



Hypertension in Chronic Kidney Disease

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Introduction

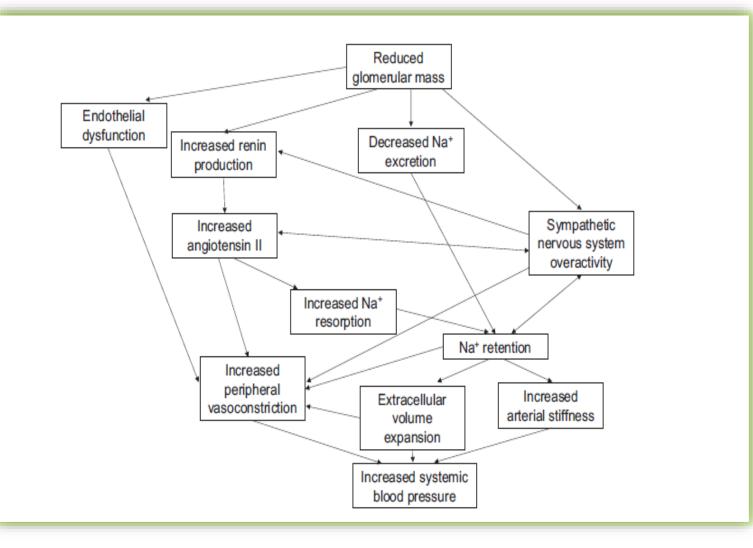
Hypertension is common in patients with CKD .The prevalence ranges from 60% to 90% depending on the stage of CKD and its cause and the interrelation between these two pathophysiological states is bidirectional . Persistently high blood pressure (BP) can accelerate the progression of CKD and the progressive decline eGFR can conversely interfere with the achievement of adequate BP control .

The coexistence of uncontrolled hypertension and CKD substantially

magnifies the risk of cardiovascular disease, which is the most important

cause of morbidity and mortality in patients with CKD.

Pathophysiologic Mechanisms Of Hypertension In CKD





Mechanisms Of Hypertension In CKD

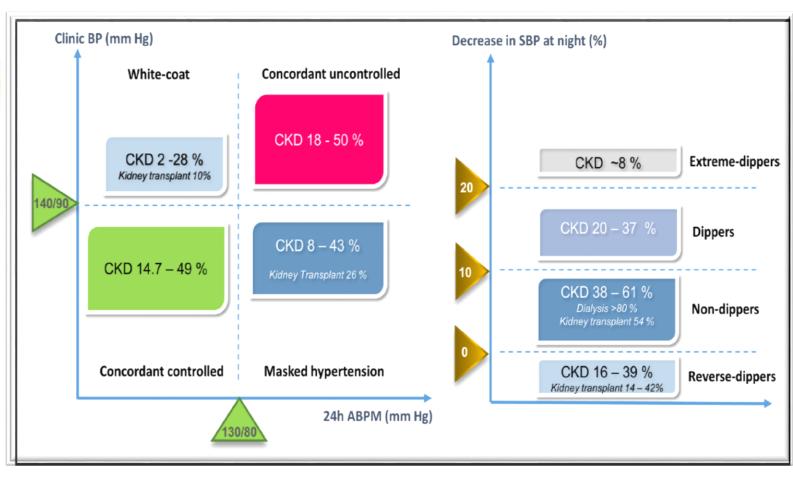
- Volume overload
- Sympathetic overactivity
- Salt retention
- Endothelial dysfunction
- Alterations in hormonal systems that regulate BP



Complications unique to CKD

- secondary hyperparathyroidism
- increased prevalence of OSA
- erythropoietin, glucocorticoids or calcineurii inhibitors

Hypertension phenotypes and 24-hour BP patterns based on office and out-of-office measurements



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Why BP not decrease during the night in CKD?

a high activity of the sympathetic nervous system and the hyperactivity

of several other neuro-hormonal systems.

one interesting hypothesis is that patients with a reduced renal function, whatever the cause, need to maintain a high BP throughout the night to remain in sodium balance as part of a pressure-natriuresis mechanism.

In many patients with a nondipping pattern, there is an impaired

capacity to excrete sodium during daytime that may be due to either

a reduced GFR or to a primary increase in tubular sodium reabsorption.



Target of BP in CKD



Summary of recent guideline recommendations for the assessment and management of HTN in CKD

Guideline/Year	BP target	Office BP measurement	First-line therapy	Second-line therapy	Third-line therapy	Fourth-line therapy
AHA/ACC 2017	<130/80 mmHg	Standardized	ACEI or ARB in those with very high albuminuria	CCB or diuretic	Diuretic or CCB	Spironolactone*
ESH/ESC 2018	Systolic <140 down to 130 mmHg, if tolerated	Standardized	Initial combination of an ACEI or an ARB + CCB or diuretic		Combination therapy with ACEI or ARB + CCB + diuretic	Spironolactone*
ISH 2020	<130/80 mmHg (<140/90 mmHg in elderly patients)	Standardized	ACEI or ARB	CCB or diuretic	Diuretic or CCB	Spironolactone*
ESC 2021	Systolic <140 down to 130 mmHg, if tolerated	Standardized	Initial combination of an ACEI or an ARB + CCB or diuretic		Combination therapy with ACEI or ARB + CCB + diuretic	Spironolactone*
KDIGO 2021	Systolic <120 mmHg, when tolerated	Standardized	ACEI or ARB in those with very high albuminuria			





KDIGO suggests that adults with high BP and CKD be treated

with target systolic blood pressure (SBP) of <120 mm Hg, as

determined by standardized office measurement, if tolerated.



ESH Guideline 2023

BP target for proteinuric nondiabetic CKD applies to patients with proteinuric diabetic kidney disease as well and for both patient categories , a target SBP of <130mmHg and DBP <80mmHg, if well tolerated, can be associated with protection against CKD progression in individuals with an albuminuria >30 mg/g.



Lifestyle interventions for lowering blood pressure in pts with CKD not receiving dialysis

KDIGO 2021 suggests targeting a sodium intake <2 g of sodium per day (or <90 mmol of sodium per day, or <5 g of sodium chloride per day) in patients with high BP and CKD (2C).

Dietary sodium restriction is usually not appropriate for patients with sodium-wasting nephropathy

The Dietary Approaches to Stop Hypertension (DASH)–type diet or use of salt substitutes that are rich in potassium may not be appropriate for patients with advanced CKD or those with hyporeninemic hypoaldosteronism or other causes of impaired potassium excretion because of the potential for hyperkalemia.

Lifestyle interventions for lowering blood pressure in pts with CKD not receiving dialysis

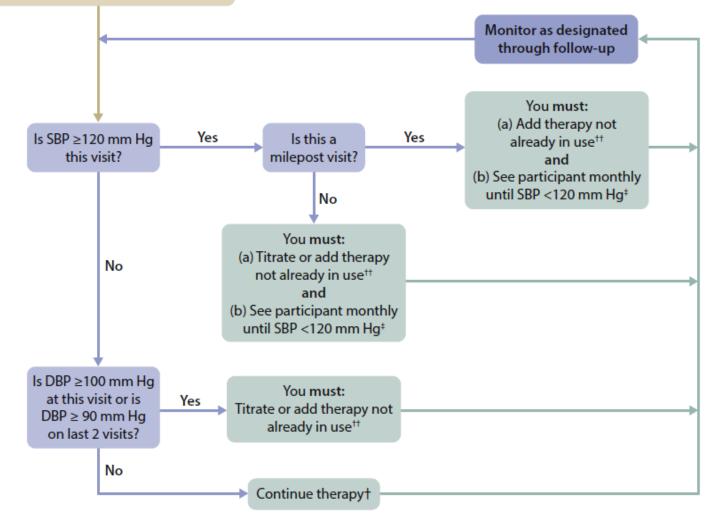
KDIGO 2021 suggests that patients with high BP and CKD be advised to undertake moderate intensity physical activity for a cumulative duration of at least 150 minutes per week, or to a level compatible with their cardiovascular and physical tolerance (2C).

Consider the cardiorespiratory fitness status ,physical limitations ,cognitive function ,and risk of falls

Algorithm for BP therapy used in SPRINT

Start here: At randomization visit, begin with 2- or 3-drug therapy* using a combination of a thiazide-type** diuretic, and/or an ACEI or ARB (but not both) and/or a CCB

Include β -blocker or other agents as appropriate for compelling indication



There is limited evidence on the use of specific antihypertensive agents to treat high BP in CKD.

Many people with CKD and BP who are at least 20 mm Hg above the target will need combinations of 2 or more antihypertensive drugs.

Starting combination therapy in such people is, therefore, suggested.

There are, however, no randomized trials comparing different drug combinations in CKD, as there are no randomized trials on antihypertensive classes other than renin-angiotensin system inhibitors (RASi), b-blockers, and calcium-channel blockers (CCBs) compared to placebo or to each other. Any antihypertensive treatment algorithm in CKD, therefore, beyond monotherapy, is based on expert opinion, pathophysiologic or pharmacodynamic considerations, or extrapolation from findings in the general population or from surrogate outcomes.





KDIGO recommends starting renin-angiotensin-system inhibitors (RASi) ([ACEi] or [ARB]) for people with high BP, CKD, and severely increased albuminuria (G1–G4, A3) without diabetes (1B).



KDIGO suggests starting RASi (ACEi or ARB) for people with high *BP, CKD, and moderately increased albuminuria (G1–G4, A2)* without diabetes (2C).

We recommend starting RASi (ACEi or ARB) for people with high BP, CKD, and moderately-to-severely increased albuminuria (G1–G4, A2 and A3) with diabetes (1B).

KIDGO recommends avoiding any combination of ACEi, ARB, and direct renin inhibitor (DRI) therapy in patients with CKD, with or without diabetes (1B).



ESH 2023

CKD stage 1 to 3 eGFR ≥30 ml/min/1.73 m²

ACEi or ARB + CCB or T/TLDiuretic^a

ACEi or ARB + CCB + T/TLDiuretic^a Increase to full-dose if tolerated^s

True Resistant Hypertension^d Add I) Spironolactone^e (preferred) or other MRA^d or II) BB^f or Alpha-1 Blocker or III) Centrally acting agent Step 1 Dual combination

Step 2 Triple combination

Step 3 Add further drugs eGFR <30 ml/min/1.73 m² ACEi^{b,c} or ARB^b + CCB or Loop Diuretic Increase to full-dose if well tolerated^c ACEi^{b,c} or ARB^b + CCB + Loop Diuretic Increase to full-dose if well tolerated^c True Resistant Hypertension^d Add

CKD stage 4 and 5 (not on dialysis)

I) Chlorthalidone (preferred) or other _{T/TL}Diuretic to Loop Diuretic or II) BB^f or Alpha-1 Blocker or III) Centrally acting agent

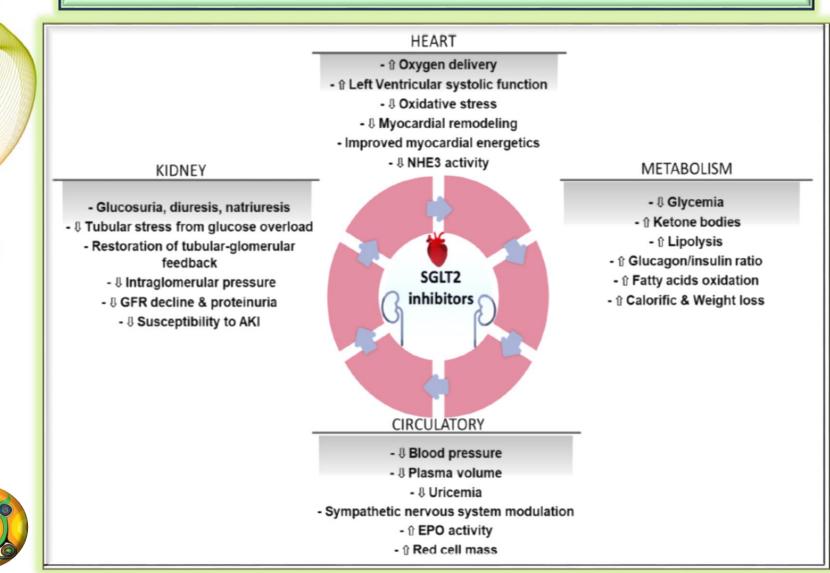
+ SGLT2i or Finerenone^g



Special therapeutic challenges in CKD



Multiple potential mechanisms and protective effects of SGLT2 inhibitors on cardiac and renal functions



THANKS FOR YOUR ATTENTION

