
Nutrition and Growth in Kidney Disease

CAROL POLLOCK, *CONVENOR (St Leonards, New South Wales)*

DAVID VOSS (*Auckland, New Zealand*)

ELISABETH HODSON (*Westmead, New South Wales*)

CHARLES CROMPTON (*Nedlands, Western Australia*)

Energy intake in predialysis patients

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Author: David Voss

GUIDELINES

No recommendations possible based on Level I or II evidence

SUGGESTIONS FOR CLINICAL CARE

(Suggestions are based on Level III and IV evidence)

- **Pre-dialysis chronic kidney disease (CKD) patients should have an ideal calorie energy intake determined for their age, gender, body mass index (BMI) and level of physical activity. A nutritionally balanced diet with adequate energy intake to maintain a healthy weight should then be prescribed. To avoid protein malnutrition or undesired weight loss, the recommended energy intake is 35 kCal/kg ideal body weight (IBW)/day. In patients who maintain a sedentary lifestyle or a low level of activity or who are elderly, 30–35 kCal/kg IBW/day is recommended. (Level IV evidence)**
- **Early referral to a dietician skilled in renal care is recommended. The renal dietician should address issues of energy balance along with protein intake. Attainment of an IBW (as assessed by BMI) may need addressing concurrently.**

Background

There is no evidence that the levels of energy intake and expenditure in the non-dialysed CKD population differ from the general population (Kopple et al 1997). Information about the general population has been applied to the kidney disease population and this information includes recommendations that protein and caloric intake should be based on IBW for an individual (see Appendix).

Malnutrition and the associated morbidity and mortality, is prevalent in the dialysis population (Degoulet et al 1982, Acchiardo et al 1983, Lowrie et al 1990, Maiorca et

al 1993, Avram et al 1994, Jones 1994, Pollock et al 1995, Ikizler et al 1995, Bergstrom & Lindholm 1993). Much of this malnutrition results from poor energy intake and an inadequately balanced diet in the pre-dialysis stage. Several factors may contribute such as, anorexia, social and financial problems, lethargy, depression, acidosis and protein catabolism (Guarnieri et al 1983, Bergstrom 1995, Toigo et al 1990). The patient must be prepared for dialysis, by being in the best possible nutritional state, minimising the risk of malnutrition and its associated morbidity and mortality. Protein-energy malnutrition is usually not apparent to the clinician until the glomerular filtration rate (GFR) is below 15 mL/min.

Moderate to severe malnutrition is common in patients undergoing maintenance dialysis (CANUSA Study Group 1996, Kopple et al 1997). This complication is of increasing concern, since inadequate nutrition is an important determinant of patient mortality. Improved patient survival and less hospitalisation was found to be associated with better nutrition (CANUSA Study Group 1996). Early identification of malnutrition (especially in the pre-dialysis stage) is aimed at improving the individual's nutritional status and outcome. The main factors contributing to reduced energy intake and associated malnutrition are low nutrient intake, acidosis and increased catabolism. At present, there is no evidence that such intervention affects the morbidity or mortality of someone on dialysis.

Lower levels of thyroid hormone T3, and post-receptor insulin resistance in renal failure are associated with a lower energy use in this population.

The objective of this guideline is to assess whether different calorie intake based on body weight is associated with mortality and morbidity.

Search strategy

Databases searched: MeSH terms and text words for kidney disease were combined with MeSH terms and text words for energy intake then combined with the Cochrane highly sensitive search strategy for randomised controlled trials and search filters for identifying prognosis and aetiology studies. The search was carried out in Medline (1996 – November Week 2 2003). The Cochrane Renal Group Trials Register was also searched for trials not indexed in Medline.

Date of searches: 27 November 2003.

What is the evidence?

No randomised controlled trials (RCTs) are available which address this issue.

Retrospective studies:

Kopple and colleagues (1986) looked at 16 clinically stable non-dialysed CKD subjects fed for an average of 24 days on diets containing either 45 (4 subjects), 35 (5 subjects), 25 (5 subjects) or 15 (2 subjects) kcal/kg/day. The diet provided 0.55 to 0.6 g protein/kg IBW/day. More individuals maintained nitrogen balance when on the high calorie diets than the lower energy diets. The authors concluded that a dietary

intake providing approximately 35 kcal/kg/day may be more likely to maintain neutral or positive nitrogen balance, and to maintain or increase body mass.

Energy intake below 30–35 kCal per kg body weight per 24 hours may lead to protein catabolism, negative nitrogen balance, and associated protein malnutrition.

Summary of the evidence

There are no RCTs on this topic.

What do the other guidelines say?

Kidney Disease Outcomes Quality Initiative: The recommended daily energy intake for individuals with chronic renal failure (CRF; GFR < 25 mL/min) who are not undergoing maintenance dialysis is 35 kcal/kg/d for those who are younger than 60 years old and 30 – 35 kcal/kg/d for individuals who are 60 years of age or older.

British Renal Association: If protein restriction is practised it must be supplemented with an adequate increase in energy intake (> 35 calories/kg ideal body weight/24 hours), and supervised carefully by a trained renal dietician.

European Dialysis & Transplant Nurses Association/European Renal Care Association: The dietician/nutrition advisor will advise the pre-dialysis patient on an appropriate energy intake of 35 kCal/kg IBW/day.

Implementation and audit

1. The evidence shows the pre-dialysis patient is at risk of malnutrition at GFRs below 25 mL/min, although this may not be clinically evident until the GFR is below 15 mL/min. All pre-dialysis patients should be referred to a suitably trained and qualified renal dietician before the GFR reaches 25 mL/min, preferably once the GFR is below 30 mL/min. This necessitates the patient being referred to the renal physician for assessment before the GFR falls below 30 mL/min.
2. The frequency at which patients should be followed up is not defined. A brief assessment of the patient's diet and weight at least every 3 months, by the renal physician at the outpatient renal clinic should occur. Any patient falling outside the recommended parameters should be reviewed promptly by the renal dietician.
3. Each patient should be given a goal weight to aim for, based on their IBW (see Appendix). Education of the patient in the importance of general health and wellbeing to attain and maintain this weight is recommended.

Suggestions for future research

1. Outline caloric supplementation and outcomes in CKD.
2. Compare supplemented diets with control diets and assess maintenance of BMI, inflammatory markers, progression of CKD and clinical endpoints – in particular, cardiovascular outcomes and mortality.

Out of date

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Out of date

Appendix

Table 1 Ideal body weights by BMI for men and women over the age of 18 years

Body Weight Classification	Ethnic Group		
	European	Pacific Islander and Maori	Asian and Indian
Underweight	< 18.5	< 18.5	< 18.5
Healthy weight	18.5–25.0	18.5–26.0	18.5–23.0
Overweight	25.0–30.0	26.0–32.0	23.0–25.0
Obese	> 30.0	> 32.0	> 25.0

Source: The New Zealand Dietetic Association Inc. 2001 Clinical Handbook. 6th edn. Wellington, The New Zealand Dietetic Association Inc., 2000.