Diagnosis and Treatment of Hypertension

Juan Carlos Monge, MD, FACC, FRCPC
Division of Cardiology,
Saint Michael's Hospital
Associate Professor of Medicine,
University of Toronto

Declaration of Conflict

None

Outline

Latest Hypertension guidelines: what is new, what is most important?

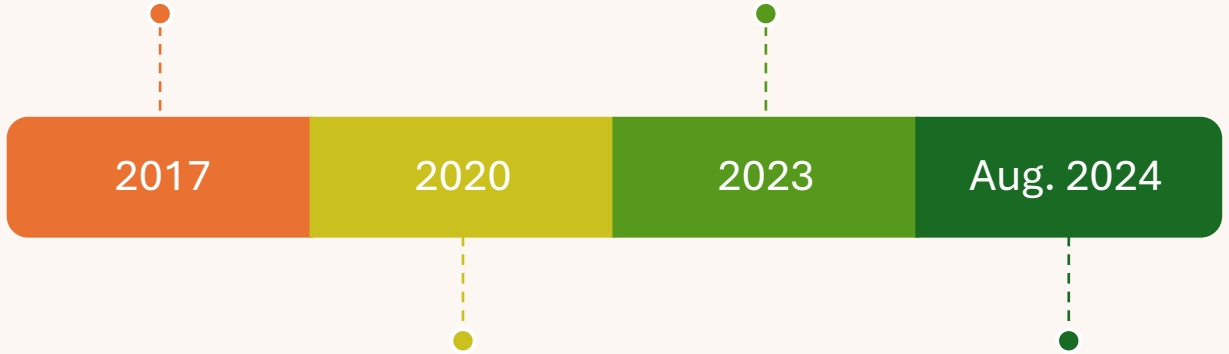
Resistant Hypertension: What is it? How is it treated?

Is there a role for SGLT-2 Inhibitors in hypertension?

Most Recent Canadian and International Guidelines

1) American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

3) European Society of Hypertension



2) Hypertension Canada

4) European Society of Cardiology (August 2024, ESC Congress, London, UK).

ESC European Society of Cardiology
European Heart Journal (2024) **45**, 3912–4018
https://doi.org/10.1093/eurheartj/ehae178

ESC GUIDELINES

2024 ESC Guidelines for the management of elevated blood pressure and hypertension

Developed by the task force on the management of elevated blood pressure and hypertension of the European Society of Cardiology (ESC) and *endorsed by the European Society of Endocrinology (ESE) and the European Stroke Organisation (ESO)*

Authors/Task Force Members: John William McEvoy *†, (Chairperson) (Ireland), Cian P. McCarthy ‡, (Task Force Co-ordinator) (United States of America), Rosa Maria Bruno ‡, (Task Force Co-ordinator) (France), Sofie Brouwers (Belgium), Michelle D. Canavan (Ireland), Claudio Ceconi (Italy), Ruxandra Maria Christodorescu (Romania), Stella S. Daskalopoulou (Canada), Charles J. Ferro [1] (United Kingdom), Eva Gerdts (Norway), Henner Hanssen (Switzerland), Julie Harris (United Kingdom), Lucas Lauder (Switzerland/Germany), Richard J. McManus (United Kingdom), Gerard J. Molloy (Ireland), Kazem Rahimi (United Kingdom), Vera Regitz-Zagrosek (Germany), Gian Paolo Rossi [2] (Italy), Else Charlotte Sandset [3] (Norway), Bart Scheenaerts (Belgium), Jan A. Staessen (Belgium), Izabella Uchmanowicz (Poland), Maurizio Volterrani (Italy), Rhian M. Touyz *†, (Chairperson) (Canada), and ESC Scientific Document Group

2024 European Society of Cardiology (ESC) guidelines for the management of elevated blood pressure (BP) and hypertension: Key Points

The most important point is that the target systolic BP (SBP) for adults receiving BP medications should be 120-129 mm Hg (and diastolic BP 70-79).

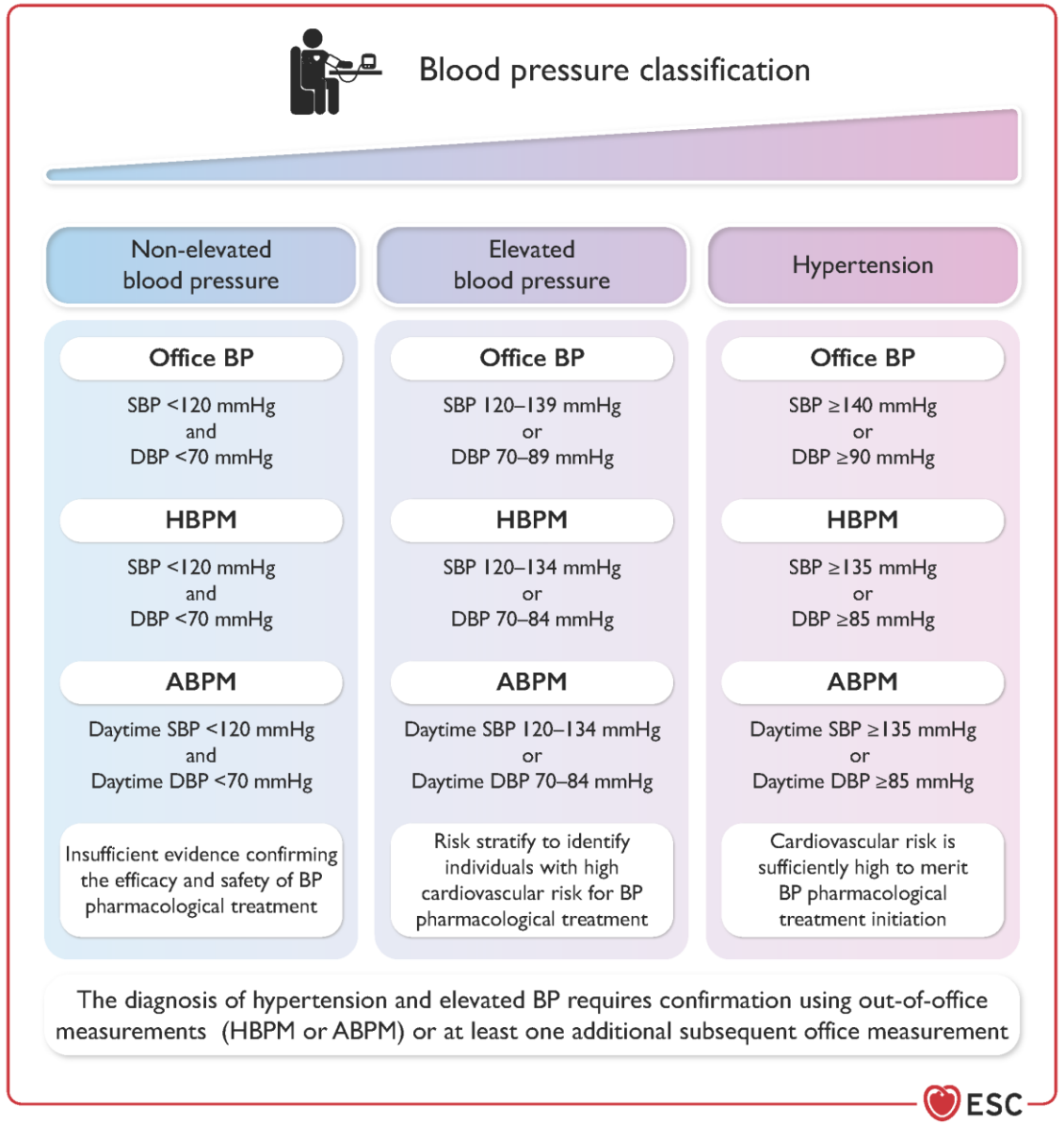
One can “opt-out” of this goal for patients who cannot tolerate that level of BP, patients who have orthostatic symptoms, patients who are over 85 years old or have frailty, or patients with limited life expectancy.

For those patients, the goal is as low a pressure toward that goal as can be achieved.

2024 European Society of Cardiology (ESC) guidelines for the management of elevated blood pressure (BP) and hypertension: Key Points

- BP is defined as having a continued risk rooted in time of exposure to higher BP. For this reason, hypertension is defined as an SBP >140 mm Hg or diastolic BP (DBP) >90 mm Hg,
- But a new category of “elevated BP” has been introduced that is an office SBP of 120-139 mm Hg or DBP 70-89 mm Hg. This guideline recognizes that risk increases across this scale, rather than starts at a certain level that is defined as “hypertension.”

Blood pressure categories



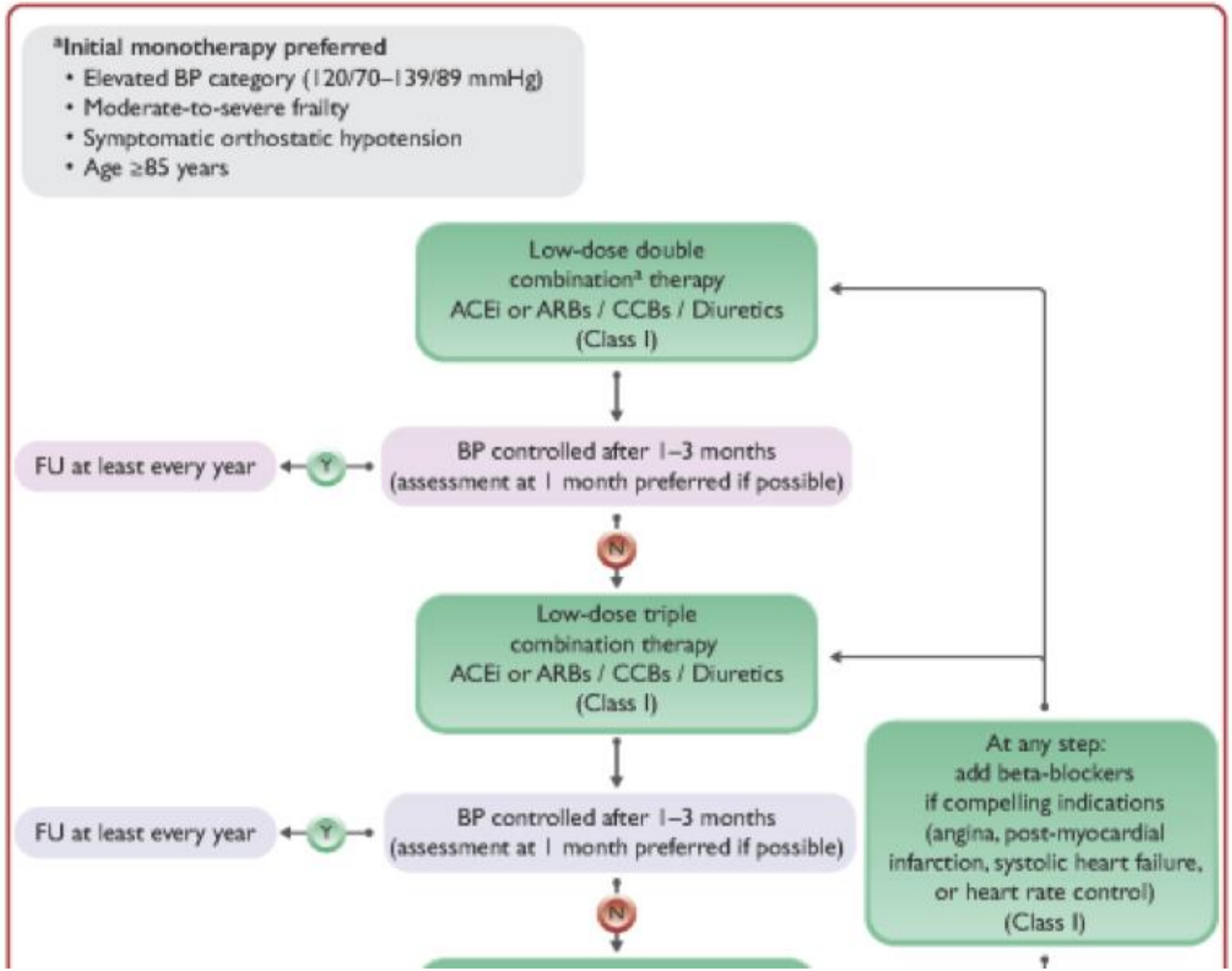
2024 European Society of Cardiology (ESC) guidelines for the management of elevated blood pressure (BP) and hypertension: Key Points

- A risk-based approach to hypertension treatment is recommended, noting that those with diabetes, kidney disease, cardiovascular disease, target organ damage, and familial hypercholesterolemia are at increased risk for adverse cardiovascular outcomes.
- More time and resources should be devoted to patients at higher overall risk from elevated BP.

Initiation of blood pressure-lowering treatment based on confirmed blood pressure category and cardiovascular disease risk (1)

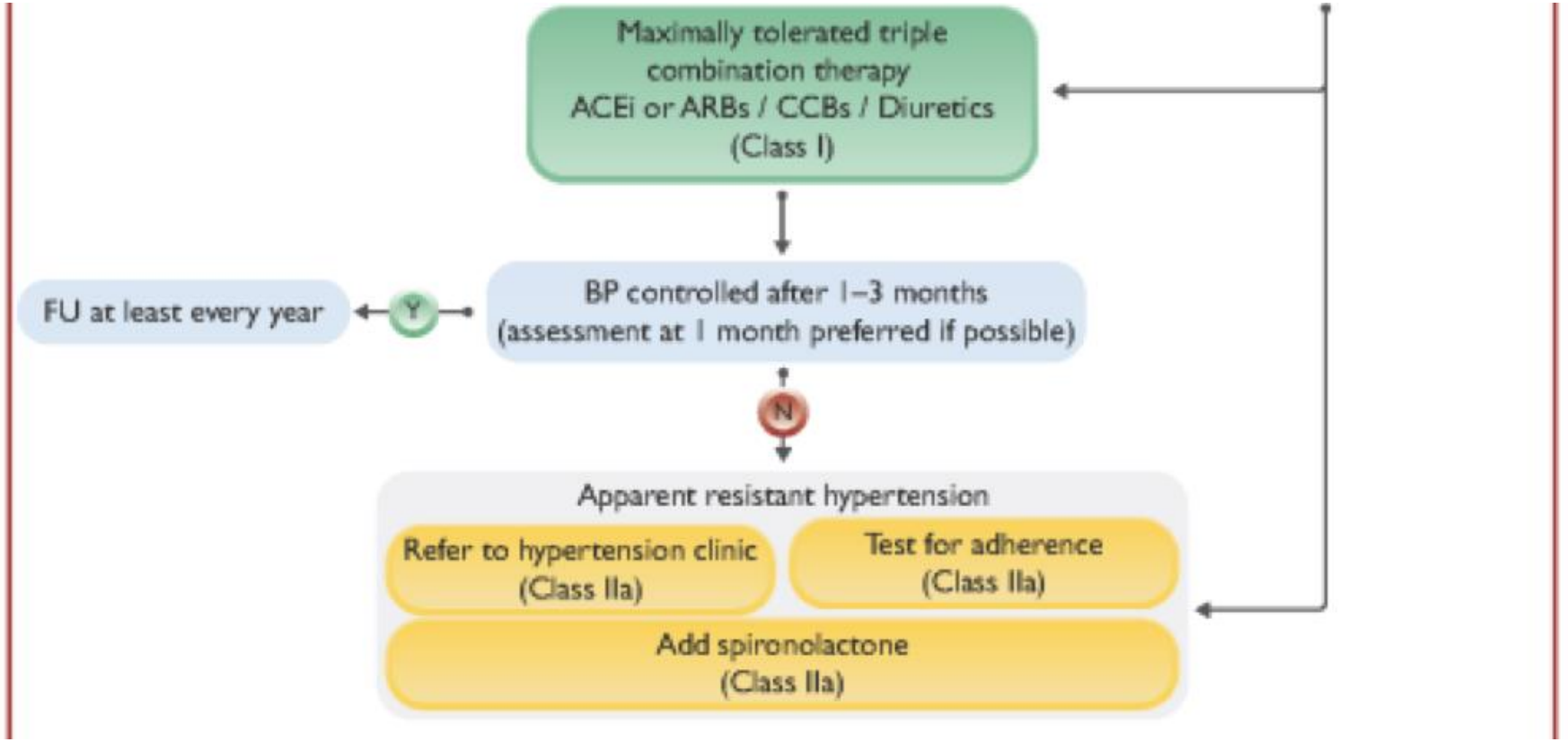
Blood Pressure (mmHg)	Non-elevated BP (<120/70)	Elevated BP (120/70 to 139/89)		Hypertension (≥140/90)
Risk		(a) All adults with SBP 120–129 mmHg (b) SBP 130–139 AND 10-year estimated CVD risk <10% AND no high-risk conditions or risk modifiers or abnormal risk tool tests	(a) SBP 130–139 AND high-risk conditions (e.g. established CVD, diabetes mellitus, CKD, FH or HMOD) (b) SBP 130–139 AND 10-year estimated CVD risk ≥10% (c) SBP 130–139 AND 10-year estimated CVD risk 5% - <10% AND risk modifiers or abnormal risk tool tests	Assumed all at sufficiently high risk to benefit from pharmacological treatment

Practical Algorithm For Pharmacological BP Lowering



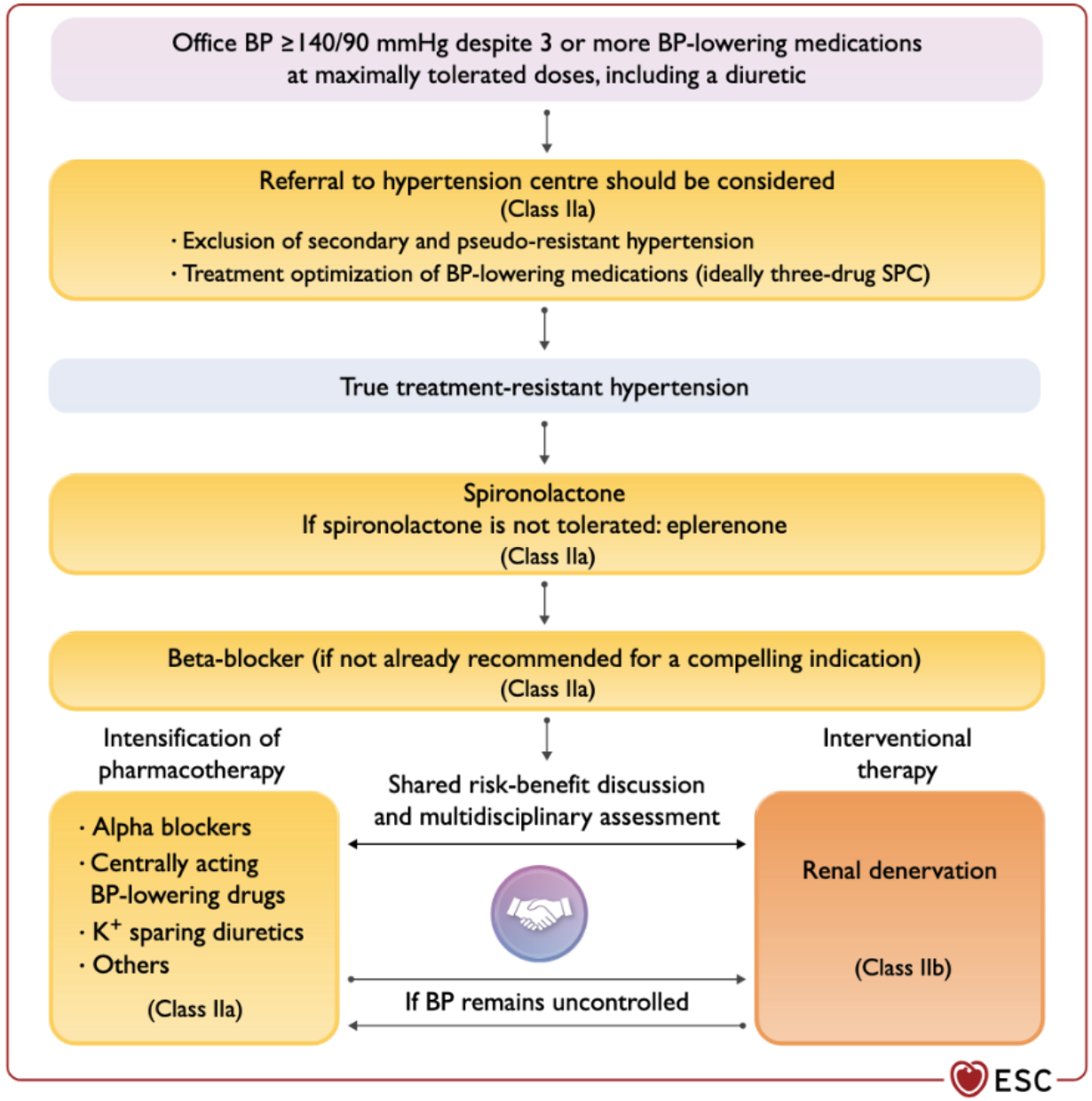
2024 ESC Guidelines for the management of elevated blood pressure and hypertension (European Heart Journal; 2024 – doi: 10.1093/eurheartj/ehae178)

Practical Algorithm For Pharmacological BP Lowering (2)



2024 ESC Guidelines for the management of elevated blood pressure and hypertension
(European Heart Journal; 2024 – doi: 10.1093/eurheartj/ehae178)

Approach to Resistant Hypertension

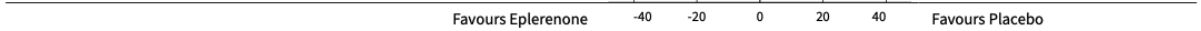


Eplerenone in Hypertension

- Tam TSC, Wu MHY, Masson SC, Tsang MP, Stabler SN, Kinkade A, Tung A, Tejani AM. Eplerenone for hypertension. Cochrane Database of Systematic Reviews 2017, Issue 2. Art. No.: CD008996. DOI: 10.1002/14651858.CD008996.pub2.

Analysis 1.3. Comparison 1 Eplerenone monotherapy vs placebo, Outcome 3 Systolic blood pressure.

Study or subgroup	Eplerenone N	Eplerenone Mean(SD)	Placebo N	Placebo Mean(SD)	Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
1.3.1 25 mg/day							
White 2003	45	-5.7 (13.4)	21	0 (11.2)		5.66%	-5.7[-11.89,0.49]
Subtotal ***	**45**		**21**			**5.66%**	**-5.7[-11.89,0.49]**
Heterogeneity: Not applicable							
Test for overall effect: Z=1.81(P=0.07)							
1.3.2 50 mg/day							
Flack 2003	174	-12.8 (14)	177	-3.4 (14)		10.88%	-9.4[-12.32,-6.48]
Saruta 2004	48	-6.8 (6.2)	16	-2.1 (6.4)		9.6%	-4.7[-8.28,-1.12]
Weinberger 2002	109	-6.3 (7.6)	17	1.6 (7.3)		9.31%	-7.87[-11.61,-4.13]
White 2003	83	-6.7 (12.8)	21	0 (11.2)		6.48%	-6.7[-12.22,-1.18]
Subtotal ***	**414**		**231**			**36.27%**	**-7.4[-9.59,-5.22]**
Heterogeneity: Tau^2=1.33; Chi^2=4.09, df=3(P=0.25); I^2=26.57%							
Test for overall effect: Z=6.64(P<0.0001)							
1.3.3 100 mg/day							
Calhoun 2011	75	-13.8 (13)	67	-2.6 (13.1)		8.32%	-11.2[-15.5,-6.9]
Saruta 2004	46	-9.7 (9.5)	16	-2.1 (6.4)		8.57%	-7.6[-11.75,-3.45]
Weinberger 2002	103	-9.9 (7.4)	17	1.6 (7.3)		9.3%	-11.49[-15.24,-7.75]
White 2003	88	-10.4 (15)	21	0 (11.2)		6.22%	-10.4[-16.12,-4.68]
Subtotal ***	**312**		**121**			**32.41%**	**-10.21[-12.37,-8.05]**
Heterogeneity: Tau^2=0; Chi^2=2.18, df=3(P=0.54); I^2=0%							
Test for overall effect: Z=9.25(P<0.0001)							
1.3.4 200 mg/day							
Saruta 2004	48	-10.6 (6.2)	16	-2.1 (6.4)		9.6%	-8.5[-12.08,-4.92]
White 2003	87	-8.8 (11.2)	21	0 (11.2)		6.73%	-8.8[-14.13,-3.47]
Subtotal ***	**135**		**37**			**16.33%**	**-8.59[-11.57,-5.62]**
Heterogeneity: Tau^2=0; Chi^2=0.01, df=1(P=0.93); I^2=0%							
Test for overall effect: Z=5.66(P<0.0001)							
1.3.5 400 mg/day							
Weinberger 2002	104	-14.9 (7.2)	17	1.6 (7.3)		9.33%	-16.51[-20.23,-12.78]
Subtotal ***	**104**		**17**			**9.33%**	**-16.51[-20.23,-12.78]**
Heterogeneity: Not applicable							
Test for overall effect: Z=8.68(P<0.0001)							
Total ***	**1010**		**427**			**100%**	**-9.21[-11.08,-7.34]**



Eplerenone in Hypertension

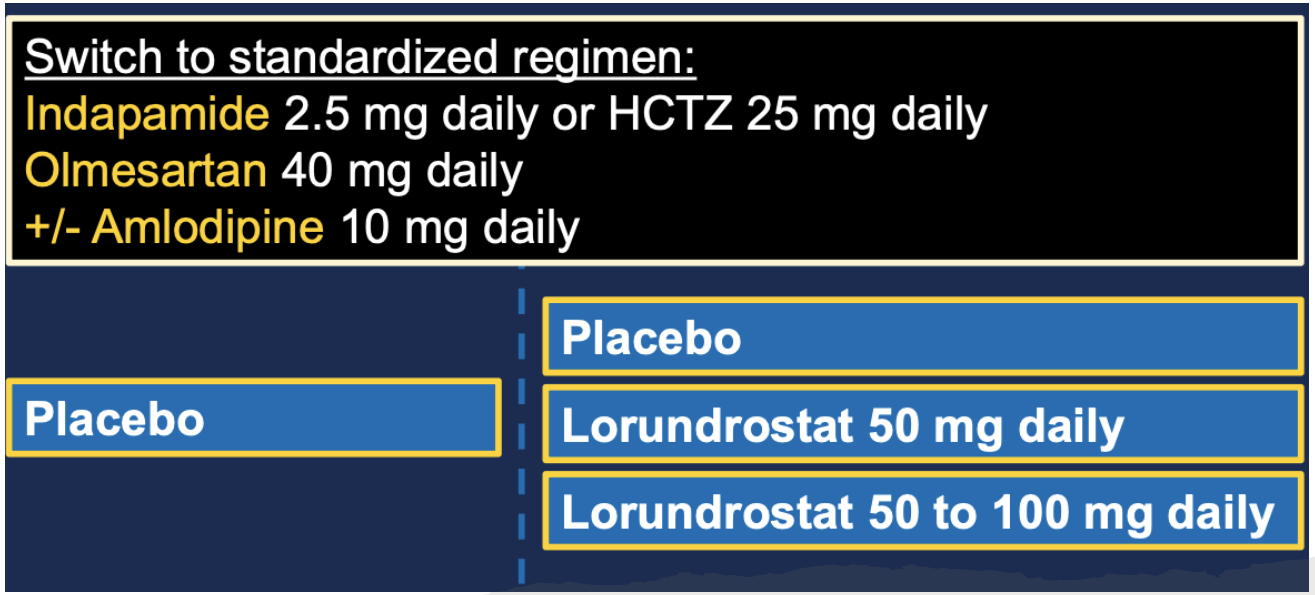
- Eplerenone 50 to 200 mg/day lowers blood pressure in people with primary hypertension by 9.2 mmHg systolic and 4.2 mmHg diastolic compared to placebo, with no difference of effect between doses of 50 mg/day to 200 mg/day.
- A dose of 25 mg/day did not produce a statistically significant reduction in systolic or diastolic blood pressure and there is insufficient evidence for doses above 200 mg/day.
- There is currently no available evidence to determine the effect of eplerenone on clinically meaningful outcomes such as mortality or morbidity in hypertensive patients.

ADVANCE-HTN: ACC 2025

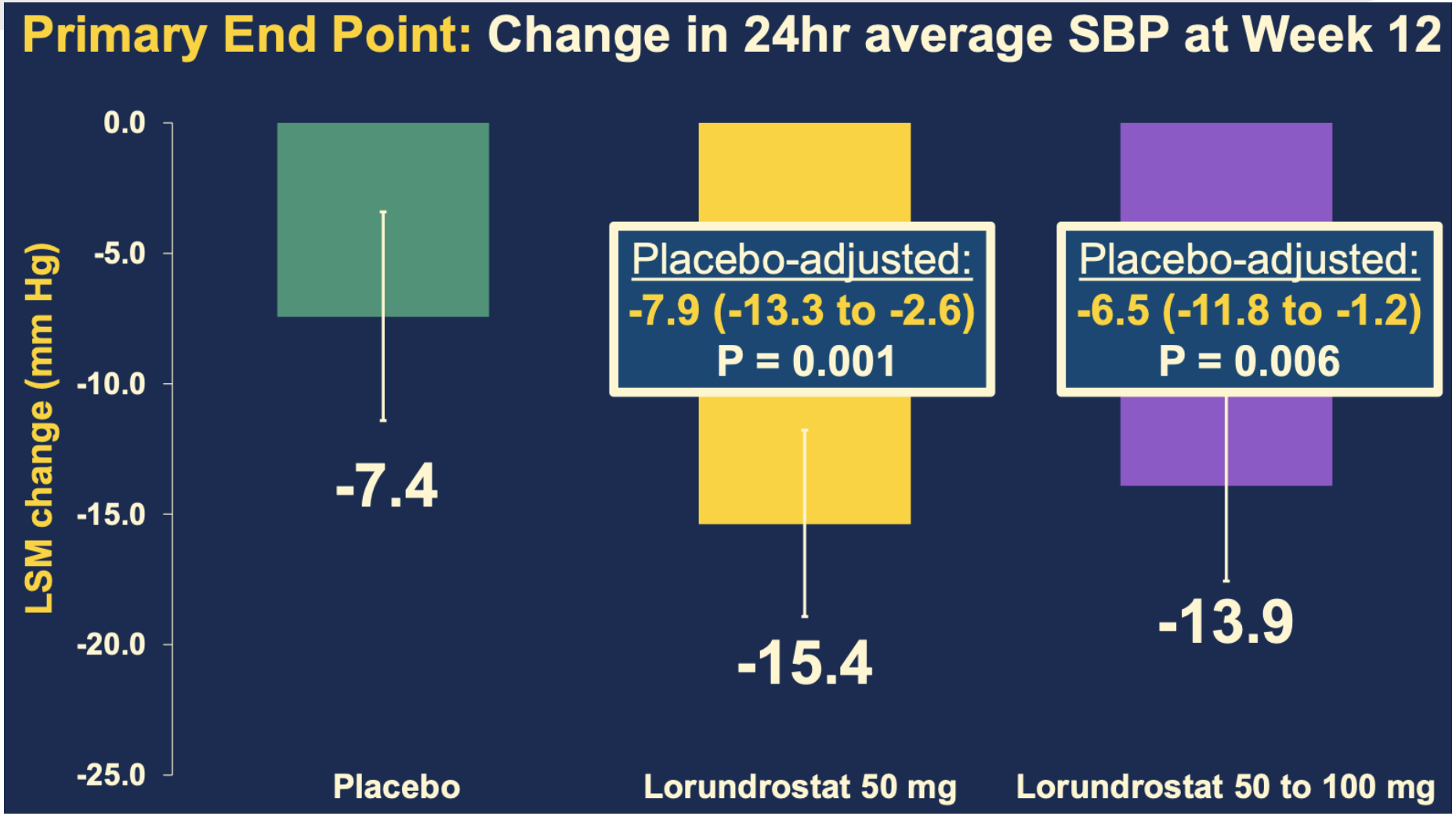
Background

Lorundrostat is an aldosterone synthase inhibitor which is a novel class of blood pressure lowering medication

Rather than blocking the mineralocorticoid receptor, aldosterone synthase inhibitors disrupt aldosterone biosynthesis



ADVANCE-HTN ACC 2025



SGLT2 inhibitors and hypertension

Striking benefits of empagliflozin in hypertension despite limited BP response

Hypertension + diabetes (EMPA-REG outcome)	Hypertension + HFpEF (EMPEROR-preserved)
↓ Systolic Office BP	
~-5 mmHg	~-2 mmHg
↓ CV outcomes (CV death + HF hospitalization)	
-38% and -35%	-21% global -29% for HF hospitalization
↓ CKD progression	Slow eGFR slope ↓ Hypertensive urgencies

Selected differences between SGLT2i and thiazide diuretics

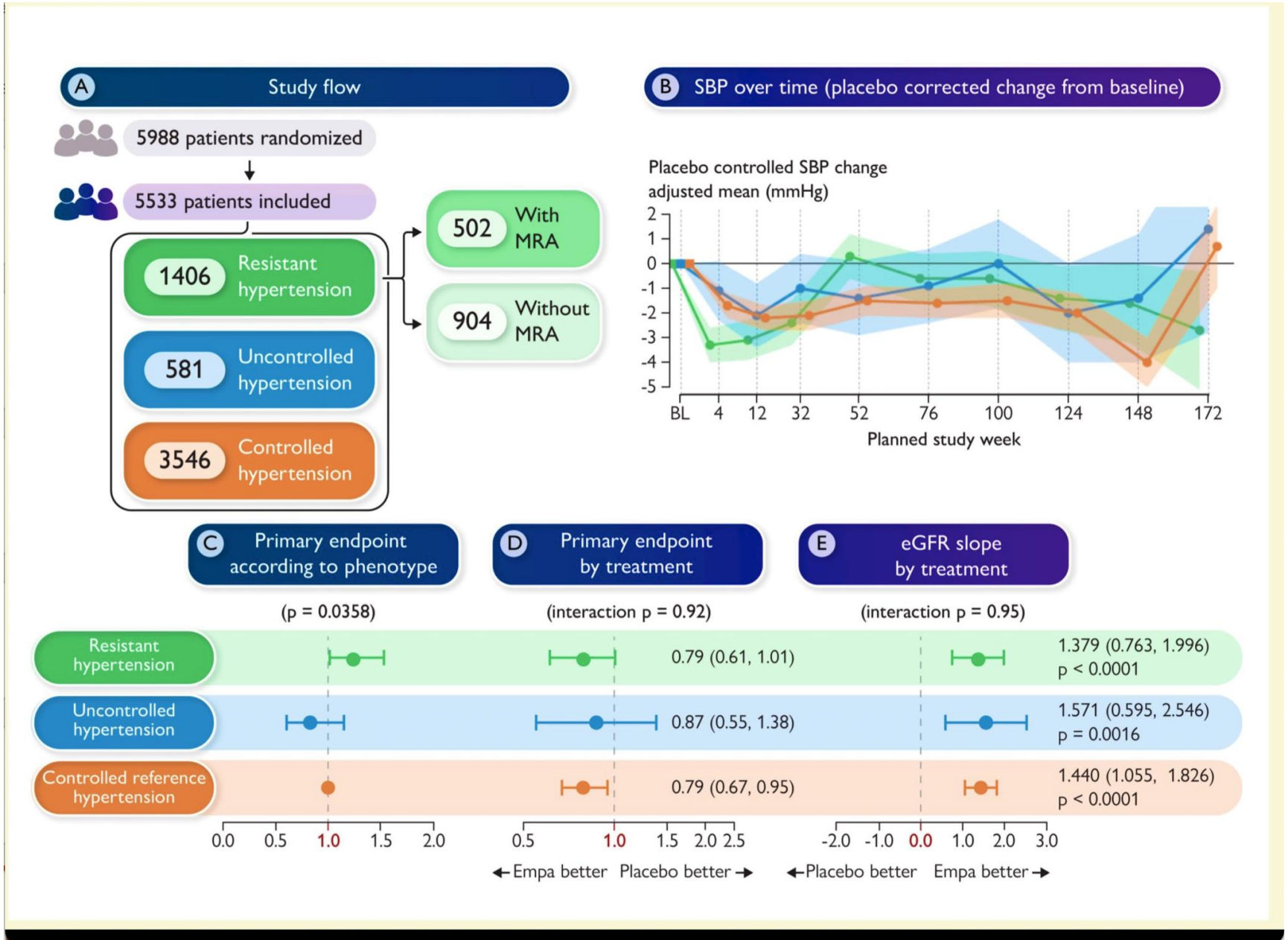
	SGLT2-inhibitors	Thiazide diuretics
Decrease in BP	+	+++
Hypokalaemia	(+)	+++
Decrease in plasma volume	+ persistent	++ transient only
Natriuresis	Decreased Na^+ reabsorption Proximal tubule Possible distal effect	Decreased Na^+ reabsorption Distal convoluted tubule
Osmotic diuresis	+	None
Plasma uric acid	Decrease	Increase
Increase in renin-aldosterone	++	+++
Increase in catecholamines	(+)	+++
Glycosuria	+++	None
Glycaemia	Decrease	Increase with time
Restore tubulo-glomerular feedback	Yes	No
eGFR slope decline	Decelerated	Accelerated (?)

Conclusions

- SGLT2-inhibitors are efficacious for prevention of cardiovascular-renal endpoints
- SGLT2-inhibitors have little, if any BP lowering effect
- SGLT2-inhibitors are not to be used to treat high BP, but to prevent target organ damage

Empagliflozin in resistant hypertension and heart failure with preserved ejection fraction: the EMPEROR-Preserved trial

-Empagliflozin reduced SBP in resHTN slightly more than in the other categories in the first weeks.
-The modest reduction in SBP resulted in a moderate increase in time at target and reduced hypertensive urgencies.
-The treatment effect of empagliflozin on the primary endpoint was similar in resHTN, as was the improvement of the estimated glomerular filtration rate slope



European Heart J. 2025 Mar 4:ehae938.
doi: 10.1093/eurheartj/ehae938. Online ahead of print.

ESC European Society of Cardiology

European Heart Journal (2024) **00**, 1–3
https://doi.org/10.1093/eurheartj/ehae751

EDITORIAL
Hypertension

SGLT2 inhibitors: not *for* hypertension but exceedingly useful *in* hypertension

Franz H. Messerli [1,*], Renate Schoenenberger-Berzins[2], and Michel Burnier[3]

[1]Faculty of Medicine, University of Bern, Bern, Switzerland; [2]Department of Cardiology, Luzerner Kantonsspital, Luzern, Switzerland; and [3]Service of Nephrology and Hypertension, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland

SGLT2 inhibitors: not for hypertension but exceedingly useful in hypertension

1. In contrast to most antihypertensives, the multi-organ benefits of empagliflozin are not conferred by a fall in mmHg.
2. Hence the take-home lesson …is SGLT2 inhibitors such as empagliflozin are of limited use ‘for’ hypertension but may be exceedingly helpful ‘in’ hypertension.
3. When added in hypertensive patients, SGLT2 inhibitors are likely to be particularly efficacious in mitigating hypertensive target organ disease.

Take Home Messages (1)

The ESC 2024 Elevated BP and Hypertension Guidelines recommend a target BP of 120-129/70-79 mmHg.

BP is defined as having a continued risk rooted in time of exposure to higher BP.

The focus is on true risk reduction related to fatal and nonfatal cardiovascular outcomes.

Take Home Messages (2)

Aldosterone is the recommended choice in resistant hypertension added to ACEi/ARB, CCB, and a diuretic.

High dose eplerenone can be used in patients who experience adverse effects with spironolactone.

SGLT2i are not very effective **FOR** hypertension but are exceedingly helpful **IN hypertension.**.

They should be used in hypertensive patients with an indication (type 2 DM, CKD, HFpEF).