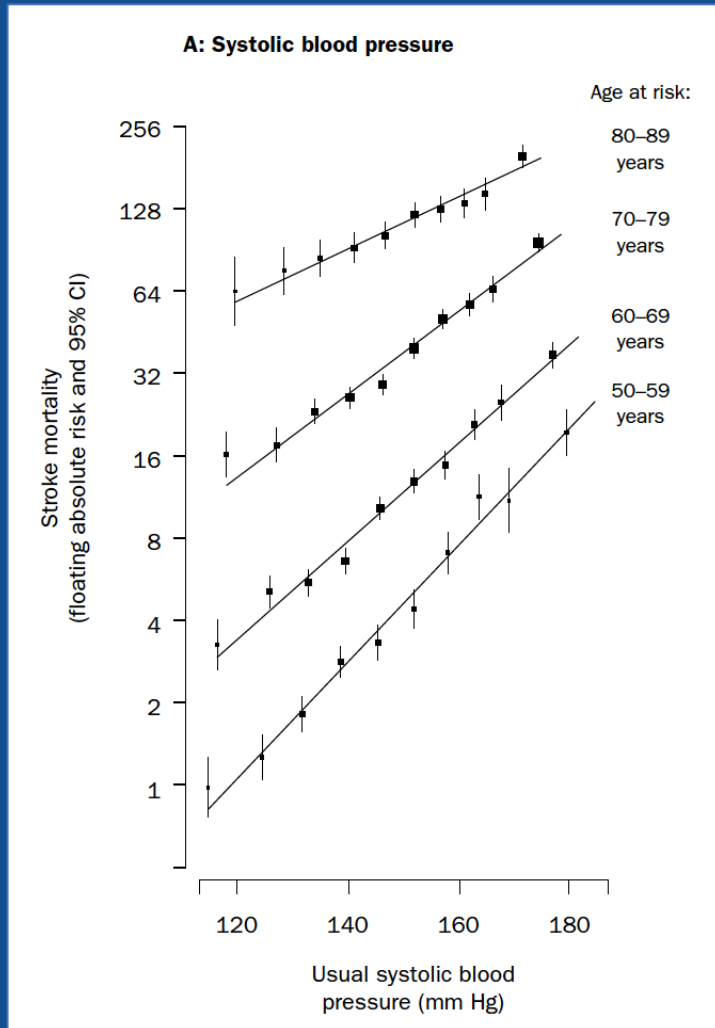
# Overview and Objective

Problem of hypertension

Case Presentation

*Logic for role of renal denervation*

# Association of Hypertension with Adverse Events



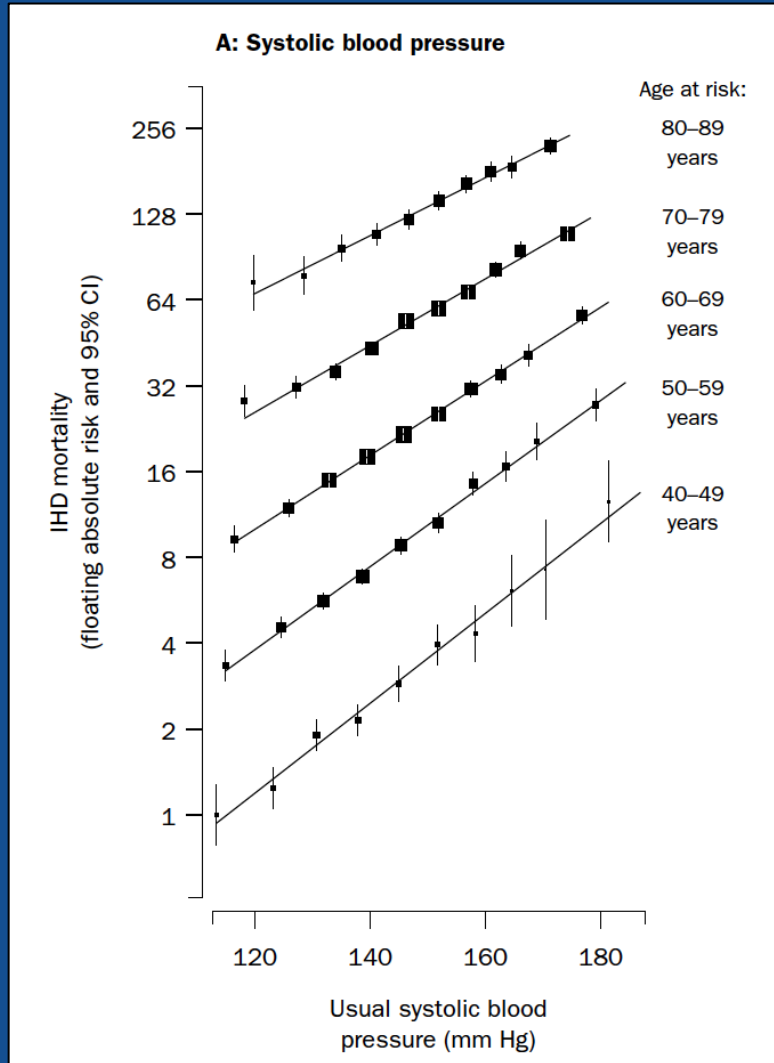
Meta-analysis

61 prospective observational studies

1 million adults with no history vascular disease

*Lancet* 2002; **360**: 1903–13

# Association of Hypertension with Adverse Events



Linear relationship of increase in risk with increase in blood pressure

*Lancet* 2002; **360**: 1903-13

# Estimated Prevalence of Hypertension in United States

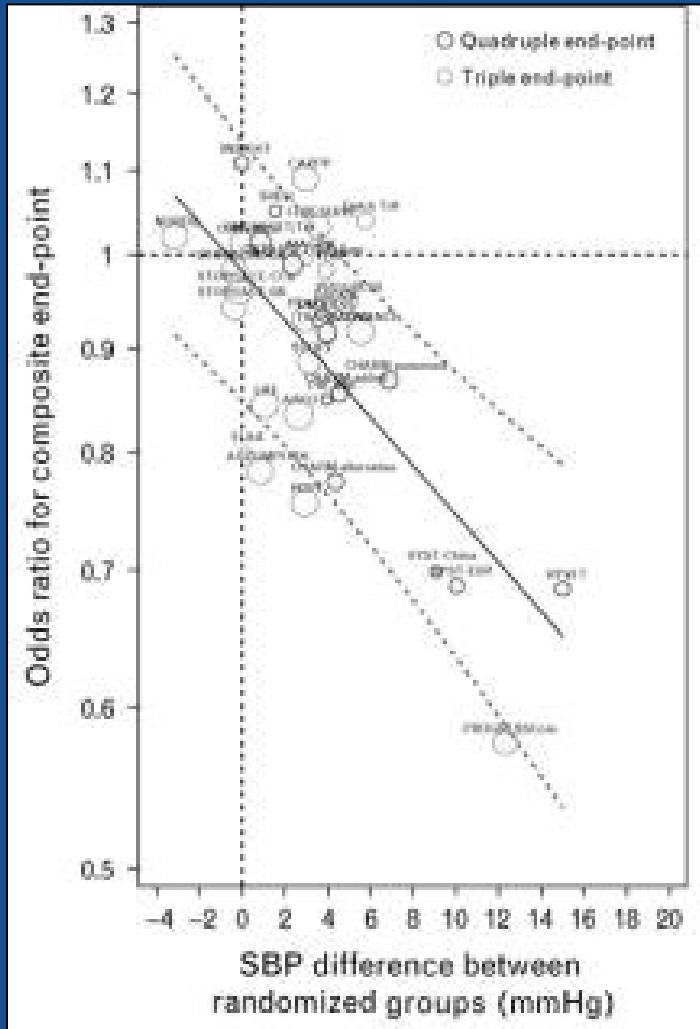
**TABLE 7** Prevalence of Hypertension Based on 2 SBP/DBP Thresholds\*†

|                           | SBP/DBP $\geq$ 130/80 mm Hg or Self-Reported Antihypertensive Medication† |                | SBP/DBP $\geq$ 140/90 mm Hg or Self-Reported Antihypertensive Medication‡ |                |
|---------------------------|---|----------------|---|----------------|
| Overall, crude            | 46%   |                | 32%   |                |
|                           | Men (n=4717)  | Women (n=4906) | Men (n=4717)  | Women (n=4906) |
| Overall, age-sex adjusted | 48%   | 43%            | 31%   | 32%            |

Whelton et al.  
2017 High Blood Pressure Clinical Practice Guideline

JACC VOL. 71, NO. 19, 2018  
MAY 15, 2018:e127-248

# Successful Treatment of Hypertension Improves Outcomes

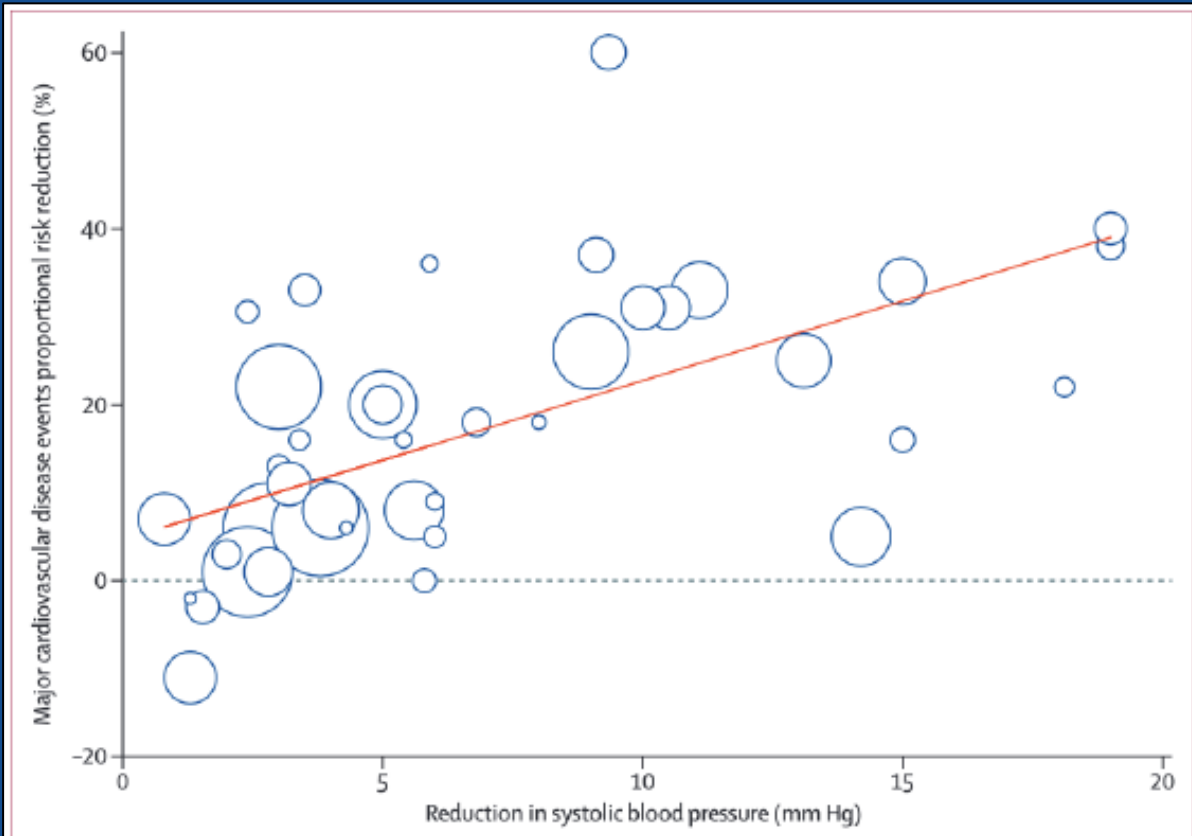


Meta-analysis of 30 trials comparing BP lowering meds ( $n=220,000+$ )

Outcome=MI / stroke / CV death +/- HF

Journal of Hypertension. 28(7):1356-1365, July 2010.

# Successful treatment of Hypertension Improves Outcomes



**Figure 2: Meta-regression plot**

Plot shows the percentage risk reduction in major cardiovascular events regressed against the difference in achieved systolic blood pressure between study treatment groups.

Meta-analysis of 123 BP-lowering trials  
1966-2015 (n=613,815)

A reduction of 10 mm Hg in SBP reduced  
major cardiovascular events by 20%

Dena Ettehad,

Lancet 2016; 387: 957-67



# Resistant Hypertension is Prevalent

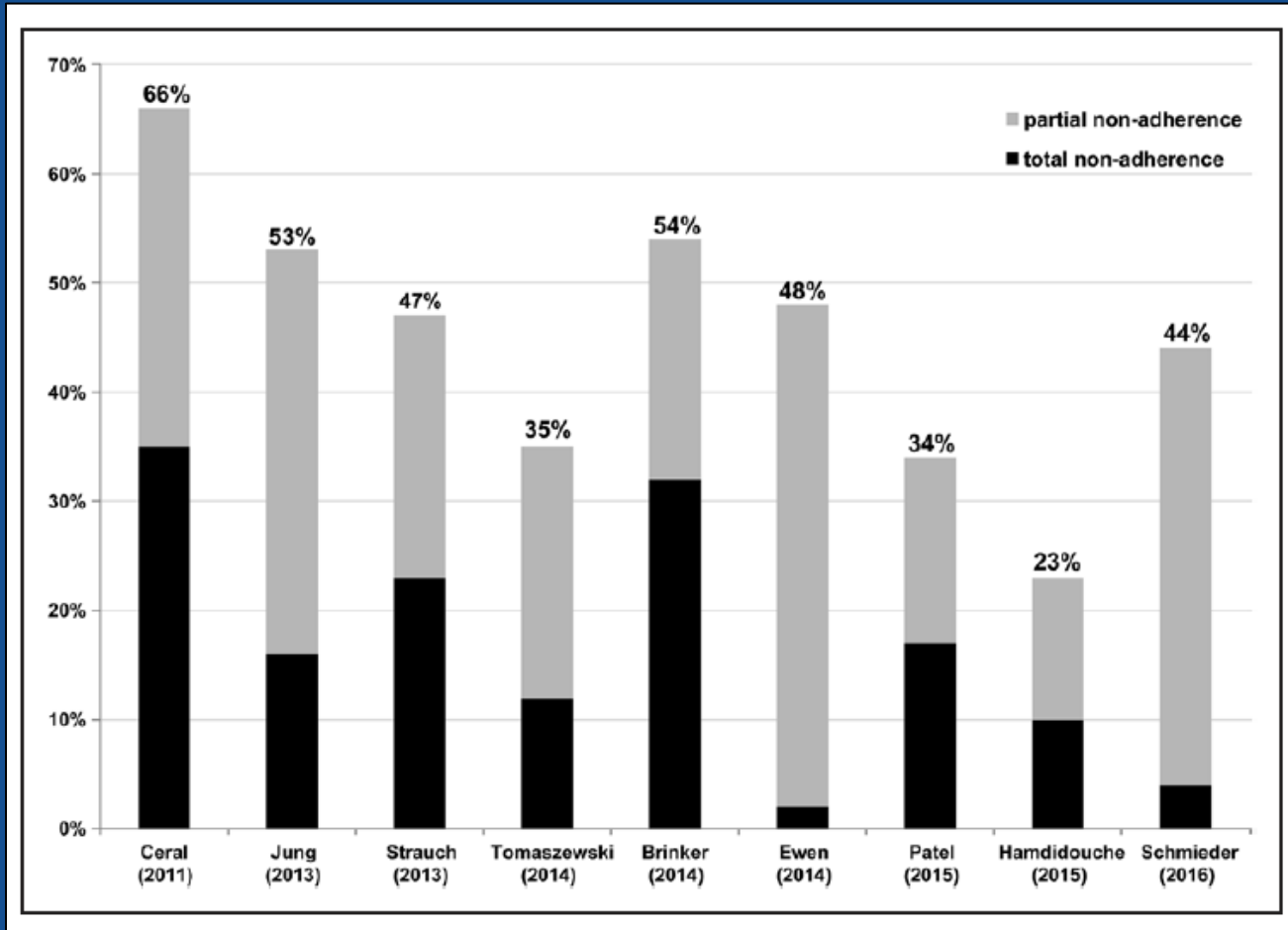
**Table 1. Classification of Adults With Hypertension in the United States**

| Classification  | No. of Participants | Among All Hypertensive Adults, % (SE) | Among Drug-Treated Hypertensive Adults, % (SE) |
|---|---------------------|---------------------------------------|--|
| Uncontrolled, no drug treatment   | 1520                | 30.7 (1.2)                            |  |
| Controlled hypertension, $\leq 3$ drugs   | 2035                | 40.8 (1.1)                            | 58.9 (1.2)                                     |
| Uncontrolled hypertension, $\leq 2$ drugs   | 1136                | 19.6 (0.8)                            | 28.3 (1.1)                                     |
| Resistant hypertension, uncontrolled, $\geq 3$ drugs or controlled $\geq 4$ drugs | 539                 | 8.9 (0.6)                             | 12.8 (0.9)                                     |

Uncontrolled indicates a mean systolic pressure of  $\geq 140$  or diastolic  $\geq 90$  mm Hg.

NHANES  
2003-2008

# Medication Non-adherence is Prevalent



747 patients from 9 trials across 5 countries in patients with difficult to control hypertension

Urine / plasma testing for drug adherence

**23-68% had partial or total non-adherence**

Berra *Hypertension*. 2016;68:297-306.

# The Problem of Hypertension

- Hypertension is associated with adverse cardiovascular outcomes
- Hypertension is prevalent
- Improving blood pressure reduces cardiovascular events
- Hypertension is difficult to treat successfully
- Medication non-adherence is an obstacle to successfully treating hypertension

*Now what?*

# Case Presentation

32 year-old female referred for uncontrolled hypertension

History of Greig cephalopolysyndactyly syndrome, migraines, 3-mm ACA aneurysm

Hypertension was diagnosed at 19 years of age

Catheter-based angiogram 2 years ago – no renal fibromuscular dysplasia

Other secondary hypertension workup – negative

*Urine vanillylmandelic acid, catecholamines, metanephrines, 5-hydroxyindoleacetate*

*Plasma catecholamines, aldo:renin*

Renal function is normal



# Case Presentation

Followed closely in Renal Hypertension Clinic since 2019

11 ED presentations and 4 admissions over 2020-2023 for headaches, neurologic symptoms, chest pain in the setting of uncontrolled hypertension

**Meds currently prescribed:**

*lisinopril 10 mg daily*

*labetalol 200 mg twice daily*

*prazosin 1 mg twice daily*

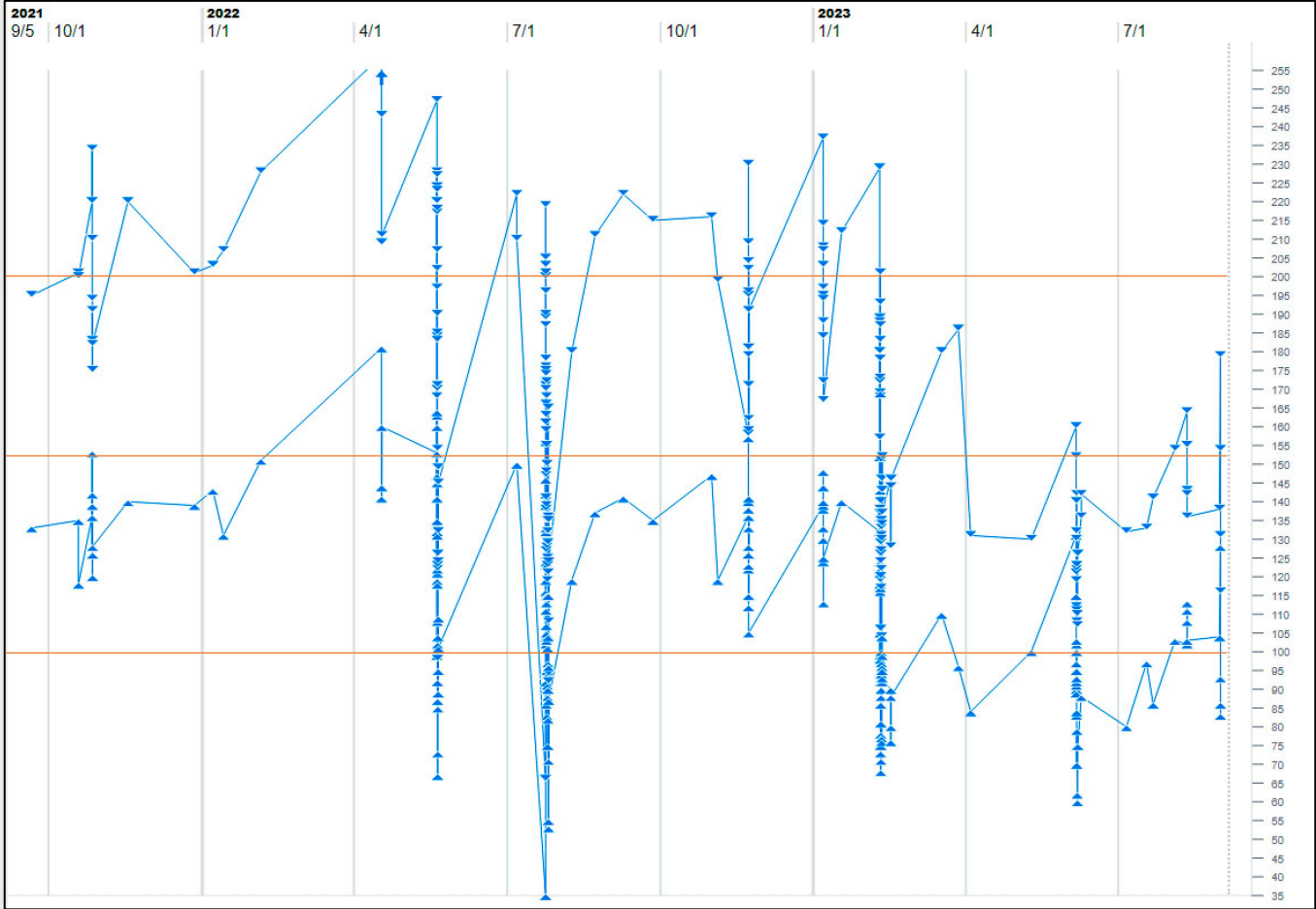
*spironolactone 50 mg daily*

**Medications previously prescribed but not tolerated and / or discontinued:**

*clonidine, losartan, amlodipine, hydralazine, hctz, Lasix, minoxidil*



# Case Presentation



200 mm Hg  
150 mm Hg  
100 mm Hg



 **VASCULAR**  
Scientific Sessions  
*Presented by the Society for Vascular Medicine*

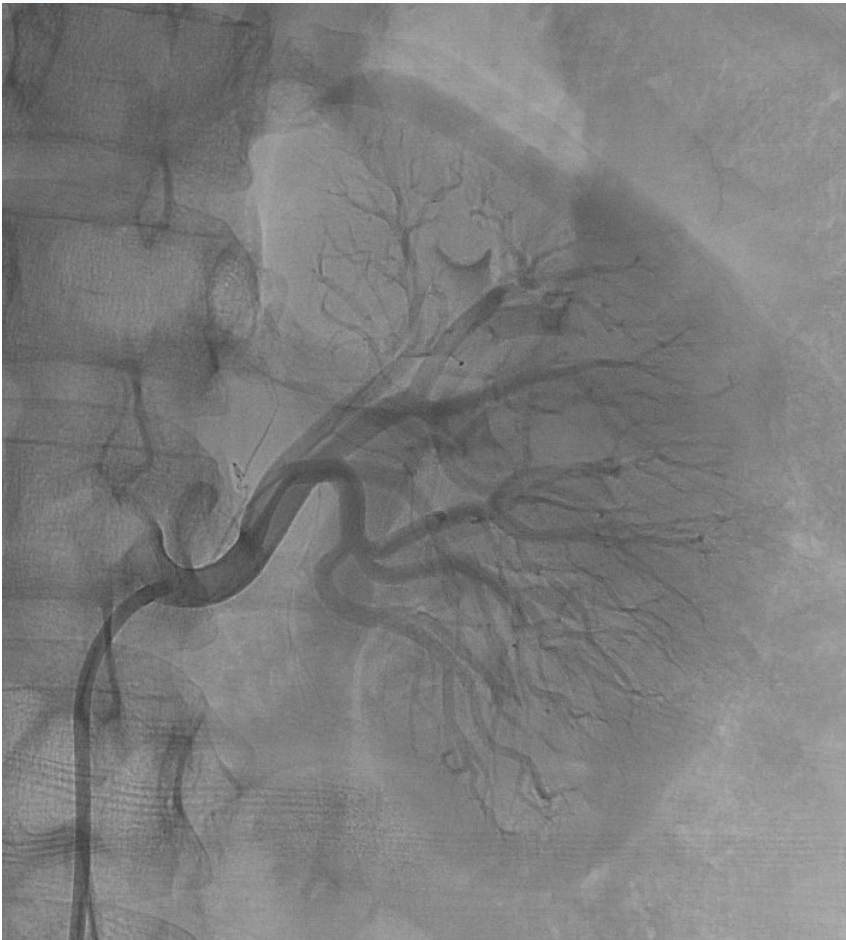
 **SVM**

# Case Presentation

Enrolled in SPYRAL-AFFIRM with  
BP 146/88 mm Hg



# Case Presentation

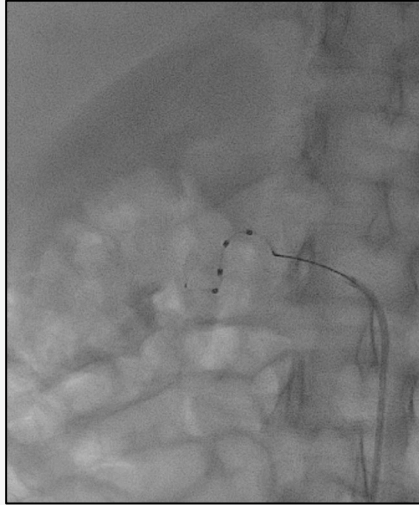


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 **SVM**



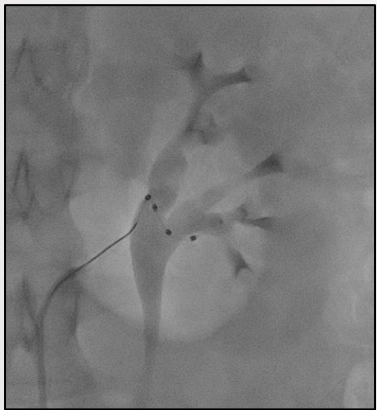
# Right Renal Denervation



**14 treatments**

**2 segmental and main renal arteries**

# Left Renal Denervation

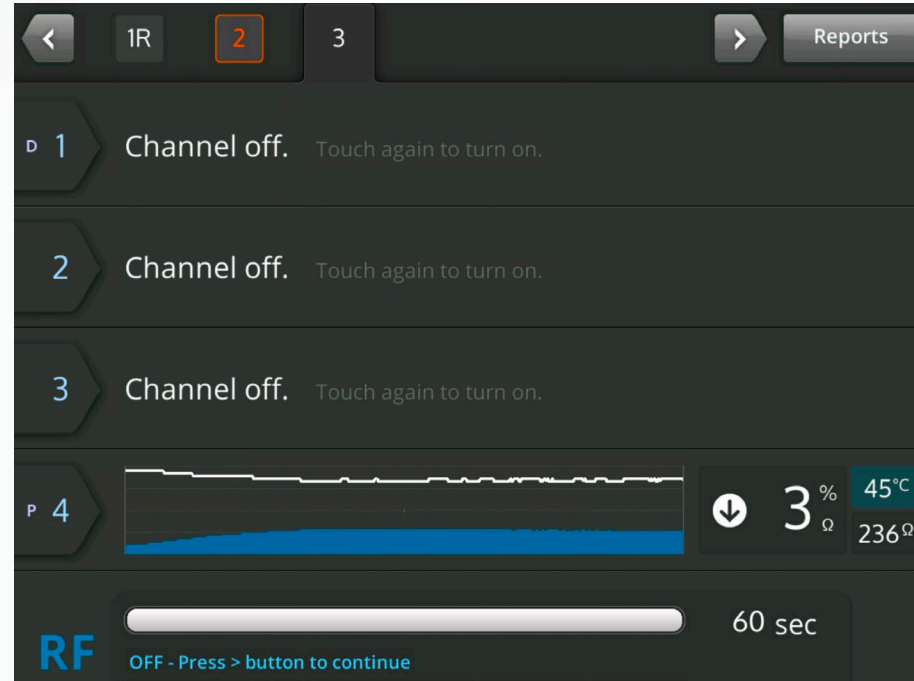
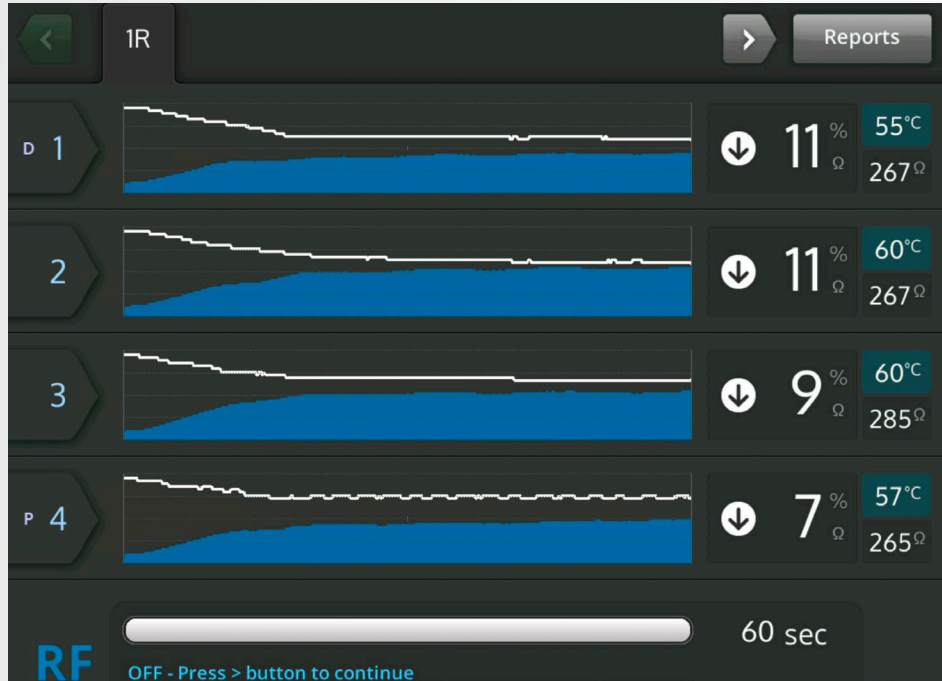


**15 treatments**

**2 segmental and main renal arteries**



# Example of Data during RDN



# Follow-up

131/86 mm Hg office-based BP at 3 months on same meds (4)

*(Baseline was office BP 146/88 mm hg)*

Renal function remained normal

Renal duplex - normal

# Conclusion

Hypertension is a problem due to its association with adverse events, prevalence, and difficulties in effectively treating, leading to uncontrolled hypertension in many individuals

A challenge in treatment is medication non-adherence

Renal denervation offers an option for those with uncontrolled hypertension

