

3.3.1 Protein intake

Recommendation 3.3.1.1: We suggest maintaining a protein intake of 0.8 g/kg body weight/d in adults with CKD G3–G5 (2C).

Practice Point 3.3.1.1: Avoid high protein intake (>1.3 g/kg body weight/d) in adults with CKD at risk of progression.

Practice Point 3.3.1.2: In adults with CKD who are willing and able, and who are at risk of kidney failure, consider prescribing, under close supervision, a very low-protein diet (0.3–0.4 g/kg body weight/d) supplemented with essential amino acids or ketoacid analogs (up to 0.6 g/kg body weight/d).

Practice Point 3.3.1.3: Do not prescribe low- or very low-protein diets in metabolically unstable people with CKD.

This recommendation places a higher value on slowing the rate of GFR decline without the challenges associated with adherence to lower-protein diets, potential adverse effects, and the contraindications in people with sarcopenia, cachexia, or undernutrition. The Work Group judged that many well-informed people with CKD G3–G5 would choose to implement this recommendation.

Key information

Balance of benefits and harms. The Work Group considered that maintaining a protein intake of 0.8 g/kg body weight per day in adults in the absence of indications for a higher or lower protein intake was congruent with a person's culture and QoL. Considerations for protein restriction in the context of individual preferences, true impact on CKD progression based on etiology, and other factors need to be considered and weighed against any potential adverse impacts, such as malnutrition.

In many societies, most adults and older adults consume more protein than recommended, with average protein intakes of 1.2 g/kg/d.^{453,454} There is general agreement that, in the absence of intercurrent disease, the protein requirements for people with CKD are not different from those of healthy subjects.⁴⁵⁵ The Work Group thus suggests maintaining a protein intake of 0.8 g/kg body weight/d, a target consistent with the WHO Recommended Dietary Allowances for the general population.^{456,457} Figure 19²³ shows some examples

of the amount of protein in grams that would be recommended based on body weight. Clinicians should advise people with CKD not to confuse grams of protein per day with the weight of food in grams (i.e., 100 g of meat contains only approximately 25 g of protein; Figure 20²³).

Unlike carbohydrates and fats, excess dietary proteins cannot be stored in the body and are catabolized, leading to accumulation of protein waste products such as urea and other uremic toxins. As CKD progresses, these byproducts accumulate and affect organ function. High-protein intake also contributes to increased intraglomerular pressure and glomerular hyperfiltration, which, in turn, may lead to glomerulosclerosis and tubulointerstitial injury.^{458,459} Progressive decline in kidney function is also associated with a spontaneous loss of appetite potentially leading to inadequate protein and energy intake.⁴⁶⁰ The Work Group therefore encourages maintaining protein intake in adults with CKD within the recommended range around 0.8 g/kg body weight/d, and particularly avoiding excess protein intakes (>1.3 g/kg of body weight/d), which may be harmful for the kidney.⁴⁵⁵ There is observational evidence suggesting that excess protein intake may accelerate kidney functional decline.^{461–463}

The protein type, not only the quantity, may also be relevant. Table 21 briefly summarizes the impact of plant-based diets in people with CKD.^{464–470} In another cohort study of older subjects (N = 291, mean age 76 years) with eGFR <60 ml/min per 1.73 m², there was no significant association between vegetable protein intake and change in eGFR.⁴⁶⁰ Observational studies^{452,464,465} and an RCT⁴⁶⁶ have associated a higher plant-based protein relative to animal-based protein consumption or adherence to plant-based protein dominant diets with slower eGFR decline over time and lower risk of death; no study so far has assessed the measures of patient preferences.⁴⁷¹ It is unclear whether the associations are attributed to plant-based protein intake *per se* or to other nutrients or lifestyle habits that accompany the plant-based protein intervention; however, there is biological plausibility. A crossover study of 10 healthy individuals fed for 3 weeks evaluated the effect of a plant-based protein diet versus an animal-based protein diet on kidney function parameters. Both diets provided the same amount of total protein per day. Compared with animal-based protein, a plant-based protein diet reduced renal plasma flow, increased renal vascular resistance, and lowered the fractional clearance of albumin.^{472,473}

Body weight (kg)	35	40	50	55	60	65	70	75	80	85	90	95	100
Grams of protein per day (wt × 0.8 g/kg)	28	32	40	44	48	52	56	60	64	68	72	76	80

Figure 19 | Protein guideline for adults with chronic kidney disease not treated with dialysis. wt, body weight in kg. Reproduced from Kidney Disease: Improving Global Outcomes Diabetes Work Group. KDIGO 2022 Clinical Practice Guideline for Diabetes Management in Chronic Kidney Disease. *Kidney Int.* 2022;102:S1–S127.²³ Copyright © 2022, KDIGO: Kidney Disease Improving Global Outcomes. Published by Elsevier Inc. on behalf of the International Society of Nephrology. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).