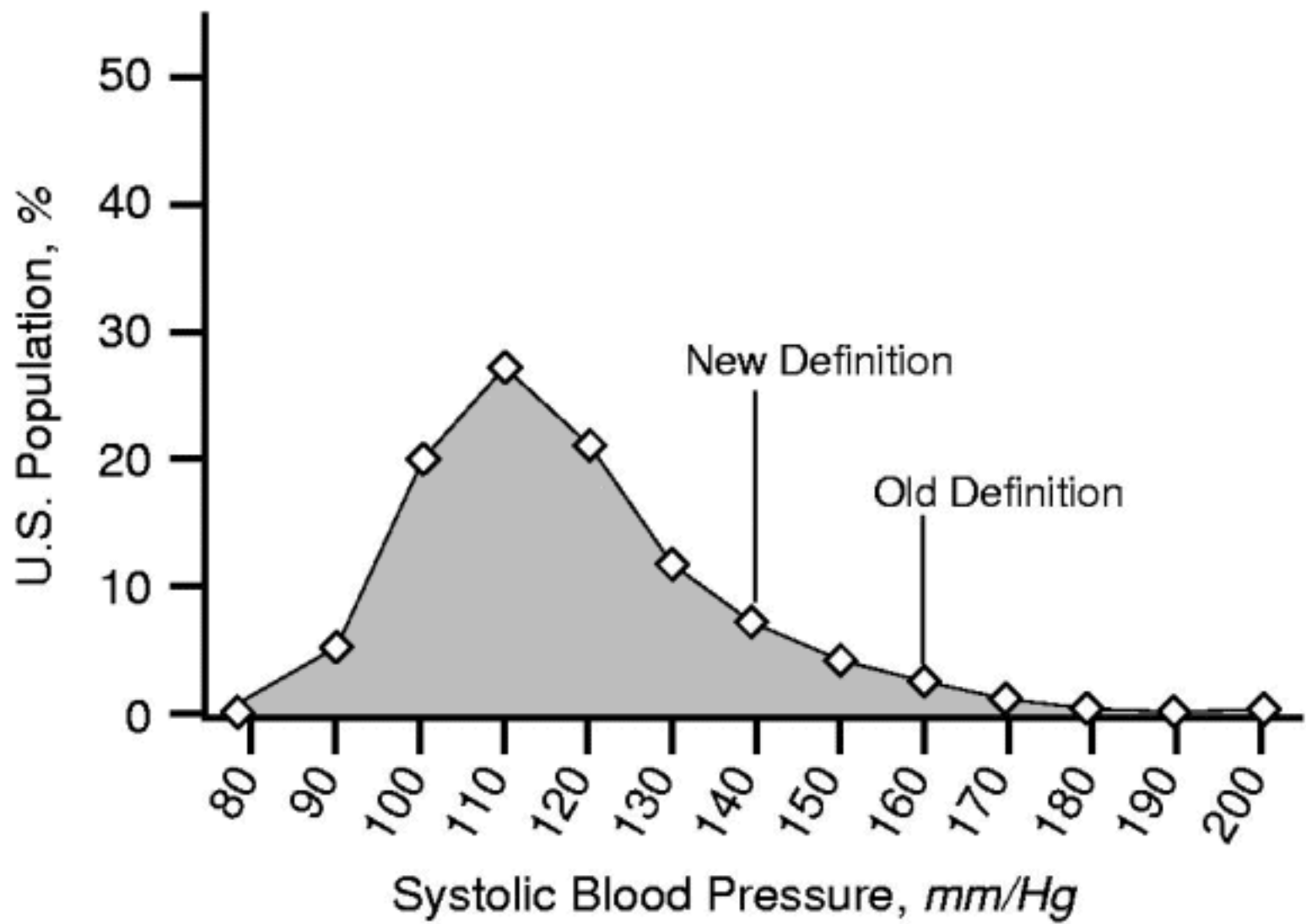


Hypertension and its management

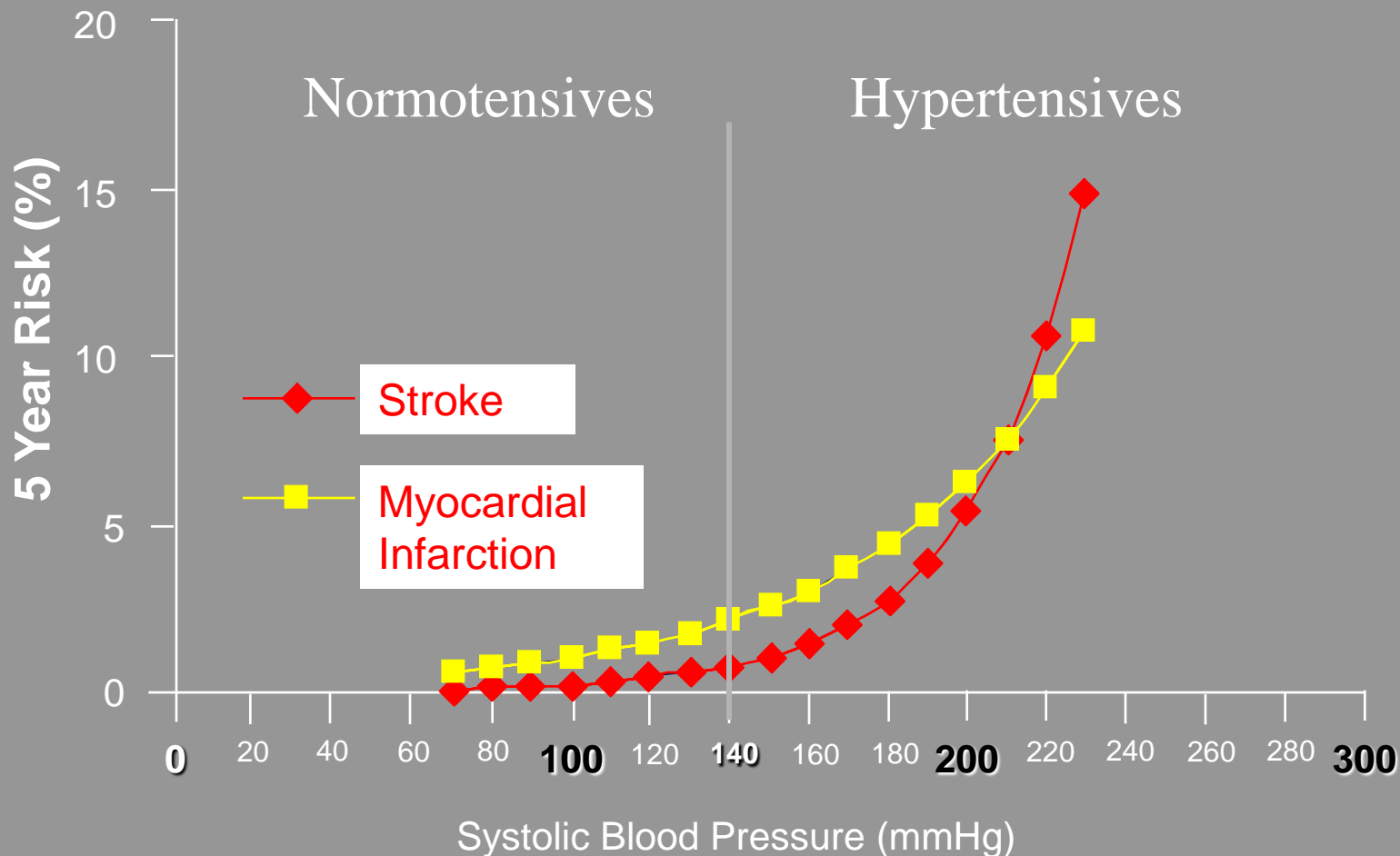
Indranil Dasgupta

Consultant Nephrologist, Heartlands Hospital

Honorary Senior Lecturer, University of Birmingham, UK



Differing influence of hypertension on absolute and relative risk of stroke and MI



BHS Classification of BP Levels

Category	Systolic BP (mmHg)	Diastolic BP (mmHg)
Optimal BP	<120	<80
Normal BP	<130	<85
High Normal BP	130-139	85-89
Grade 1 Hypertension (mild)	140-159	90-99
Subgroup: Borderline	140-149	90-94
Grade 2 Hypertension (moderate)	160-179	100-109
Grade 3 Hypertension (severe)	\geq 180	\geq 110
Isolated Systolic Hypertension	\geq 140	<90
Subgroup: Borderline	140-149	<90

Threshold levels of BP for the diagnosis of Hypertension according to measurement method

	SBP (mmHg)	DBP (mmHg)
Office	≥ 140	≥ 90
Self/home Monitoring	Cut off 5/5 mmHg lower by ABP and HBP	
Ambulatory BP Monitoring Day	> 135	> 85
Ambulatory BP Monitoring Night	> 120	> 75
Ambulatory 24 hr BP Monitoring	> 130	> 80

Prevalence of hypertension and its impact

- The global prevalence of hypertension in adults was 26% in 2000 and is projected to go up to 29% in 2025 (1-5% in children)
- 36% in the UK
- It is estimated to contribute to
 - 62% of all strokes,
 - 49% of heart disease
 - 7.1 million or 13% of all deaths annually.
 - 57 million disability adjusted life years (DALYs).

The risk

- Hypertension is a major risk factor for
 - Stroke 33%
 - MI 25%
 - Heart failure
 - Kidney failure (cost of dialysis £30k/patient/yr)
 - Premature death
 - Cognitive impairment
- **2 mmHg rise in BP increases stroke mortality by 10% and from MI by 7%**

Risk reduction by treatment

Systolic blood pressure (SBP)¹



**10 mmHg
reduction
in SBP**



**40-50%
reduced
risk of
stroke
in those
under 60**

Diastolic blood pressure (DBP)²



**10 mmHg
reduction
in DBP**



**37%
reduced
risk of
CHD**

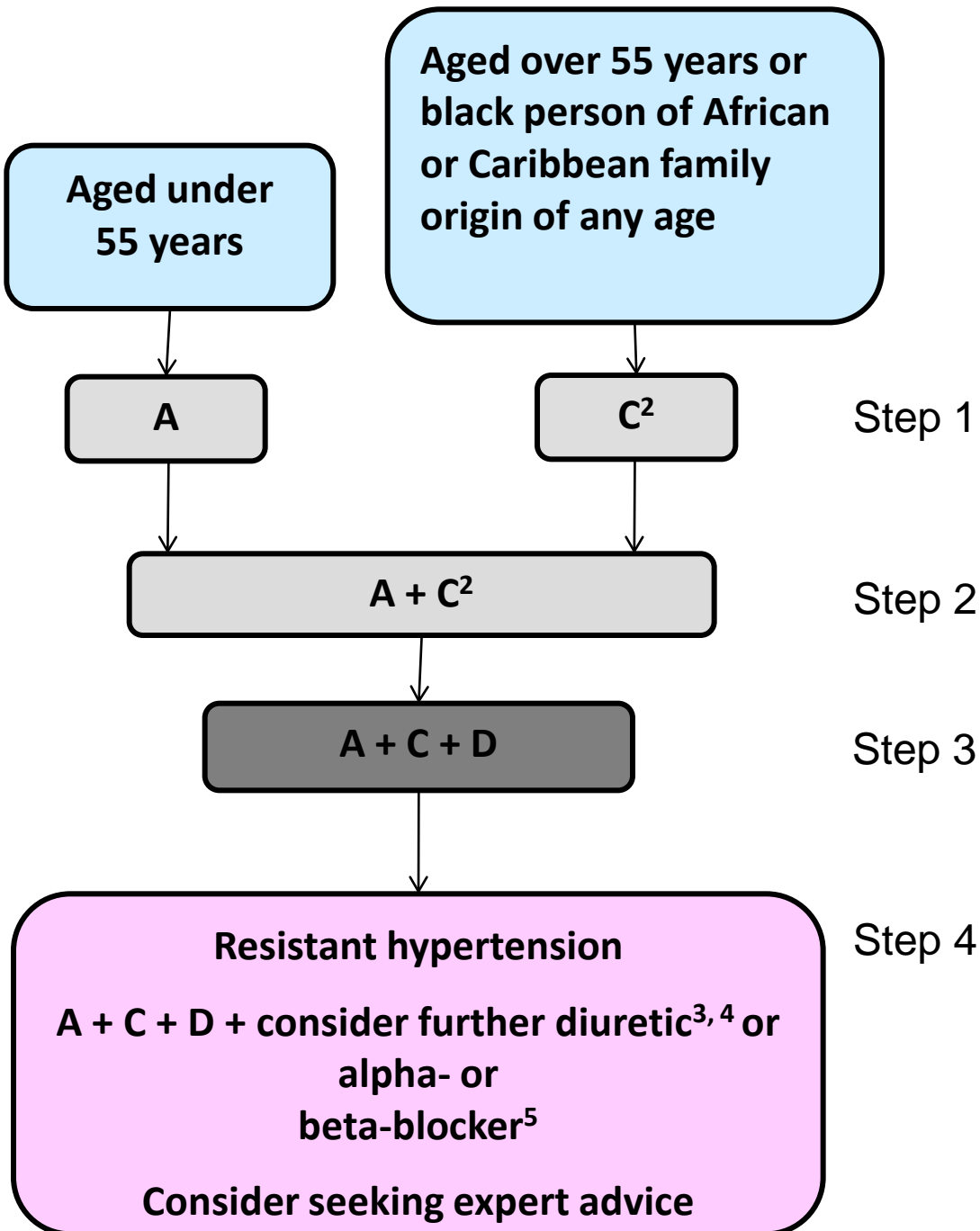


**56%
reduced
risk of
stroke**

References

1. Lawes CM *et al* Blood pressure and stroke: an overview of published reviews. *Stroke* 2004;35:776-85
2. NICE Guideline 18 (June 2004); MacMahon S *et al* Blood pressure, stroke and coronary heart disease. Part 1, prolonged differences in blood pressure: prospective observational studies corrected for regression dilution bias. *Lancet* 1990;335:765-74

Summary of antihypertensive drug treatment



Key

A – ACE inhibitor or angiotensin II receptor blocker (ARB)¹

C – Calcium-channel blocker (CCB)

D – Thiazide-like diuretic

See slide notes for details of footnotes 1-5

NICE hypertension update 2011

- If high BP identified in GP surgery – patient should be referred for 24 hour ambulatory BP monitoring to rule out white-coat hypertension
- WCH is present in 15-30% of general population and 50% of treated hypertensives
- If patient does not tolerate ABPM – patients should be asked to monitor BP at home (HBPM) using a validated machine – 2 readings am and pm for 7 days

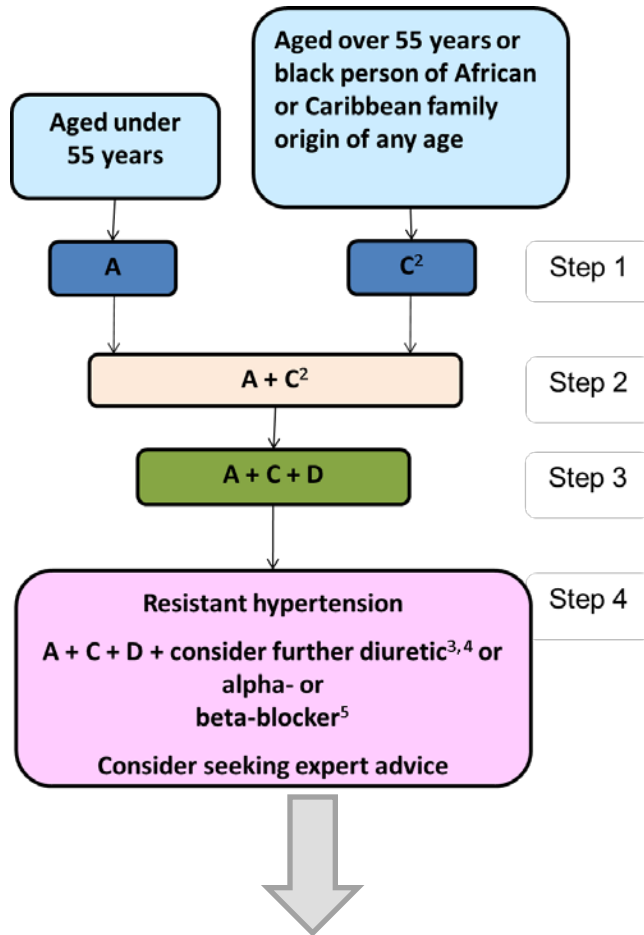
A case history

- 46 year old, African Caribbean, male
- Referred with BP 180/106
- On amlodipine 10 mg, Lisinopril 20 mg, Bendrofluomethiazide 2.5 mg, Doxazosin 16 mg
- ABPM: daytime mean BP 170/100, echo LVH
- Change BFZ to furosemide 40 mg
- 3/12 - BP 176/ 104, add Spironolactone 25 mg
- 3/12 – BP 172/102, add moxonidine 400 mg
- 3/12 – BP 170/102

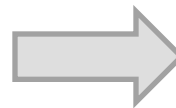
Resistant Hypertension

- 36% of the UK population have hypertension
- Resistant hypertension = uncontrolled BP (>140/90) despite taking > 3 agents
- Health Survey of England 2008 – 30% men and 35% of women hypertensives have resistant hypertension
- **True resistance 10 – 15%**

Current management pathway for resistant hypertension



- 24 hr ambulatory BP to confirm resistance
- Exclude secondary hypertension
- Add further medication

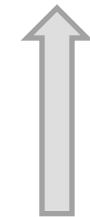


Non-compliance

- Drug efficacy clinic/ admit for 2 days
- Supervised administration of drugs
- 24 hr BP

**Add further med/
device based treatment**

True drug resistance



Spironolactone versus placebo, bisoprolol, and doxazosin to determine the optimal treatment for drug-resistant hypertension (PATHWAY-2): a randomised, double-blind, crossover trial

*Bryan Williams, Thomas M MacDonald, Steve Morant, David J Webb, Peter Sever, Gordon McInnes, Ian Ford, J Kennedy Cruickshank, Mark J Caulfield, Jackie Salsbury, Isla Mackenzie, Sandosh Padmanabhan, Morris J Brown, for The British Hypertension Society's PATHWAY Studies Group**

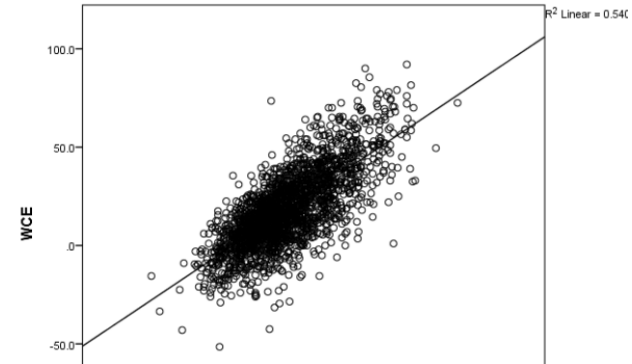
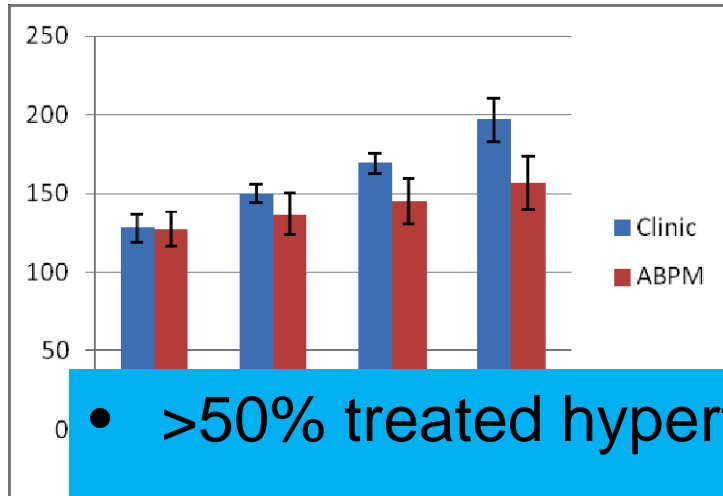
- Trial in RH patients
- Spironolactone most effective
- 8.7 mmHg drop Vs. Placebo
- 4.26 mmHg drop Vs. mean of bisoprolol and doxazosin
- Implicates primary role of sodium retention in patient with RH.

Causes of resistance to anti-hypertensive treatment

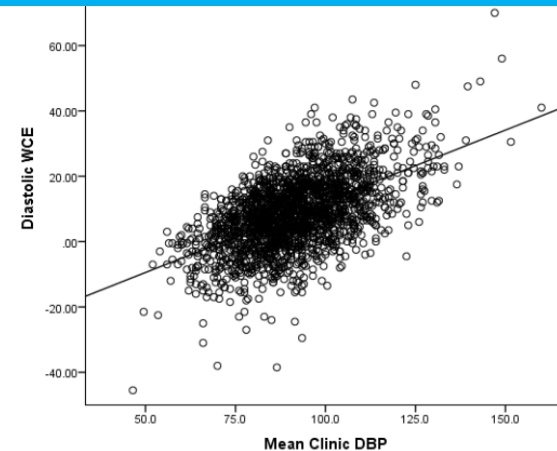
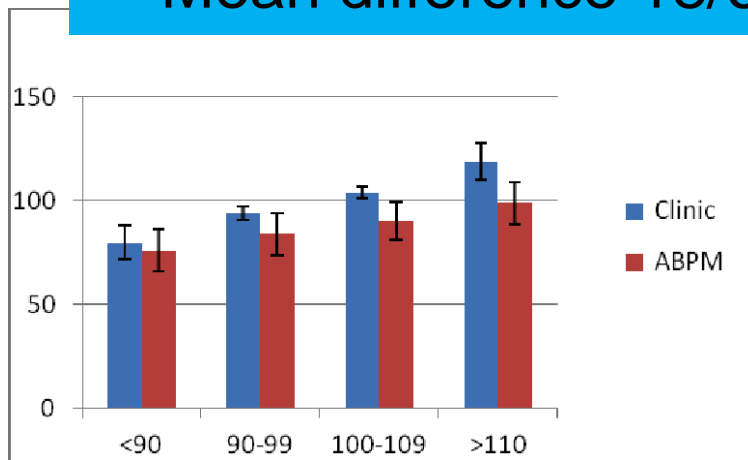
- White coat effect (apparent resistance)
 - Often superimposed on essential hypertension
- Non-adherence to medication
 - Unintentional – multiple AH drug intolerance
 - Intentional – overt or covert
- High salt intake
- Use of concomitant medication, e.g. NSAID
- Secondary hypertension
 - Renal disease, Conn's, Cushing's, Pheochromocytoma
- Truly resistant hypertension

Prevalence and determinants of white coat effect in a large UK hypertension clinic population.

Thomas O, Shipman KE, Day K, Thomas M, Martin U, Dasgupta I.
J Hum Hypertens. 2015 Sep 17



- >50% treated hypertensive patients have WCE
- Mean difference 18/6 mmHg between clinic and ABPM



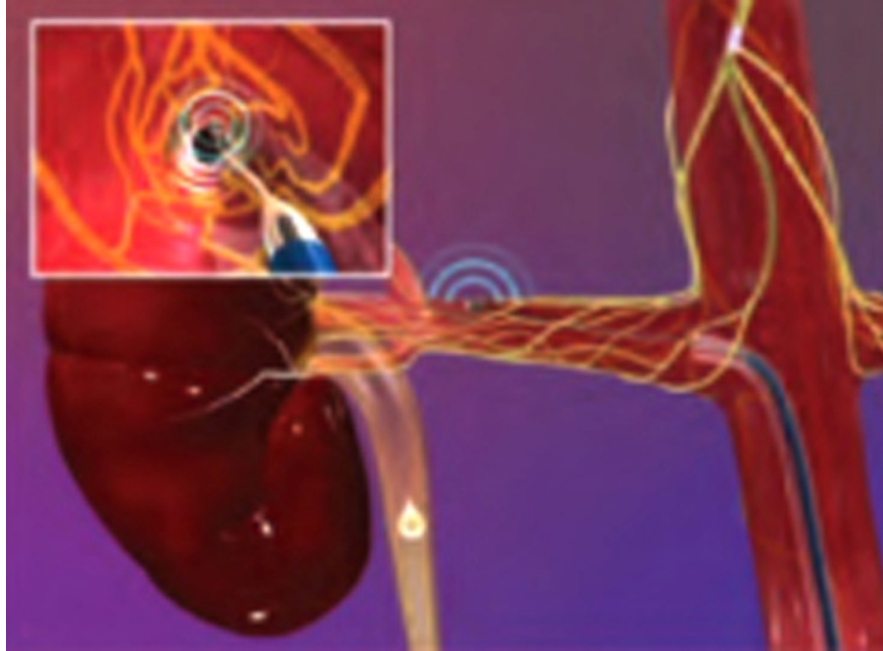
N=2056, F = 53%, Caucasian 76%, 85% on treatment

Secondary hypertension

- Renal (>95%)
 - Renal parenchymal disease
 - Reno-vascular disease – fibromuscular dysplasia, atherosclerotic (commoner, in patients with PVD)
- Adrenal
 - Conn's syndrome
 - Cushing's syndrome
 - pheochromocytoma
- Others
 - Acromegaly
 - Coarctation of aorta

DEVICE-BASED TREATMENTS

Renal sympathetic denervation



- Catheter based
- Radio frequency ablation

Renal Denervation in Patients With Uncontrolled Hypertension and Confirmed Adherence to Antihypertensive Medications

Mohammed Awais Hameed, MBChB;¹ Mark Pucci, MBChB;² Una Martin, PhD;^{2,3} Richard Watkin, MD;¹ Sagar Doshi, MD;² Jonathan Freedman, MBChB;¹ Peter Riley, MBChB;² Jonathan Townsend, MBChB;² Paul Crowe, MBBCh;¹ Graham Lipkin, MD;² Indranil Dasgupta, DM¹

From the Heart of England NHS Foundation Trust;¹ University Hospitals Birmingham NHS Foundation Trust,² and College of Medical and Dental Sciences, University of Birmingham, Birmingham, UK³

- Experience of RDN in Birmingham
 - Real-life experience
 - Report on the safety and efficacy outcomes
-
- 34 patients in total across the 2 sites
 - Mean BP >180/100 mmHg
 - >5 drugs on average

50% patients responded

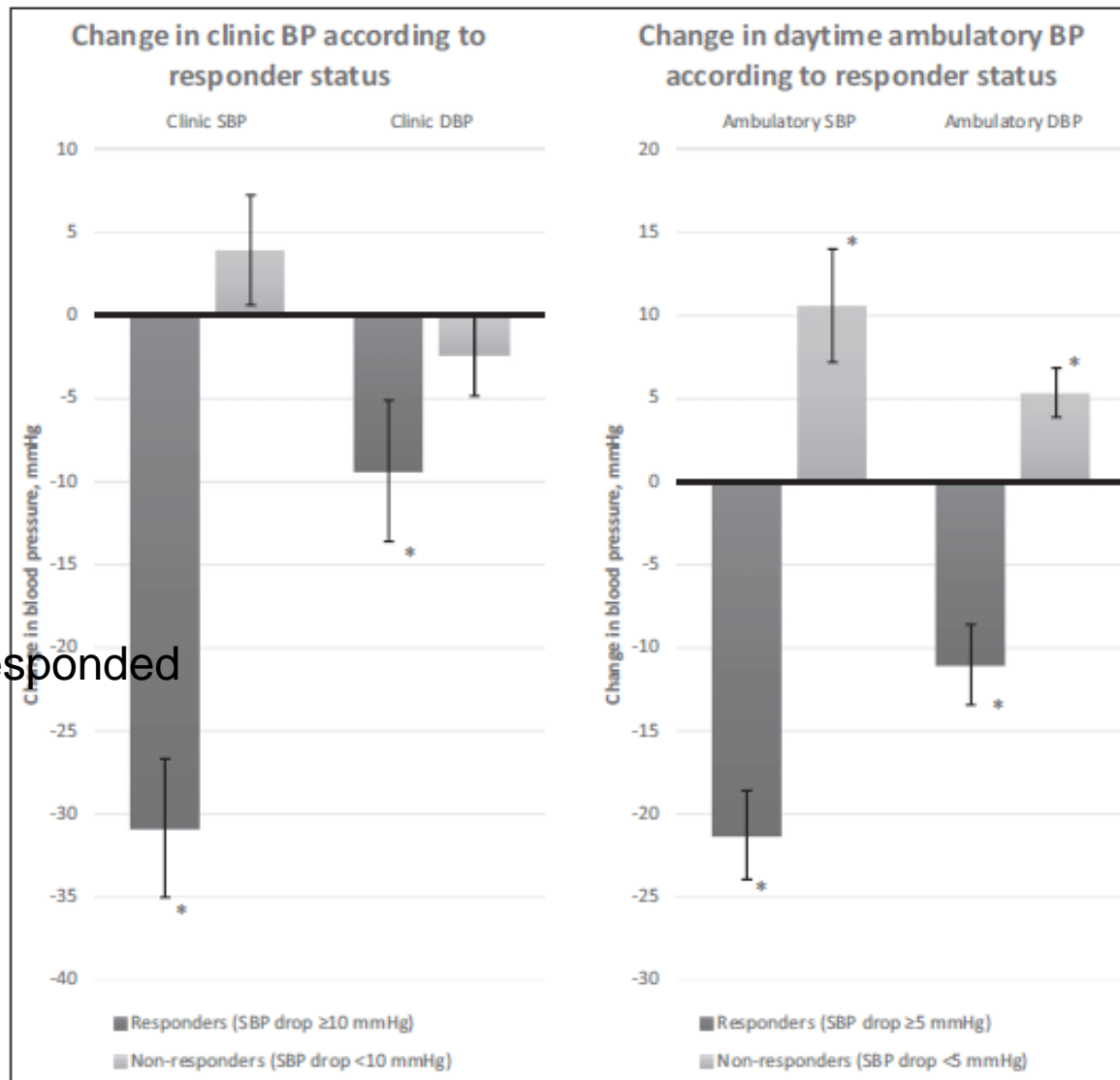
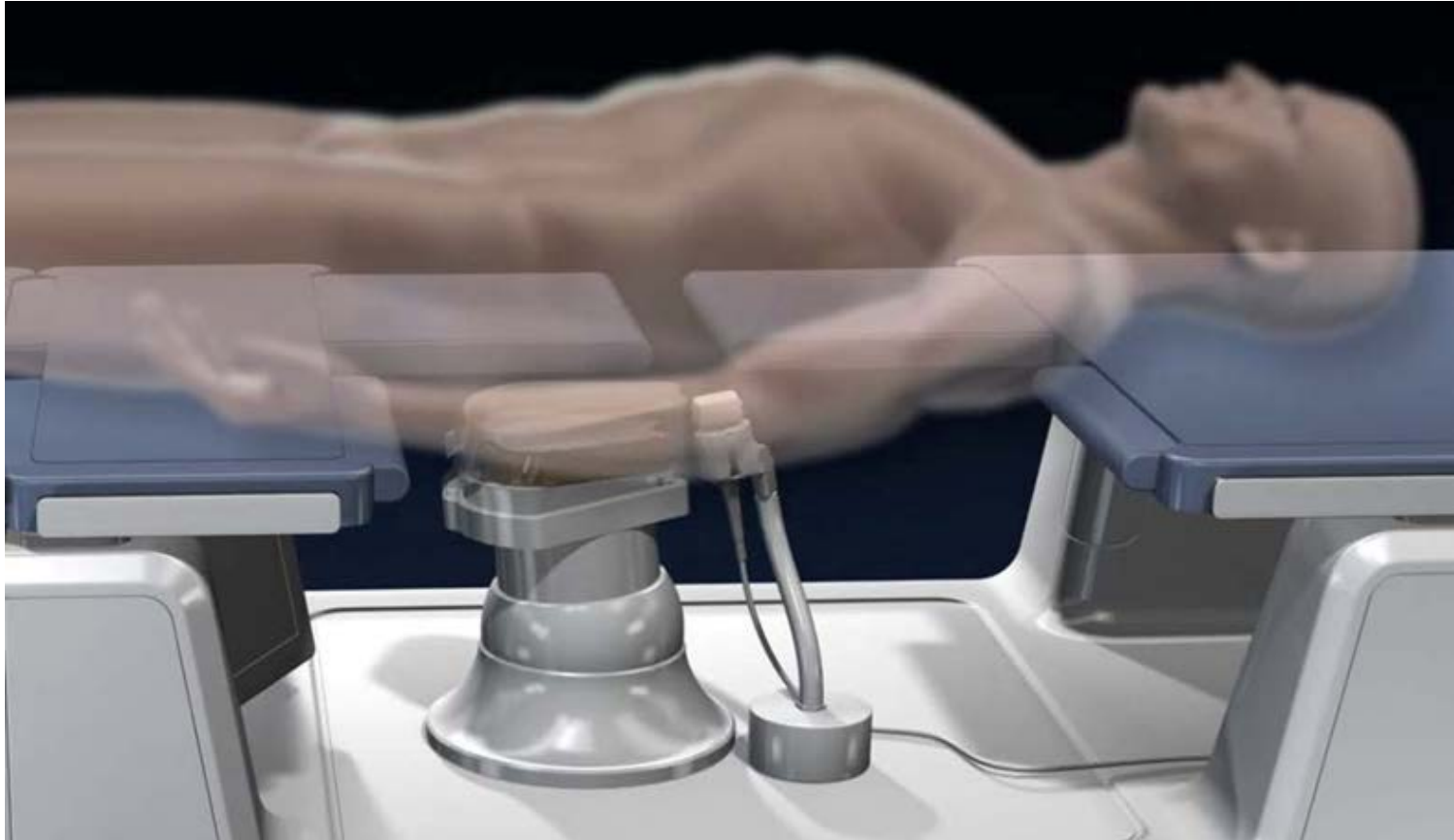


FIGURE. Change in clinic blood pressure (BP) (left) and day ambulatory BP (right) according to responder status. The two graphs show the mean BP changes in responders and nonresponders based on the reduction achieved in either clinic BP (responder defined as BP drop ≥ 10 mm Hg and nonresponder as BP drop < 10 mm Hg) or daytime ambulatory BP (responder defined as BP drop ≥ 5 mm Hg and nonresponder as BP drop < 5 mm Hg). The I bars indicate standard error of the mean. *Indicates statistically significant change ($P < .05$). SBP indicates systolic blood pressure; DBP, diastolic blood pressure.

Ultrasound Renal Denervation

- KONA WAVE IV clinical trial in progress cross Europe and Australia
- Sham-controlled
- Non-invasive
- High Frequency US based ablation of renal nerves
- Completed first round of treatment at BHH

KONA WAVE IV



Other Device

Central arteriovenous anastomosis for the treatment of patients with uncontrolled hypertension (the ROX CONTROL HTN study): a randomised controlled trial

*Melvin D Lobo, Paul A Sobotka, Alice Stanton, John R Cockcroft, Neil Sulke, Eamon Dolan, Markus van der Giet, Joachim Hoyer, Stephen S Furniss, John P Foran, Adam Witkowski, Andrzej Januszewicz, Danny Schoors, Konstantinos Tsioufis, Benno J Rensing, Benjamin Scott, G André Ng, Christian Ott, Roland E Schmieder, for the ROX CONTROL HTN Investigators**

- A-V fistula between artery and vein
- Iliac Vessels

Summary

- Hypertension: BP >140/90 (clinic), >135/85 (ABP)
- Prevalence 36% in the UK
- Commonest CV risk factor – contributes to 62% all strokes, 49% of heart dis, and 13% of all deaths
- Minor reduction in BP lowers CV death significantly
- WCH common – ABP or Home BP before start of Tx
- Life style advice should be offered first
- Start treatment with RAAS blocker for <55 years
- Spironolactone – probably best 4th line agent
- Device based treatment available for true resistance
- Target BP 140/90 but 130/80 for high risk patients