

**Consultation on the draft report:**

**Lower carbohydrate diets for adults with type 2 diabetes**

**Comments Form**

<b>Organisation</b>	Obesity Group of the British Dietetic Association
<b>Name of commentator and contact details</b>	Dr Hilda Mulrooney

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General comments	Comments
	Please insert each new comment in a new row
<i>Example: References</i>	<i>Example: Please check that referencing is consistent across all the chapters.</i>
Primary outcomes	We support the choice of body weight and HbA <sub>1c</sub> as primary outcomes to ascertain the effects of a low carbohydrate diet in those with type 2 diabetes, and fasting plasma glucose and blood lipids as secondary outcomes. Given that the majority of those with type 2 diabetes have overweight or obesity at the time of diagnosis, that HbA <sub>1c</sub> is a meaningful measure of glycaemic control and that poorly controlled diabetes is a risk factor for cardiovascular disease (for which blood lipids are surrogate measures), these make sense.
Primary outcomes	We support the exclusion of studies with duration <12 months for the measurement of body weight. The maintenance of healthy body weight in the long-term is well documented as challenging so including shorter term studies could potentially over-estimate any effect of low carbohydrate diets on weight and health.
Macronutrient and energy intakes	Quantity of carbohydrate intake is clearly an issue in studies of this type since prescribed and achieved carbohydrate intakes in both short and longer term studies do not equate. Studies included in this review primarily compared moderate rather than low carbohydrate intakes with higher carbohydrate intakes, with considerable overlap between low, moderate and high intakes, and heterogeneity of quantities consumed within each category. This makes the effect of low carbohydrate diets hard to ascertain with any certainty.
Macronutrient and energy intakes	Lower carbohydrate diets resulted in higher intakes of protein and fat including total and saturated fat intakes. While considerable heterogeneity of intake was seen, poorly controlled diabetes is a risk factor for increased risk of cardiovascular disease (for which higher fat intakes are also a risk factor). The question of what carbohydrate is replaced with from a nutritional perspective in low carbohydrate groups is of great importance.
Macronutrient and energy intakes	Despite this, no differences in either total serum cholesterol or serum LDL cholesterol between low and high intake groups were seen either in the short term (3 - <12 months; moderate and adequate evidence respectively) or longer term (≥12 months; adequate evidence). However lower serum triglyceride concentrations were lower in lower carbohydrate compared to higher intake groups in shorter term studies (3 - <12 months; adequate evidence), although no consistent effect was seen in studies ≥12 months. Inconsistent effects were found for serum HDL levels in both short and longer term studies for lower compared with higher carbohydrate intakes.
Macronutrient and energy intakes	The effect of lower carbohydrate intakes on body weight independent of calorie intake is hard to ascertain since similar energy intakes were achieved in both low and high carbohydrate groups; there is considerable overlap in energy intakes between them.

Macronutrient and energy intakes	Many of the difficulties inherent in dietary studies are evident in this review. Differences between intakes prescribed and achieved, lack of clarity about what a low carbohydrate diet actually comprises and difficulties in comparing the effects of studies which had variable approaches and differing levels of dietary adherence were all issues. In addition, blinding to the diet group was not possible and intakes were self-reported with possible under-reporting as a consequence (whether any such under-reporting was systematic by type of diet is unclear).
Macronutrient and energy intakes	Whether or not actual carbohydrate intakes achieved were actually low depended on how they were expressed i.e. whether they were expressed as quantities per day or as a % of energy intake. Where energy intakes were restricted a carbohydrate intake which appeared low (expressed in quantities consumed per day) was actually moderate (expressed as % energy intake) in some studies included. This makes the actual effect of carbohydrate restriction hard to ascertain.
Macronutrient and energy intakes	From a nutritional and health perspective, the quality of carbohydrate consumed is of relevance particularly for those living with diabetes. However most of the studies included did not consider quality, focusing solely on the quantity of carbohydrate consumed. From a metabolic perspective the type of carbohydrate consumed would be expected to impact upon metabolic indicators.
Other issues	Generalisability of studies is an issue since the effects of dietary change may vary by ethnicity and weight status at study commencement.
HbA1C; fasting plasma glucose	The effects of length of study were evident. While in short term studies (3 - <12 months) significantly greater weight loss (evidence not graded), reduced fasting plasma glucose (moderate evidence) and reduced HbA1 <sub>C</sub> in lower carbohydrate compared with higher carbohydrate intakes (adequate evidence) were apparent, the same was not true of longer term studies (>12 months). While no difference in weight between groups was observed (adequate evidence), inconsistent results were observed for HbA1 <sub>C</sub> with some studies finding a greater reduction in lower carbohydrate groups and others not. Studies followed up to 24 months found no difference in HbA1 <sub>C</sub> between lower and higher carbohydrate groups (adequate evidence). There was insufficient evidence for fasting plasma glucose in longer term studies (≥12 months). Weight is an important potential confounder for any metabolic differences observed between groups.
Potential long-term effects	It is unclear from the data presented in this report whether lower carbohydrate intakes are associated with adverse effects although many potential adverse effects have been identified. It does not appear that lower carbohydrate diets are specifically beneficial for those with type 2 diabetes, albeit several limitations to the data have been identified. Only fasting plasma glucose, HbA1 <sub>C</sub> and serum triglyceride were lower in the short term (3 - <12 months) in lower intake compared with higher intake groups, however this was not shown in the longer term (≥12 months). Whether these were due to weight differences or lower carbohydrate intakes <i>per se</i> is unclear since weight loss was a primary outcome for many of the primary studies included, and is a potential confounder. Differences in body weight between lower and higher carbohydrate groups were not

	seen in longer term studies although they were reported in the shorter term studies (evidence not graded). On the other hand adverse effects from following a lower carbohydrate diet were also not shown, although following a very low carbohydrate intake (20-50g/day; <10% total energy) resulted in some adverse effects.
Overall summary	Based on this evidence there does not appear to be a clear reason either to recommend lower carbohydrate diets for those with type 2 diabetes or to advise against them. Where individuals wish to follow them, advice should focus on the quality of the carbohydrate being consumed to ensure that adequate intakes of fruit and vegetables are achieved, and that complex carbohydrates are well represented at the expense of simple carbohydrates. Based on a tailored approach and starting with the individuals' current intake, intakes of simple sugars should be reduced as a starting point if necessary. This may not necessarily result in a low carbohydrate intake, but will contribute to an improved overall dietary profile.
Overall summary	The majority of those diagnosed with type 2 diabetes have overweight or obesity at the time of diagnosis, and obesity is a recognised risk factor for type 2 diabetes. Therefore any dietary approach which helps people to manage their weight is likely to benefit their diabetes. Although lower carbohydrate diets have not been shown to be superior to higher carbohydrate diets for body weight in the longer term, they may be preferred by some individuals, and in that case they should be supported to achieve a healthy overall intake while aiming for a healthy weight.
Overall summary	Many of the studies included did not measure low carbohydrate intake compared to high intakes; but lower compared with higher intakes. The effects are hard to ascertain given the extent of the limitations identified in the studies.
Overall summary	Future research should address the limitations identified in this report. There is a lack of clarity about the effect of truly low carbohydrate diets in those with diabetes on body weight and metabolic measures, and research is needed to clarify this. It is not clear whether the participants included in this report had longstanding diagnoses of type 2 diabetes or whether it had been recently diagnosed.

Please add extra rows as needed

Comments by paragraph	Comments
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<i>Example: 1.2</i>	<i>Example: Missing reference and statement unclear</i>

6.81	People First language should be used in this paragraph.

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