

High protein diets and diabetes

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Higher protein diets are currently 'hot'. The *CSIRO total wellbeing diet* book has been on the bestseller list in Australia and internationally. Various other high protein diets have also had, or are getting, media attention. However, high protein diets, particularly for people with diabetes, are controversial. There are questions about effectiveness and safety, especially in the long term. As a general practitioner people will look to you for advice about what to eat. This article summarises the pros and cons of two of the popular higher protein diets – the Atkins diet and the CSIRO total wellbeing

In diabetes, a healthy lifestyle is the cornerstone for management. 'Eat less and walk more' is an important and simple message for achieving a healthy lifestyle.¹ However, it may not always be simple to implement. We all know that lifestyle change can be difficult, and it makes sense that people are looking for the quickest and easiest solution. It is no wonder 'diets' are attractive to people as they usually promise weight loss at a rate more rapid than can be achieved conventionally.

Weight loss requires either a reduction in energy intake (less calories/kilojoules) or an increase in energy output (more physical activity) or both. An energy deficit can be achieved by reducing any or all of the macronutrients: protein, fat or carbohydrate, or by reducing alcohol intake. Over the years, various popular diets have manipulated each of the macronutrients. For at least the past decade, the standard approach to weight loss has been a low fat diet. The nutritional approach for diabetes has been through a number of changes over the past 40 years. In recent years, the focus has been on a low fat diet (particularly saturated fats) and the inclusion of moderate amounts of carbohydrates (particularly low glycaemic index sources).

Accompanying what is now termed the 'obesity epidemic', is an increased interest in alternative diets. Diets appearing to get the most attention are the higher protein, lower carbohydrate (HPLC) diets. Such diets include the 'Zone diet', 'Sugar busters', 'Slim forever', the 'CSIRO total wellbeing diet', and the controversial 'Atkins diet'. These diets vary enormously in the amount of protein and carbohydrate they provide. At opposite ends of the spectrum are the Atkins diet and the CSIRO diet. The Atkins diet promotes the highest amount of protein and lowest amount of carbohydrate, while the CSIRO diet

promotes only slight changes to protein and carbohydrate intake than other popular diets. Although some diets claim to be the 'miracle cure' for overweight and obesity, their safety and effectiveness has been questioned, especially in diabetes. The Atkins diet and the CSIRO diet are the focus of this article.

Current nutrition recommendations

Nutrition recommendations for people with diabetes are similar to those for the rest of the Australian population (*Figure 1*). A diet that is low in fat (particularly saturated fat and trans fat) is encouraged. The range of protein intake recommended by most diabetes associations is 10–20% of energy, and for carbohydrate, 45–60% of energy. The *Australian guide to healthy eating* recommends:

- eat plenty of plant foods (wholegrain breads and cereals, rice, pasta, noodles, vegetables, legumes and fruit)
- eat moderate amounts of animal foods (milk, yoghurt, cheese, meat, fish, poultry, eggs)
- eat small amounts of the 'extra' foods (eg. biscuits, cakes, desserts, pastries, soft drinks, crisps, chocolates) and small amounts of fats and oils (unsaturated varieties)
- drink plenty of water.

Australian eating patterns

According to the most recent national survey on eating patterns, the percentage contribution of nutrients to the total energy intake are similar to the current recommendations (*Figure 2*). However, Australians are eating more from each food group. Protein intakes are approximately 1.2–1.3 g per kg body weight per day. This is approximately 60% higher than the Australian recommended dietary intake (RDI) of 0.75 g per kg body weight per day.

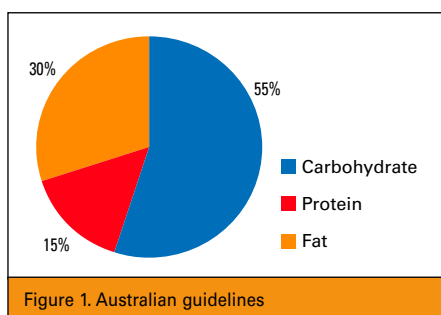


Figure 1. Australian guidelines

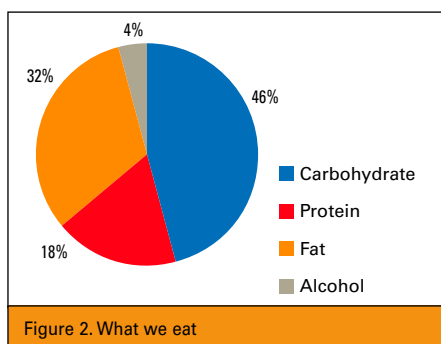


Figure 2. What we eat

The Atkins diet

The Atkins diet is one of the best known higher protein diets – it is also one of the most extreme as it promotes much higher levels of protein and fat, and lower levels of carbohydrate than conventional recommendations (Figure 3). With an unlimited intake of meat, cheese, and eggs, protein intake can be higher than 3 g per kg body weight per day.

This diet is one of the most controversial among health professionals concerned about high saturated fat and dietary cholesterol, and low dietary fibre, antioxidants and other micronutrients.

CSIRO total wellbeing diet

Compared to the Atkins diet, the CSIRO diet is more moderate in protein and carbohydrate levels and is lower in fat (Figure 4). It is an energy controlled diet that recommends 300 g of lean meat, chicken, fish, or eggs (with a focus on red meat) and three serves of bread or cereal per day. In comparison, a conventional diet of the same energy intake would recommend 65–100 g of meat and 4–5 serves of bread and cereal per day.

The 'pros' of high protein diets

Weight loss

There have been few long term randomised controlled trials comparing

weight loss resulting from HPLC diets and more conventional diets, and trials conducted have used different macronutrient proportions or subjects with varying medical conditions.

Some studies have suggested that 'Atkins type' diets may result in more weight and abdominal fat loss in the short term (up to 6 months).^{3,4} However, three longer term studies found little difference in weight loss between Atkins type diets and more conventional diets at 12 months.^{5–7}

'CSIRO type' diets have also been reported to increase weight loss⁸ and abdominal fat loss⁹ in the shorter term compared to conventional diets. One study showed that women who followed the CSIRO diet for 12 weeks lost slightly more weight than women on a conventional diet, although this was not statistically significant. However, weight loss was significantly more for women with triglyceridaemia on the CSIRO diet.¹⁰ Longer term studies of the CSIRO diet have not shown a significant difference in weight loss compared to conventional diet at 12 months in obese hyperinsulinaemic people¹¹ and obese people with type 2 diabetes.¹²

An analysis of 94 weight loss interventions found that weight loss was not independently associated with reduced carbohydrate intake.¹³ Most studies have shown that restricted energy intake and not macronutrient composition is the key determinant of total weight loss.^{8,9,14}

Adherence

Some studies suggest that higher protein intake produces more satiety during weight loss but there is no evidence that carbohydrate dieters show higher long term adherence.^{5,7,11,12} Drop out rates seem to be high in the long term for any type of diet.

Insulin resistance

Weight loss does improve insulin sensitivity¹⁵ but it is not clear whether replacing carbohydrate with protein has extra benefits independent of weight loss.^{5,6,11,14}

In obese men (without diabetes), both a conventional diet and an Atkins diet was associated with an improvement in insulin sensitivity after 6 months. However,

after 12 months on the diets, there was no significant difference from baseline.⁵ Another study similarly found no difference in insulin sensitivity at 1 year between diet groups, however HbA1c decreased more on the Atkins diet for subjects with diabetes.⁶ There is no difference in fasting insulin and insulin resistance for obese subjects with the CSIRO diet and a conventional diet at 12 months.¹¹

Lipid control

Weight loss independent of macronutrient composition improves blood lipids. Higher protein diets improve total and LDL cholesterol, but no more than a conventional diet.^{5,6,10} There does appear to be a better reduction of triglyceride levels when carbohydrate intake is reduced.^{5,6,10} Triglyceridaemia in type 2 diabetes can also be reduced by replacing carbohydrate with monounsaturated fat.²⁰

A low saturated fat eating plan incorporating moderate amounts of poly- and mono-unsaturated fats and oils, omega 3 fatty acids, and a wide variety of fruits, vegetables and wholegrain cereal products is recommended by the National Heart Foundation of Australia for improving blood lipids. Plant sterols and stanols are also recommended to further reduce LDL cholesterol.²¹

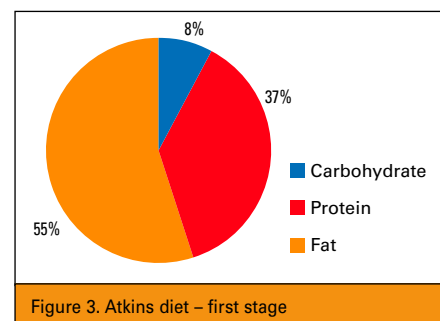


Figure 3. Atkins diet – first stage

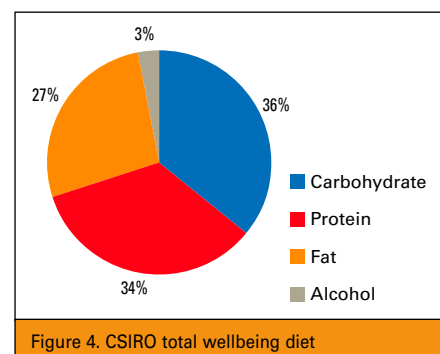


Figure 4. CSIRO total wellbeing diet

The 'cons' of high protein diets

Hypoglycaemia

One of the greatest concerns for people with diabetes following a HPLC diet is the risk of hypoglycaemia if taking sulphonylurea medication or insulin. Appropriate dose adjustments are essential.

Osteopaenia/osteoporosis

Short term studies indicate that increased protein intake (2 g per kg body weight per day) is associated with increased renal calcium excretion, negative calcium balance and bone resorption.¹⁶ Specifically, protein intakes in excess of 1.6–2.4 g per kg body weight (as occurs in the Atkins diet) may have harmful effects on calcium homeostasis and bone mass, particularly if the protein comes primarily from animal sources. However, the CSIRO diet does not appear to have deleterious effects on bone turnover in the short term.^{9,10}

Nephropathy

A higher protein diet does not appear to cause kidney disease, but may worsen pre-existing kidney disease.¹⁶

Cancer risk

One of the main areas of controversy regarding high protein diets is the possible link with bowel cancer. A recent prospective study confirmed that colorectal cancer risk is positively associated with intake of red and processed meat (highest >160 g/day vs. lowest intake 20 g/day).¹⁷ Red meat intake in the Atkins diet is unrestricted. In the CSIRO diet, 200 g (raw weight) of lean red meat is advised at least four times per week, averaging out to 114 g per day.

On the other hand, increased fish intake reduces colorectal cancer risk.¹⁷ Those following high protein diets might be better off with the extra protein provided by fish instead of red meat, but there is the risk of increased mercury exposure of excessive fish consumption, particularly with fish high in the food chain.¹⁸

Heart disease

Although speculative, homocysteine blood levels are related to higher risk of coronary heart disease, stroke and peripheral vascular disease.

A higher protein diet (21% of energy from protein) is associated with higher postprandial homocysteine levels.¹⁹

Conclusion

It is clear that there is no one perfect diet for diabetes or weight loss. Weight loss is achieved through an energy deficit over the long term and appears to be independent of macronutrient composition. Higher protein, lower carbohydrate diets might be more superior for weight loss in the short term only.

Extreme swings from the conventional guidelines (such as in the Atkins diet), are more likely to be inadequate nutritionally and present increased risk of health dangers. Slight modifications in protein and carbohydrate intake (such as in the CSIRO diet), appear to be safe over a 12 month period, except possibly for people with kidney disease. People treating their diabetes with insulin therapy or sulphonylurea medication may need to dose adjust if following a lower carbohydrate diet. Medical and dietetic supervision is recommended.

The key message is that nutritional advice should be tailored to the individual, with a focus on the importance of a variety of foods to provide essential nutrients, together with regular physical activity.

Conflict of interest: none declared.

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