Cardiovascular risk in patients on dialysis

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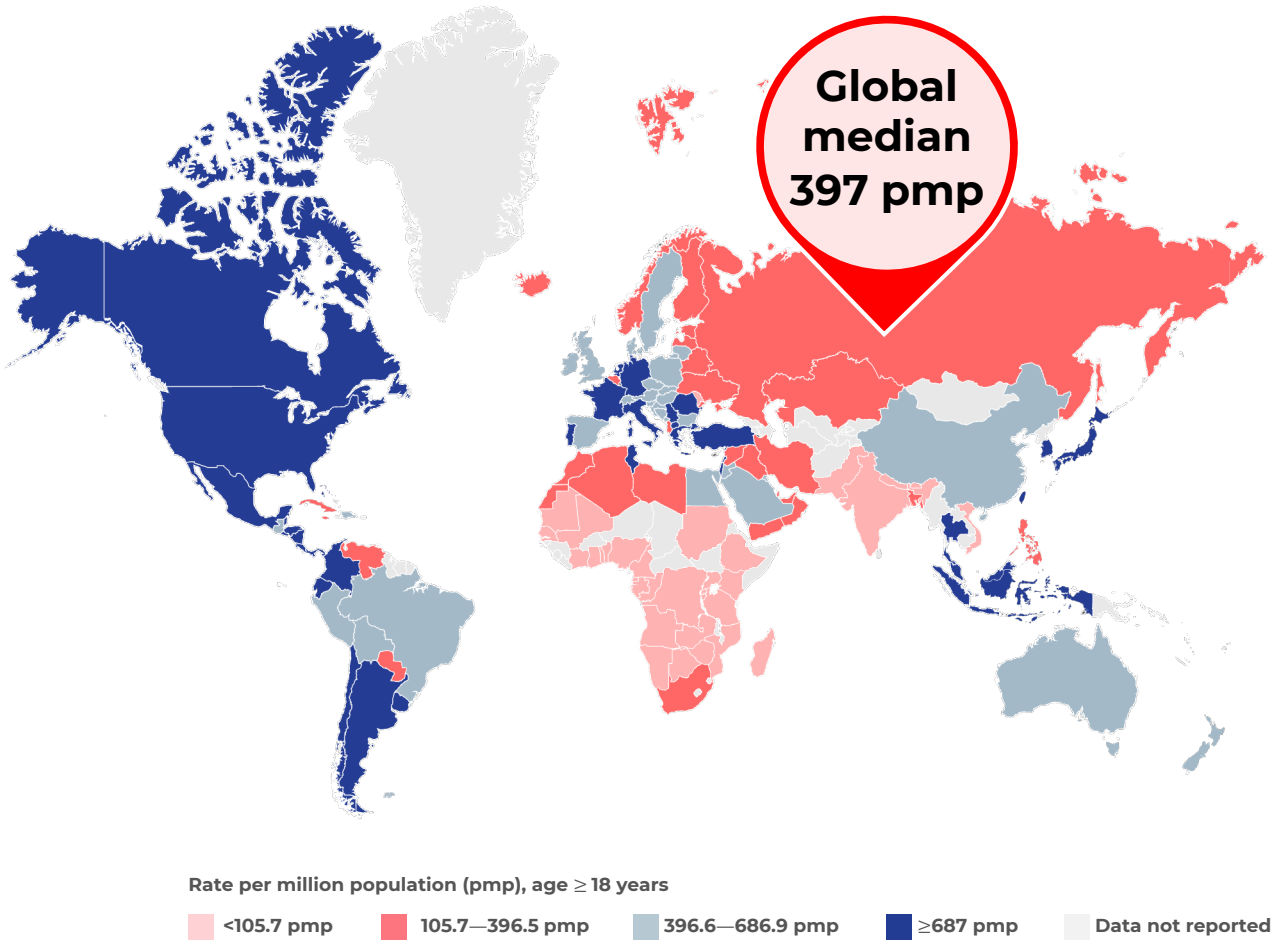
- Global prevalence of dialysis
- Prevalence of cardiovascular disease in patients on dialysis
- Cardiovascular-related outcomes in patients on dialysis
- Inflammation and cardiovascular risk in patients on dialysis

The global prevalence of patients with ESKD undergoing dialysis remains high

- Despite improvements in care, the prevalence of dialysis remains high across the globe[1]
- Factors impacting the prevalence of dialysis:[2]
  - improved overall survival
  - prevalence of risk factors, such as obesity and diabetes
  - an aging population
  - access to treatment



ESKD, end-stage kidney disease; pmp, people per million.

1. Bello AK, et al. ISN–Global kidney health atlas: A report by the International Society of Nephrology. Available at: https://www.theisn.org/wp-content/uploads/media/ISN%20Atlas_2023%20Digital_REV_2023_10_03.pdf. Accessed March 2026;
2. Thurlow JS, et al. Am J Nephrol 2021;52:98–107.

Among CKD patients, the proportion of patients with CVD increases as kidney function worsens[1]

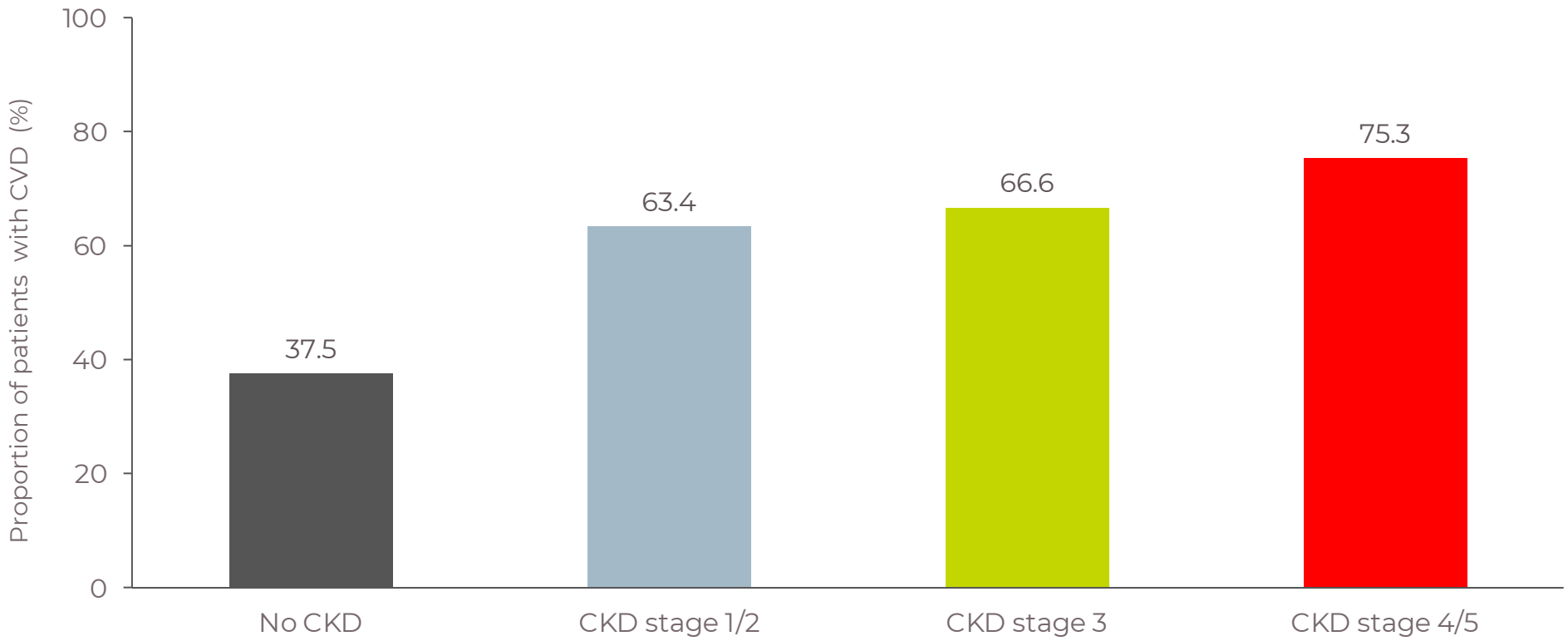
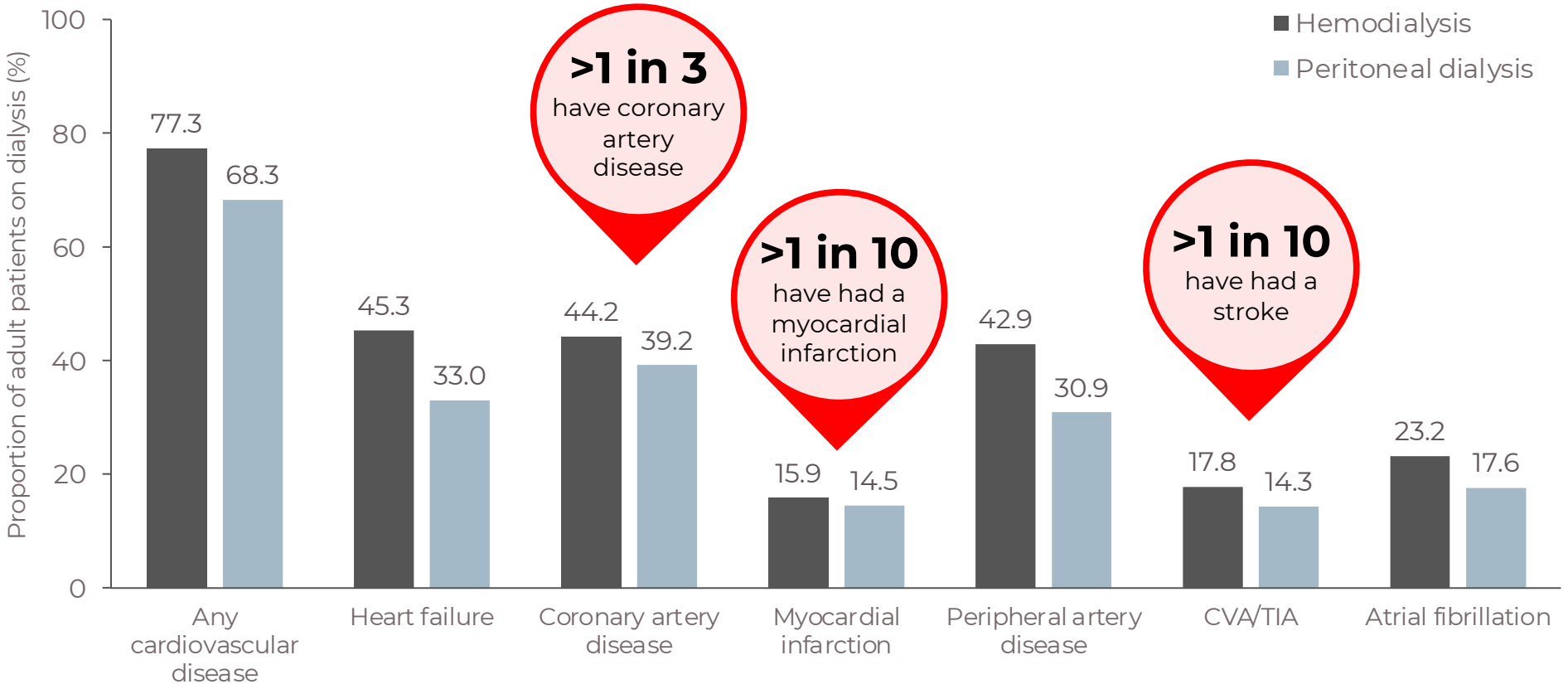


Figure shows the adjusted prevalence of common cardiovascular diseases in Medicare beneficiaries aged ≥66 years, by CKD status and stage in the US Renal Data System in 2018.
CKD, chronic kidney disease; CVD, cardiovascular disease.

1. National Institute of Diabetes and Digestive Kidney Diseases (NIDDK). United States Renal Data System annual data report 2020 chronic kidney disease: Chapter 4. Available at: https://usrds-adr.niddk.nih.gov/2020/chronic-kidney-disease/4-cardiovascular-disease-in-patients-with-ckd. Accessed March 2026.

More than two thirds of adults with ESKD undergoing dialysis have comorbid cardiovascular disease[1]



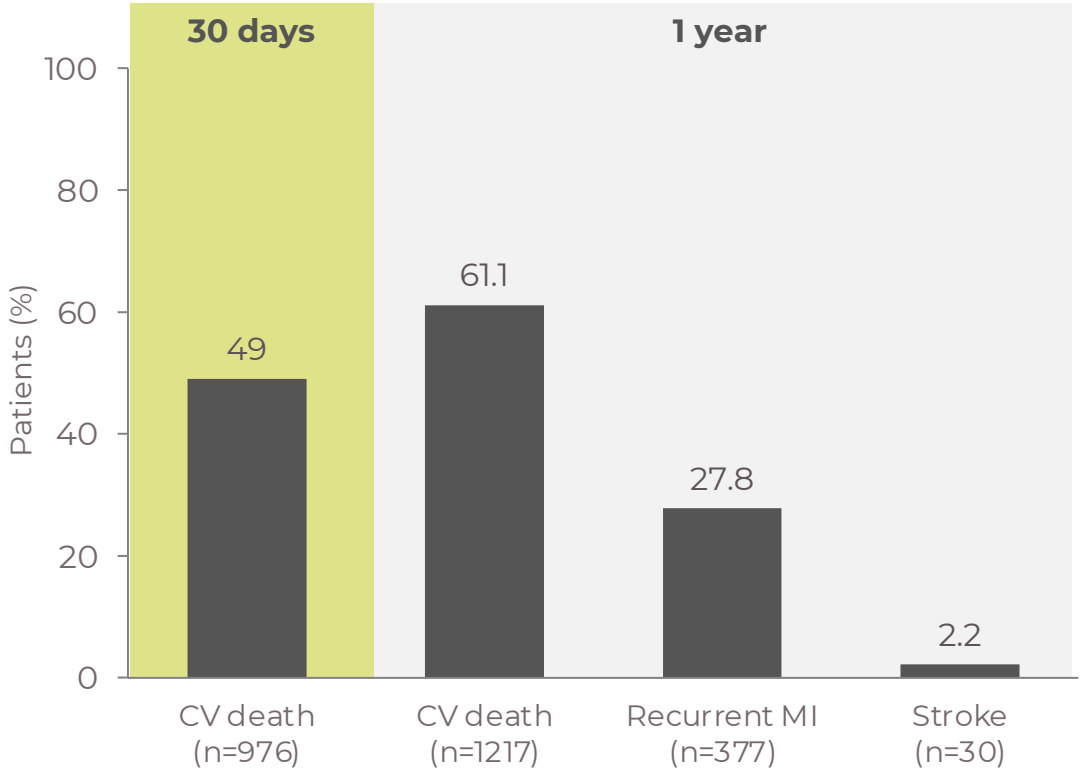
>1 in 4

Hospitalizations for patients on dialysis are due to cardiovascular causes[2]

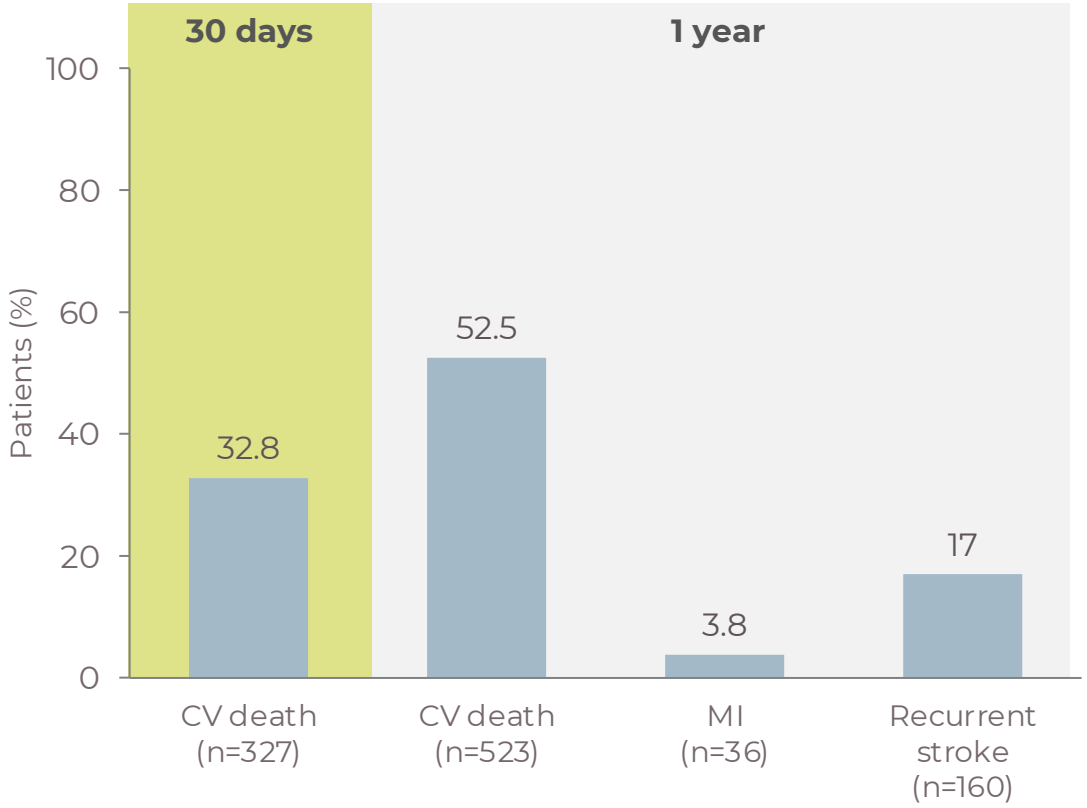
CVA/TIA, cerebrovascular accident/transient ischemic attack; ESKD, end-stage kidney disease.
Figure shows the unadjusted prevalence of cardiovascular disease in adults with end-stage kidney disease in the US Renal Data System in 2021.
Figure adapted from 1. National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). United States Renal Data System annual data report 2023 end stage renal disease: Chapter 1. Available at: https://usrds-adr.niddk.nih.gov/2023/end-stage-renal-disease/1-incidence-prevalence-patient-characteristics-and-treatment-modalities. Accessed March 2026; 2. National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). United States Renal Data System annual data report 2025 end stage renal disease: Chapter 5. Available at: https://usrds-adr.niddk.nih.gov/2025/end-stage-renal-disease/5-hospitalization. Accessed March 2026.

Patients with ESKD who have had a CV event have a substantially increased risk for secondary CV events[1]

PATIENTS WITH ESKD WHO HAD A PRIOR MYOCARDIAL INFARCTION (N=1992)

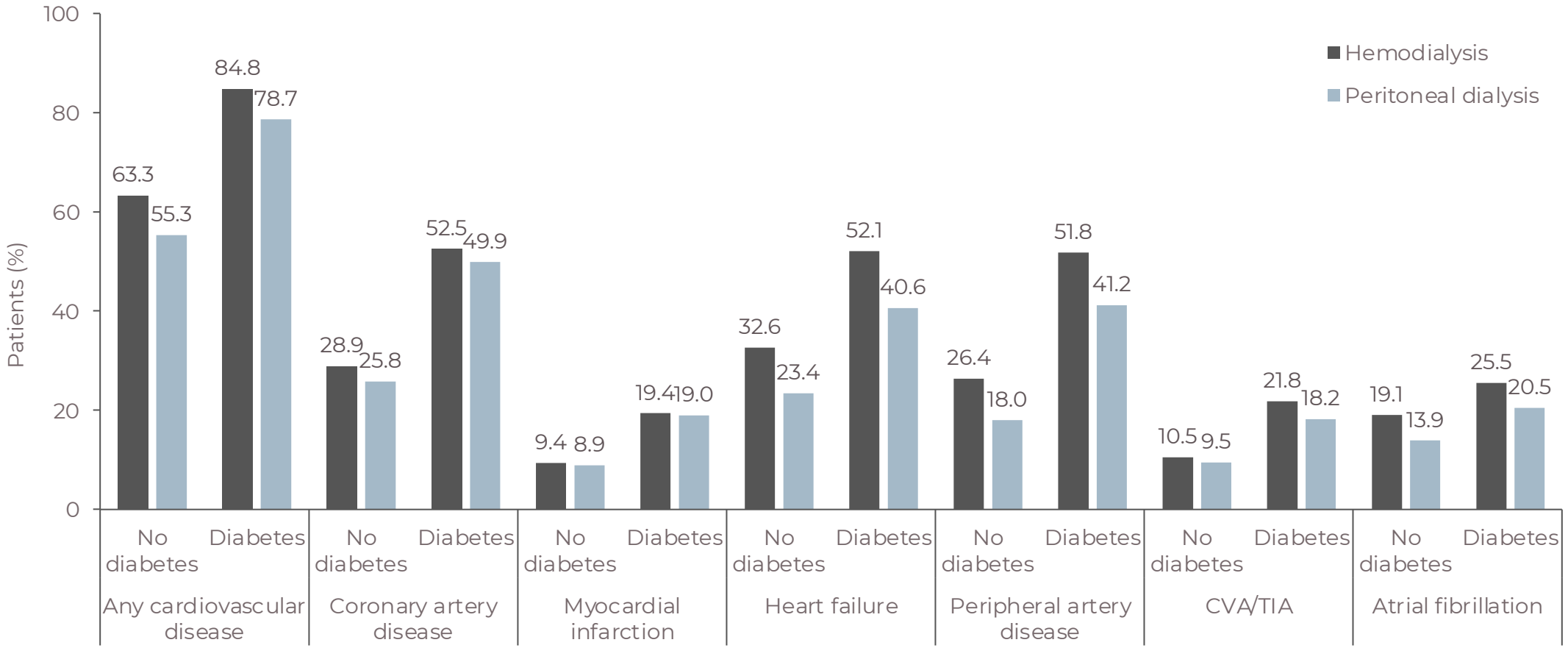


PATIENTS WITH ESKD WHO HAD A PRIOR STROKE (N=996)



Figures show the data from a retrospective national data linkage study and included patients with ESKD in Scotland (UK) receiving kidney replacement therapy between January 1996 and December 2016 and included 16,050 patients with ESKD.
CV, cardiovascular; ESKD, end-stage kidney disease; MI, myocardial infarction.
1. Gallacher PJ, et al. Eur Heart J 2024;45:1339–1351.

Patients on dialysis with diabetes have a higher prevalence of cardiovascular disease than those without



CVA/TIA, cerebrovascular accident/transient ischemic attack.
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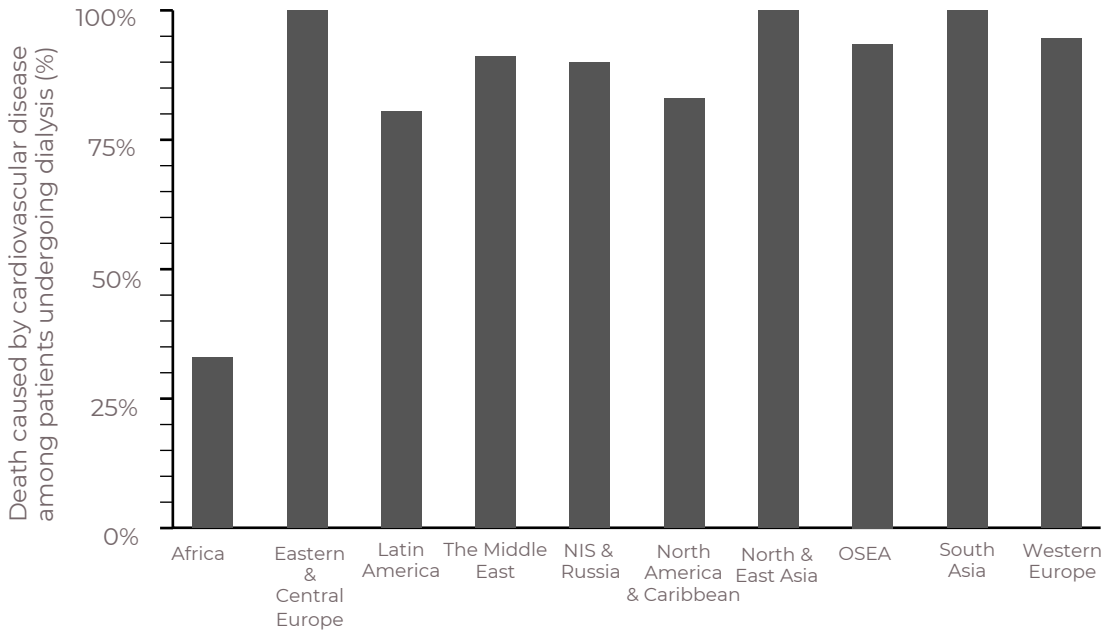
Cardiovascular disease is the leading cause of death in patients on dialysis

Cardiovascular disease is the most common cause of death in the majority of countries[1]

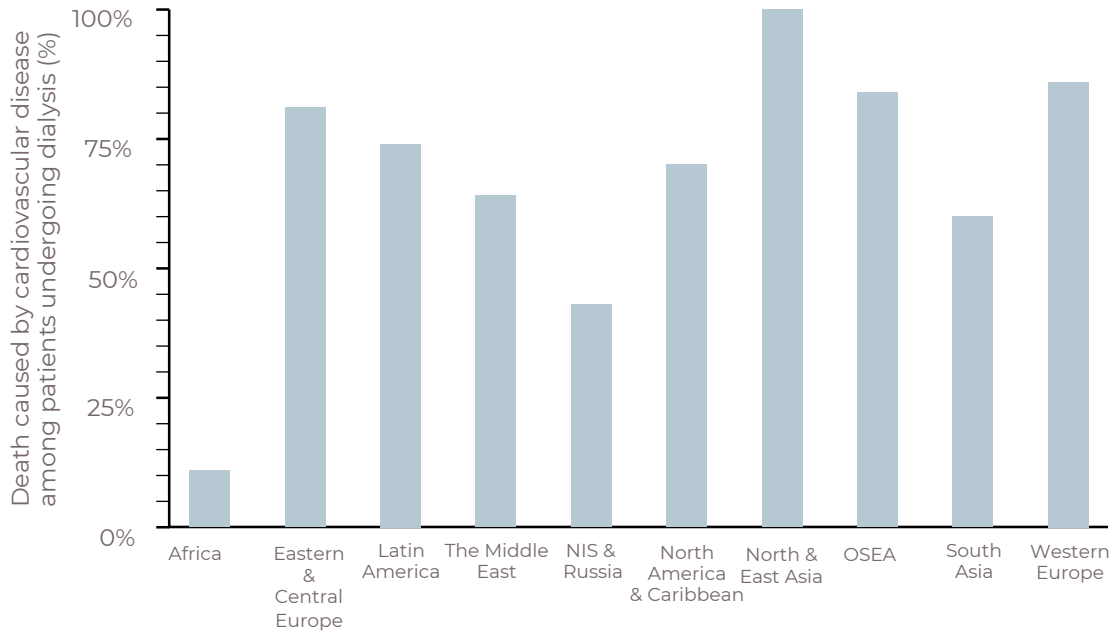
77%

OF COUNTRIES FOR HEMODIALYSIS



66%

OF COUNTRIES FOR PERITONEAL DIALYSIS

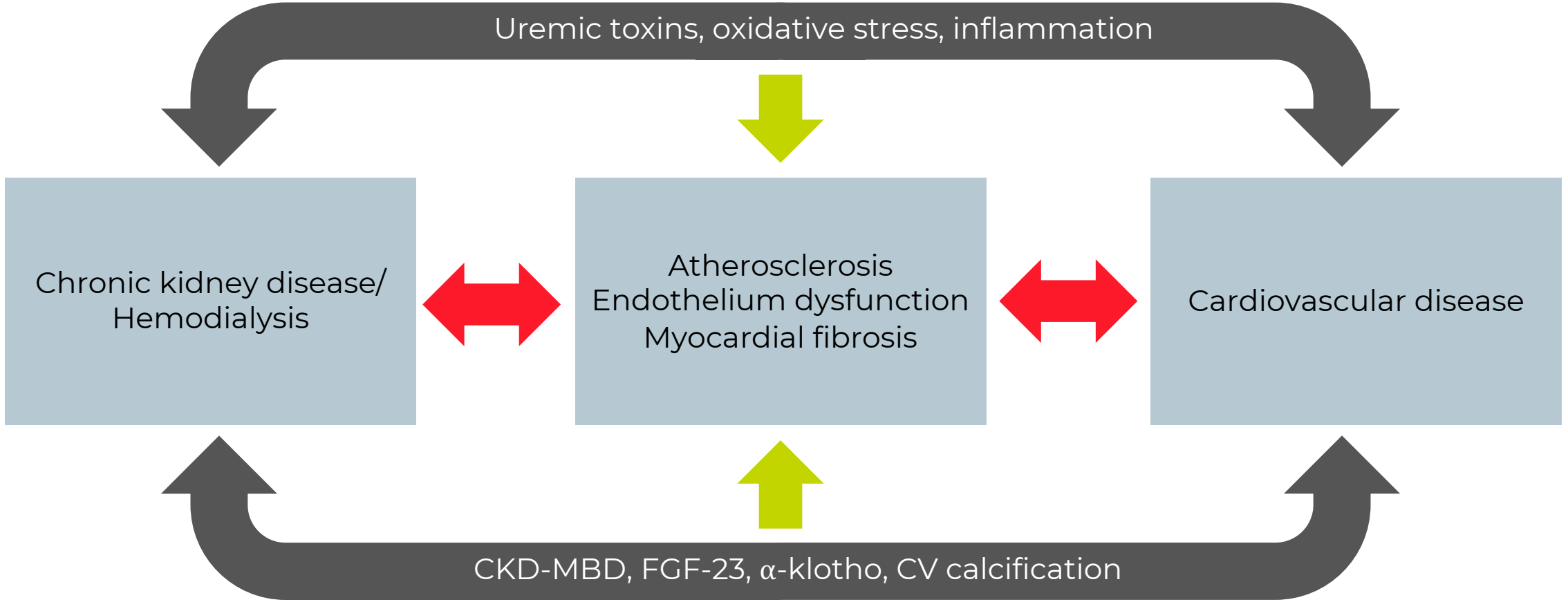


NIS, Newly Independent States [of the former Soviet Union]; OSEA, Oceania and South-East Asia.

1. Bello AK, et al. ISN–Global kidney health atlas: A report by the International Society of Nephrology. Available at: https://www.theisn.org/wp-content/uploads/media/ISN%20Atlas_2023%20Digital_REV_2023_10_03.pdf. Accessed March 2026.

Inflammation is a major factor in the onset of cardiovascular complications in patients on dialysis[1]

CARDIOVASCULAR DISEASE IN DIALYSIS[2]



CKD-MBD, chronic kidney disease-mineral bone disorder; CV, cardiovascular; FGF-23, fibroblast growth factor 23.
Figure adapted from: Cozzolino M, et al. Nephrol Dial Transplant 2018;33:iii28–iii34.

1. Wang Y & Gao L. Front Pharmacol 2022;13:800950; 2. Cozzolino M, et al. Nephrol Dial Transplant 2018;33:iii28–iii34.

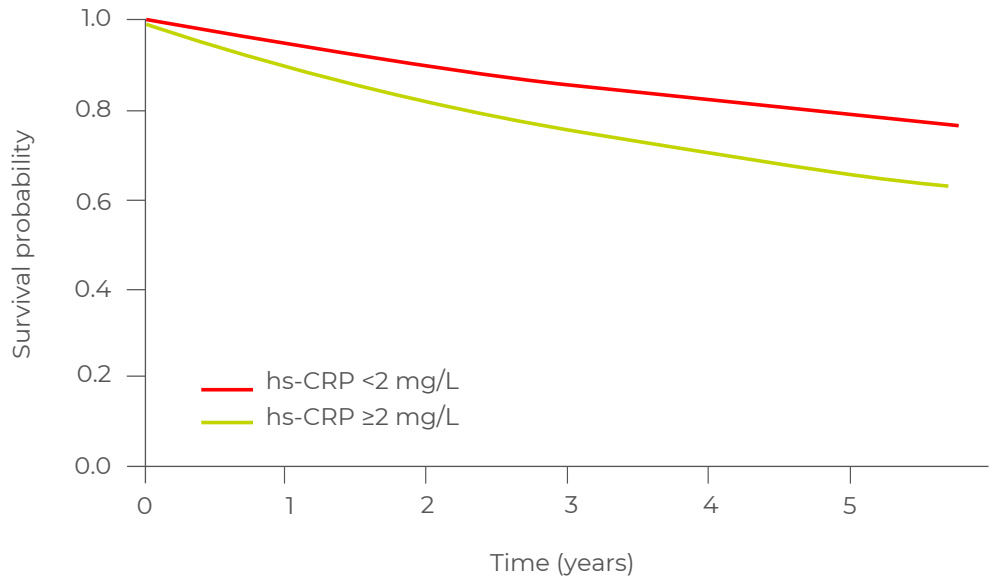
hs-CRP is a clinically valid biomarker of chronic inflammation and predictor of cardiovascular risk

American College of Cardiology consensus recommendation:[1]

Among individuals with known CVD both treated and not treated with statins, hs-CRP is at least as powerful a predictor of recurrent vascular events as that of LDL-C, demonstrating the importance of “residual inflammatory risk” in contemporary practice

hs-CRP levels ≥2 mg/L
are considered moderate-to-high risk[1]

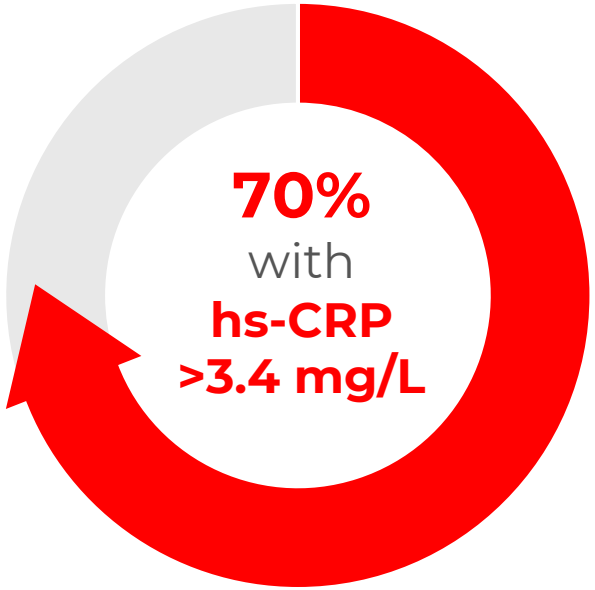
HS-CRP LEVELS ≥2 MG/L ARE ASSOCIATED WITH AN INCREASED RISK OF MAJOR ADVERSE CARDIOVASCULAR EVENTS[2*]



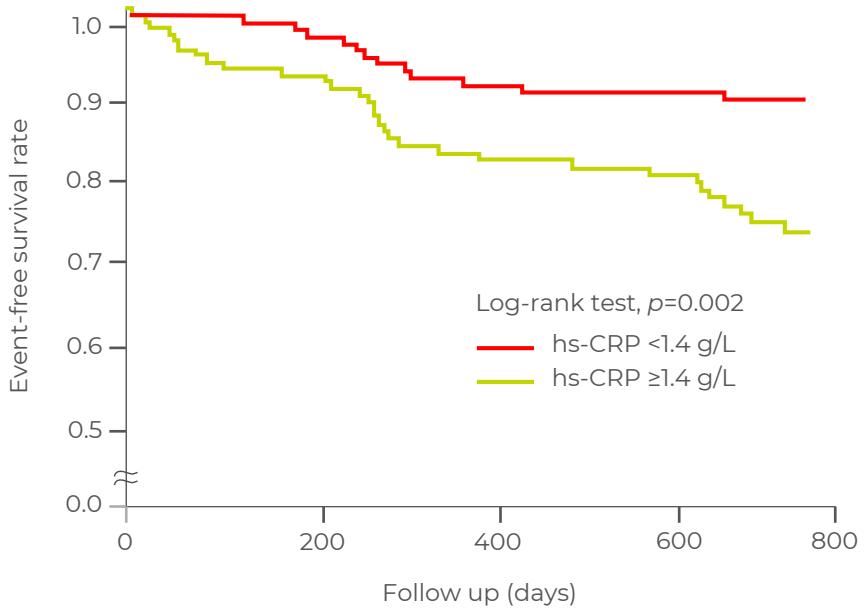
CVD, cardiovascular disease; hs-CRP, high-sensitivity C-reactive protein; LDL-C, low-density lipoprotein cholesterol.
*Based on data from a real-world study in Sweden (2006–2011) of patients with prior MI. Major adverse cardiovascular events was defined as the composite of non-fatal MI, non-fatal stroke, or CV death.
1. Mensah GA, et al. J Am Coll Cardiol 2025;Sep 29:S0735–1097(0725)07555–2; 2. Carrero JJ, et al. J Am Heart Assoc. 2019;8(11):e01263.

Chronic inflammation is highly prevalent in patients on dialysis and is a predictor of cardiovascular risk

IN PATIENTS WITH ESKD, ON OR STARTING DIALYSIS, IN THREE EUROPEAN RENAL CENTRES:[1]



PATIENTS ON HEMODIALYSIS HAVE A HIGHER RISK OF CARDIOVASCULAR EVENTS WITH ABOVE VS. BELOW MEDIAN HS-CRP[2*†]



*Patients aged ≥20 years on hemodialysis (HD) for ≥3 months undergoing HD for 3–4 hours three times per week. Nonfatal cardiovascular events included revascularization for coronary artery disease or peripheral vascular disease, hospitalization due to congestive heart failure, and nonfatal stroke. Fatal cardiovascular events included fatal myocardial infarction, fatal stroke, and sudden cardiac death; †The hazard ratio (HR) of an hs-CRP level above the median was 2.63 (95% confidence interval [CI]=1.37–5.02) in the unadjusted model and 2.47 (95%CI=1.29–4.73) in the model adjusted for age and sex. The HR remained significant after adjusting for age, sex, history of cardiovascular disease, and diabetes (HR=2.30; 95%CI=1.20–4.43).
hs-CRP, high-sensitivity C-reactive protein; ESKD, end-stage kidney disease.
1. Stenvinkel P, et al. Kidney Int 2002;62:1791–1798; 2. Osawa H, et al. In Vivo 2024;38:1351–1358.

Thank you for your attention