Who Are the Candidates for Renal Denervation?

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Disclosures

- Medtronic Advisory Board
- Ablative Solutions – investigator in CE-Mark trial and postmarket trial

Renal denervation for resistant thypertension

- In resistant hypertension the renal sympathetic outflow is highly activated
- Sympathetic activation is a significant predictor of a poor prognosis
  - heart failure
  - myocardial infarction
  - chronic kidney disease
- Sympathetic drive contributes to Na+ retention, renin release, reduced RBF, and resistance to loop diuretics
- Increased sympathetic activity is present in obstructive sleep apnea

FUNDAMENTAL PHYSIOLOGICAL LINK BETWEEN AUTONOMIC NERVE SYSTEM AND RESISTANT HYPERTENSION

Paton J F et al. Hypertension 2013;61:5-13

Patients selection

1. Drug-resistant hypertension
2. Patients with characteristics = sham-controlled RCT
3. „Neurogenic” hypertension = clinical/laboratory/physiological profile of high sympathetic activity
    - obesity
    - renal hypertension
    - persistently elevated heart rate
    - hypertensive patient reporting chronic stress
3. Mild essential hypertension in younger patients with no CV remodeling
4. Non-compliant with medical therapy
5. Side effects of the drugs
6. Patients unwilling to take multiple drugs throughout lifetime

Autonomic Neuroscience: Basic and Clinical 204 (2017) 131–138

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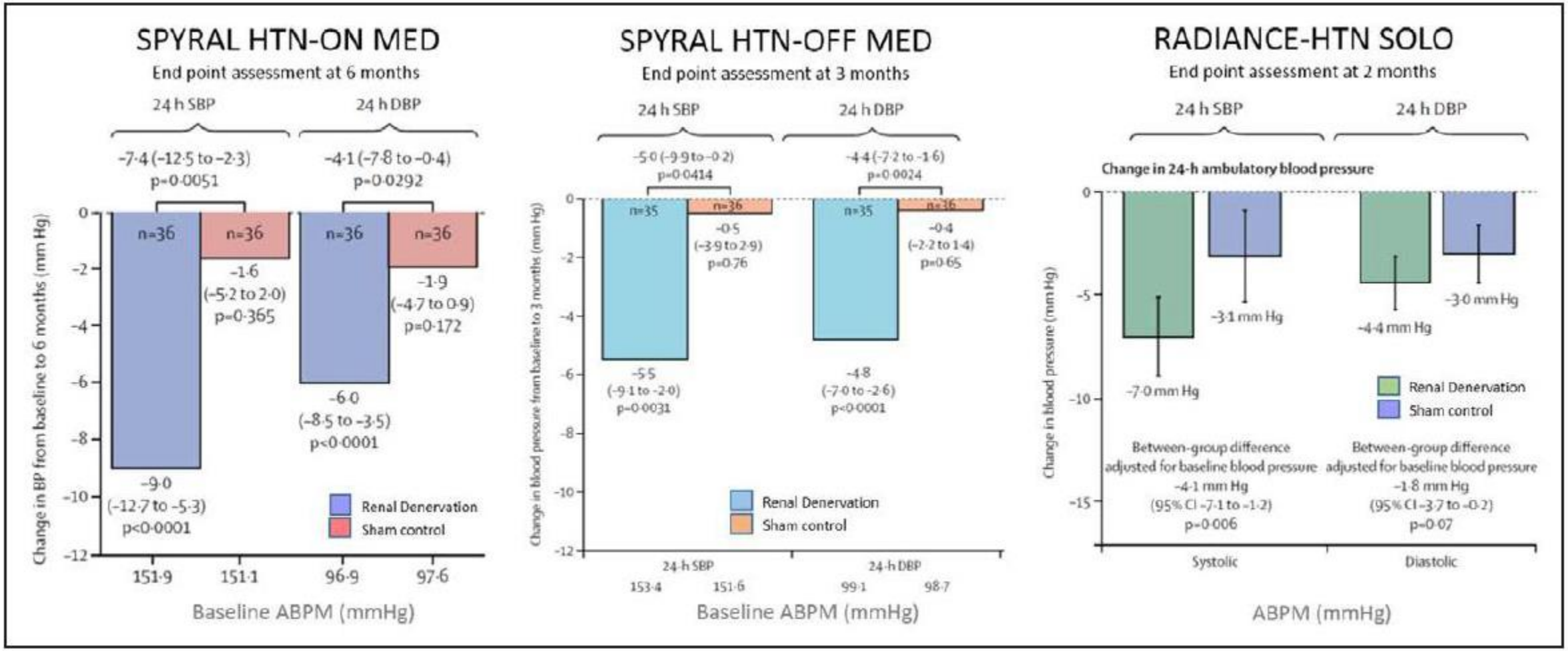
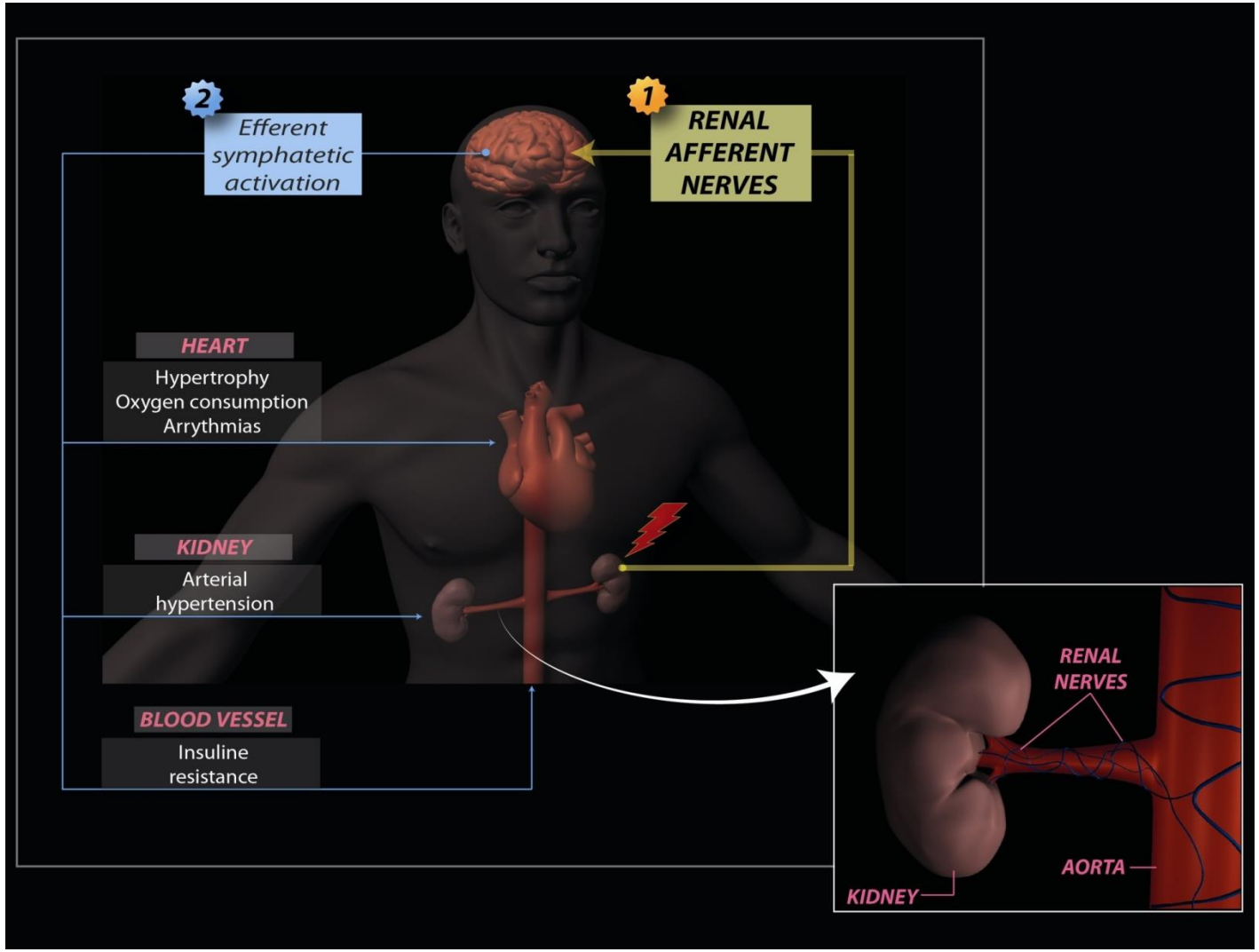
Based on properly executed RCT (with sham control)



Schlaichet al, Hypertension, 2018

Renal hypertension



1. High level of sympathetic nervous activation

2. Stimulation of renal afferent nerves

3. Ablation of renal afferent nerves reduces central sympathetic outflow in CKD and end-stage real disease

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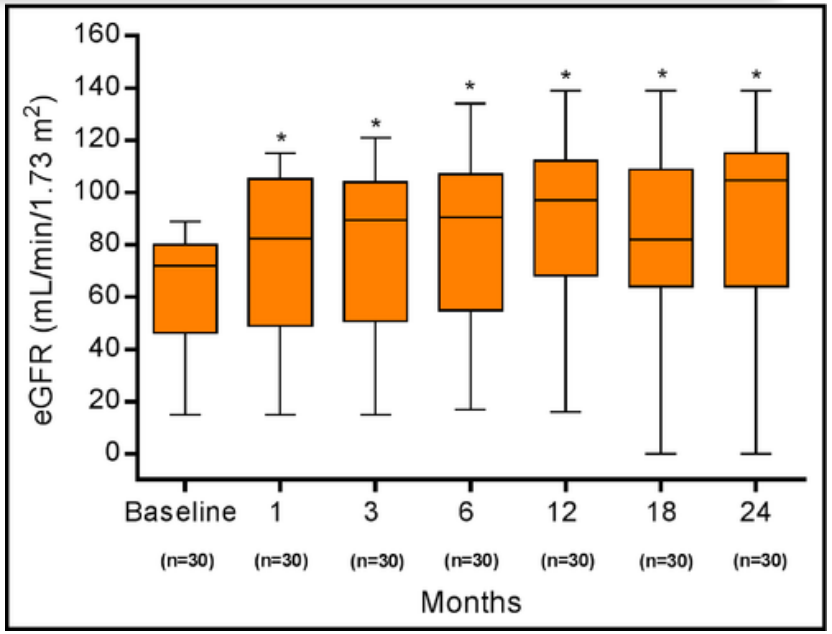
Renal hypertension

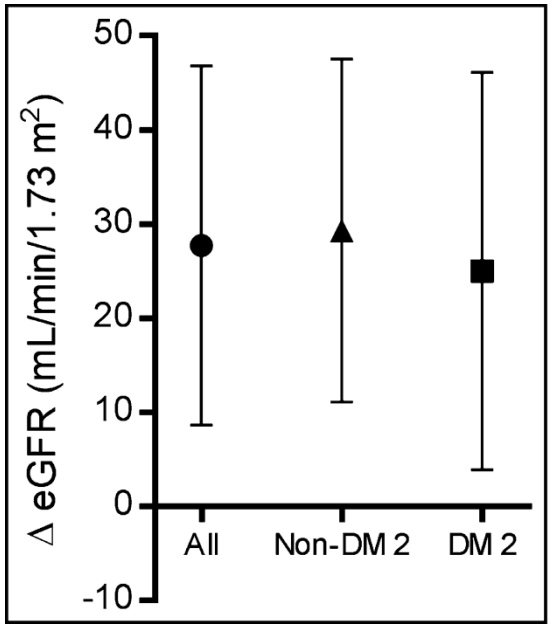
- prospective, longitudinal study of patients with CKD (stages 2 – 4) and refractory hypertension treated with RA denervation

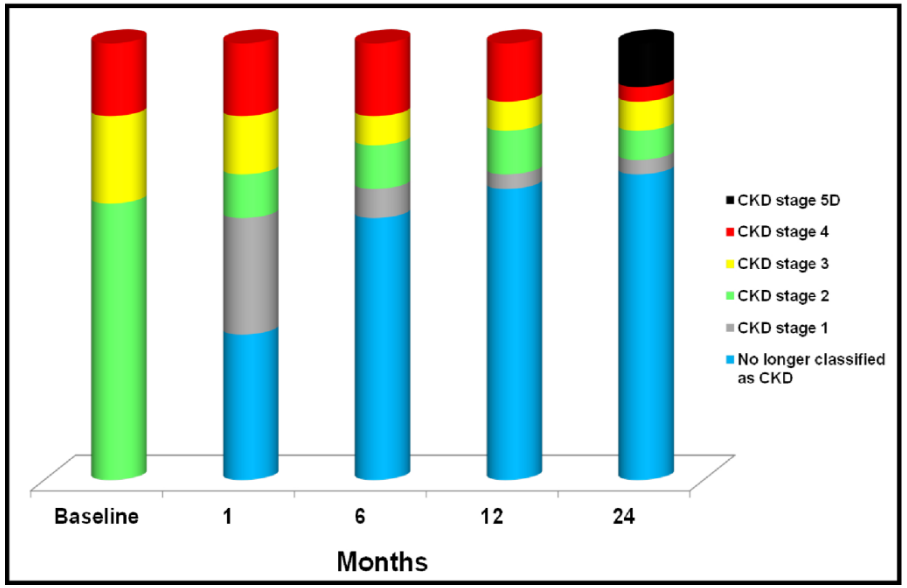
- 4.6 ± 1.3 medicationa

2. 9 (5-14 ablations/artery)

3. n=30, follow-up 24 months







- Reduction of microalbuminuria
- Reduction of BP
- Reduction of meds to 3.2 ±1.3

Am. J. Hypertens., 18 (2016), pp. 190-196

Identification of the right patients

1. Clinical
    - Obesity
    - OSA
    - Self-reported chronic stress
    - Morning BP surge
    - Elevated HR
    - CKD
    - HF
    - AFib
2. Laboratory tests
    - Plasma/urine NE levels
3. Physiology testing
    - HRV
    - Nerve activity
    - Arterial pulse vave velocity

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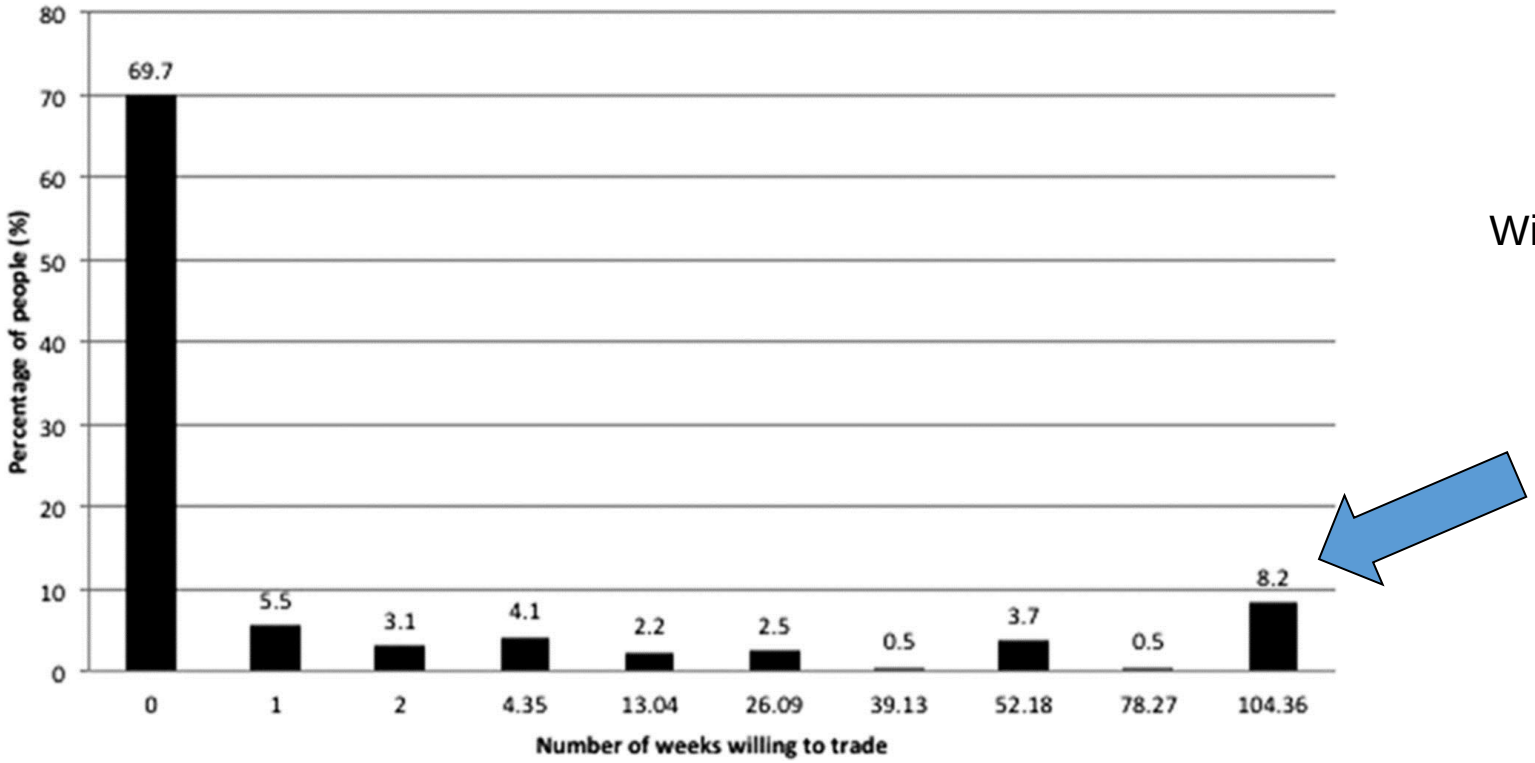
Not widely available

Not well standardized

Costly

Not supported by clinical trials

Patients preference



Willing to trade 2 years of life for not taking 1 additional pill

Circ Cardiovasc Qual Outcomes. 2015;8:155-163

Who should not have RDN

1. Isolated systolic hypertension ?
2. Secondary hypertension
3. White-caoat hypertension
4. High risk anatomy (RAS, AAA, small accessory arteries)

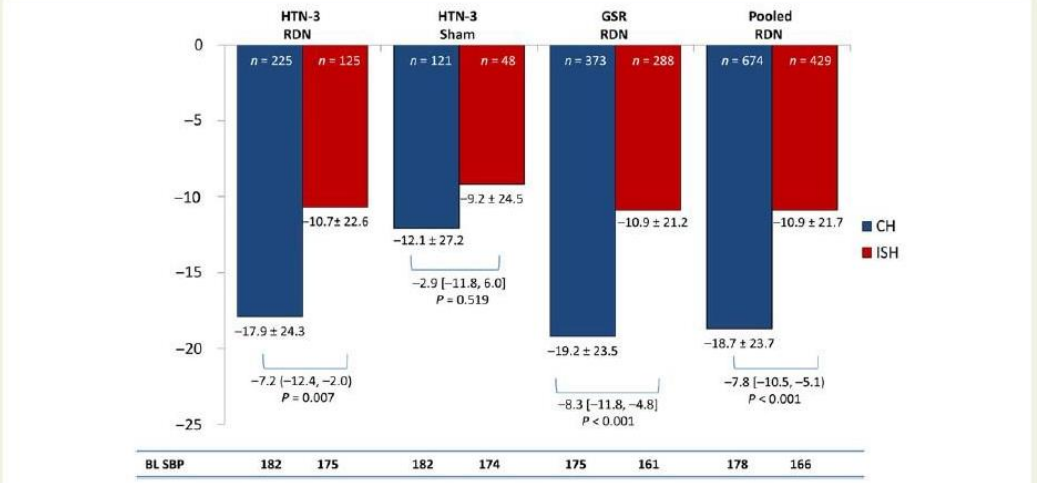


Figure 1 Office systolic blood pressure change at 6 months. BL, baseline; CH, combined (systolic–diastolic) hypertension; GSR, Global SYMPLICITY Registry; HTN-3, SYMPLICITY HTN-3 trial; ISH, isolated systolic hypertension; RDN, catheter-based renal denervation.

Table 27 Incidence and typical causes of secondary hypertension according to age

Age group	Per cent with underlying cause	Typical causes
Young children (<12 years)	70–85	• Renal parenchymal disease • Coarctation of the aorta • Monogenic disorders
Adolescents (12–18 years)	10–15	• Renal parenchymal disease • Coarctation of the aorta • Monogenic disorders
Young adults (19–40 years)	5–10	• Renal parenchymal disease • Fibromuscular dysplasia (especially in women) • Undiagnosed monogenic disorders
Middle-aged adults (41–65 years)	5–15	• Primary aldosteronism • Obstructive sleep apnoea • Cushing's syndrome • Phaeochromocytoma • Renal parenchymal disease • Atherosclerotic renovascular disease
Older adults (>65 years)	5–10	• Atherosclerotic renovascular disease • Renal parenchymal disease • Thyroid disease

Mahfoudet al, EHJ 2016
Williams et al, EHJ, 2018

Conclusions

1. Patients with primary HTN
2. Resistant to medical therapy (meeting inclusion criteria of RDN trials)
3. Intolerance of meds
4. Non-compliant
5. Patients preference

Conclusions

1. Patients with primary HTN
2. Resistant to medical therapy (meeting inclusion criteria of RDN trials)
3. Intolerance of meds
4. Non-compliant
5. Patients preference
6. Patients likely to have particular benefits („neurogenic” HTN)
    1. Afib
    2. HF
    3. Younger patients
7. Renal HTN