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AMERICAN COLLEGE of CARDIOLOGY

Cardiovascular Symposium India

# "Session 8: **Resistant Hypertension"**


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***No relevant disclosures***


J Assoc Physicians India. 2019 Dec;67(12):14-17.

# Resistant Hypertension in Clinical Practice in India: Jaipur Heart Watch

Rajeev Gupta [1], Krishna K Sharma [2], Shubham Soni [3], Nishant Gupta [4], Raghubir S Khedar [5]

Affiliations expand

**Conclusion:** Prevalence of resistant hypertension is high in a secondary-care practice in India. It is significantly greater among older patients and women.

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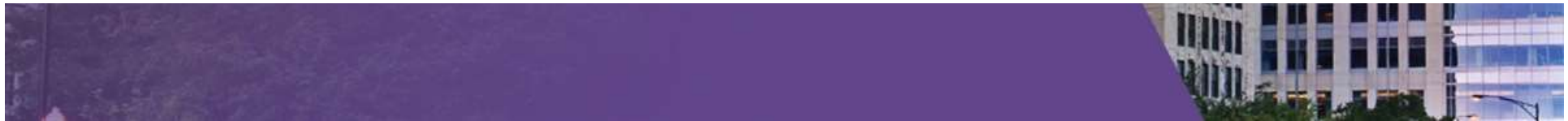


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The Imperative to
Treat Hypertension
As a strategy to
prevent heart failure

# Stages of Heart Failure

| STAGE A: At-Risk for Heart Failure | STAGE B: Pre-Heart Failure |
| --- | --- |
| Patients at risk for HF but without current or previous symptoms/signs of HF and without structural/functional heart disease or abnormal biomarkers.<br><br>Patients with HTN, CVD, diabetes, obesity, exposure to cardiotoxic agents, genetic variant for cardiomyopathy, or family history of cardiomyopathy. | Patients without current or previous symptoms/signs of HF but evidence of 1 of the following: structural heart disease, increased filling pressures, or risk factors and increased natriuretic peptide levels or cardiac troponin (in the absence of competing diagnosis) |


**Abbreviations:** CVD indicates cardiovascular disease; GDMT, guideline-directed medical therapy; HF, heart failure; HTN, hypertension; and NYHA, New York Heart Association.

American Heart Association.

Heidenreich, P. A. et al. (2022). 2022 AHA/ACC/HFSA Guideline for Heart Failure. *Circulation*.

NOVEMBER 26, 2015

# A Randomized Trial of Intensive versus Standard Blood-Pressure Control

The SPRINT Research Group*

| Outcome | Intensive Treatment | | Standard Treatment | | Hazard Ratio (95% CI) | P Value |
|---|---|---|---|---|---|---|
| | *no. of patients (%)* | *% per year* | *no. of patients (%)* | *% per year* | | |
| **All participants** | **(N=4678)** | | **(N=4683)** | | | |
| Primary outcome† | 243 (5.2) | 1.65 | 319 (6.8) | 2.19 | 0.75 (0.64–0.89) | <0.001 |
| Secondary outcomes | | | | | | |
| Myocardial infarction | 97 (2.1) | 0.65 | 116 (2.5) | 0.78 | 0.83 (0.64–1.09) | 0.19 |
| Acute coronary syndrome | 40 (0.9) | 0.27 | 40 (0.9) | 0.27 | 1.00 (0.64–1.55) | 0.99 |
| Stroke | 62 (1.3) | 0.41 | 70 (1.5) | 0.47 | 0.89 (0.63–1.25) | 0.50 |
| Heart failure | 62 (1.3) | 0.41 | 100 (2.1) | 0.67 | 0.62 (0.45–0.84) | 0.002 |
| Death from cardiovascular causes | 37 (0.8) | 0.25 | 65 (1.4) | 0.43 | 0.57 (0.38–0.85) | 0.005 |
| Death from any cause | 155 (3.3) | 1.03 | 210 (4.5) | 1.40 | 0.73 (0.60–0.90) | 0.003 |
| Primary outcome or death | 332 (7.1) | 2.25 | 423 (9.0) | 2.90 | 0.78 (0.67–0.90) | <0.001 |

**Patients at high risk for CV events, without diabetes, targeting a systolic BP of less than 120 mm Hg, compared with less than 140 mm Hg, resulted in lower rates of fatal and nonfatal major CV events and death from any cause.**

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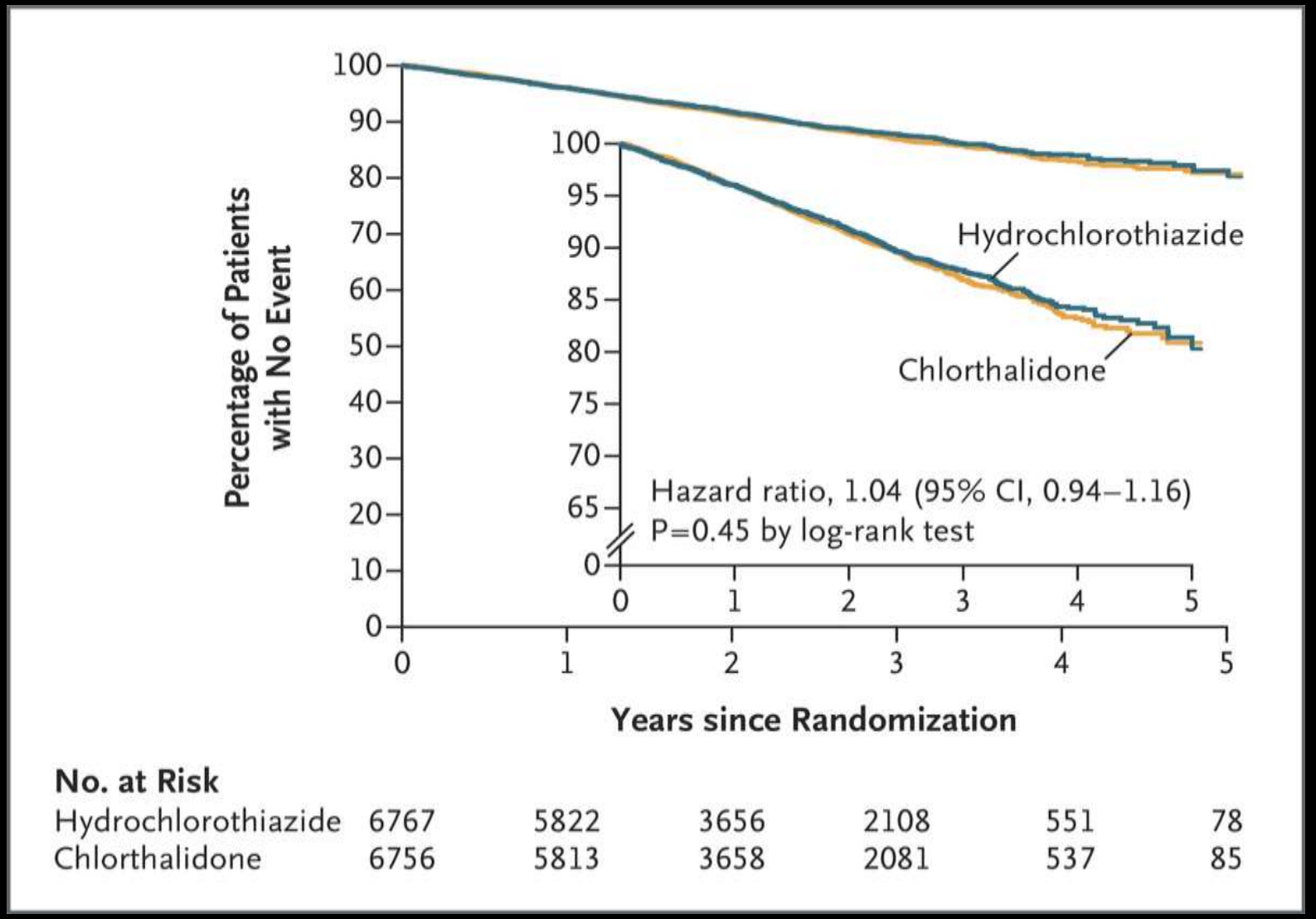
# Kaplan–Meier Survival Curve for the Primary Outcome.




**No. at Risk**

| | | | | | | |
|---|---|---|---|---|---|---|
| Hydrochlorothiazide | 6767 | 5822 | 3656 | 2108 | 551 | 78 |
| Chlorthalidone | 6756 | 5813 | 3658 | 2081 | 537 | 85 |

A Ishani et al. N Engl J Med 2022;387:2401-2410.

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Resistant
Hypertension
A guideline based
approach


# 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

FREE ACCESS

Clinical Practice Guideline

Paul K. Whelton, Robert M. Carey, Wilbert S. Aronow, Donald E. Casey, Karen J. Collins, Cheryl Dennison Himmelfarb, Sondra M. DePalma, Samuel Gidding, Kenneth A. Jamerson, Daniel W. Jones, Eric J. MacLaughlin, ... SEE ALL AUTHORS

J Am Coll Cardiol. 2018 May, 71 (19) e127–e248

# Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension*

| | Nonpharmacologi-cal Intervention | Dose | Approximate Impact on SBP | |
|---|---|---|---|---|
| | | | Hypertension | Normotension |
| Weight loss | Weight/body fat | Best goal is ideal body weight, but aim for at least a 1-kg reduction in body weight for most adults who are overweight. Expect about 1 mm Hg for every 1-kg reduction in body weight. | -5 mm Hg | -2/3 mm Hg |
| Healthy diet | DASH dietary pattern | Consume a diet rich in fruits, vegetables, whole grains, and low-fat dairy products, with reduced content of saturated and total fat. | -11 mm Hg | -3 mm Hg |
| Reduced intake of dietary sodium | Dietary sodium | Optimal goal is <1500 mg/d, but aim for at least a 1000-mg/d reduction in most adults. | -5/6 mm Hg | -2/3 mm Hg |
| Enhanced intake of dietary potassium | Dietary potassium | Aim for 3500–5000 mg/d, preferably by consumption of a diet rich in potassium. | -4/5 mm Hg | -2 mm Hg |

*Type, dose, and expected impact on BP in adults with a normal BP and with hypertension.
DASH indicates Dietary Approaches to Stop Hypertension; and SBP, systolic blood pressure.
Resources: Your Guide to Lowering Your Blood Pressure With DASH—How Do I Make the DASH?
Available at: https://www.nhlbi.nih.gov/health/resources/heart/hbp-dash-how-to.
Top 10 Dash Diet Tips. Available at: http://dashdiet.org/dash_diet_tips.asp

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# Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension* (cont.)

| | Nonpharmacological Intervention | Dose | Approximate Impact on SBP | |
|---|---|---|---|---|
| | | | Hypertension | Normotension |
| Physical activity | Aerobic | ● 90–150 min/wk<br>● 65%–75% heart rate reserve | -5/8 mm Hg | -2/4 mm Hg |
| | Dynamic resistance | ● 90–150 min/wk<br>● 50%–80% 1 rep maximum<br>● 6 exercises, 3 sets/exercise, 10 repetitions/set | -4 mm Hg | -2 mm Hg |
| | Isometric resistance | ● 4 × 2 min (hand grip), 1 min rest between exercises, 30%–40% maximum voluntary contraction, 3 sessions/wk<br>● 8–10 wk | -5 mm Hg | -4 mm Hg |
| Moderation in alcohol intake | Alcohol consumption | In individuals who drink alcohol, reduce alcohol† to:<br>● Men: ≤2 drinks daily<br>● Women: ≤1 drink daily | -4 mm Hg | -3 mm |

*Type, dose, and expected impact on BP in adults with a normal BP and with hypertension.
†In the United States, one "standard" drink contains roughly 14 g of pure alcohol, which is typically found in 12 oz of regular beer (usually about 5% alcohol), 5 oz of wine (usually about 12% alcohol), and 1.5 oz of distilled spirits (usually about 40% alcohol).


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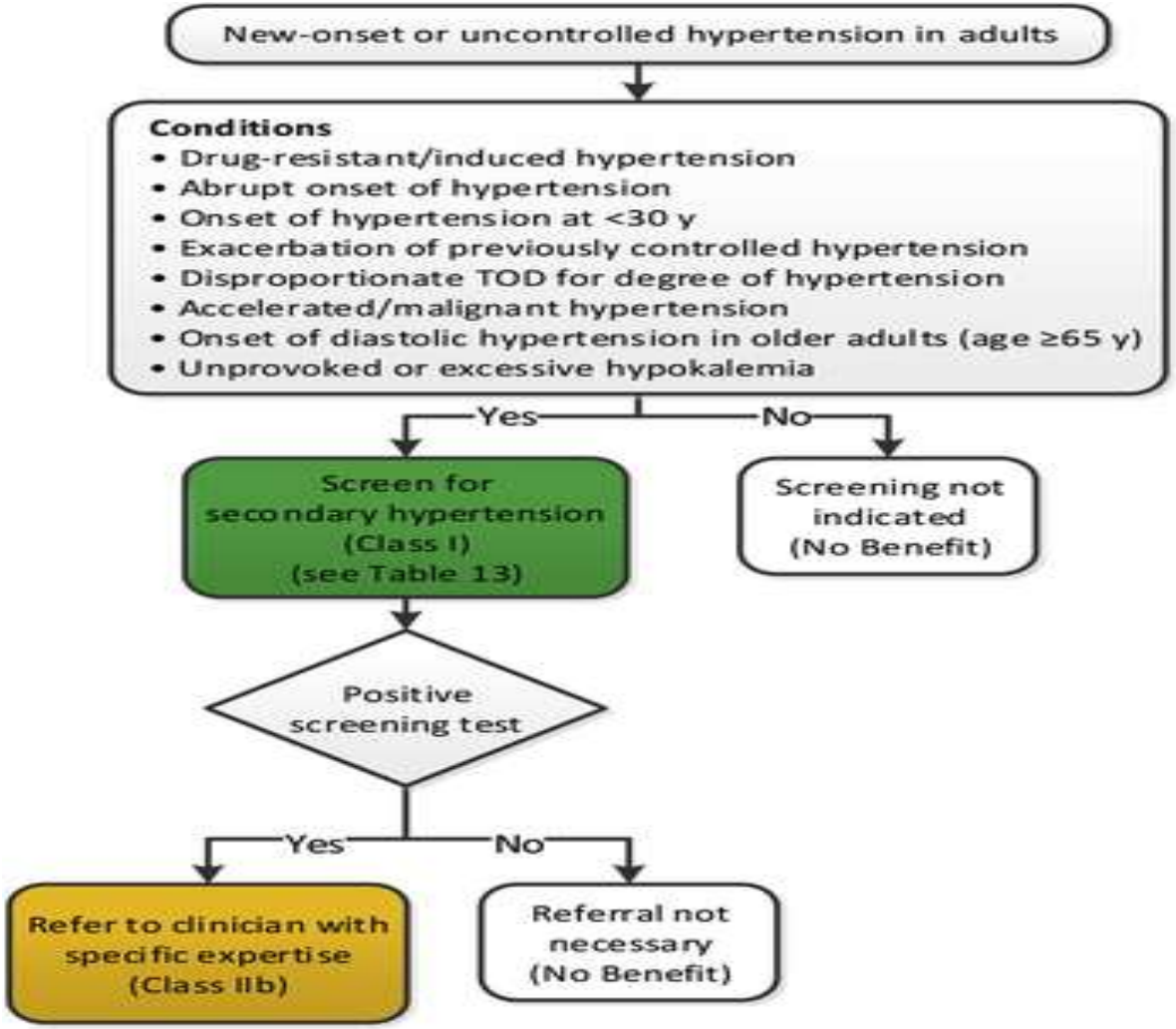
New onset or uncontrolled HTN?




**Paul K. Whelton et al. *J Am Coll Cardiol* 2017; 71:e127-e248.**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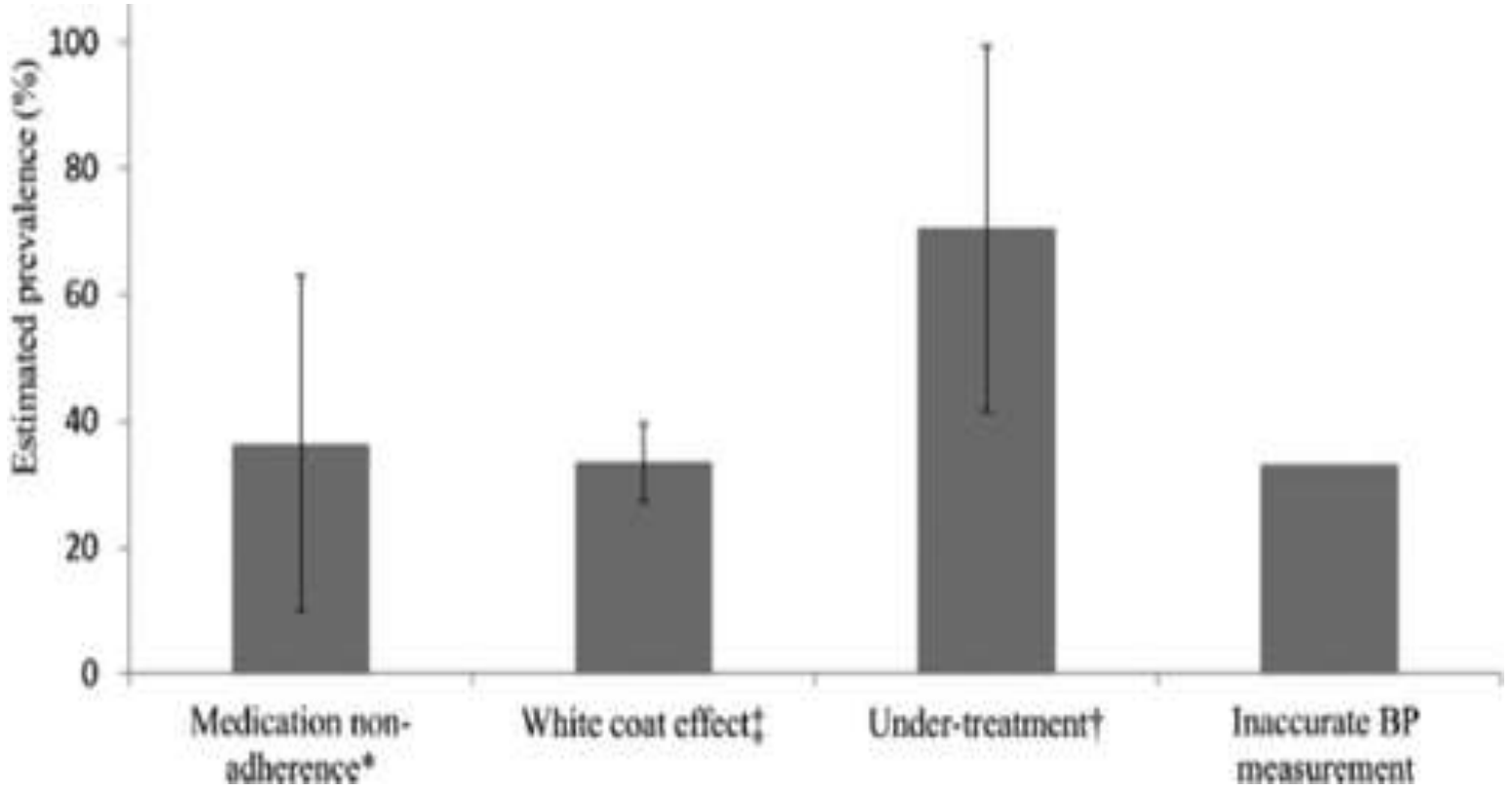
# Resistant Hypertension: Detection, Evaluation, and Management: A Scientific Statement From the American Heart Association

Robert M. Carey, David A. Calhoun, George L. Bakris, Robert D. Brook, Stacie L. Daugherty, Cheryl R. Dennison-Himmelfarb, Brent M. Egan, John M. Flack, Samuel S. Gidding, Eric Judd, Daniel T. Lackland, Cheryl L. Laffer, Christopher Newton-Cheh, Steven M. Smith, Sandra J. Taler, Stephen C. Textor, Tanya N. Turan, William B. White and ... See all authors

Originally published 13 Sep 2018 | https://doi.org/10.1161/HYP.0000000000000084 | Hypertension. 2018;72:e53–e90




Robert M. Carey. Hypertension. Resistant Hypertension: Detection, Evaluation, and Management: A Scientific Statement From the American Heart Association, Volume: 72, Issue: 5, Pages: e53-e90, DOI: (10.1161/HYP.0000000000000084)

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## Evaluation of Resistant Hypertension

**Confirm Treatment Resistance**
Clinic BP >130/80 mm Hg and patient taking 3 or more antihypertensive agents (including a long-acting calcium channel blocker, a blocker of the renin-angiotensin system [ACEI or ARB] and a diuretic) at maximal or maximally tolerated doses

### Assess for Secondary Hypertension

- Primary aldosteronism
- Renal parenchymal disease
- Renal artery stenosis
- Pheochromocytoma/paraganglioma
- Cushing syndrome
- Obstructive sleep apnea
- Coarctation of the aorta
- Other endocrine causes (**Table 3**)

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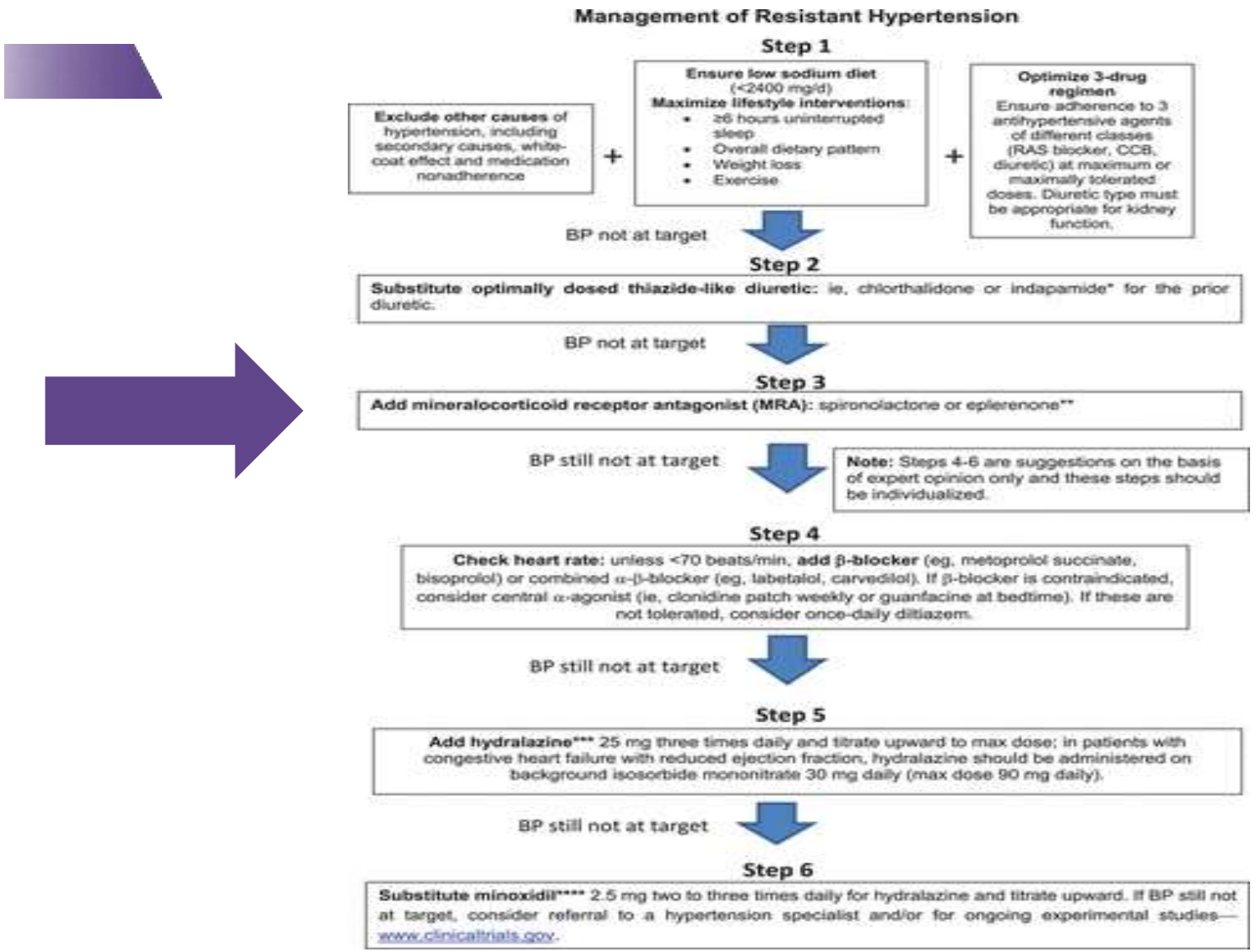


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**Table 4. Specific Clinical Issues Associated With Treatment Resistance***

| Issue Associated With Treatment Resistance | Management Consideration(s) |
|---|---|
| Volume control, edema resolution | Thiazide→chlorthalidone→loop diuretic |
| Heart rate control inadequate | β-Blocker, α,β-blocker, verapamil, diltiazem |
| Renin and aldosterone levels low | Low-salt diet, avoid nighttime shift work, amiloride |
| Renin low, aldosterone normal to high normal | Mineralocorticoid receptor antagonist |
| Would split dosing of medications improve control? | Evaluate BP pattern according to home and ambulatory BP monitoring |
| Medication adherence questionable | Initiate indirect or direct methods to detect nonadherence; if nonadherence is documented (partial or complete), discuss frankly, nonjudgmentally with patient and family |
| Pattern of BP response to medications outside clinician visit times unknown | Identify meal effects on BP, duration of medication effect, relationship of BP to side effects using out-of-office BP monitoring |
| Sleep disordered breathing; significant anxiety associated with highly variable hypertension | Initiate nondrug strategies concurrently with or separately from antihypertensive drug therapy |

BP indicates blood pressure.

*Modified from White et al[334] with permission from the American Society of Hypertension. Copyright © 2014, American Society of Hypertension.

Robert M. Carey. Hypertension. Resistant Hypertension: Detection, Evaluation, and Management: A Scientific Statement From the American Heart Association, Volume: 72, Issue: 5, Pages: e53-e90, DOI: (10.1161/HYP.0000000000000084)

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Hypertension
The evidence base
from randomized
controlled trials

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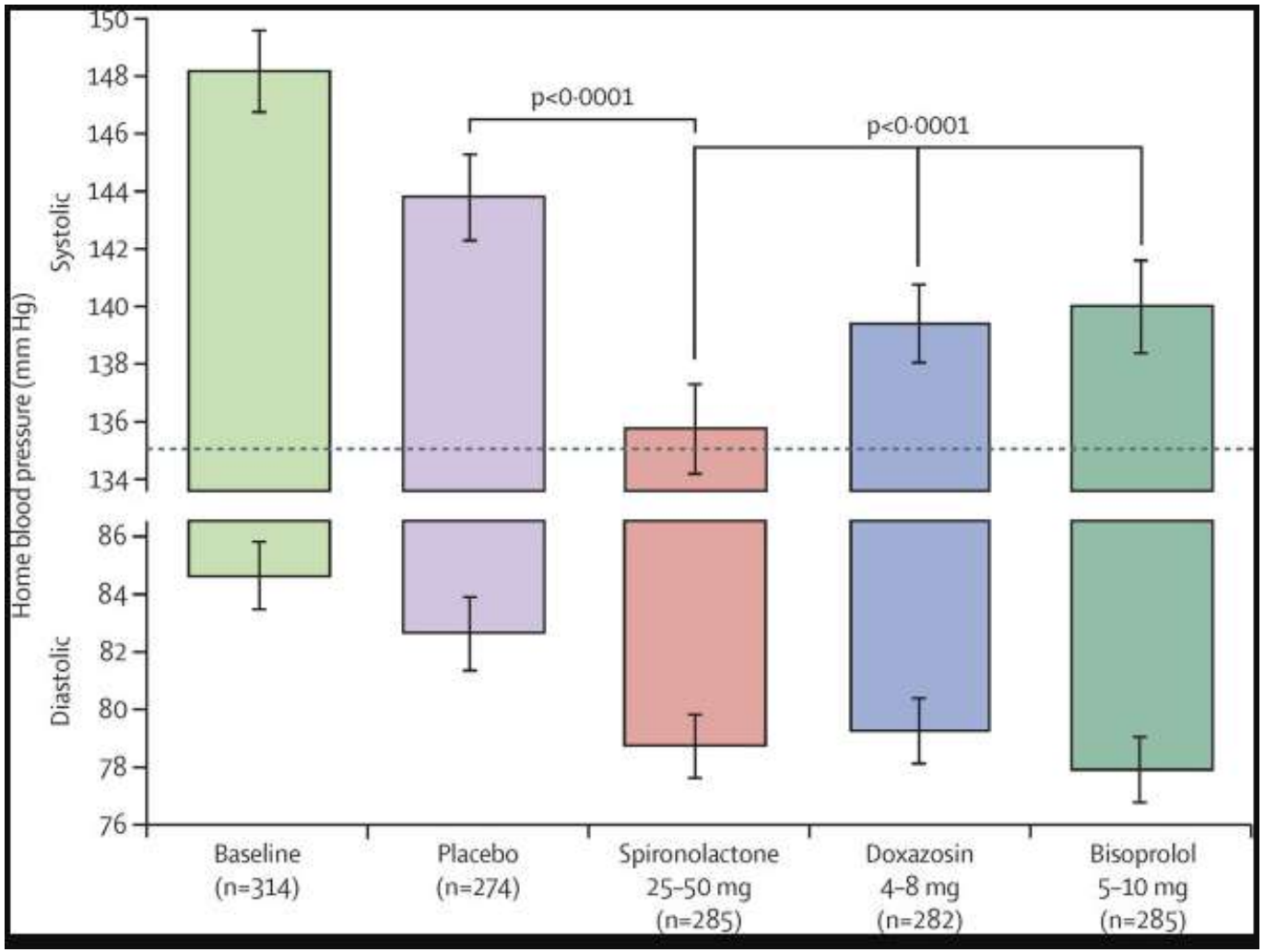
THE LANCET

Volume 386, Issue 10008, 21–27 November 2015, Pages 2059-2068

Articles

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

Prof Bryan Williams FRCP [a], Prof Thomas M MacDonald FRCP [b], Steve Morant PhD [b], Prof David J Webb FMedSci [c], Prof Peter Sever FRCP [d], Prof Gordon McInnes FRCP [e], Prof Ian Ford PhD [f], Prof J Kennedy Cruickshank FRCP [g], Prof Mark J Caulfield FMedSci [h], Prof Jackie Salsbury RGN [i], Isla Mackenzie FRCP [b], Sandosh Padmanabhan FRCP [e], Prof Morris J Brown FMedSci [i], The British Hypertension Society's PATHWAY Studies Group [†]

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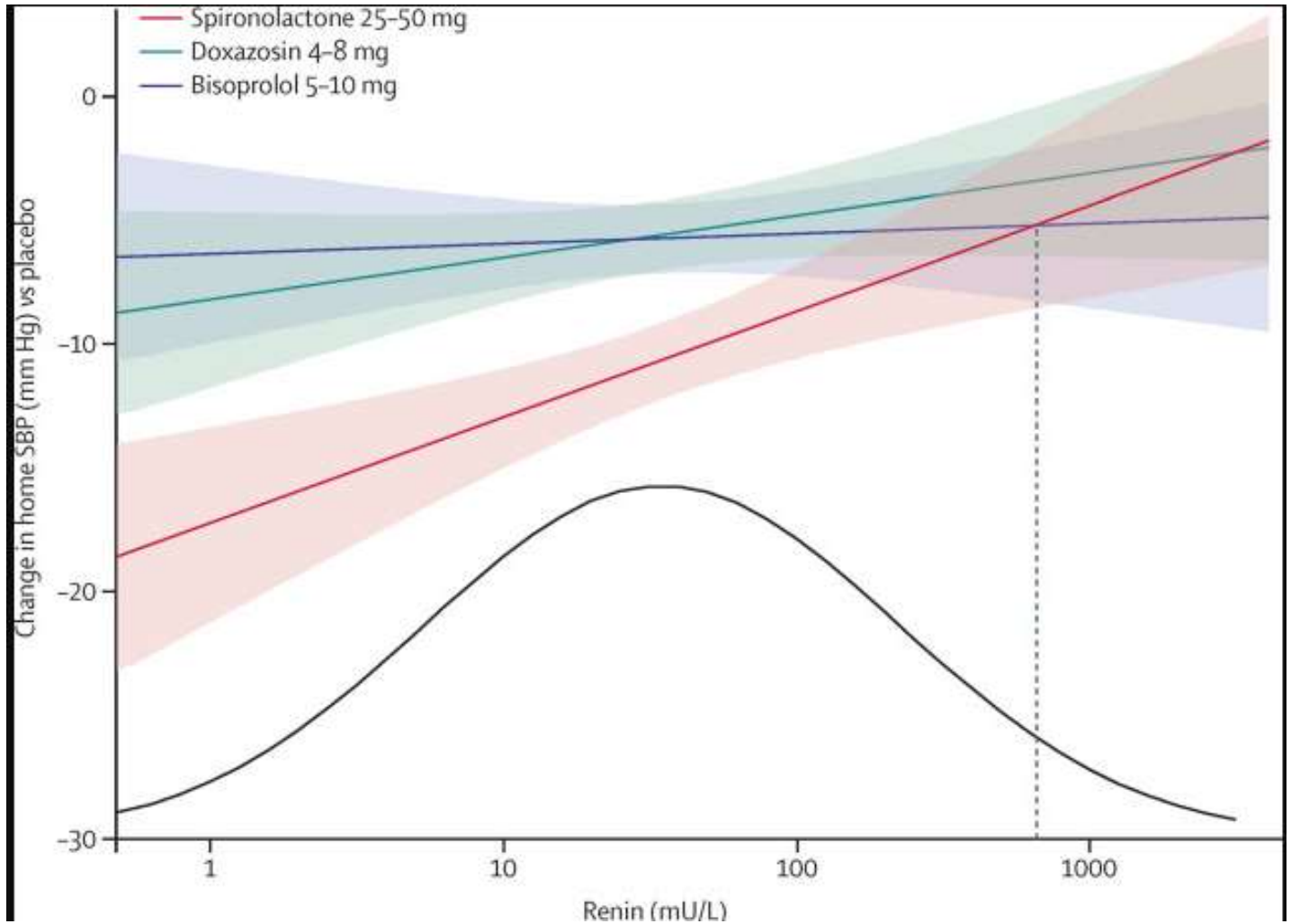


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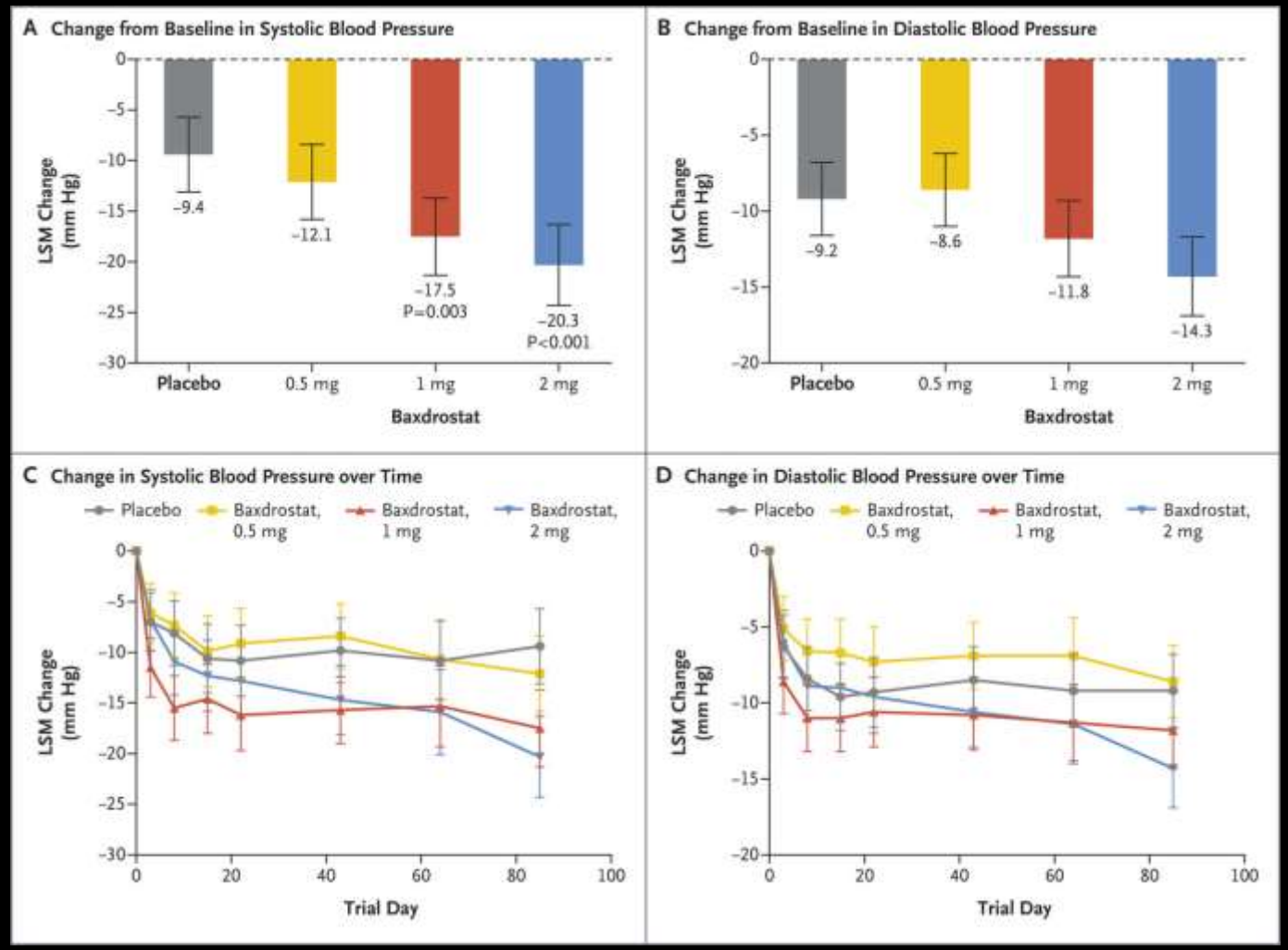
Resistant Hypertension
New medical treatments on the horizon

# Dose-Dependent Decreases in Blood Pressure in Patients with Treatment-Resistant Hypertension Who Received Baxdrostat.




MW Freeman et al. N Engl J Med 2022. DOI: 10.1056/NEJMoa2213169

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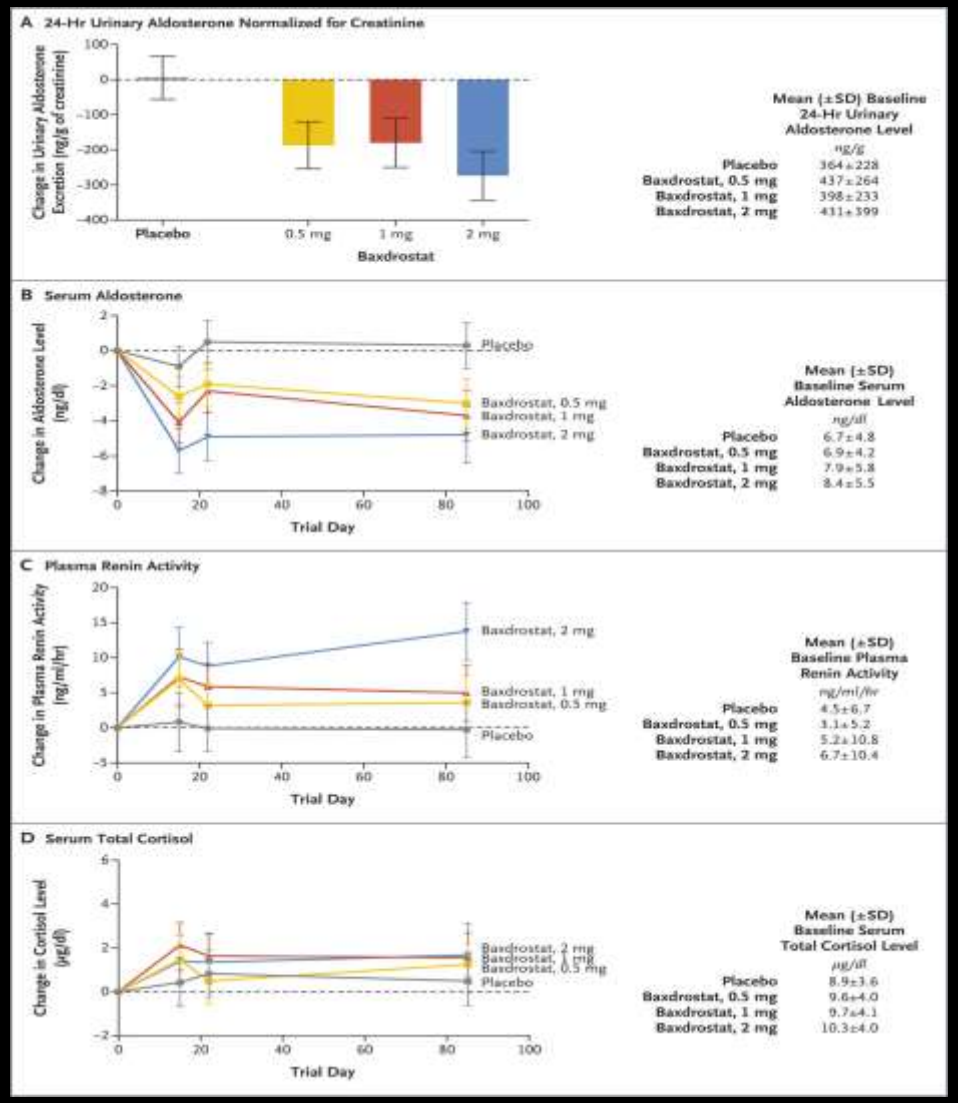
# Effects of Baxdrostat on Pharmacodynamic Measures.

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# Takeaways:

1. Resistant Hypertension is prevalent in India
2. Consideration for secondary causes and pseudo-resistant HTN are necessary
3. The evidence based “fourth” drug is an MRA
4. Novel medical therapies are the horizon may substantially improve BP control; ? Clinical outcomes

# Thank you!

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