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HEART & DIABETES INSTITUTE

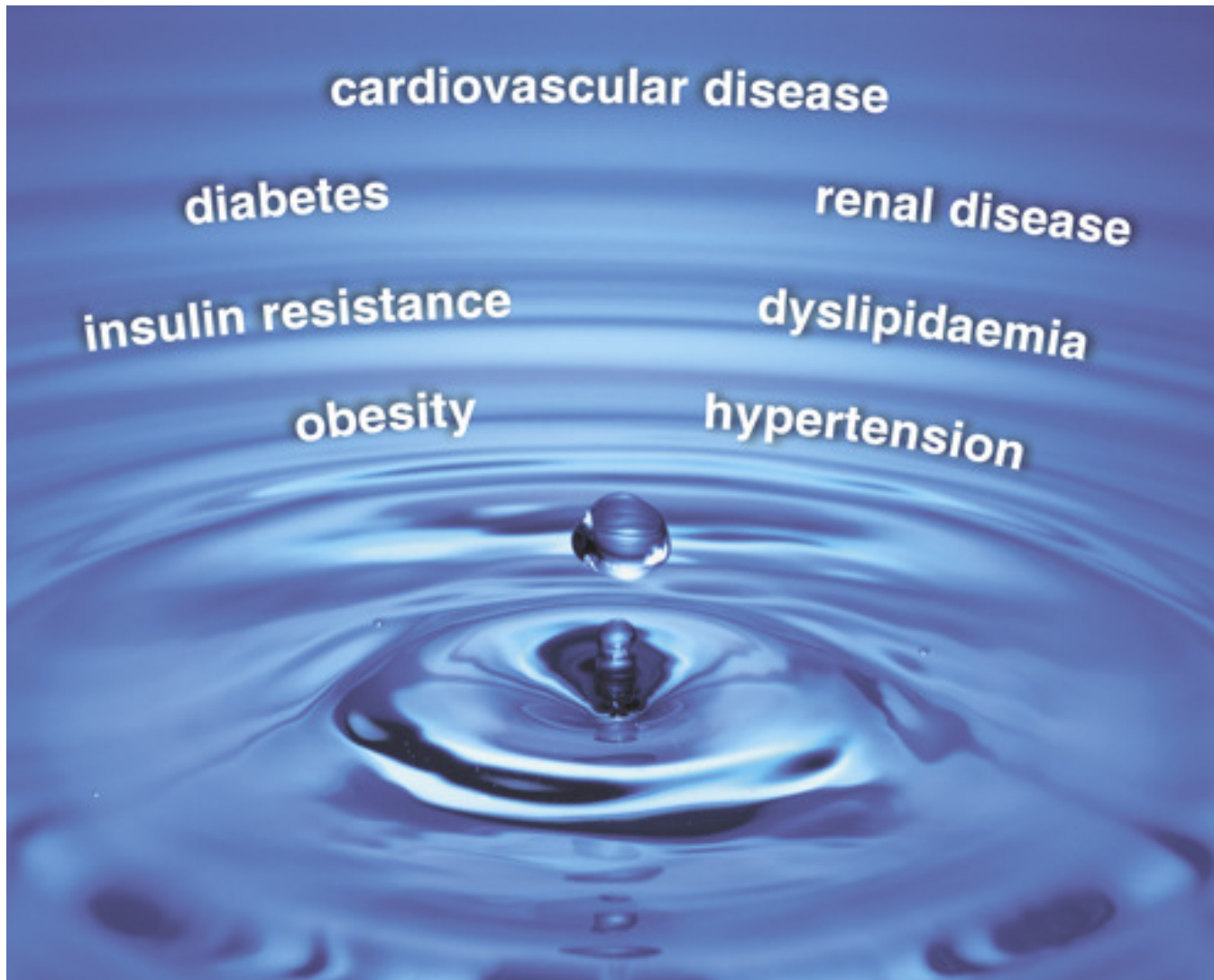
# **Effects of renal sympathetic denervation on noradrenaline spillover and systemic blood pressure in patients with resistant hypertension**

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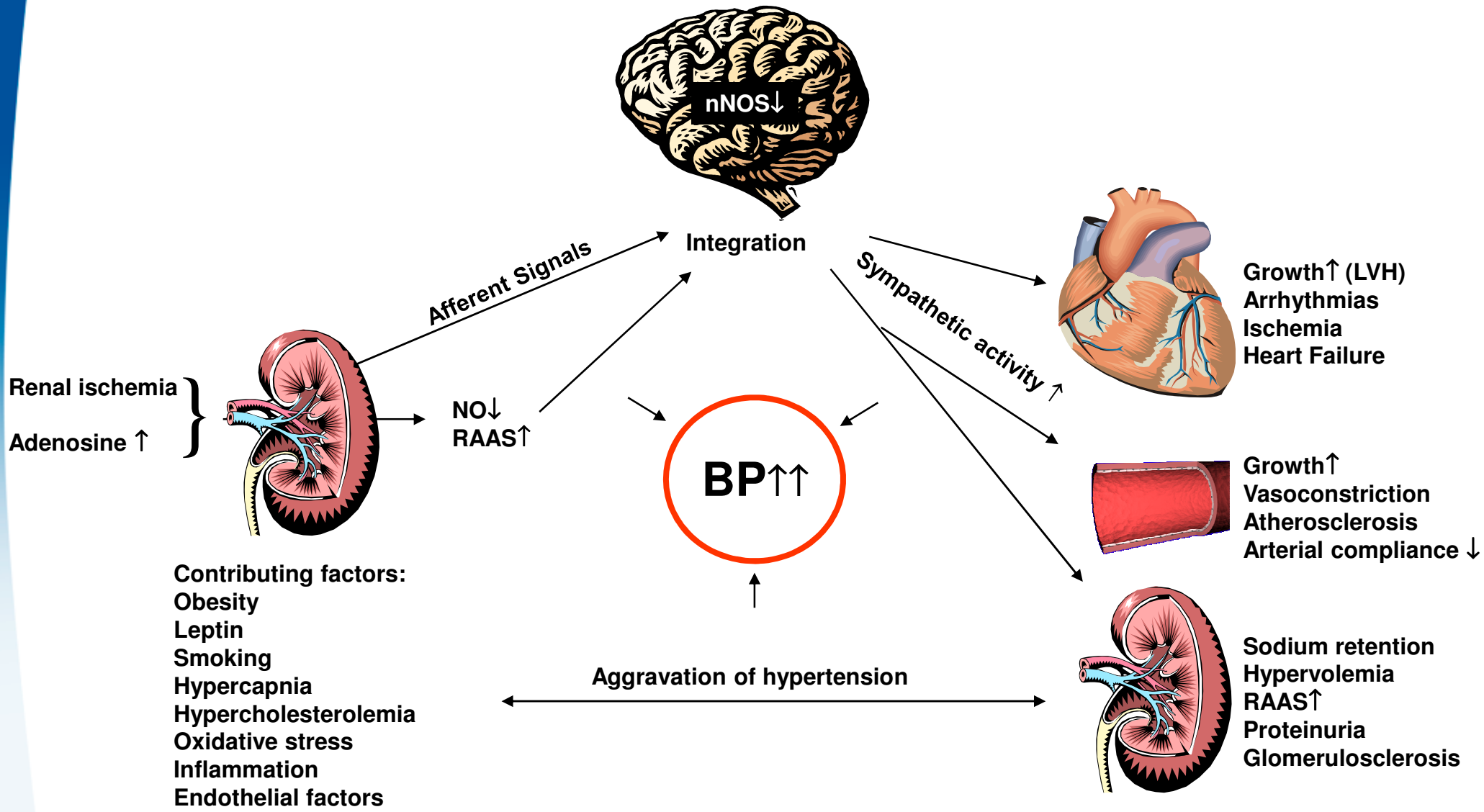
# Disclosures

- This study was sponsored by ARDIAN Inc., Palo Alto, CA, USA.
- The presenter declares to have received consulting fees from ARDIAN Inc. and lecture fees from pharmaceutical companies (Solvay, Servier, AstraZeneca, Novartis).

# Sympathetic Nervous System Activation - A major Player in CV disease



Cause → Central Integration → Consequence



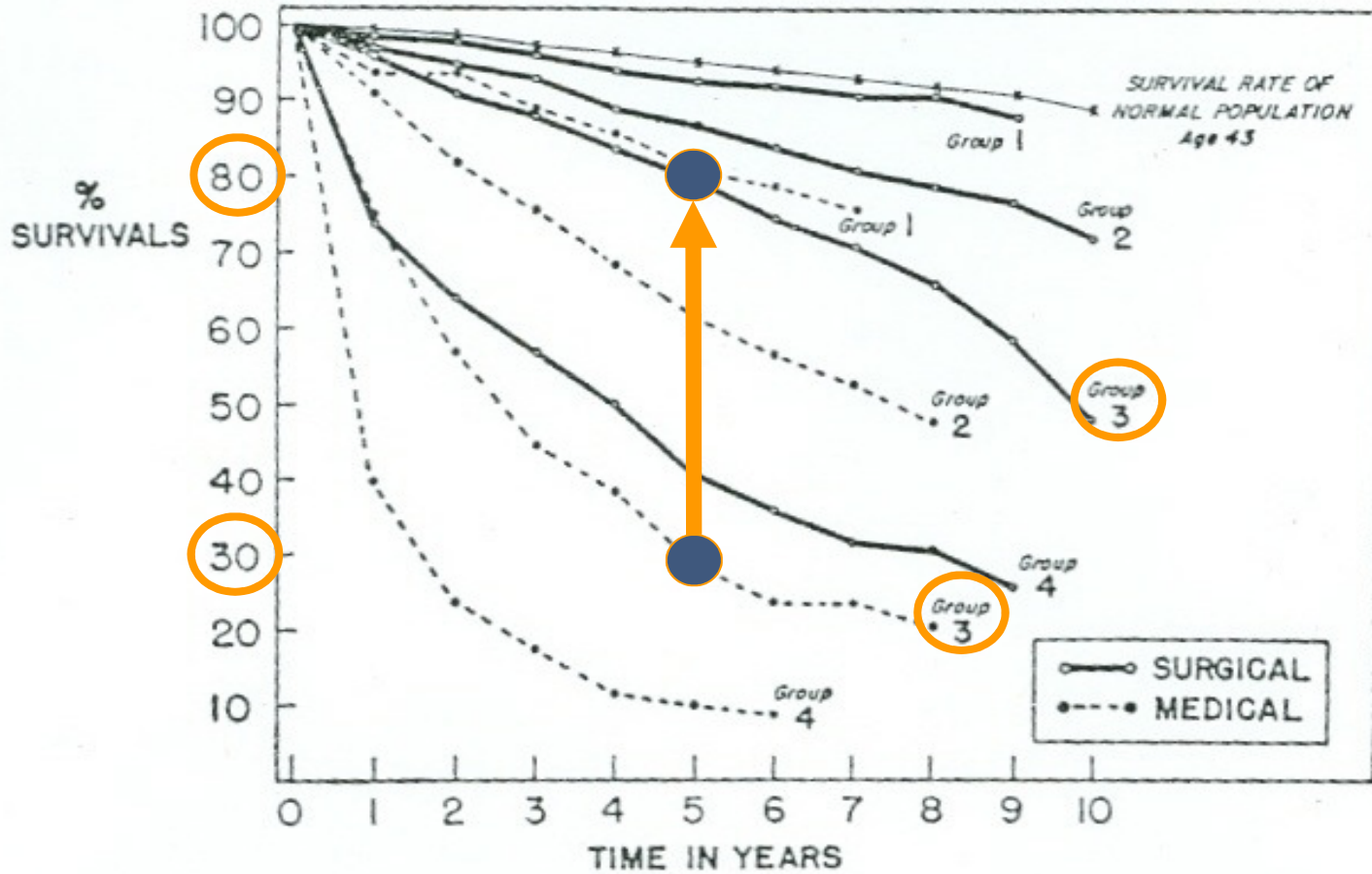
### SPLANCHNICECTOMY FOR ESSENTIAL HYPERTENSION

RESULTS IN 1,266 CASES

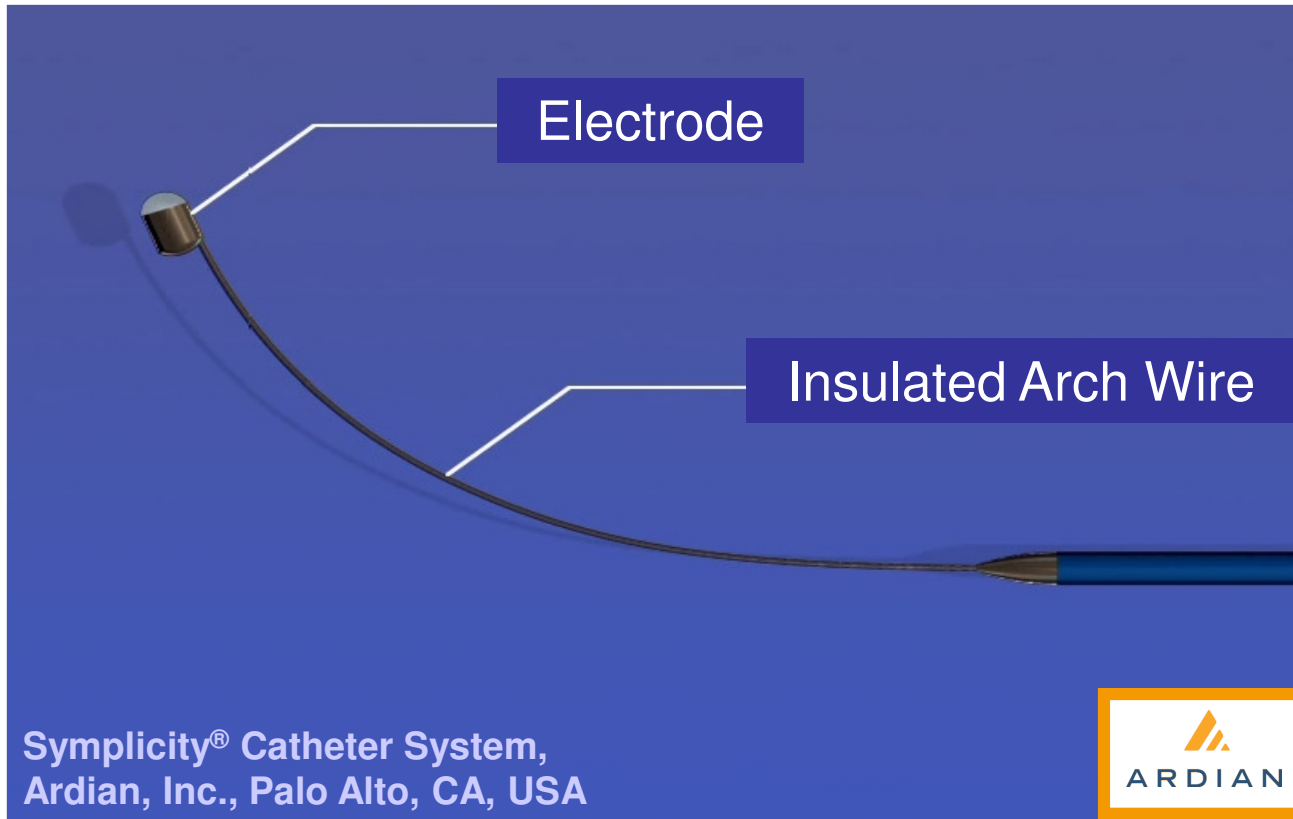
*Reginald H. Smithwick, M.D.*

and

*Jesse E. Thompson, M.D., Boston*

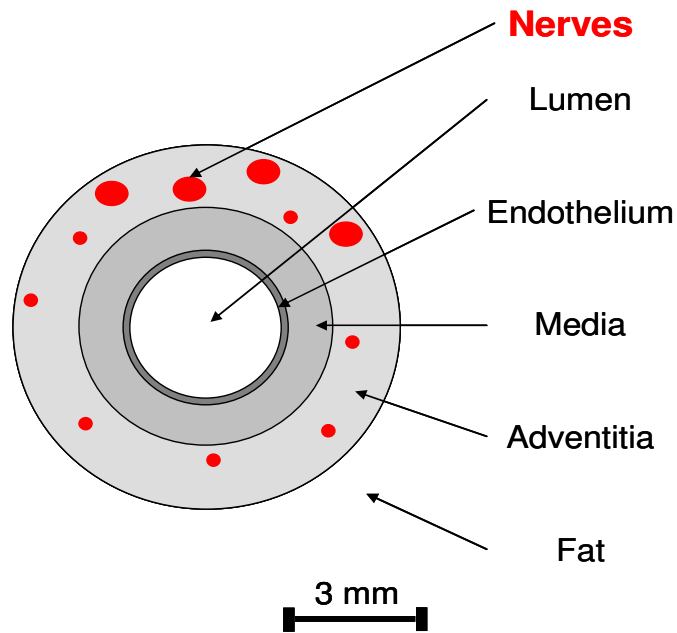


# Selective Renal Denervation



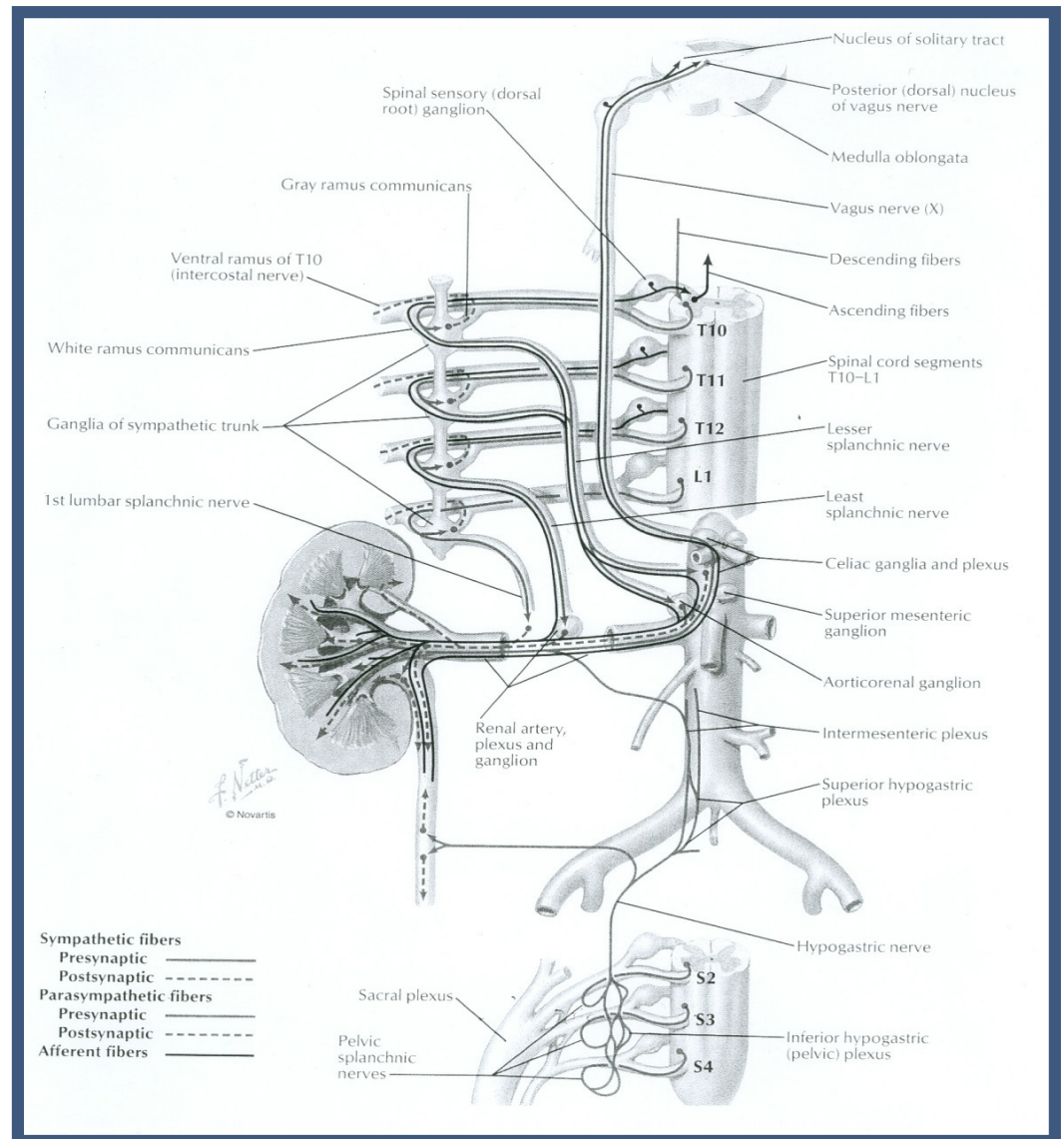
- Disrupt sympathetic nerve traffic to and from the kidneys
- Disable the renal nerves via RF ablation
- A 40-minute catheter-based procedure

# The Renal Nerves

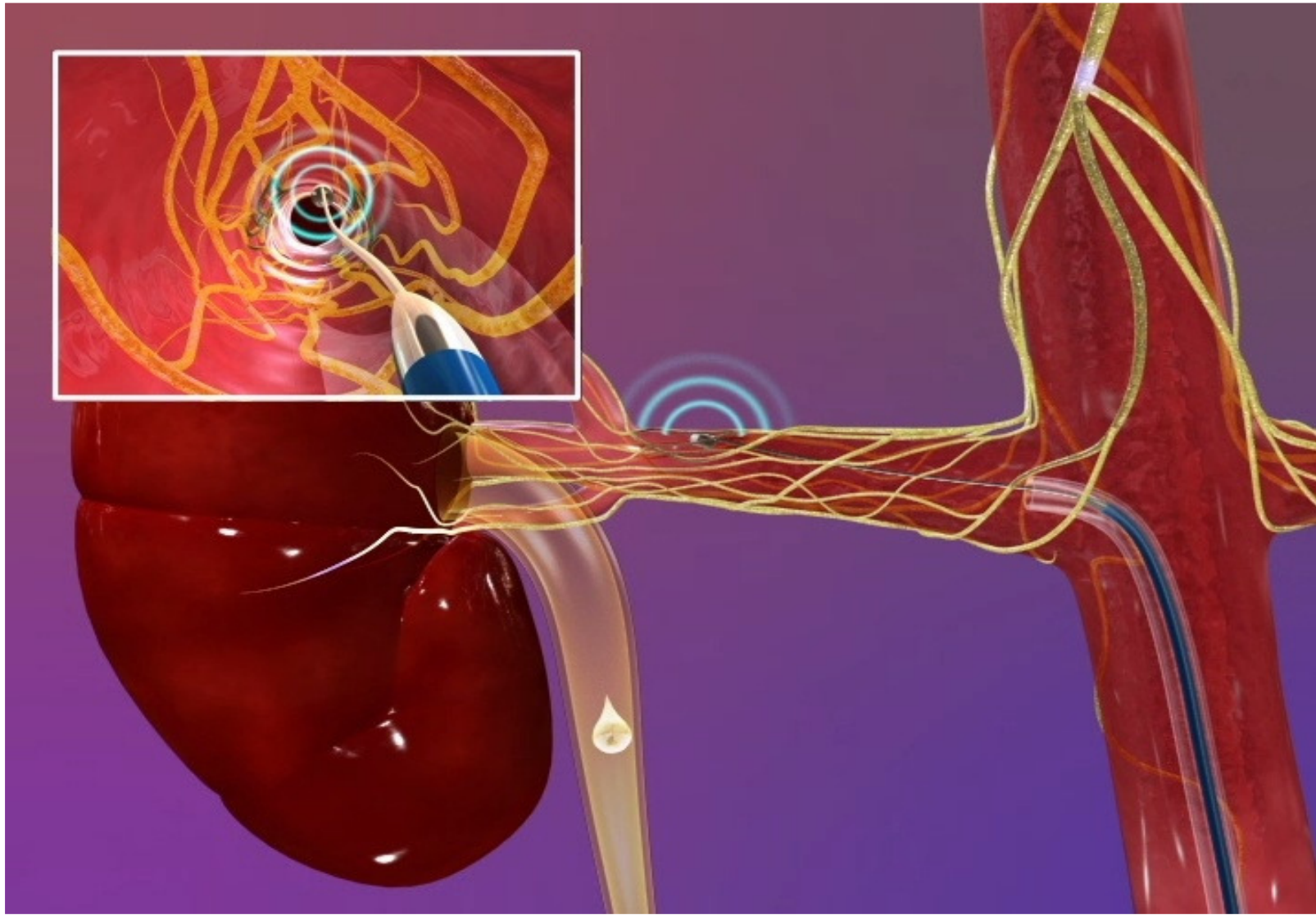


*...follow the renal artery to the kidney*

*...primarily within the adventitia*

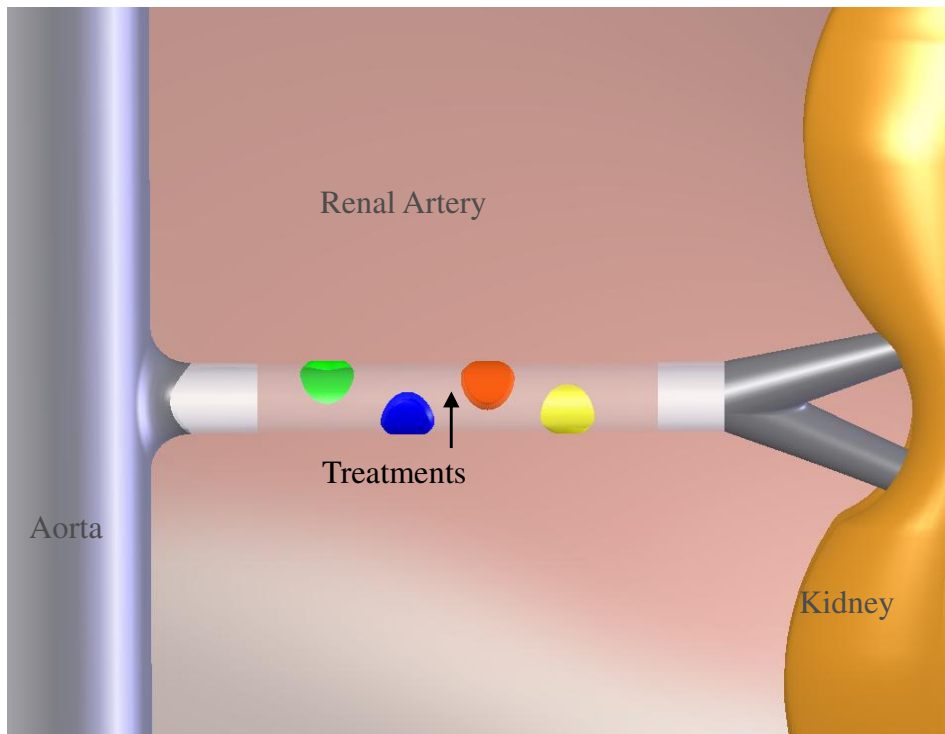


# Treatment by Renal RF Catheter

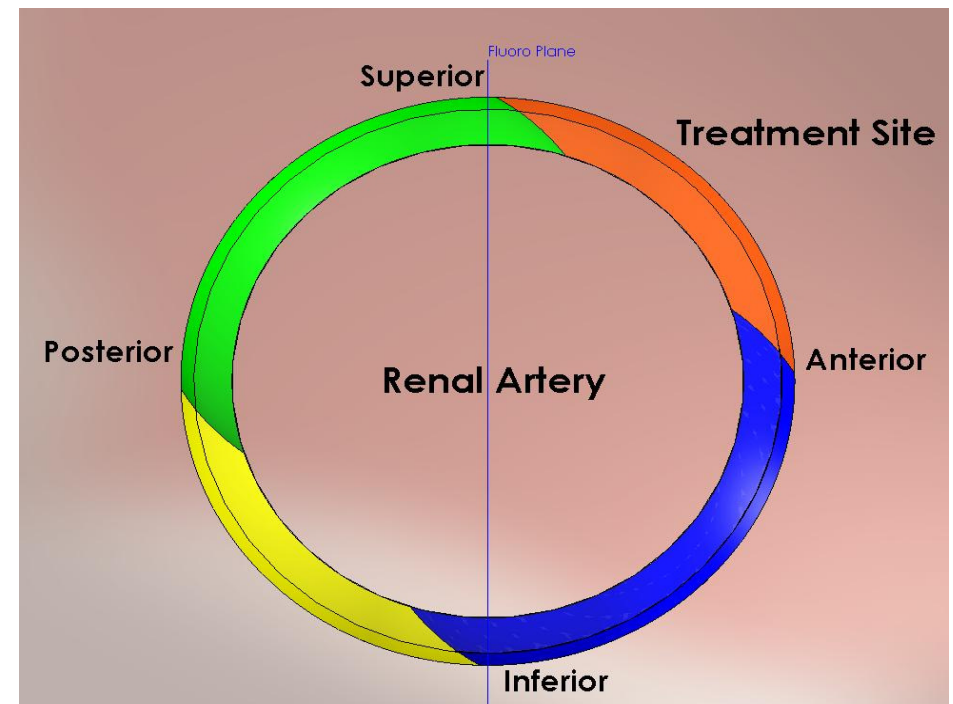


# Selective Renal Denervation:

Symlicity<sup>®</sup> Catheter System, Ardian, Inc., Palo Alto, CA, USA



Focal ablations  
spaced along vessel



Multiple focal ablations  
↑ circumferential coverage

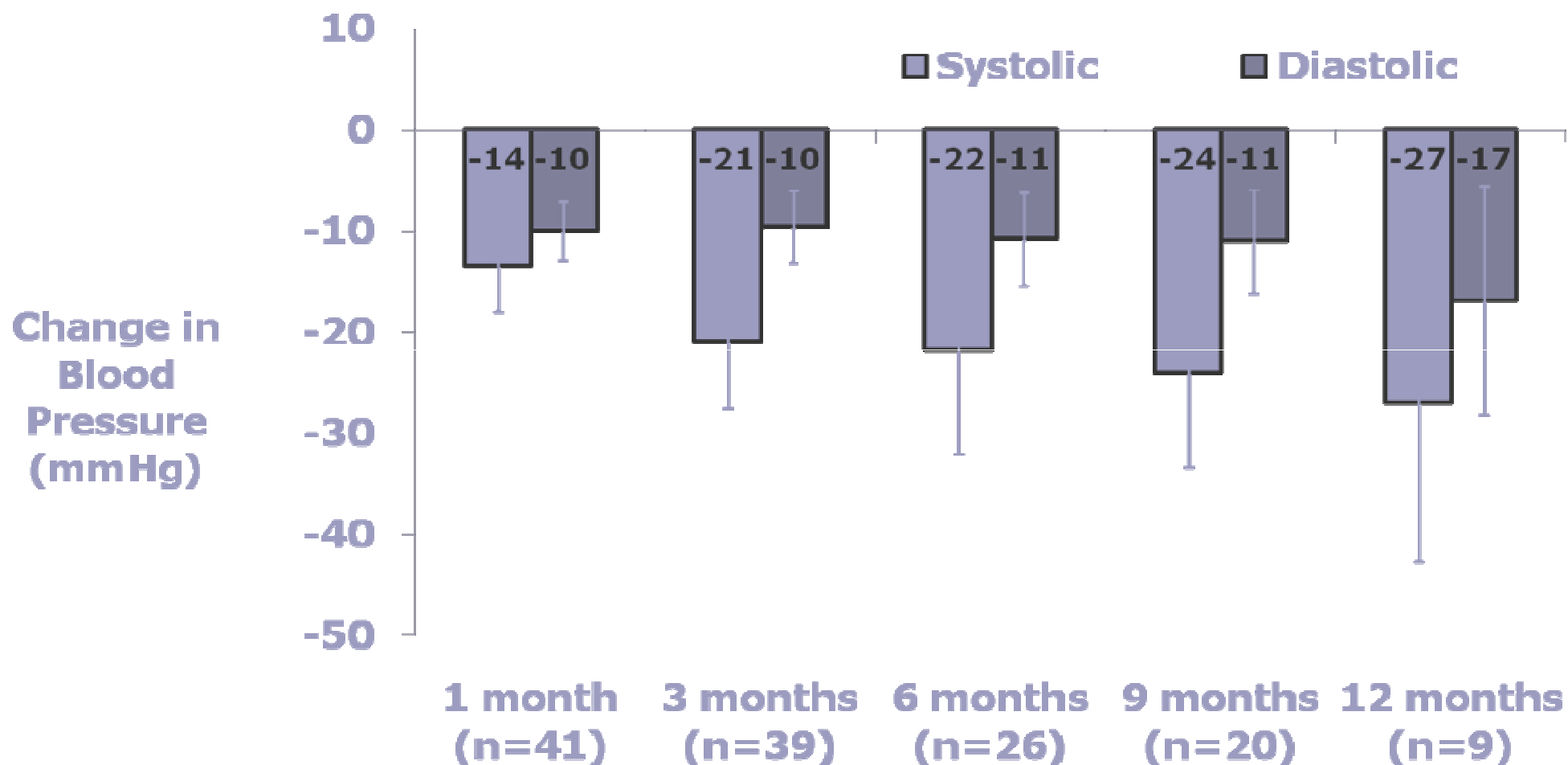
# Baseline Patient Characteristics

	<b>Patients Undergoing Procedure (N=45)</b>	<b>Patients Anatomically Ineligible for Procedure (N=5)</b>
<b>Age (years)</b>	58 ± 9	51 ± 8
<b>Gender (% female)</b>	44	20
<b>Race (% non-Caucasian)</b>	4	0
<b>Diabetes Mellitus II (%)</b>	31	40
<b>CAD (%)</b>	22	20
<b>Heart Rate (bpm)</b>	72 ± 11	79 ± 9
<b>eGFR (mL/min/1.73m<sup>2</sup>)</b>	81 ± 23	95 ± 15
<b>BP (mmHg)</b>	177/101 ± 20/15	173/98 ± 8/9

# Baseline Patient Characteristics

	<b>Patients Undergoing Procedure (N=45)</b>	<b>Patients Anatomically Ineligible for Procedure (N=5)</b>
<b>Number of anti-HTN meds (mean)</b>	4.7 ± 1.5	4.6 ± 0.5
<b>ACE/ARB (%)</b>	96	80
<b>Beta-blocker (%)</b>	76	100
<b>Calcium channel blocker (%)</b>	69	100
<b>Vasodilator (%)</b>	18	0
<b>Diuretic (%)</b>	96	60

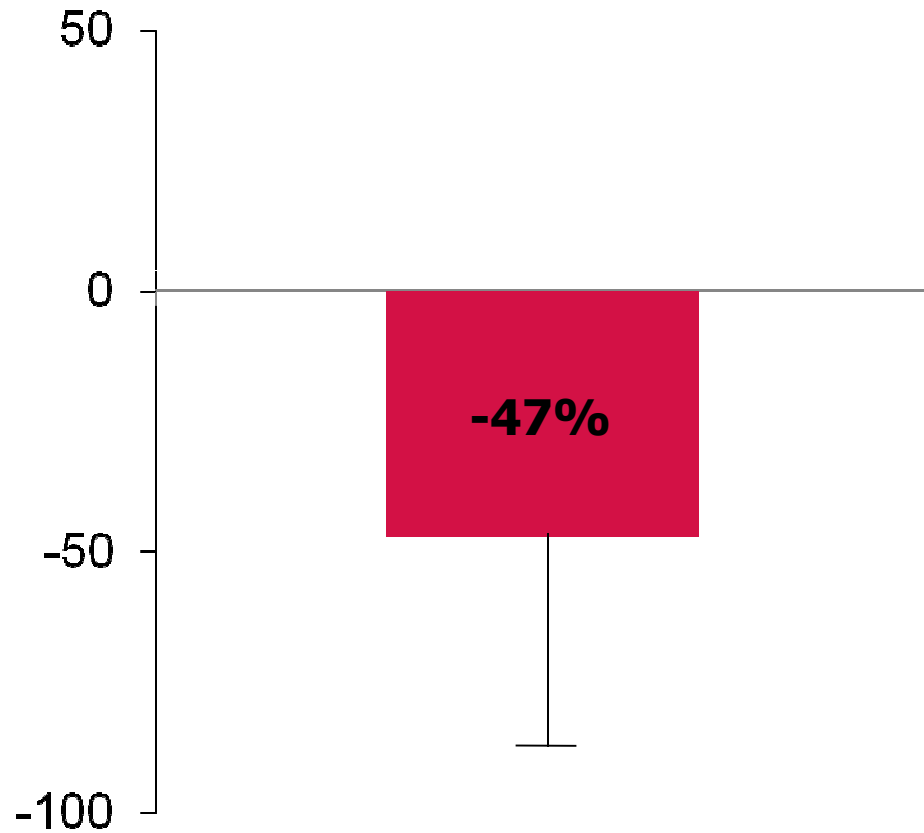
## Office BP: All Treated Patients



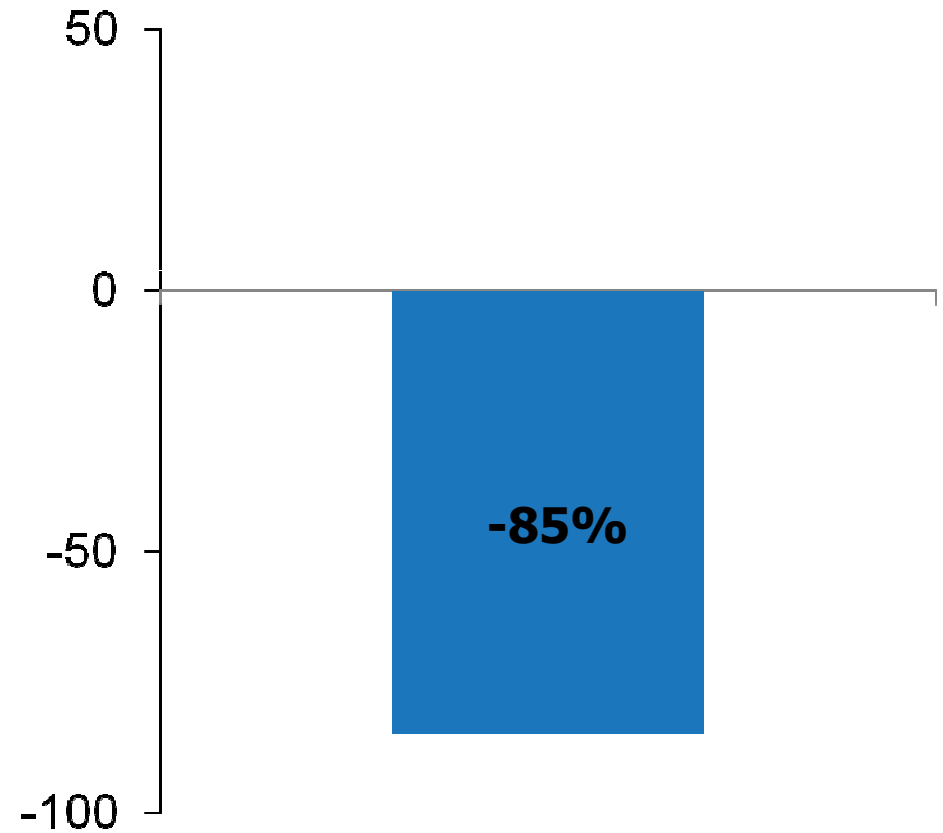
n=45

## *Evidence for denervation*

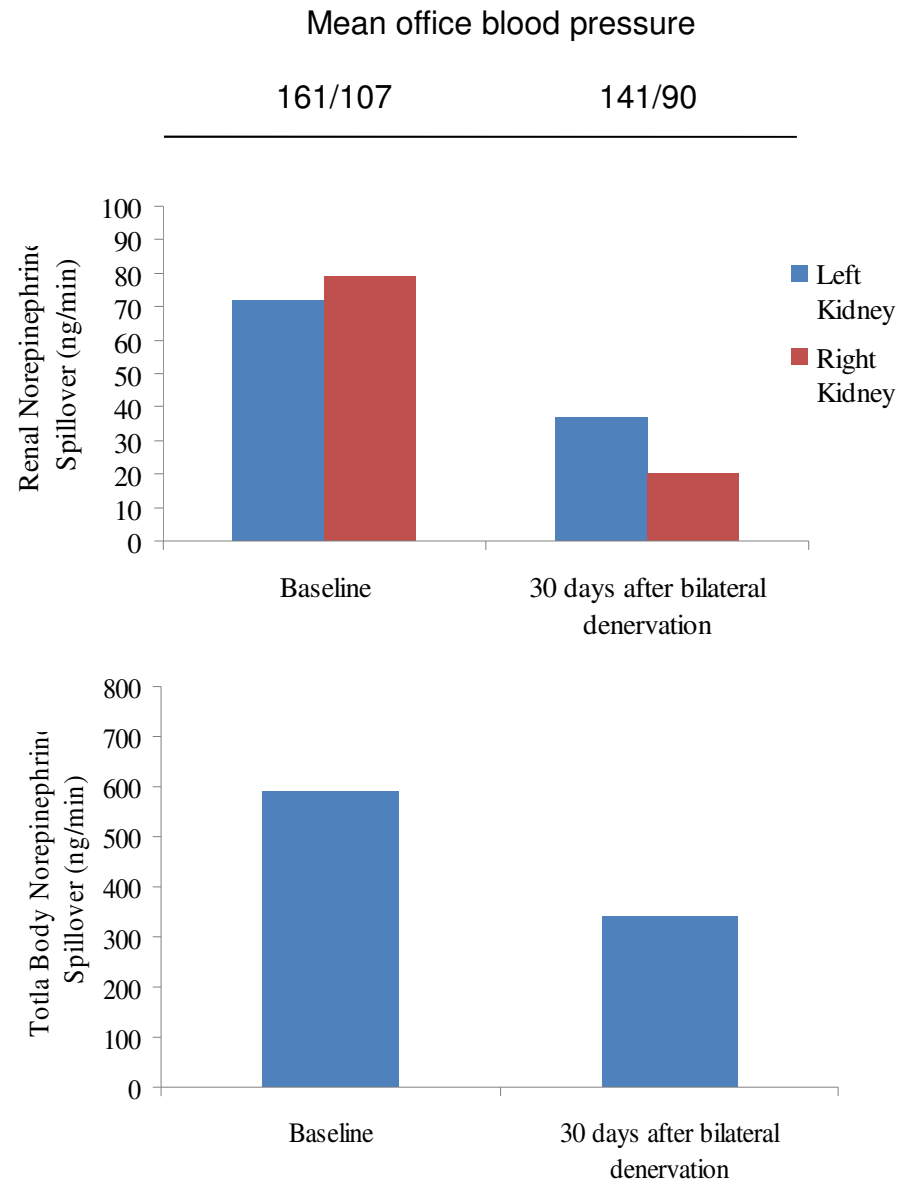
**Δ Renal NE Spillover  
(n=10)**



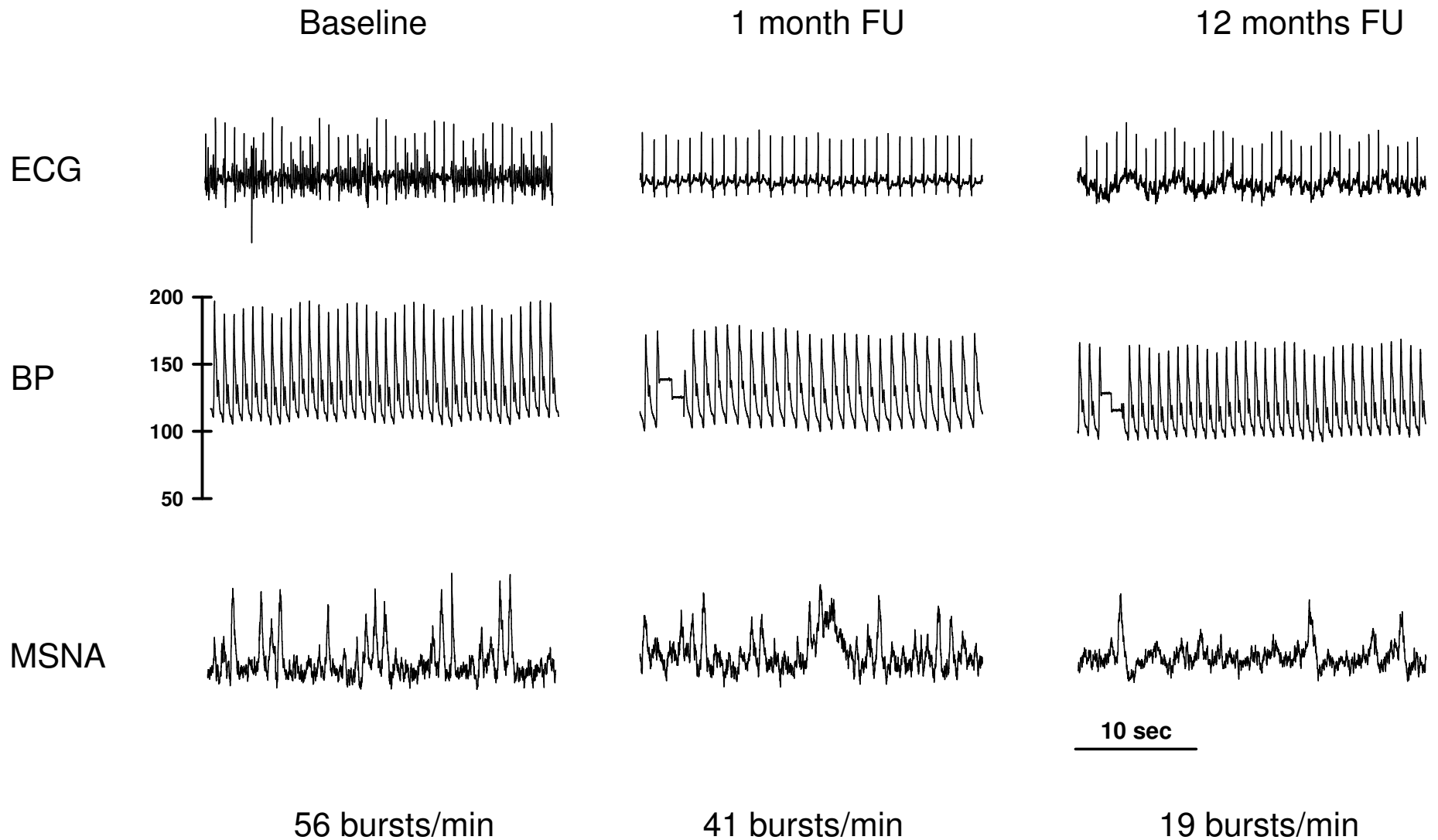
**Δ Total Kidney NE Content  
(pigs n=70)**



# Effects of renal denervation on renal and total body NE spillover



# Effects of renal denervation on MSNA



# Conclusions

Selective renal sympathetic denervation via a catheter based approach using RF ablation

- appears to be a safe procedure
- effectively reduces efferent sympathetic nerve activity (NA spillover ↓)
- appears to inhibit afferent signaling via renal sensory nerves (MSNA ↓)
- is associated with a substantial and sustained reduction in blood pressure
- may represent a treatment option for other conditions characterized by heightened sympathetic drive

# Acknowledgements

Alfred Hospital, Melbourne, AU:

Cardiology Team  
Prof Murray Esler  
Dr Tony Walton  
Prof Henry Krum

St Vincent's Hospital, Melbourne, AU:

Cardiology Team  
A/Prof Rob Whitbourn

John Hunter Hospital, Newcastle, AU:

Cardiology Team  
Dr Suku Thambar

Cardiovascular Center Frankfurt, Germany:

Cardiology Team  
Prof Horst Sievert

Jagiellonian University, Krakau, Poland:

Cardiology Team  
Prof Jerzy Sadowski  
Dr Krzysztof Bartus  
Dr Boguslav Kapelak

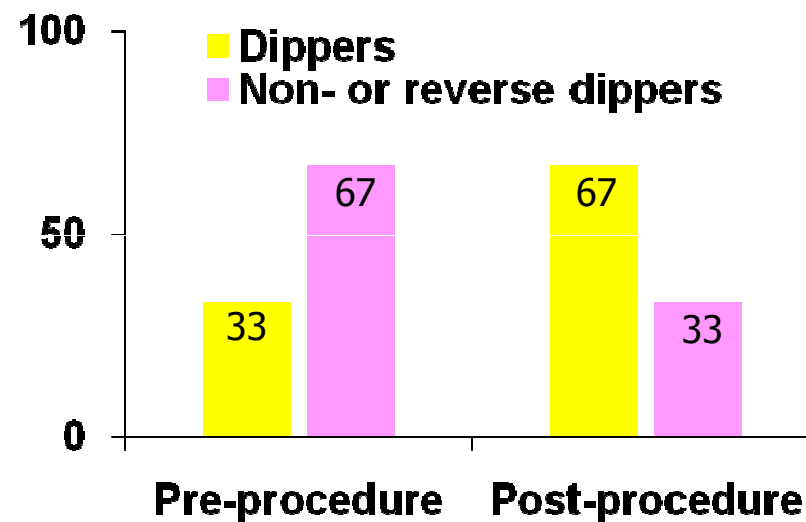
Ohio State University, Columbus, Ohio, USA:

Prof William Abraham  
Prof Paul Sobotka

ARDIAN Inc., Palo Alto, CA, USA

# Other interesting aspects and open questions

- Predictors of response (age, sex, PMHx, BP, HR, GFR...?)  
( 6 patients had BP reduction  $<10\text{mmHg}$  = non-responders)
- Dipping pattern in responders (n=12)



- Glucose control and insulin sensitivity
- Long term effects (re-innervation?...)
- Relevance in other patients cohorts (CHF, CRF, ESRD....)?