




Hypertension in Chronic Kidney Disease


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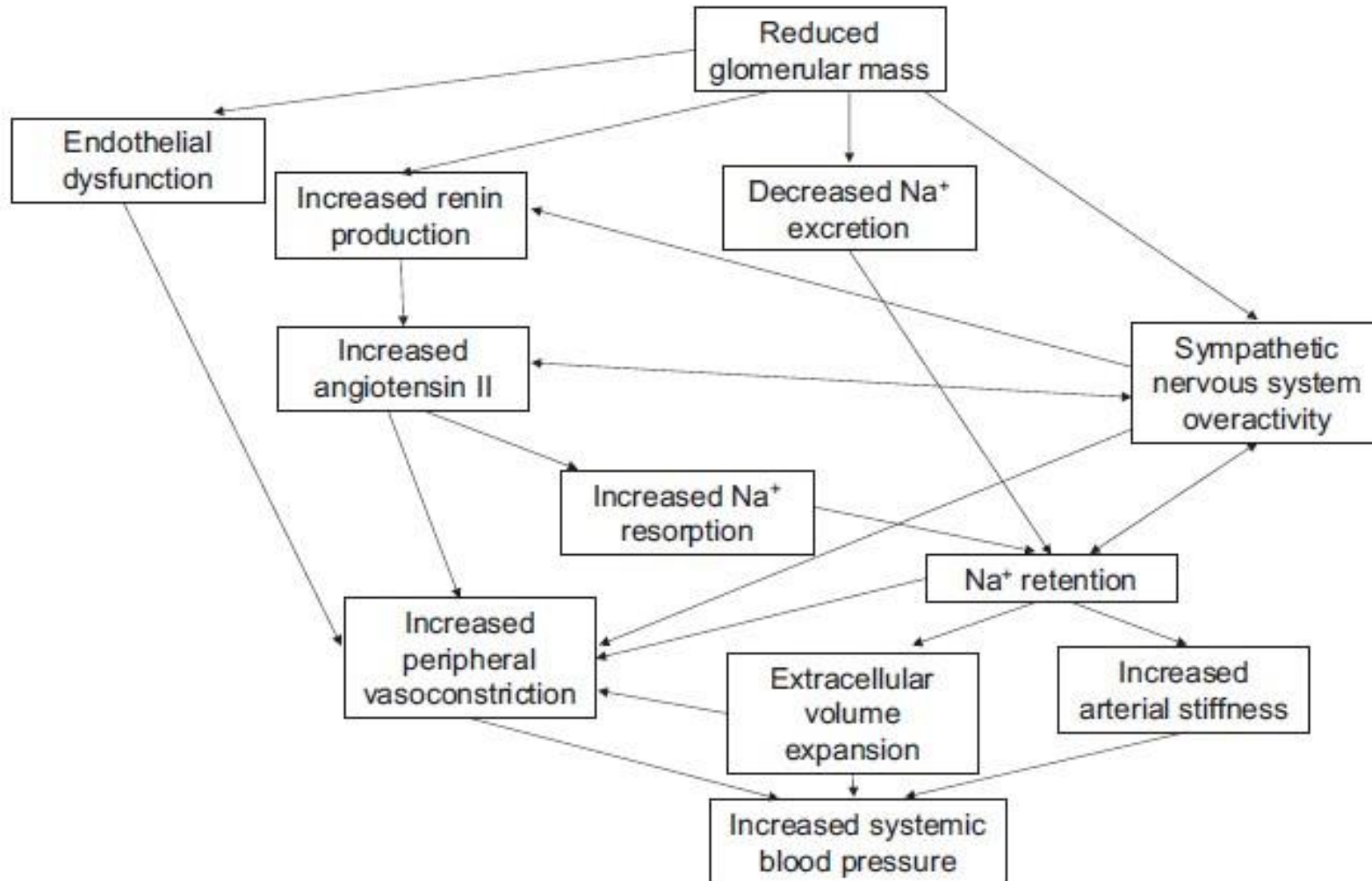
*Hypertension is **common** in patients with **CKD** .The prevalence ranges from **60% to 90%** depending on the stage of CKD and its cause and the interrelation between these two pathophysiological states is bidirectional .*


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

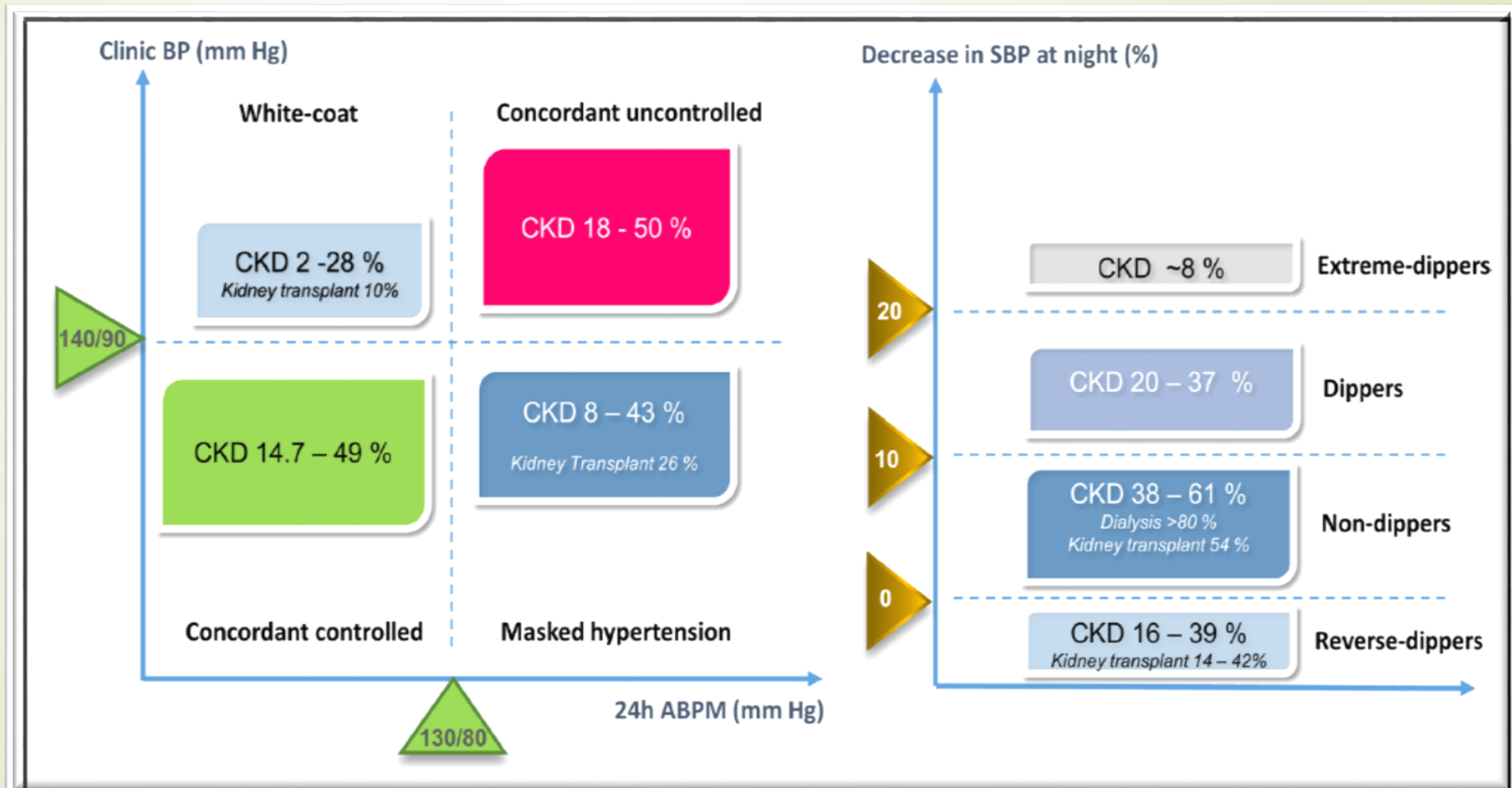
- *Volume overload*
 - *Sympathetic overactivity*
 - *Salt retention*
 - *Endothelial dysfunction*
 - *Alterations in hormonal systems that regulate BP*
- 



Complications unique to CKD

- ❖ ***secondary hyperparathyroidism***
- ❖ ***Increased prevalence of OSA***
- ❖ ***erythropoietin, glucocorticoids or calcineurin inhibitors***

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





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

| 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 Guideline 2021

***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.

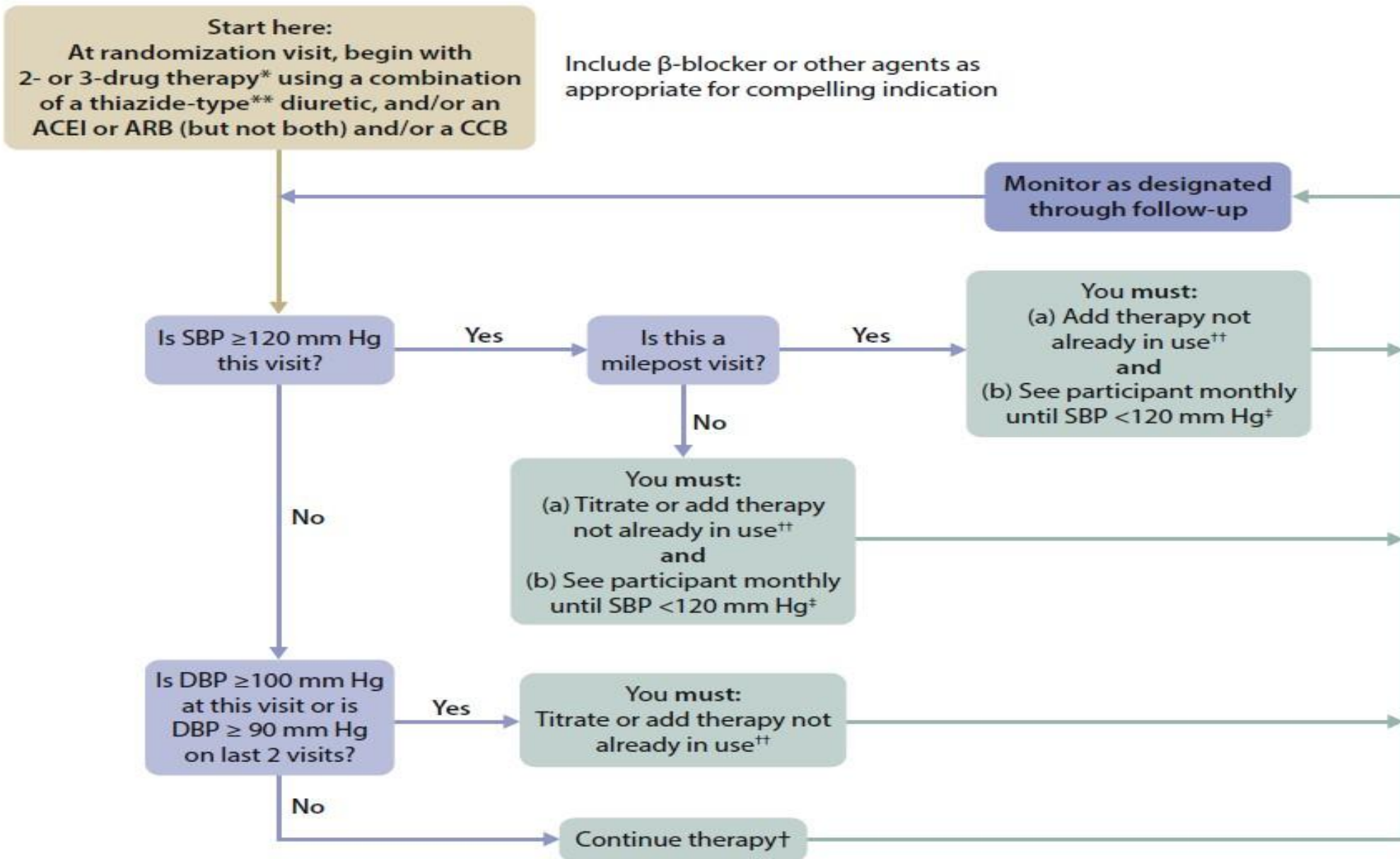


Lifestyle interventions for lowering blood pressure in pts with CKD not receiving dialysis

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





Anti-hypertensive drugs

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.*



Anti-hypertensive drugs

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 (CCB) 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



Anti-hypertensive drugs

*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)**.*

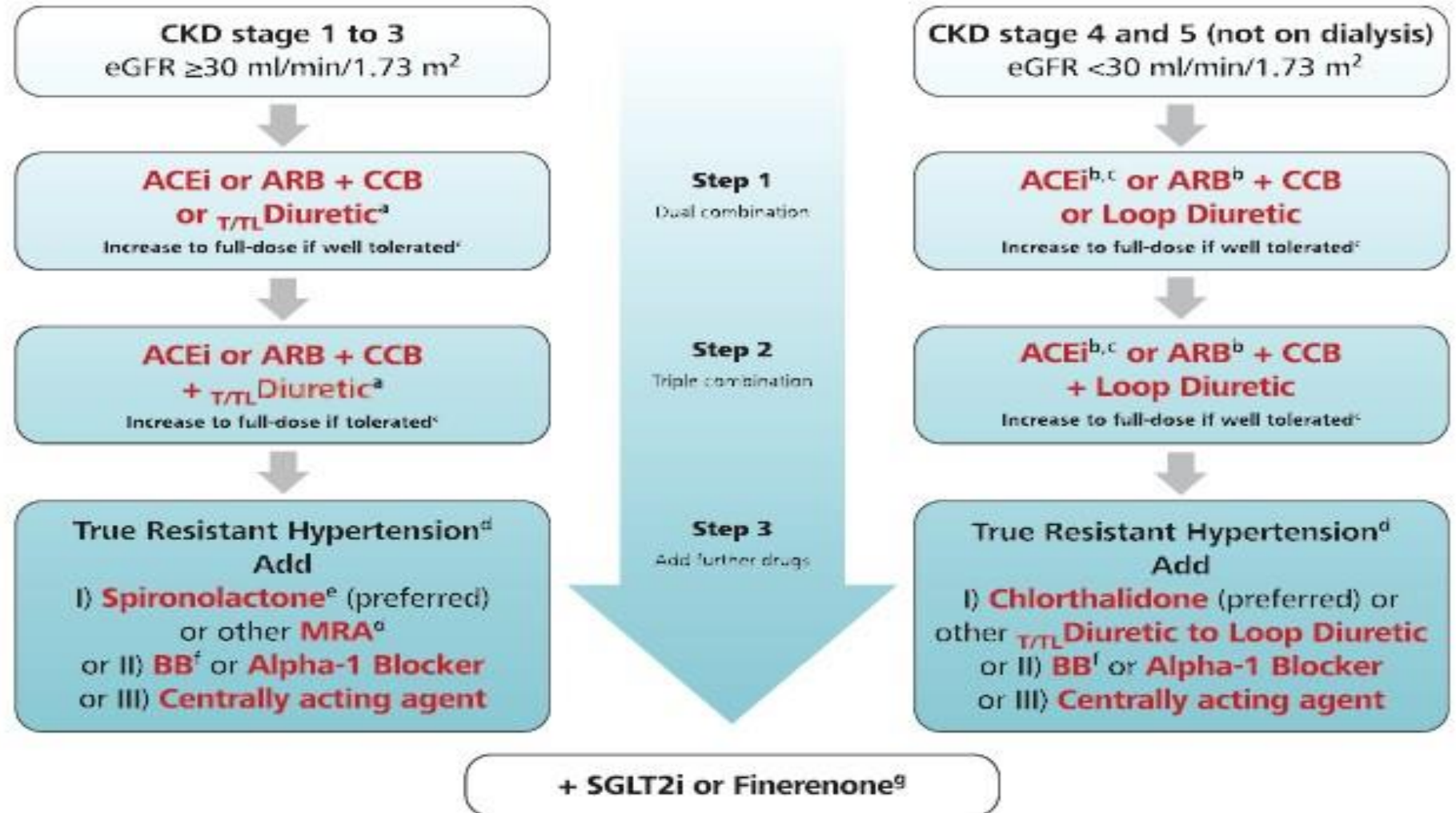
Anti-hypertensive drugs

***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



Special therapeutic challenges in CKD



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

