

# Ipertensione arteriosa non controllata: nuove evidenze della denervazione renale



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## Cardiovascular Daily

Latest Breaking Cardiology News from  
The American Heart Association and MedPage Today.

April 01, 2014

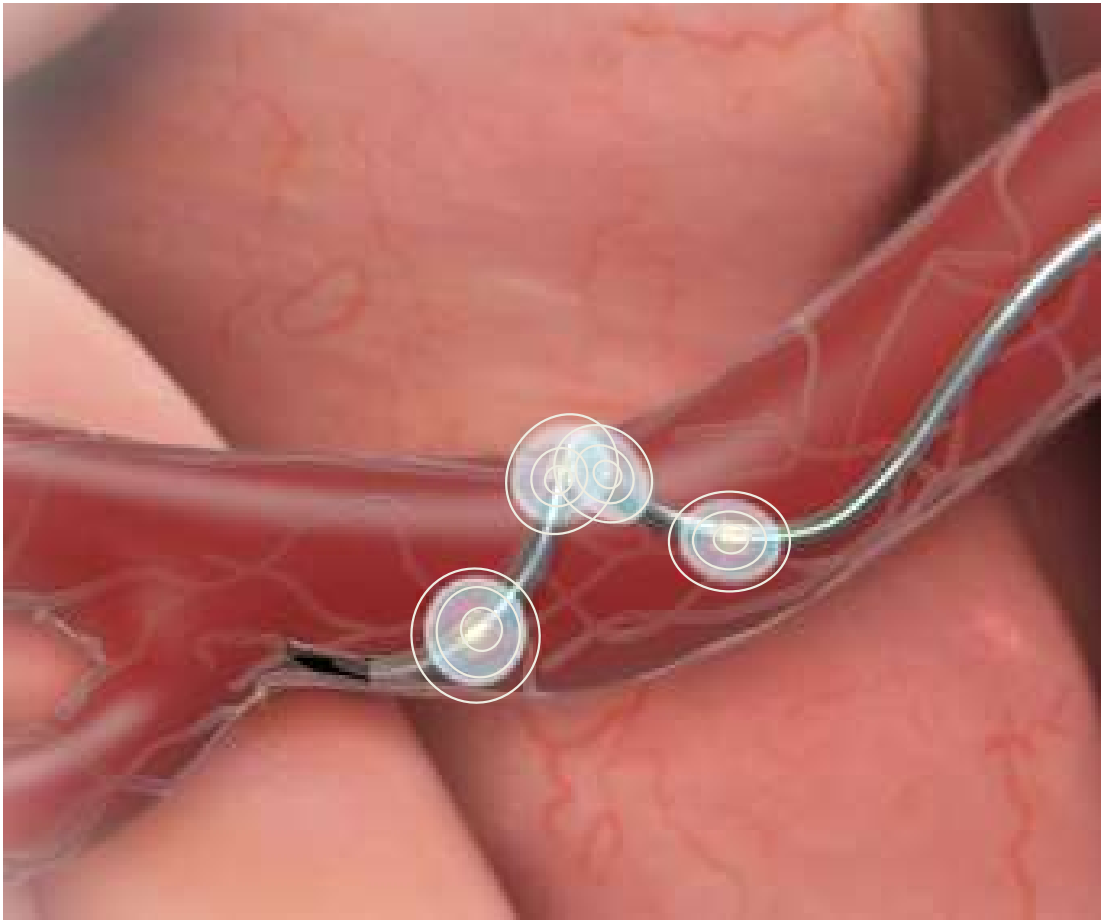


### **SYMPPLICITY: Is This the End of Renal Denervation?**

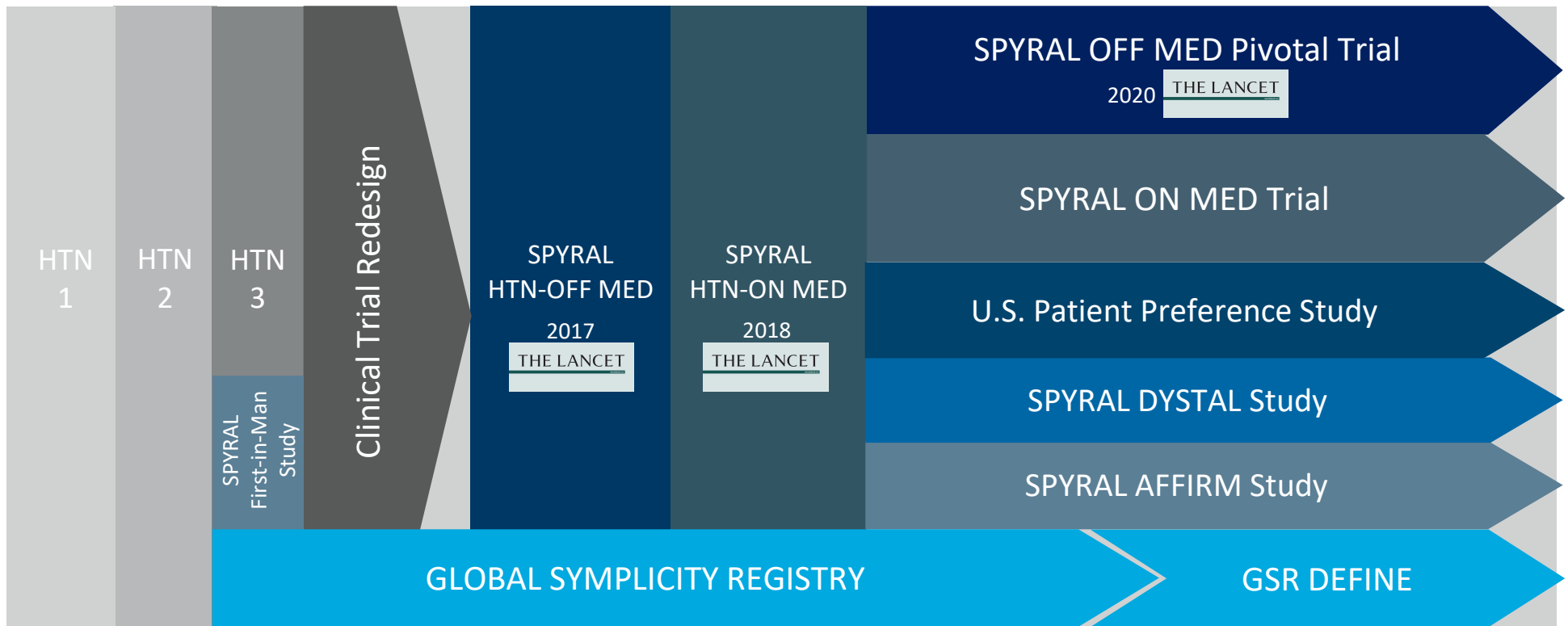
As has been known since January, renal denervation with Medtronic's Symplicity catheter was safe, but it was no better than a sham procedure for reducing office blood pressure in the SYMPPLICITY HTN-3 trial, full results showed.

[Read more](#)

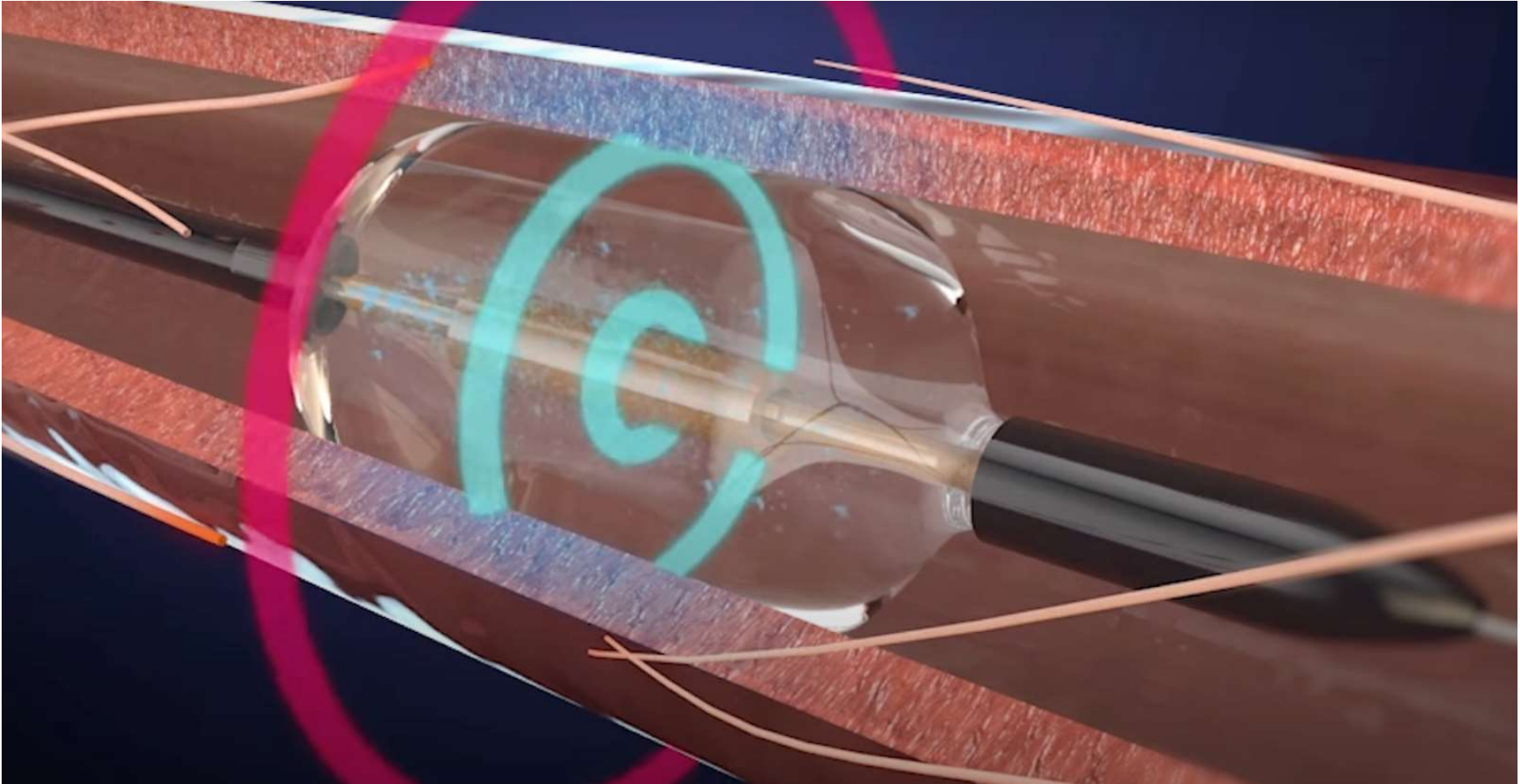
RDN development  
**Spyral catheter**



# RDN development Spiral catheter

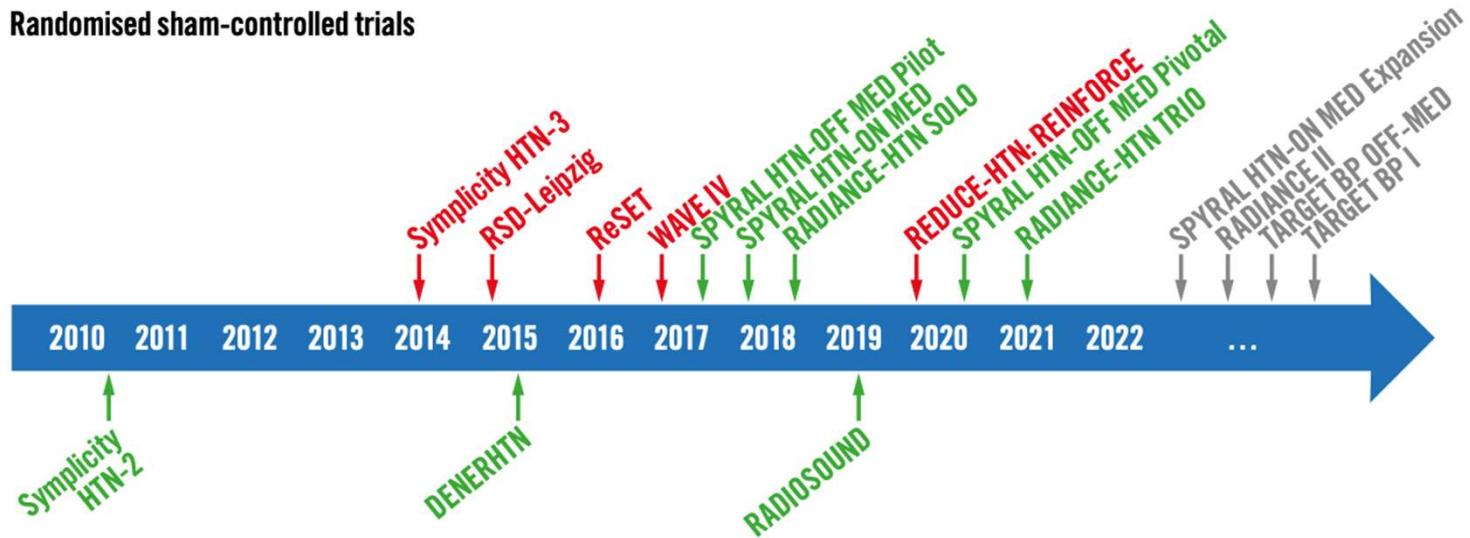


RDN development  
**Paradise catheter**



# Denervazione delle arterie renali (RDN)

## Randomised sham-controlled trials



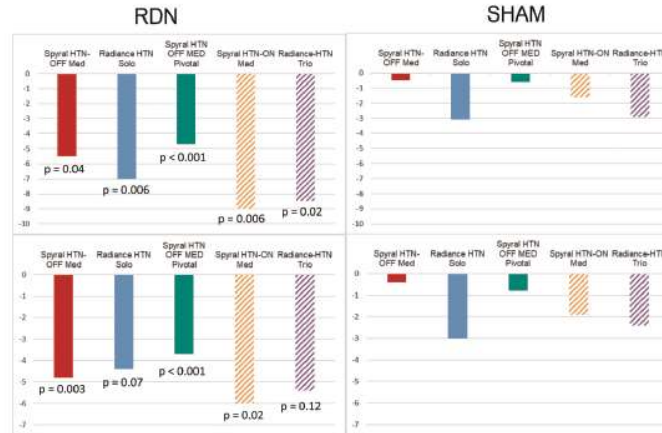
## Randomised controlled trials without a sham group

E. Barbato et al.-Eur Heart J- 2023,  
*RDN in the management of hypertension in adults. A clinical consensus statement of the ESC Council on Hypertension and the European Association of Percutaneous Cardiovascular Interventions (EAPCI)*

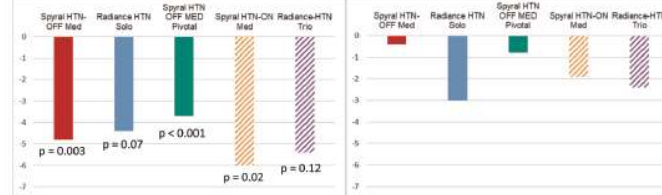
# Efficacy

(a)

Systolic  
Amb BP



Diastolic  
Amb BP

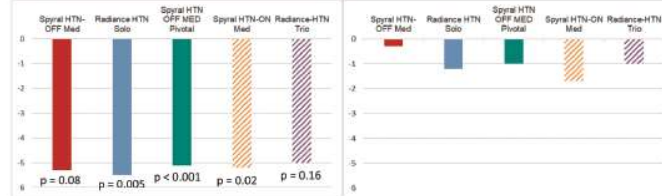


(b)

Systolic  
Office BP



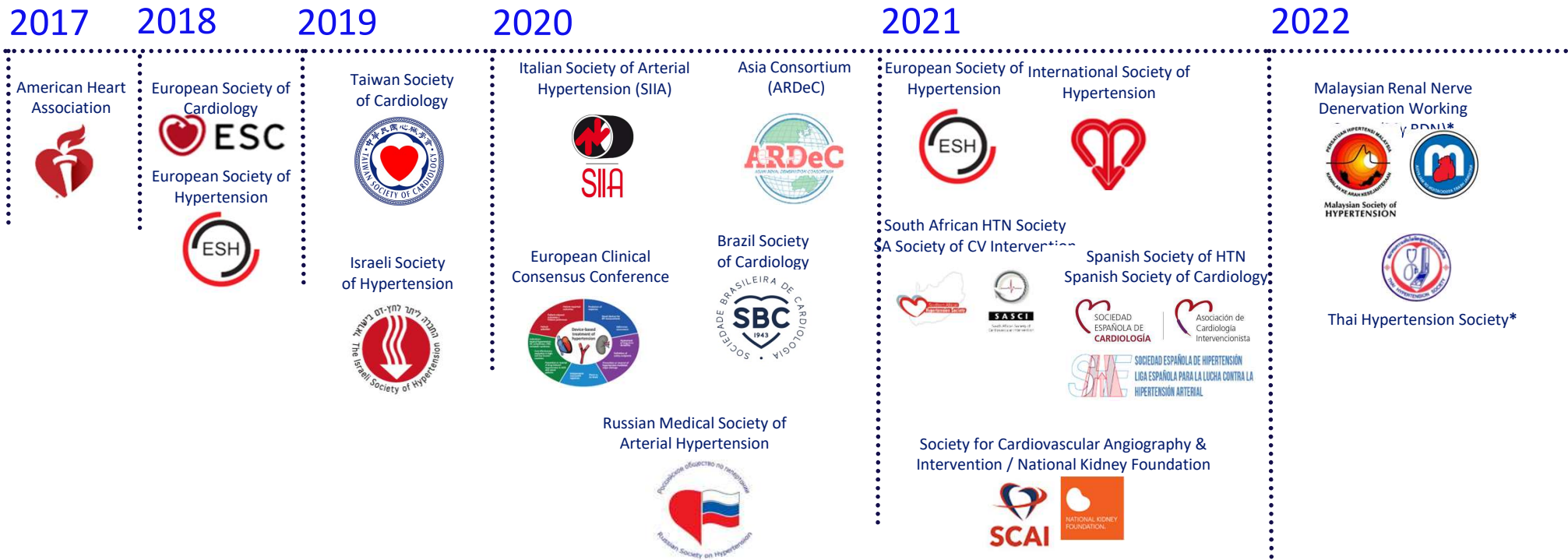
Diastolic  
Office BP





# Societies put guidelines in practice, updating with latest data

RDN consensus statements published in multiple countries



\* Publication pending



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## SLIA position paper on the role of renal denervation in the management of the difficult-to-treat hypertensive patient

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**Società Italiana dell'Ipertensione Arteriosa**  
**Lega Italiana contro l'Ipertensione Arteriosa**

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Bruno RM et al. High Blood Press 2019

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## SLIA position paper on the role of renal denervation in the management of the difficult-to-treat hypertensive patient

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### Table of contents

- Epidemiology of hypertension and its impact on global health
- Adherence and persistence in treatment
- Renal denervation: summary of current evidence from clinical trials
- Renal denervation: safety data
- When to perform renal denervation? From resistant hypertension to the difficult-to-treat patient
- The patient's flowchart

# Possible clinical profiles of patients candidates to RDN

## a) Resistant hypertensive patients

- Uncontrolled office and 24h BP
- In treatment with an association RAS-blocker / CCB / Diur at maximally tolerated doses
- No secondary hypertension
- Eligible renal artery anatomy

Evidence from Symplicity trials, GSR, DENERHTN ...

<b>Additional features:</b>	
- adverse effects with spironolactone	Prague-15
- poor drug adherence despite extensive counseling	Azizi M et al, Circulation 2016
-preferentially systo-diastolic hypertension (but isolated systolic hypertension not controindicated !)	Mahfoud F et al Eur Heart J 2017, GSR ACC2019
- patient preferences	

# Possible clinical profiles of patients candidates to RDN

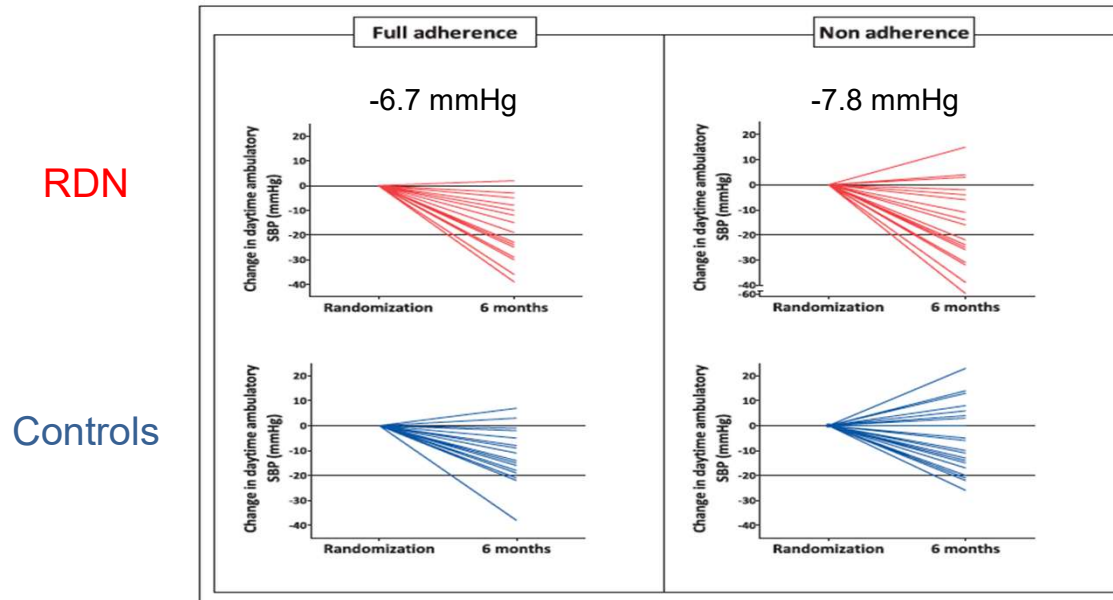
## b) Difficult-to-treat hypertensive patients

- Grade 1-2 hypertensive patients
- Untreated or with uncontrolled systodiastolic office and 24h BP with 1-3 drugs
- Systo-diastolic hypertension
- No secondary hypertension
- Eligible renal artery anatomy

### Evidence from Spyril OFF-med, ON-med, Radiance solo

<b>Additional features:</b>	
- multiple intolerance to BP-lowering drugs / adverse effects	
- poor drug adherence despite extensive counseling	
- 24h- heart rate >73.5 bpm	Bohm et al, Eur Heart J. 2019
- paroxysmic/persistent atrial fibrillation	Atti V et al. J C Electrophysiol 2019
- high / very high lifetime cardiovascular risk	
- patient preferences	

RDN is the only treatment with proved efficacy in non-adherent patients !



DenerHTN Study: Azizi M et al, Circulation 2016;**134**(12):847-57

Would patients with mild to moderate essential hypertension accept to consider treatment with renal denervation?

# Patient Preference



# What is the preference of an intervention vs. adding a medication?

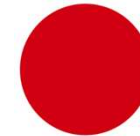
About one third of patients would choose an intervention like RDN to treat their HTN over adding a medication

**28.2%-38.2%\***  
of patients preferred RDN over medication<sup>1</sup>



N=	1011
Age (yr)	66
Male	55%
OSBP (mmHg)	144.2
HTN duration (yr)	10.8

**31.6%**  
of patients would rather undergo RDN<sup>2</sup>



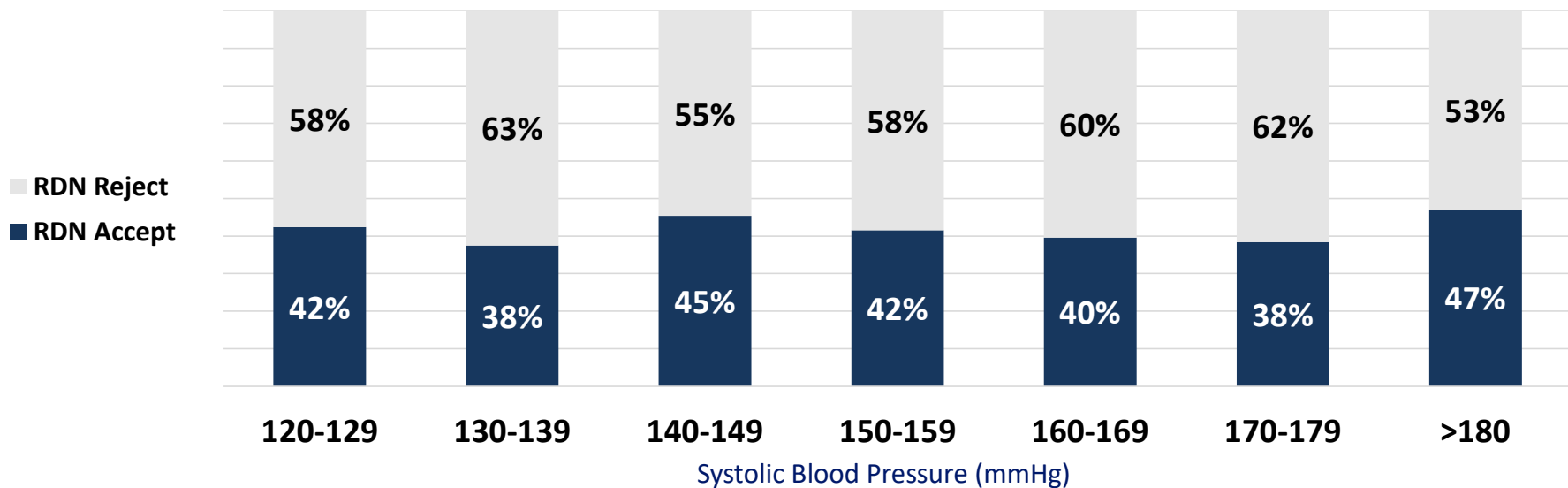
N=	2392
Age (yr)	59.8
Male	65.9%
OSBP (mmHg)	135.7
HTN duration (yr)	11.4

\*28.2% of patients taking  $\geq 1$  antihypertensive medication and 38.2% of patients taking no medication

1. Schmieder et al. Clin Res Cardiol. 2019
2. Kario et al. HTN Res. 2021

# Patient Research Found No Correlation Between Current BP Level and Willingness to Consider Treatment with Renal Denervation

Patient preference to RDN across blood pressure ranges  
(N = 1666)



\*Differences between patients with SBP less than 130mmHg and those with SBP at least 130mmHg or at least 150mmHg were not significant ( $P > 0.7$  for both)

Schmieder et al. Journal of Hypertension 2020 (in-press).

# Physicians are More Likely to Recommend Renal Denervation for Patients with Higher Blood Pressure Levels and Greater Number of Medications

## Referring Physicians

		# of Medications				Likert Score
		0	1-2	3	4+	
Systolic Blood Pressure (mmHg)	N = 286					
	<140	1.10	1.23	1.76	2.60	<2
	140-160	1.23	1.63	2.62	3.66	2-2.5
>160	1.50	2.17	3.57	4.54	2.5-3	

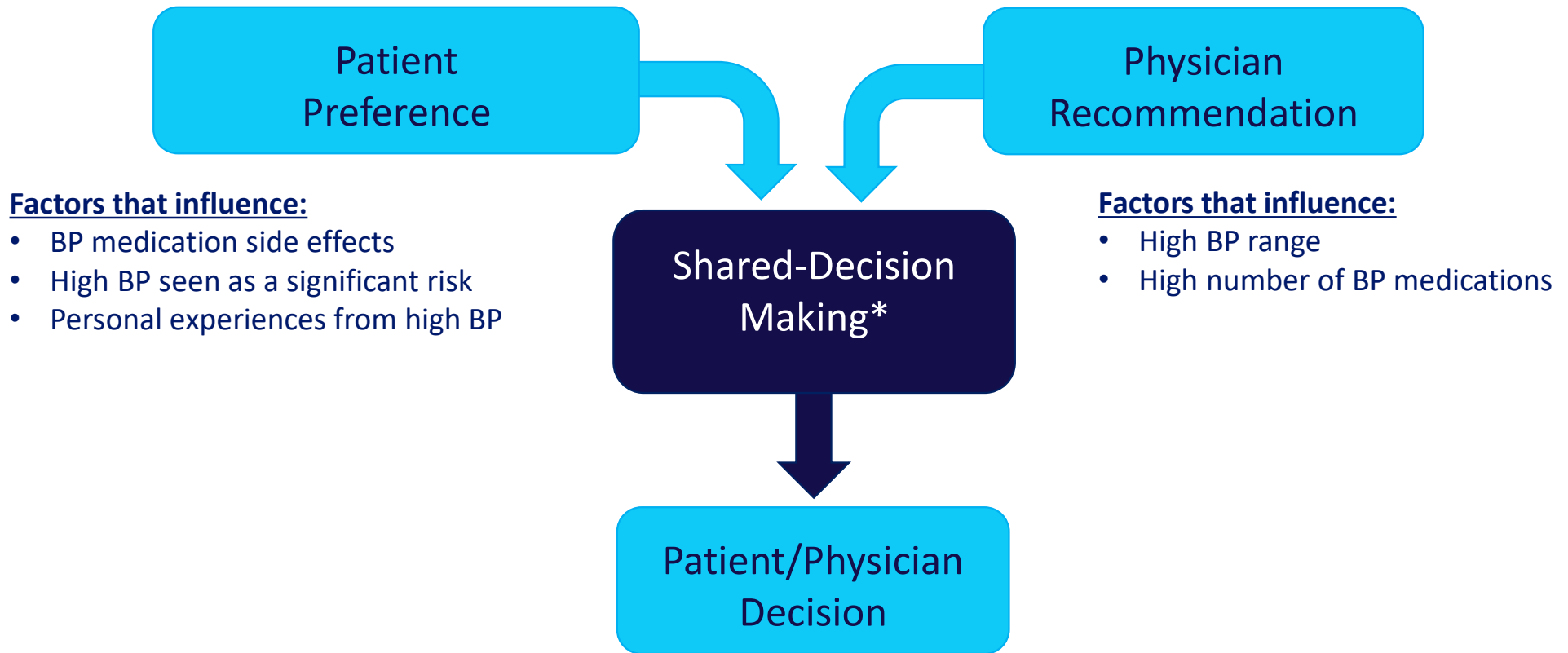
## Proceduralist

		# of Medications				Likert Score
		0	1-2	3	4+	
Systolic Blood Pressure (mmHg)	N = 246					
	<140	1.12	1.45	2.22	2.98	3-3.5
	140-160	1.41	2.08	3.21	4.00	3.5-4
>160	1.85	2.84	4.08	4.64	>4	

*“On a scale of 1-5, how likely would you be to recommend/refer for/perform on patients with the following characteristics?”*

# Shared-Decision Making is Key to RDN Recommendation

Factors Influencing Patient and Physician Perspectives on Renal Denervation



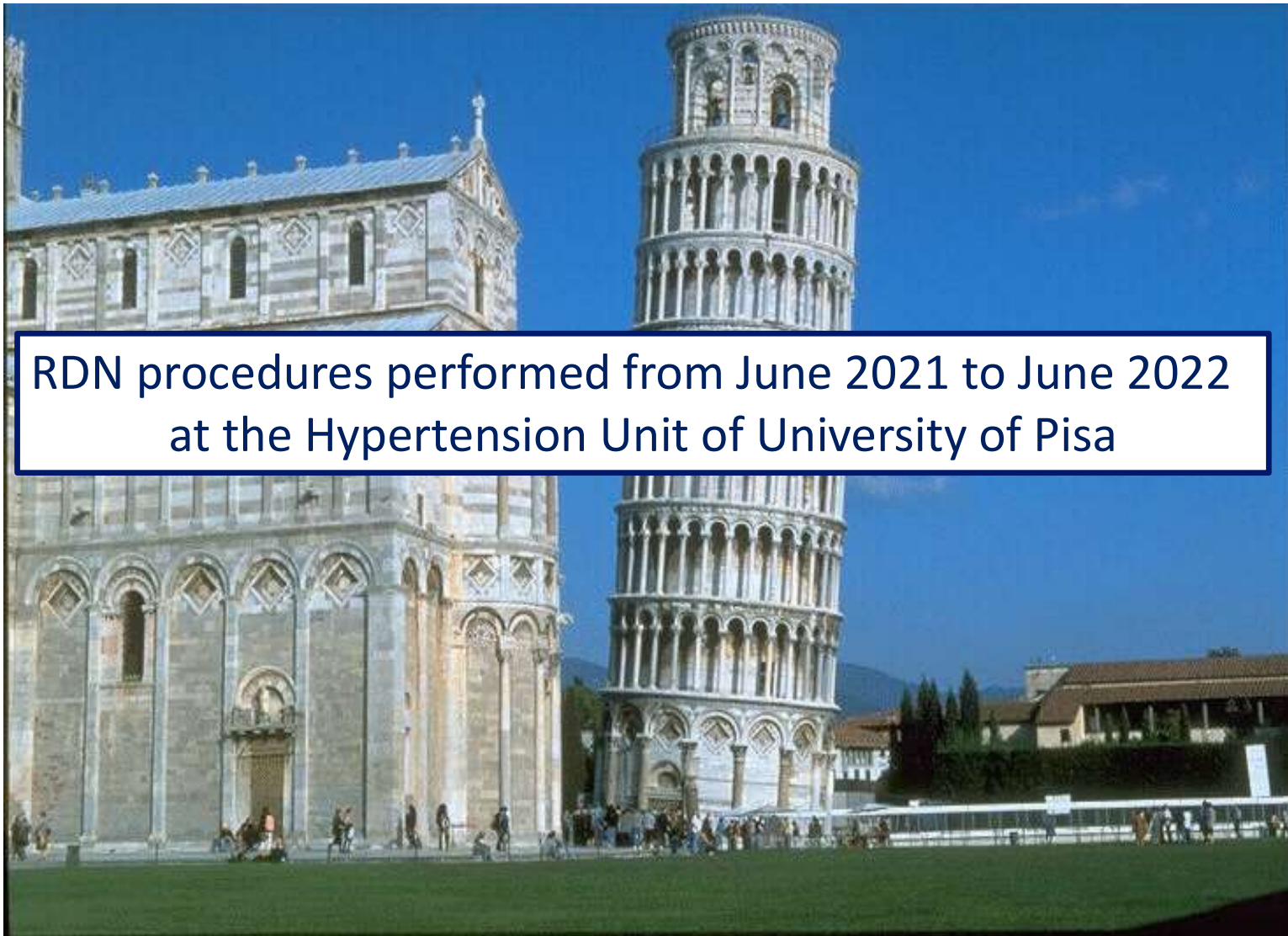
\*A physician's recommendation was the single most important positive factor influencing patients' readiness to undergo RDN

Schmieder RE, et al. *J Hypertens.* 2021;39(1):162-168.

## Minimum requirements for RDN selection centers

The selection process for RDN should be performed only in at specialist hypertension centres

<b>Hypertension Center:</b>
- SIIA centers with a dedicated outpatient service for the difficult-to-treat patients
- Medical and nurse staff with targeted education, i.e. through participation in SIIA official courses
- Equipment to assess 24-h BP, drug adherence and screen for main causes of secondary hypertension
- Coordination of the multidisciplinary team in charge of finalizing the indication to RDN
<b>Interventional Center:</b>
- Certified operators (interventional radiologists or cardiologists)
- Volume of > 5 procedures/year
- Agreement with Regional Healthcare System
<b>Other specialists:</b>
- Involved in the decision process in selected cases
- Pharmacology, Psychology, Endocrinology, Neurology, Sleep Medicine and so on



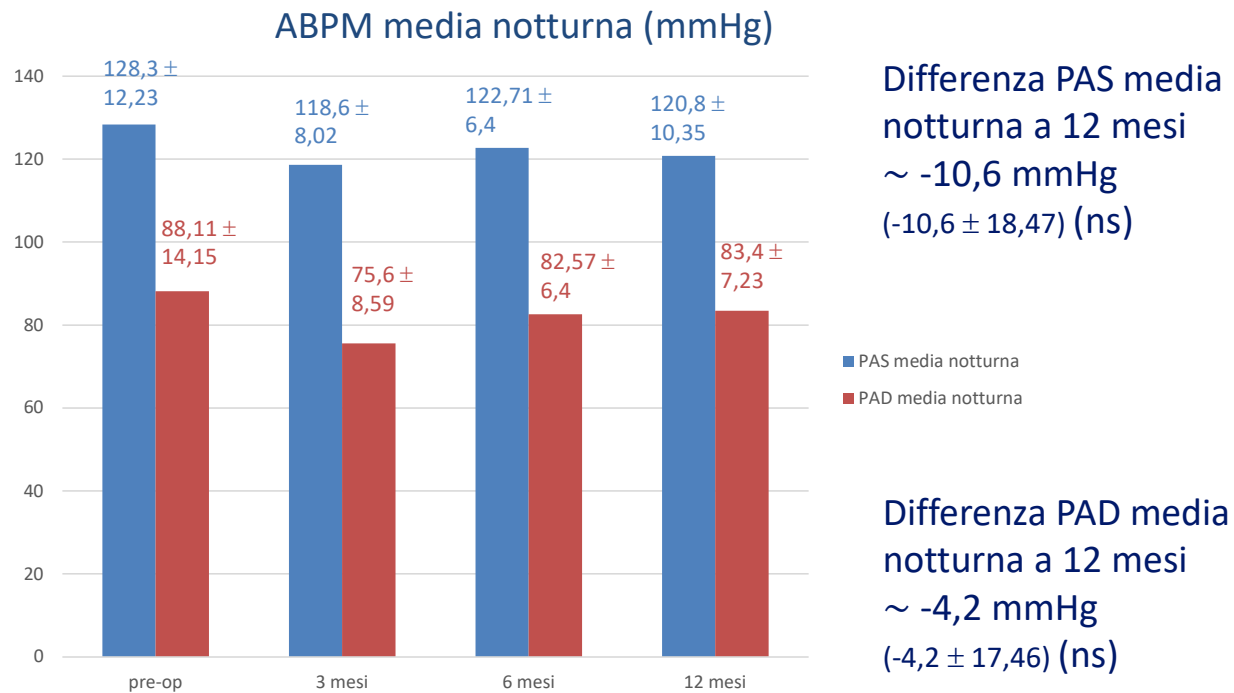
RDN procedures performed from June 2021 to June 2022  
at the Hypertension Unit of University of Pisa

RDN procedures performed from June 2021 to April 2023  
at the Hypertension Unit of University of Pisa

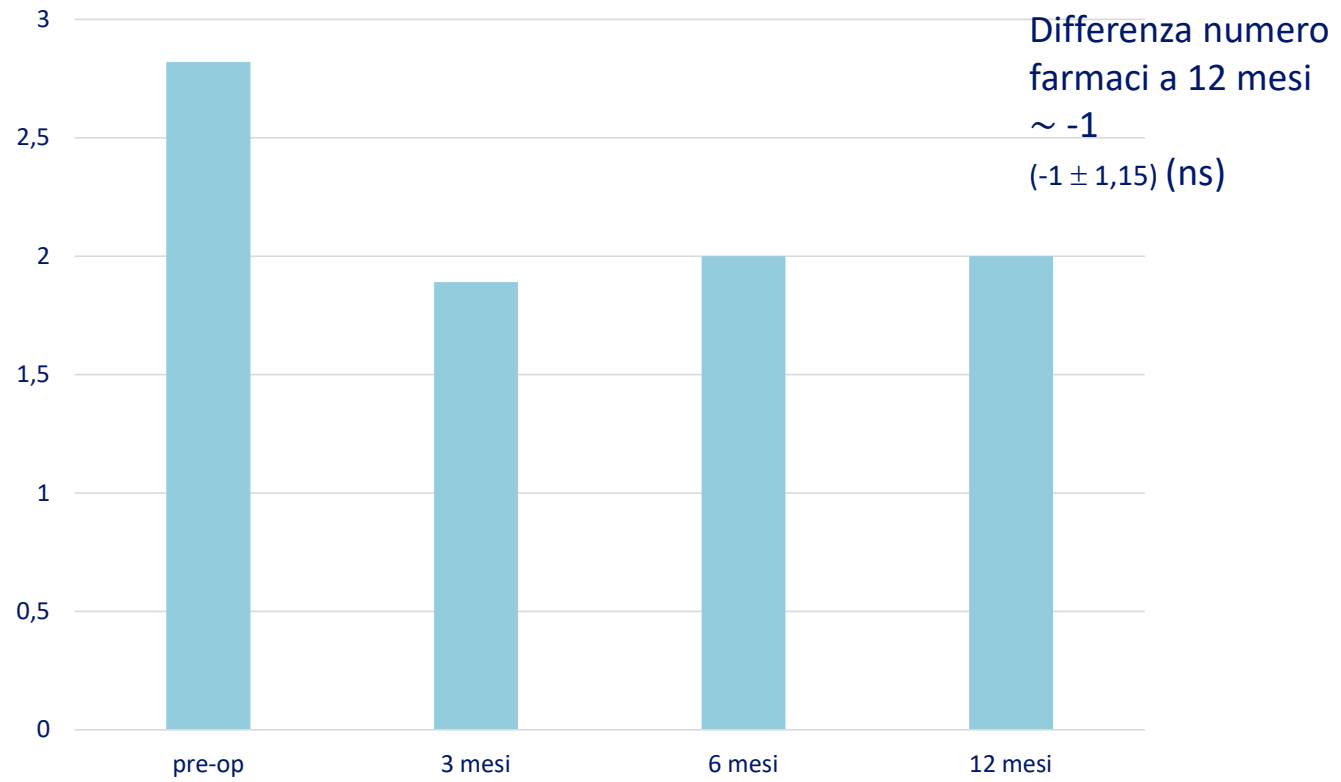
- Patients with resistant hypertension: **4**
- Patients with «difficult-to-treat hypertension»: **11**



## RDN procedures performed from June 2021 to april 2023 at the Hypertension Unit of University of Pisa



## Andamento terapia farmacologica



# Long-term outcomes after catheter-based renal artery denervation for resistant hypertension: final follow-up of the randomised SYMPPLICITY HTN-3 Trial

*Deepak L Bhatt, Muthiah Vaduganathan, David E Kandzari, Martin B Leon, Krishna Rocha-Singh, Raymond R Townsend, Barry T Katzen, Suzanne Oparil, Sandeep Brar, Vanessa DeBruin, Martin Fahy, George L Bakris for the SYMPPLICITY HTN-3 Steering Committee and Investigators*

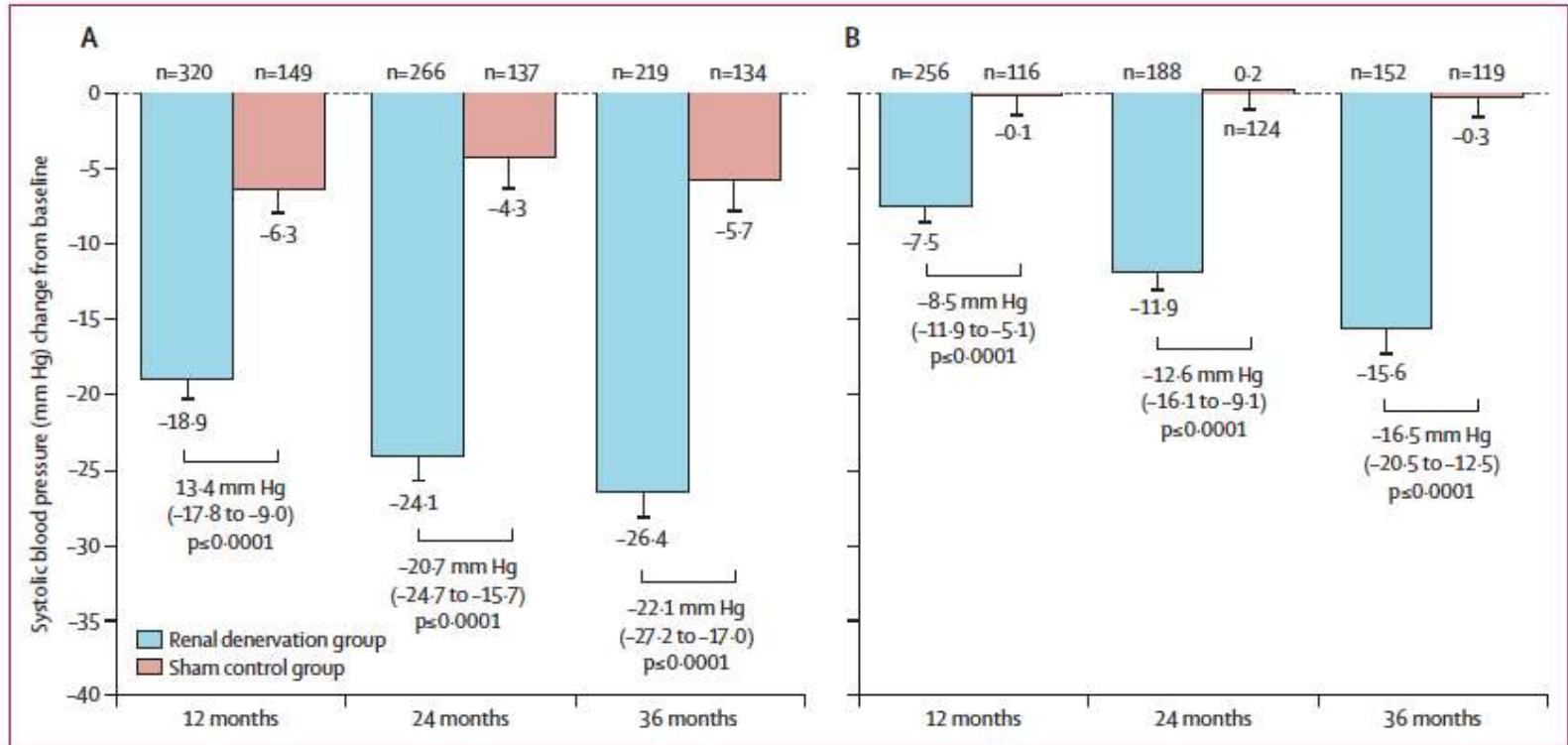
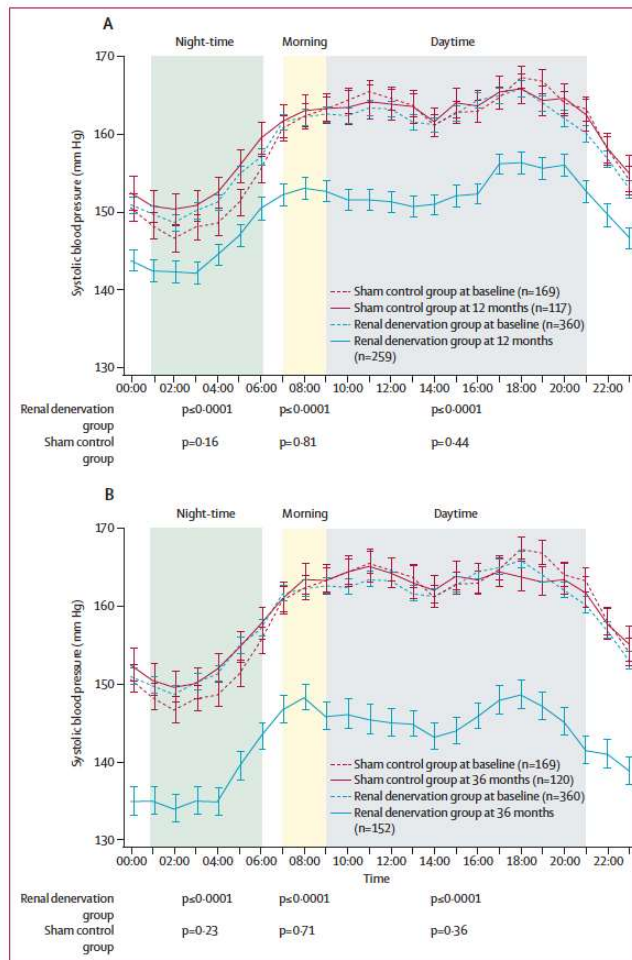


Figure 2: Reduction in mean office (A) and 24 h ambulatory (B) systolic blood pressure at 12 months, 24 months, and 36 months



**Figure 3: Hourly comparison of 24 h systolic blood pressures between sham control and renal denervation groups at baseline and 12 months (A) and at baseline and 36 months (B) after procedure**  
 Night-time was defined as 01:00–06:00 h, morning was defined as 07:00–09:00 h, and daytime was defined as 09:00–21:00 h (appendix p 13). Mean measurements in the sham control group at 12 months and 36 months include 97 imputed blood pressure values from patients in the crossover group from their most recent measurements before the renal artery denervation procedure. Error bars represent SE in this post-hoc analysis. p values are from paired t-tests comparing baseline and follow-up blood pressures within each group for each time range.

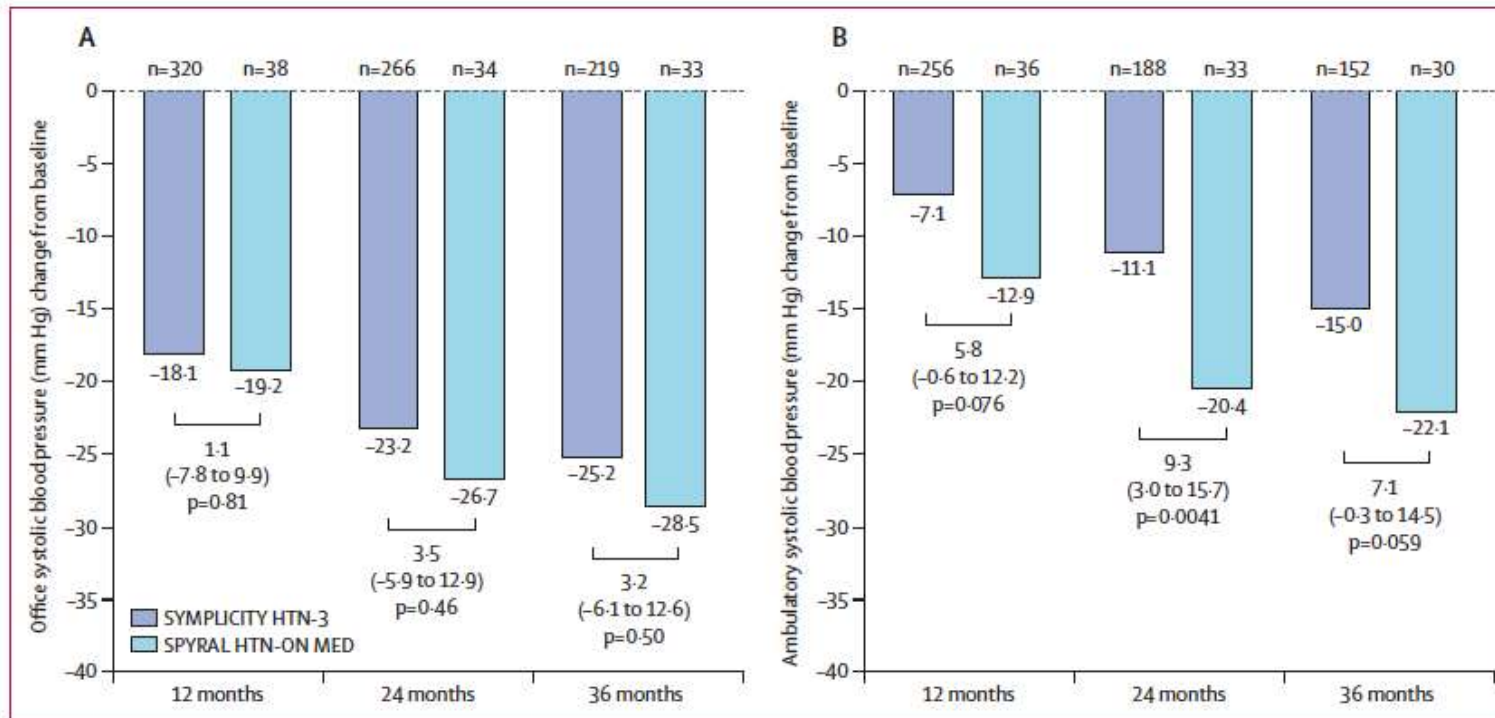


Figure 5: Office (A) and 24 h ambulatory (B) systolic blood pressure reductions in patients in the renal artery denervation groups of the HTN-3 and the SPYRAL HTN-ON MED Pilot studies

# What is the ideal patient for RDN

All patients with increased BP values are potential candidates for RDN

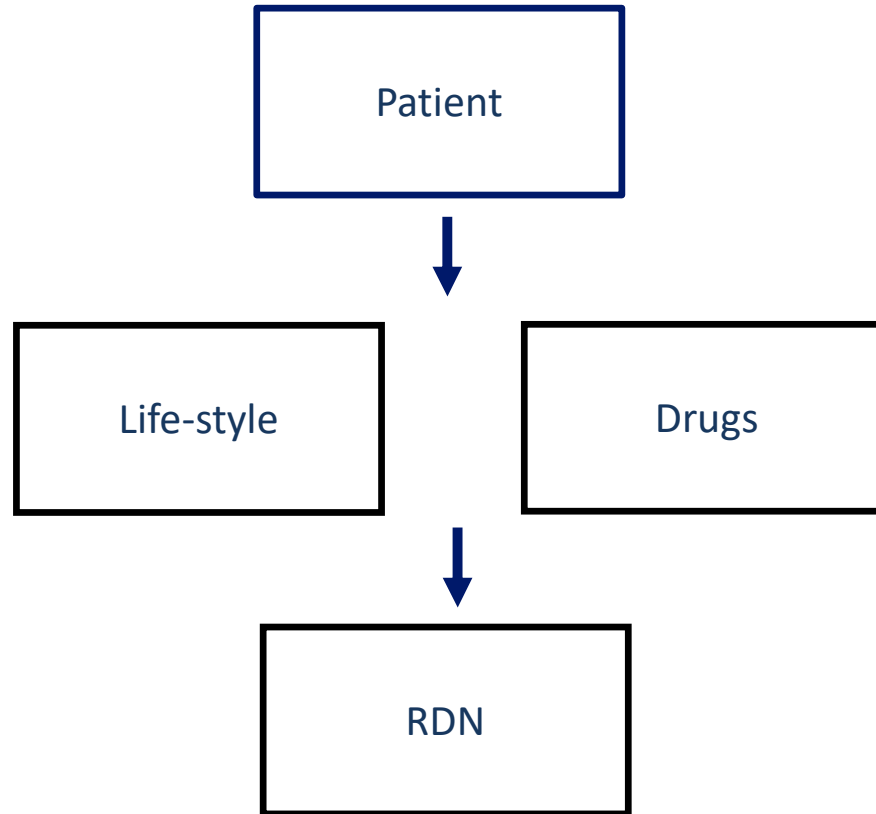
Patients with resistant hypertension are obvious candidates, but RDN must not be confined to these patients

«Difficult-to-treat»patients may include subjects with low adherence, side effects, polytherapy and, in these conditions, RDN might be a good proposal

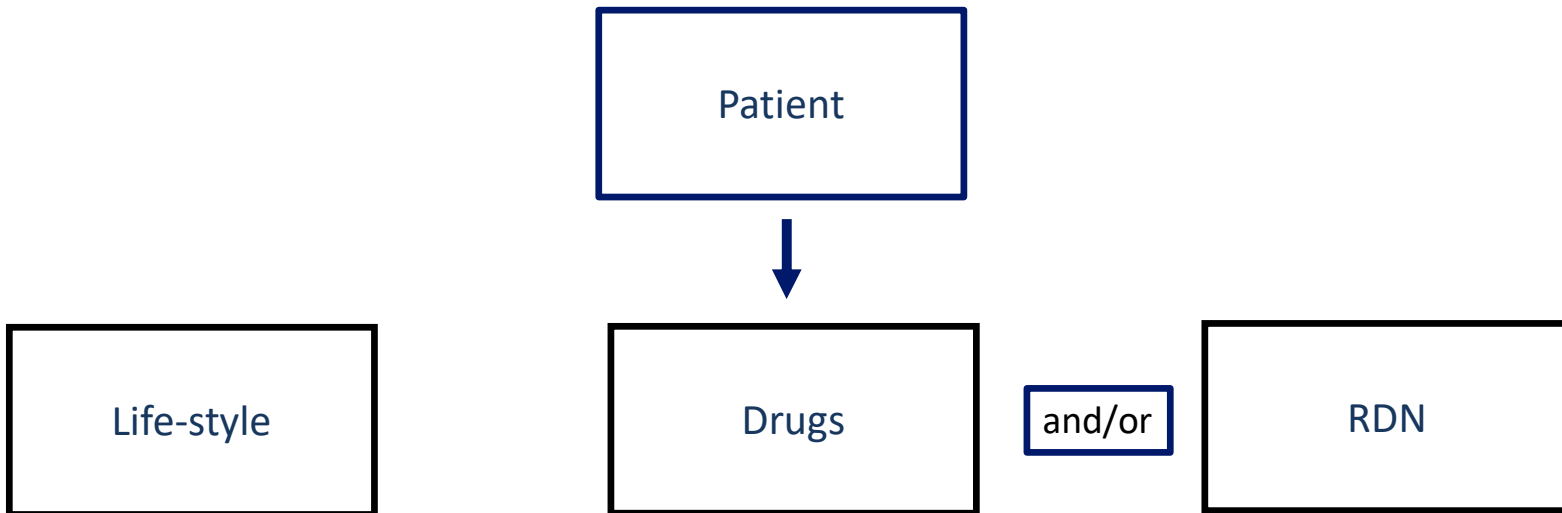
RDN is not alternative to conventional treatment but it is one adjunctive possibility in our daily practice



# Treatment of Hypertension



# Treatment of Hypertension



## Which future for RDN in hypertension?

New evidence demonstrates that RDN has steel the potential for a strong clinical development

Recent clinical studies demonstrate that RDN can be used not only in patients with «resistant hypertension» but also in patients with low-moderate risk demonstrating low compliance or side effects from pharmacological treatment

However the patient selection and hemodynamic procedure should be limited to centers with a strong and specific “*expertise*”

Thus in the future we need a strong clinical development program to have the possibility to consider RDN as a routinary option for the treatment of hypertensive patients