

# Chronic Kidney Disease

## What is **Chronic Kidney Disease**?



In chronic kidney disease (CKD), the kidney function declines over time.<sup>1</sup>

## What is the **primary role** of the kidneys?



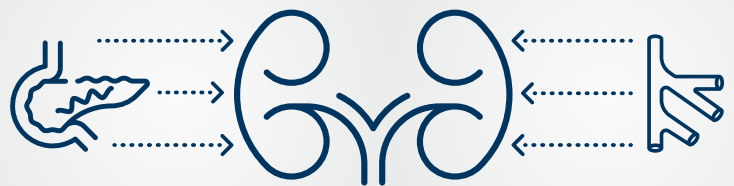
To filter blood to remove waste and excess water from the body.<sup>2</sup> Half a cup of blood is filtered every minute to make urine.<sup>2</sup>

It is a **progressive** disease with 5 stages of severity.<sup>3</sup>

Early stages = Usually no symptoms.<sup>4</sup>  
Patients may not realise they have the disease until it's advanced.<sup>5,6</sup>



Up to **2 of 3** CKD cases are caused by diabetes and high blood pressure.<sup>5</sup>



## Associated **complications**



CKD is known as a “**disease multiplier**” as it often occurs in the context of multiple comorbidities.<sup>7</sup>



As kidney function continues to decline, patients face an increased risk of developing other complications, including **anaemia** and **hyperkalaemia**.



Progression of the disease might be slowed but **no cure exists**.<sup>4</sup>



## Hyperkalaemia

Hyperkalaemia is characterised by **too much potassium** in the blood.<sup>8</sup> As kidney function declines, the kidneys are less able to remove excess potassium.<sup>8</sup>

Elevated potassium (especially at higher levels) is associated with increased risk of cardiovascular (CV) events and death.<sup>9</sup>



## Anaemia

Anaemia happens when there aren't **enough red blood cells**.<sup>10</sup> As kidney function declines, anaemia develops because the body does not properly signal that it should produce enough red blood cells.<sup>10</sup>

Anaemia in CKD can be associated with hospitalisation and higher risk of death.<sup>11, 12</sup>



## Bone disease

Bone disease happens when there is **too much phosphorus** in the blood. When kidney function declines, phosphorus is less able to be removed properly, causing the body to pull calcium from your bones.<sup>13</sup>

Elevated phosphorus has been associated with an increased risk of death in CKD patients undergoing dialysis.<sup>14</sup>



## Heart disease

Heart disease (heart attack, heart failure, stroke, arrhythmias, peripheral vascular disease) can develop when damaged kidneys **fail to help the body regulate** blood pressure.<sup>15-17</sup>

Patients with stage 5 CKD have been estimated to have 3.4x higher risk of CV events than patients with stage 1 or 2.<sup>18</sup>



Global deaths caused by CKD

# nearly doubled

from 0.6 million in 1990 to 1.2 million in 2016.<sup>19</sup>



In 2017, approximately

# 35.8 million healthy years of life

were lost globally due to disability caused by CKD.<sup>20</sup>



# 2-3%

## of the annual healthcare budget

is spent on end-stage kidney disease treatment in high-income countries.<sup>21</sup>

# References

1. National Institute of Diabetes and Digestive and Kidney Diseases. What Is Chronic Kidney Disease?; 2017 [cited 11.03.19]. Available from: URL: <https://www.niddk.nih.gov/health-information/kidney-disease/chronic-kidney-disease-ckd/what-is-chronic-kidney-disease>.
2. National Institute of Diabetes and Digestive and Kidney Diseases. Your Kidneys & How They Work [cited 11.03.19]. Available from: URL: <https://www.niddk.nih.gov/health-information/kidney-disease/kidneys-how-they-work>.
3. Kidney Research UK. Stages of kidney disease [cited 11.03.19]. Available from: URL: <https://www.kidneyresearchuk.org/health-information/stages-of-kidney-disease>.
4. National Health Service. Chronic kidney disease; 2016 [cited 11.03.19]. Available from: URL: <https://www.nhs.uk/conditions/kidney-disease/>.
5. National Kidney Foundation. Kidney Disease: The Basics [cited 11.03.19]. Available from: URL: <https://www.kidney.org/news/newsroom/factsheets/KidneyDiseaseBasics>.
6. National Kidney Disease Education Program. Chronic Kidney Disease: What Does It Mean for Me? [cited 11.03.19]. Available from: URL: <https://www.niddk.nih.gov/-/media/Files/Health-Information/Communication-Programs/NKDEP/kidney-disease-mean-for-me-508.pdf>.
7. National Institute of Diabetes and Digestive and Kidney Diseases. Kidney Disease Statistics for the United States: National Institutes of Health [cited 2018 Aug 28]. Available from: URL: <https://www.niddk.nih.gov/health-information/health-statistics/kidney-disease>.
8. National Kidney Foundation. What is Hyperkalemia?; 2016 [cited 11.03.19]. Available from: URL: <https://www.kidney.org/atoz/content/what-hyperkalemia>.
9. Hoppe LK et al. Association of Abnormal Serum Potassium Levels with Arrhythmias and Cardiovascular Mortality: A Systematic Review and Meta-Analysis of Observational Studies. *Cardiovasc Drugs Ther* 2018; 32(2):197–212.
10. National Kidney Foundation. Managing Anemia: When You Have Kidney Disease or Kidney Failure. New York; 2014 [cited 11.03.19]. Available from: URL: [https://www.kidney.org/sites/default/files/11-10-6553\\_managinganemia.pdf](https://www.kidney.org/sites/default/files/11-10-6553_managinganemia.pdf).
11. Fishbane S, Spinowitz B. Update on Anemia in ESRD and Earlier Stages of CKD: Core Curriculum 2018. *Am J Kidney Dis* 2018; 71(3):423–35.
12. KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for Anemia in Chronic Kidney Disease. *Am J Kidney Dis* 2006; 47(5 Suppl 3):S1–146.
13. American Kidney Fund. Bone disease and high phosphorous [cited 2019 Mar 18]. Available from: URL: <http://www.kidneyfund.org/kidney-disease/chronic-kidney-disease-ckd/complications/bone-disease-high-phosphorous.html>.
14. Wang M et al. Association of Parameters of Mineral Bone Disorder with Mortality in Patients on Hemodialysis according to Level of Residual Kidney Function. *Clin J Am Soc Nephrol* 2017; 12(7):1118–27.
15. Kidney Health Australia. Fact sheet: Cardiovascular Disease and Chronic Kidney Disease fact sheet; 2016 [cited 2019 Mar 18]. Available from: URL: [https://kidney.org.au/cms\\_uploads/docs/cardiovascular-disease-and-chronic-kidney-disease-fact-sheet.pdf](https://kidney.org.au/cms_uploads/docs/cardiovascular-disease-and-chronic-kidney-disease-fact-sheet.pdf).
16. Subbiah AK et al. Cardiovascular disease in patients with chronic kidney disease: A neglected subgroup. *Heart Asia* 2016; 8(2):56–61.
17. American Heart Association. How High Blood Pressure Can Lead to Kidney Damage or Failure; 2016 [cited 2019 Mar 18]. Available from: URL: <https://www.heart.org/en/health-topics/high-blood-pressure/health-threats-from-high-blood-pressure/how-high-blood-pressure-can-lead-to-kidney-damage-or-failure>.
18. Go AS et al. Chronic kidney disease and the risks of death, cardiovascular events, and hospitalization. *The New England Journal of Medicine*; 13(12):13.
19. Xie Y et al. Analysis of the Global Burden of Disease study highlights the global, regional, and national trends of chronic kidney disease epidemiology from 1990 to 2016. *Kidney Int* 2018; 94(3):567–81.
20. Kyu HH et al. Global, regional, and national disability-adjusted life-years (DALYs) for 359 diseases and injuries and healthy life expectancy (HALE) for 195 countries and territories, 1990–2017: A systematic analysis for the Global Burden of Disease Study 2017. *The Lancet* 2018; 392(10159):1859–922.
21. Bello AK, Levin A, Tonelli M, Okpechi IG, Feehally J, Harris D, Jindal K, Salako BL. Global Kidney Health Atlas: A report by the International Society of Nephrology on the current state of organization and structures for kidney care across the globe. Brussels, Belgium: International Society of Nephrology; 2017. Available from: URL: [www.theisn.org/global-atlas](http://www.theisn.org/global-atlas).