How to select patients for renal denervation therapy

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Implementation of renal denervation programme

Overcoming the interventionalists natural thought processes!

Implementation of renal denervation programme

Interventionalists “vision”

Implementation of renal denervation programme

Interventionalists “vision”

recruitment

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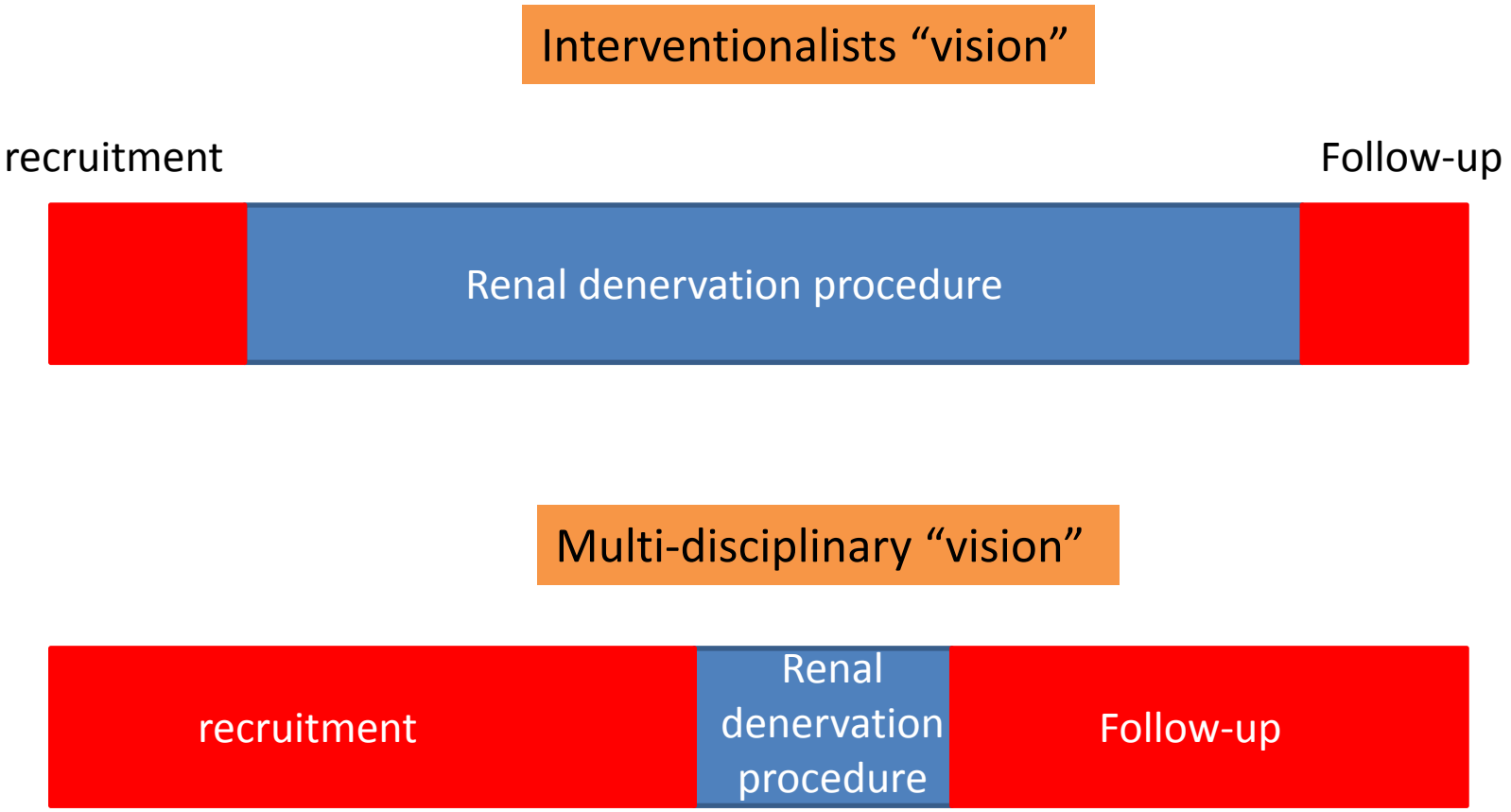

Implementation of renal denervation programme

Denervation specialist nurse

Multi-disciplinary team

Interventional operators / study principal investigators

Implementation of renal denervation programme

Denervation specialist nurse

- Oversee patient recruitment
- Ensure continuity of care
- Follow-up

Multi-disciplinary team

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Implementation of renal denervation programme

Denervation specialist nurse

- Oversee patient recruitment
- Ensure continuity of care
- Follow-up

Multi-disciplinary team

- Identify resistant hypertension
- Within the catheter lab

Interventional operators / study principal investigators

Patient Identification

- ***Vetting of patients*** through physicians with expertise in hypertension management is essential to determine appropriateness for procedure and for pre- and post-procedural care

- Close ***co-operation*** between hypertension expert/referring physician and interventionist is required

Blood Pressure Goals

Patient Type	*Goal BP (mm Hg)*
Uncomplicated hypertension[1-3]	<140/90
Renal disease[1-3]	<130/80
Diabetes[1-3]	<130/80
High CAD risk[2,3]	<130/80

CAD = coronary artery disease.

Sources:

1. Chobanian AV, et al. *Hypertension*. 2003;42:1206-1252. (JNC)
2. Mancia G, et al. *J Hypertens*. 2007;25:1751-1762. (ESH/ESC)
3. Mancia G, et al. *J Hypertens*. 2009;27(11):2121-2158. (ESH)

Despite Treatment, Many Patients With Hypertension Do Not Achieve Blood Pressure Control

Established Market Economies (EME)

			Hypertension			Treated Hypertensives
Country	**Study Year**	**Age Range**	**Aware (%)**	**Treated (%)**	**Controlled (%)**	**Controlled (%)**
United States	1999-2000	18-80+	68.9	58.4	31.0	53.1
Canada	1986-1992	18-74	58.0	39.0	16.0	41.0
Spain	1990	35-64	44.5	32.0	5.0	15.5
England	1998	16-75	46.2	31.8	9.3	29.2
Germany	1994-1995	25-74	59.5	35.1	11.8	33.6
Greece	1997	18-90	60.8	54.5	27.0	49.5
Japan	1980	30-74	–	40.5 (M) 54.5 (W)	23.6 (M) 36.0 (W)	55.7 (M) 65.4 (W)

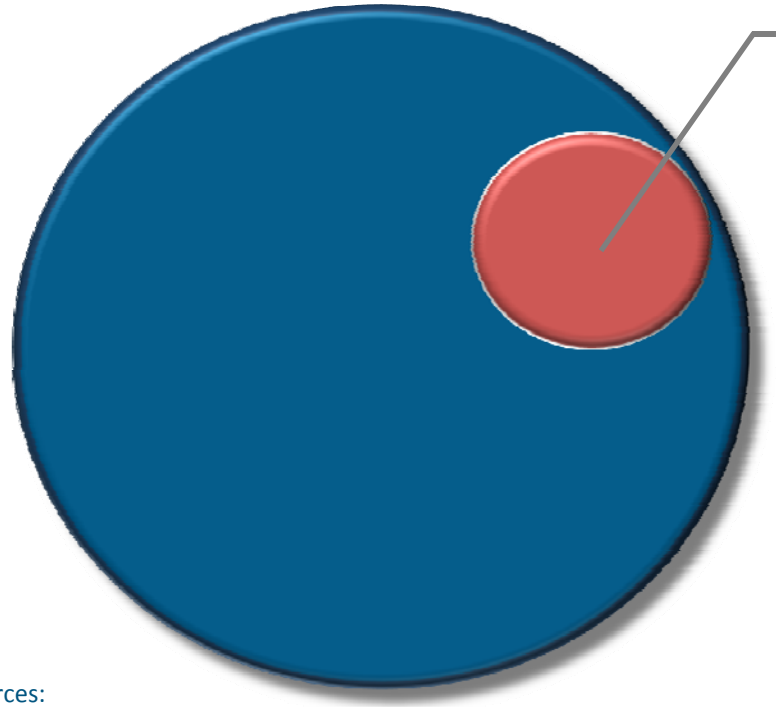
M = men.
W = women.
Source: Kearney PM, et al. *J Hypertens*. 2004; 22:11-19.

Management of Hypertension

Definition of Resistant Hypertension

Uncontrolled Hypertension

- Includes all patients who lack BP control on treatment, including those on inadequate treatment regimes, those with poor adherence, those with undetected secondary hypertension, as well as those with true treatment resistance[1]



Resistant Hypertension

- BP that remains above goal in spite of compliance with full doses of ≥3 anti-hypertensive medications of different classes; ideally, 1 of the 3 agents should be a diuretic[1]
  - The treatment plan must include attention to lifestyle measures[2]
- Includes those patients who achieve BP control but require ≥4 antihypertensive agents to do so[1]

Sources:

1. Calhoun DA, et al. *Circulation*. 2008;117(25):e510-e526.
2. Mancia G, et al. *Eur Heart J*. 2007 Jun;28(12):1462-1536.

What does resistant hypertension ***really*** mean for your patients?

Evaluation of Resistant Hypertension

Confirmation Treatment Resistance

Office BP >140/90 or 130/80 mm Hg in patients with diabetes or chronic kidney disease

and

Patient prescribed 3 or more antihypertensive medications at optimal doses, including if possible a diuretic

or

Office BP at goal but patient requiring 4 or more antihypertensive medications

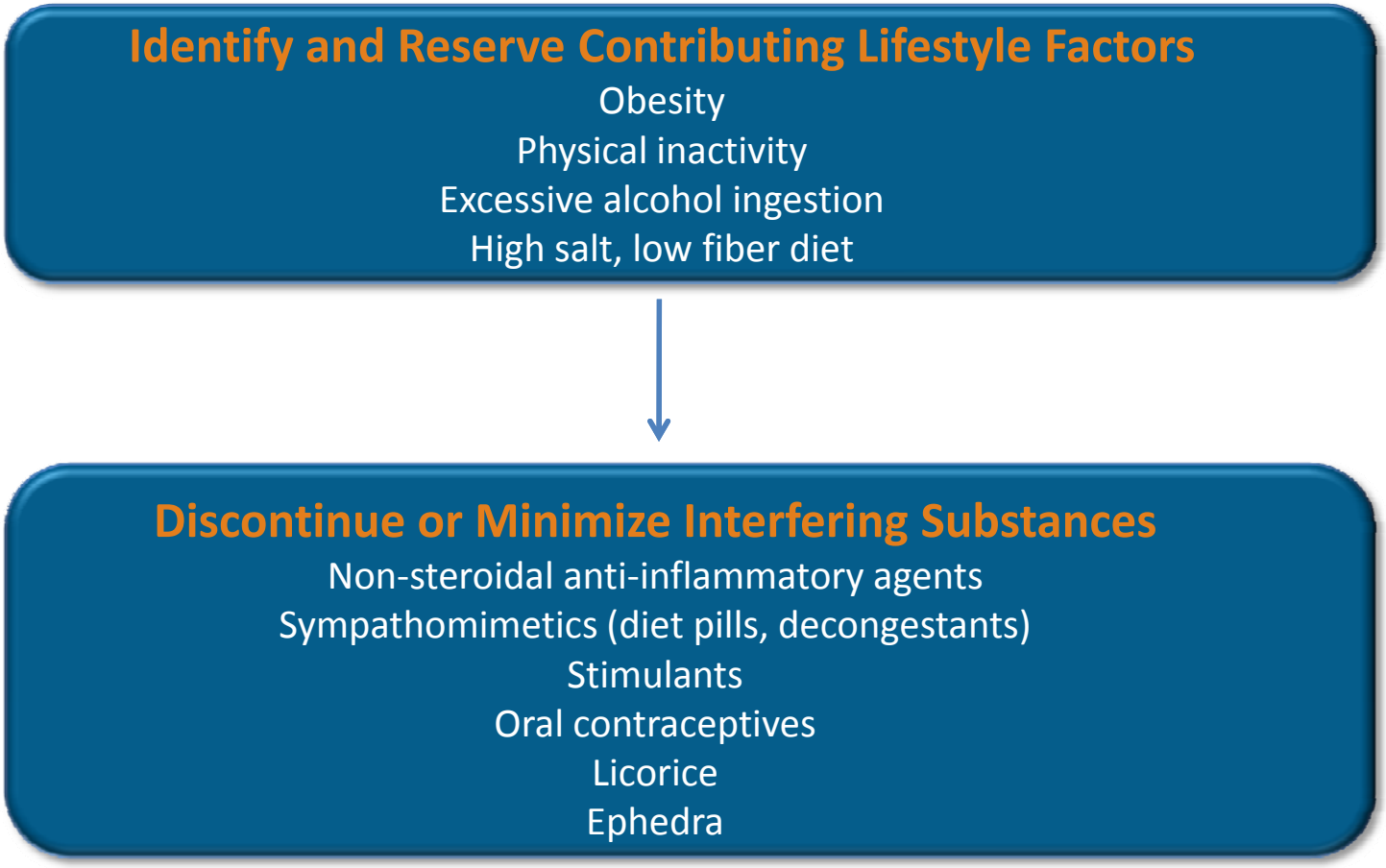
Exclude Pseudoresistance

Is patient adherent with prescribed regimen?

Obtain home, work, or ambulatory BP readings to exclude white coat effect

Source: Calhoun DA et al. *Circulation.* 2008;117;e510-e526

Evaluation of Resistant Hypertension (cont)



Source: Calhoun et al. *Circulation.* 2008;117;e510-e526

Evaluation of Resistant Hypertension (cont)

Screen for Secondary Causes of Hypertension

Obstructive sleep apnea

Primary aldosteronism

Chronic kidney disease

Renal artery stenosis

Pheochromocytoma

Cushing's syndrome

Aortic coarctation

Source: Calhoun et al. *Circulation.* 2008;117;e510-e526

Management of Resistant Hypertension

Pharmacologic Treatment

Maximize diuretic therapy, including possible addition of mineralocorticoid receptor antagonist

Combine agents with different mechanisms of action

Use of loop diuretics in patients with chronic kidney disease and/or patients receiving potent vasodilators (eg, minoxidil)

Refer to Specialist

Refer to appropriate specialist for known or suspected secondary cause(s) of hypertension

Refer to hypertension specialist if BP remains uncontrolled after 6 months of treatment

Source: Calhoun et al. *Circulation.* 2008;117;e510-e526

Appropriate Patient Selection

- Resistant Hypertension
  - Elevated systolic office blood pressure (BP) ≥160 mm Hg
  - ≥3 antihypertensive medications (including 1 diuretic)
- Estimated glomerular filtration rate (eGFR) of ≥45mL/min/1.73m^2
- Age ≥18

Sources:
1. Symplicity HTN-1 Investigators. *Hypertension*. 2011;57:911-917.
2. Symplicity HTN-2 Investigators. *Lancet*. 2010;376:1903-1909.

Appropriate Patient Selection (cont)

Patients in these categories require increased scrutiny. Patients who…

1. are pregnant, nursing, or planning to become pregnant
2. are diagnosed with Type I diabetes mellitus
3. are at risk if BP is reduced, (eg, those with hemodynamically significant valvular heart disease)
4. have prior renal angioplasty, indwelling renal stents, or aortic graphs
5. have implantable pacemakers and implantable cardioverter/defibrillators (ICDs) may be adversely affected by radio frequency (RF) ablation
6. have renal arteries with less than 4 mm in diameter
7. have significant disease or flow-limiting obstructions

Sources:
1. Symplicity HTN-1 Investigators. *Hypertension*. 2011;57:911-917.
2. Symplicity HTN-2 Investigators. *Lancet*. 2010;376:1903-1909.
3. Symplicity Catheter [instructions for use]. Medtronic, Inc., Mountain View, CA; 2010.

"*Rats in a cage*" – modern life predisposes to chronic sympathetic over activity

Sympathetic over activation

Arrhythmias

Hypertrophy

Hypertension

Insulin resistance

Modulation of Chemoreceptors

Sleep apnoea

Heart Failure

Regulation of neuro-hormonal activity

Common misconceptions

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"I am an ***experienced operator*** they won't feel any pain"

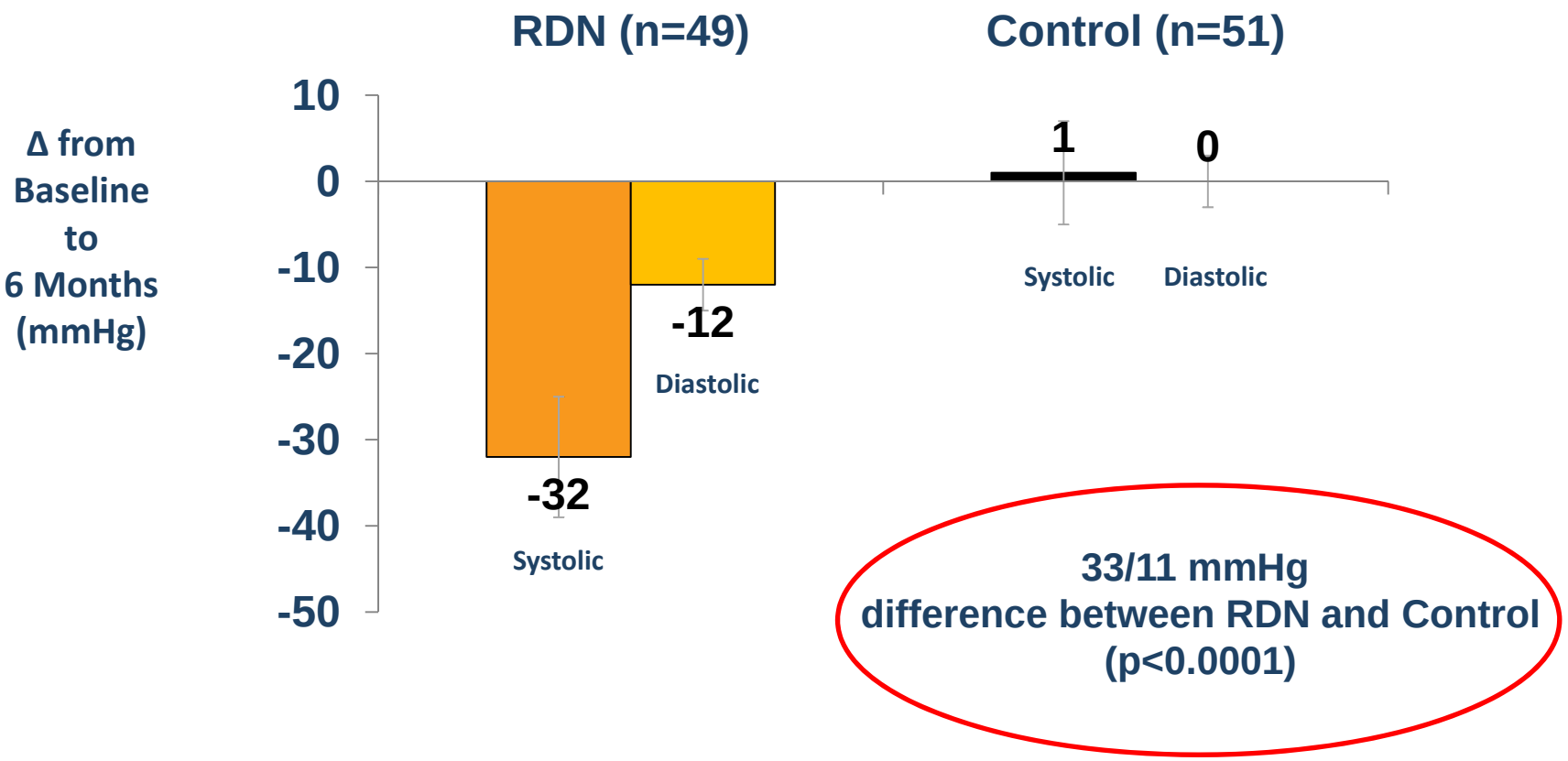
Common misconceptions

"I have ***hundreds*** of suitable patients ready to go"

"I am an ***experienced operator*** they won't feel any pain"

"We need to get this patient ***denervated as an emergency***"

Primary Endpoint: 6-Month Office BP



- 84% of RDN patients had ≥ 10 mmHg reduction in SBP
- 10% of RDN patients had no reduction in SBP

Symplicity HTN-2 Investigators. The Lancet 2010: 376:1903-1909