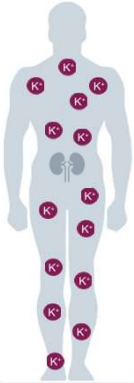


Hyperkalaemia

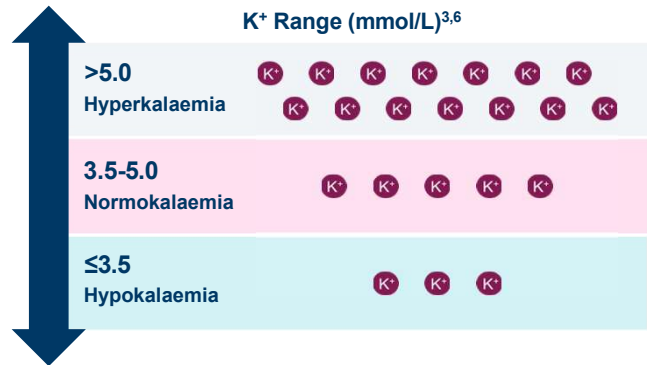
Potassium and Hyperkalaemia



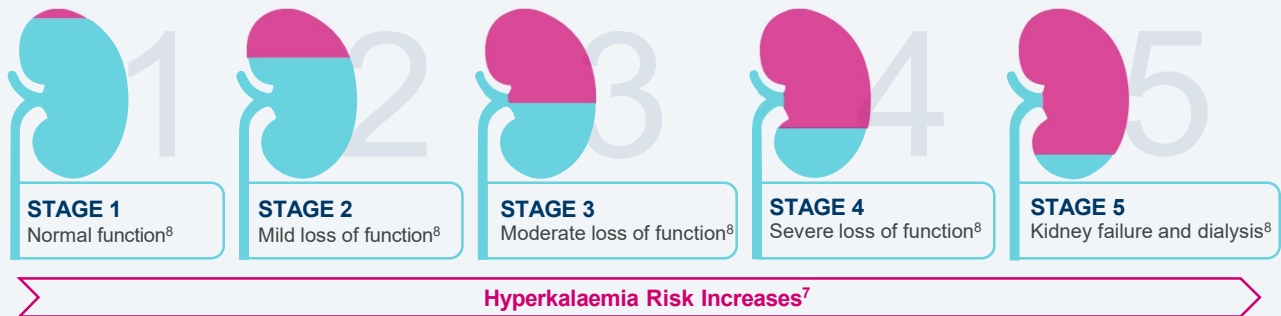
- Healthy kidneys remove waste, regulate fluid, and control potassium (K^+), sodium, and calcium levels in the blood^{1,2}
- K^+ is an important nutrient that **enables normal functioning** throughout the body, including the heart, by regulating:

- Nerve function^{3,4}
- Muscle function^{3,4}
- Fluid and electrolyte balance⁵

- Hyperkalaemia is a condition in which K^+ levels in the blood are **abnormally high**³

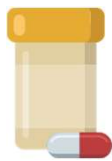


In chronic kidney disease (CKD), kidney function declines. When the kidneys are not able to excrete K^+ as effectively as healthy kidneys, K^+ levels in the body may increase^{7,8}



Hyperkalaemia risk is also increased in patients taking renin-angiotensin-aldosterone system inhibitor (RAASI) therapy, a class of life-saving medications recommended by guidelines in patients with CKD and heart failure (HF)⁹

RAASI therapy includes¹⁰:



- Angiotensin-converting enzyme inhibitors
- Angiotensin II receptor blockers
- Angiotensin receptor-neprilysin inhibitor
- Mineralocorticoid receptor antagonists



1 in 3 patients on RAASI therapy may develop hyperkalaemia^{9,a}



Hyperkalaemia can be a barrier to maintaining maximum RAASI therapy⁹

Impact of Hyperkalaemia

Hyperkalaemia is often asymptomatic.⁶ However, severe hyperkalaemia may lead to:

Cardiac arrest¹¹



Heart palpitations/arrhythmias^{3,12}

RAASI down-titration or discontinuation due to hyperkalaemia can have serious consequences⁹

2X

Mortality rates doubled in patients with CKD or HF who down-titrated or discontinued RAASI therapy compared to patients on maximum dose⁹



HF-related hospitalisations increased in patients who down-titrated or discontinued RAASI therapy compared to patients who maintained or up-titrated RAASI therapy¹³

Treatment options for chronic hyperkalaemia include¹⁴⁻¹⁷:



K⁺ binders



Low-K⁺ diet



Diuretics



RAASi dose modification
as a last resort

Real Patient Experience



When I first learned about my condition, I didn't know it was serious. There are no symptoms in kidney disease. It is only later on I began to realise it is really, really very serious. I'm frustrated because I have watched my diet carefully but still, my K⁺ is high.



—Job Loei,
Manager at the National Kidney Foundation, Singapore

Internationally recognised guidelines for the management of CKD and HF support the use of K⁺ binders to manage hyperkalaemia and keep patients on RAASi therapy¹⁴⁻¹⁷



International consensus: Novel K⁺ binders should be the preferred agent to manage hyperkalaemia, and should be used to enable and maintain optimised RAASi therapy¹⁸

Based on a Delphi consensus regarding best practices for hyperkalaemia management from:



520

cardiologists &
nephrologists



Steering group from
8 leading institutions



7 countries^b

**Hyperkalaemia should not disrupt RAASi therapy,
unless all other measures fail**

^a 1 in 3 patients on RAASi therapy had ≥ 1 hyperkalaemia (serum K⁺ >5.0 mEq/L) event during a median follow-up period of 3.4 years⁹. ^b United Kingdom (n = 49), Canada (n = 50), France (n = 50), Germany (n = 54), Spain (n = 57), Italy (n = 58), United States (n = 202)¹⁸.

1. National Kidney Foundation. How Your Kidneys Work. <https://www.kidney.org/atoz/content/howkidneyswork>. 2. National Kidney Foundation. Kidneys: Master Chemists of the Body. <https://www.kidney.org/atoz/content/kidneymasterchem>. 3. National Kidney Foundation. What is hyperkalaemia? <https://www.kidney.org/atoz/content/what-hyperkalaemia>. 4. Palmer BF, Carrero JJ, Clegg DJ, et al. Clinical management of hyperkalaemia. *Mayo Clin Proc*. 2021;96(3):744-762. doi:10.1016/j.mayocp.2020.06.014. 5. Giebisch G, Krapf R, Wagner C. Renal and extrarenal regulation of potassium. *Kidney Int*. 2007;72(4):397-410. doi:10.1038/sj.ki.5002288. 6. Viera AJ, Wouk N. Potassium disorders: hypokalemia and hyperkalaemia. *Am Fam Physician*. 2015;92(6):487-495. 7. Yamada S, Inaba M. Potassium metabolism and management in patients with CKD. *Nutrients*. 2021;13(6):1751. 8. National Kidney Foundation. Estimated eGFR. Accessed May 8, 2023. <http://www.kidney.org/atoz/content/gfr>. 9. Epstein M, Reaven NL, Funk SE, McGaughey KJ, Oestreicher N, Knispel J. Evaluation of the treatment gap between clinical guidelines and the utilization of renin-angiotensin-aldosterone system inhibitors. *Am J Manag Care*. 2015;21(11 suppl):S212-S220. 10. Vijayakumar S, Butler J, Bakris GL. Barriers to guideline mandated renin-angiotensin inhibitor use: focus on hyperkalaemia. *Eur Heart J Suppl*. 2019;21(suppl A):A20-A27. doi:10.1093/eurheartj/suy030. 11. Vallentin MF, Povlsen AL, Granfeldt A, Terkelsen CJ, Andersen LW. Effect of calcium in patients with pulseless electrical activity and electrocardiographic characteristics potentially associated with hyperkalaemia and ischemia-sub-study of the Calcium for Out-of-hospital Cardiac Arrest (COCA) trial. *Resuscitation*. 2022;181:150-157. 12. Rossignol P, Legrand M, Kosiborod M, et al. Emergency management of severe hyperkalaemia: guideline for best practice and opportunities for the future. *Pharmacol Res*. 2016;113(pt A):585-591. doi:10.1016/j.phrs.2016.09.039. 13. Kanda E, Rastogi A, Murohara T, et al. Clinical impact of suboptimal RAASi therapy following an episode of hyperkalaemia. *BMC Nephrol*. 2023. doi:10.1186/s12882-022-03054-5. 14. Kidney Disease: Improving Global Outcomes (KDIGO) Diabetes Work Group. *Kidney Int*. 2022;102(55):S1-S127. 15. KDIGO Blood Pressure Work Group. *Kidney Int*. 2021;99(3S):S1-S87. 16. McDonagh TA, Metra M, Adamo M, et al. 2021 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. *Eur Heart J*. 2021;42(36):3599-3726. 17. Heidenreich PA, Bozkurt B, Aguilar D, et al. 2022 AHA/ACC/HFSA guideline for the management of heart failure: a report of the American College of Cardiology/American Heart Association joint committee on clinical practice guidelines. *J Am Coll Cardiol*. 2022;79(17):e263-e421. 18. Burton JO, Coats AJS, Kovessy CP, et al. An international Delphi consensus regarding best practice recommendations for hyperkalaemia across the cardiorenal spectrum [published correction appears in Eur J Heart Fail. 2023;25(3):444]. *Eur J Heart Fail*. 2022;24(9):1467-1477. doi:10.1002/ehfj.2612.