

**Consultation on the draft report:**

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

**Comments Form**

<b>Organisation</b>	British Nutrition Foundation
<b>Name of commentator and contact details</b>	Bridget Benelam

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General comments	Comments
<p>Terms of reference and considerations of the outcomes of the report in practice.</p>	<p>Please insert each new comment in a new row</p> <p>As the Committee will be well aware, the issue of low carbohydrate diets for weight loss, particularly for people with type 2 diabetes, is one of great scientific and popular debate. As such, it is of great value to have a report from an authoritative body on this topic, in particular with it being developed by a joint working group including representation from Diabetes UK, the British Dietetic Association, The Royal College of Physicians and The Royal College of General Practitioners.</p> <p>With the majority of UK adults overweight or obese and given the strong association between obesity and type 2 diabetes, there is an urgent need to support people to lose weight and maintain healthier body weights. It is well established that weight loss can have a significant impact on glycaemic control in type 2 diabetes as well as reducing the risk of comorbidities, and that, if enough weight is lost, the condition can effectively be put into remission. As such, providing consistent, evidence-based, practical advice on effective weight loss strategies is of paramount importance both for public health and reducing the economic impact of obesity and related comorbidities, including type 2 diabetes.</p> <p>The mission of the British Nutrition Foundation (BNF) is to communicate evidence-based nutrition science in engaging and actionable ways. In this context, BNF would expect to refer to SACN's final report when delivering practical advice for health professionals, the media and other stakeholders, as well as general information for people with type 2 diabetes and those trying to lose weight. As such, our comments in this document relate to how the findings of the final report can be communicated in a way that is helpful and supports public health.</p> <p>We understand that SACN's role in the development of this report is to assess the scientific evidence as directed by the terms of reference agreed. However, there are a number of issues that we describe further below that we feel need consideration in order to be able to provide advice to improve public health within the population. We would suggest that the report itself as it stands may be of limited value unless supported by further public health guidance from PHE to address the widespread confusion about the efficacy of low carbohydrate diets for people with type 2 diabetes and to support those with the condition who are trying to improve their health. We have also made a number of suggestions below on research recommendations for consideration.</p> <p>The National Lipid Association Nutrition and Lifestyle Taskforce in the US has recently published a <a href="#">scientific statement</a> (Kickpatrick <i>et al.</i> 2020), reviewing current evidence and clinical recommendations on the effects of low-carbohydrate and very-low-carbohydrate diets for the management of body weight and other cardiometabolic risk factors. Although it was not a systematic review, this may be a useful reference as it</p>

	<p>included six of the eight references used within this draft SACN report, including the four systematic reviews that were given priority in the analysis.</p> <p>The NLA statement concluded that there was no evidence that low carbohydrate diets were superior to other weight loss diets and that results for many cardiovascular outcomes were mixed but that there might be advantages in relation to appetite control, reduced triglycerides and reduction in the use of diabetes medications over 12-24 months. In looking at outcomes of systematic reviews on dietary approaches to weight loss, the Taskforce authors noted that there were substantial inter-individual variations in the responses to each of the diet conditions with some achieving above average weight loss. The Taskforce authors suggested that personal preference in the macronutrient composition of the diet was important and should be a consideration when offering dietary advice.</p>
Percentage of carbohydrate in the diets of studies included.	<p>As is highlighted in SACN's draft report, there were a number of limitations within the literature that met the inclusion criteria for the review and the carbohydrate contents of the diets that were considered as 'lower carbohydrate' in the analysis varied widely from the very low carbohydrate 'ketogenic' diets, which are typically less than 10% total energy (TE) from carbohydrate, to diets comprising up to 45% TE from carbohydrate. The report highlights that the majority of studies considered were in the range of 26-45% of TE from carbohydrate. Thus the variety of diets included as 'lower carbohydrate' represent huge differences in potential dietary patterns and nutrient composition (including fibre content) and, consequently, potential health effects of these diets. At under 10% TE from carbohydrate, the carbohydrate-containing foods that could be included would be very restricted, whereas at 45% this would not be the case – indeed data from the most recent National Diet and Nutrition Survey (NDNS) indicate that the average proportion of carbohydrate in the diets of adults aged 19-64 years is 45.7% and so our current average diet is close to qualifying as 'lower carbohydrate' by this definition.</p> <p>In order to give clear advice about the health effects of a lower carbohydrate diet, it is important to be able to understand the effects of different proportions of carbohydrate in diets and also the substitution effects when carbohydrate is replaced by another macronutrient such as fat or protein. In this regard a recent systematic review and meta-analysis by <a href="#">Fechner et al.</a> (2020) may be of interest. The review looked at low carbohydrate diets, dividing them into 3 groups; moderate-low (&lt;45-40% TE from CHO), low (&lt;40-30% TE from CHO) and very low (&lt;30-3% TE from CHO) and investigated their effects on weight loss and other cardiometabolic risk markers. The study also collected data on what carbohydrates had been replaced by, including the type of fatty acids where data were available, and also took the fibre content of diets into account where this had been included in the studies.</p> <p>This allowed a comparison of the effects of different levels of carbohydrate restriction. For example, weight loss was similar across the diet groups but decreases in triacylglycerol were more pronounced as the proportion of carbohydrates in the diets decreased. On the other hand, very low carbohydrate diets appeared to increase LDL cholesterol, especially where reduction in carbohydrate resulted in an increase in energy</p>

	<p>from saturated fatty acids, as well as a decreased fibre intake which often accompanies carbohydrate reduction (it is evident from the summary on page 76 of the draft SACN report that %E from fat/saturated fat was very high in some studies). Fechner <i>et al.</i> concluded that the health effects of low carbohydrate diets are likely to be mediated by what substitutes for carbohydrates, rather than carbohydrate restriction <i>per se</i>, and suggested this should be a focus of further research.</p>
<p>Minimum of 12 months for consideration of weight loss outcomes.</p>	<p>The draft SACN report does not consider any results on body weight from studies under 12 months duration in order to reflect longer-term maintenance of weight loss, whereas, for the other outcomes, results from 3 months are considered. Whilst it is certainly the ideal that weight loss should be maintained in the longer term in order to gain the most health benefit, the available evidence indicates that the efficacy of <i>all</i> weight loss diets, regardless of macronutrient composition declines after 12 months.</p> <p>For example, a <a href="#">recent systematic review</a> (Ge <i>et al.</i> 2020) looked at a variety of weight loss diets, including low carbohydrate and higher fat, higher carbohydrate and lower fat, as well as diets comprising macronutrients in more moderate proportions as per current UK healthy eating guidance. This study found that all of the diets resulted in modest weight loss and improved cardiovascular risk factors at 6 months but that these effects had largely disappeared by 12 months. Thus, while there is insufficient evidence to suggest that low carbohydrate diets (however defined) are superior to other weight loss approaches in the longer term, evidence is also lacking that diets comprising around 50% energy from carbohydrate, such as those suggested by current UK dietary recommendations for the general population including people with type 2 diabetes, would offer any better outcomes in terms of weight control.</p> <p>With the exception of very low carbohydrate diets, adverse effects have not been shown to be associated with lower carbohydrate diets in SACN's draft report. We would absolutely agree that the available evidence doesn't support a <i>recommendation</i> to use low carbohydrate diets over other dietary approaches. However, in relation to public health advice that follows on from the final version of this report, we would suggest that given the huge task the UK has in tackling obesity and type 2 diabetes, it would be helpful to have some guidance for those who may choose to try a low carbohydrate approach in order to support them to do this in a balanced way. We know that adherence to weight loss diets is necessary for sustaining weight loss and the associated health benefits, and so considering the range of individual preferences for such approaches is important.</p> <p>This has been done by Diabetes UK in its <a href="#">low carbohydrate guidance and eating plan</a> and is reflected in its <a href="#">position statement on low carbohydrate diets</a>. We acknowledge that risk management is not the role of this report or of SACN but that it is for PHE to consider how the outcomes of the report feed into public health advice. To have such guidance from a Government source would be very helpful in encouraging consistency of messaging and supporting a balanced approach, for example to encourage the inclusion of wholegrains, pulses and a variety of fruit and vegetables if choosing a lower carbohydrate diet.</p>

<p>Diet and carbohydrate quality.</p>	<p>While we understand that consideration of quality of carbohydrate and overall dietary quality were not part of the terms of reference for this report, we would argue that they are of vital importance in being able to more fully understand the effects of different dietary sources of carbohydrate (e.g. refined versus wholegrain) and provide practical advice for people who may be considering a low carbohydrate diet.</p> <p>According to the NDNS, the UK population is close to meeting the current recommendation of 50% of energy from carbohydrates. However, alongside this, intakes of free sugars are higher than recommended and intakes of dietary fibre much lower. In terms of food choices from the starchy foods group, while wholegrains are emphasised in Government advice, refined versions of these foods, such as white bread, pasta and rice, predominate in the UK diet according to NDNS data. Thus communication of the importance of carbohydrate quality in the diet is a particular challenge in relation to how the final conclusions of this report are used in subsequent public health advice.</p> <p>The <a href="#">Linear programming analysis</a> performed in the development of the Eatwell Guide showed that intakes of wholegrains would have to significantly increase in order to meet current nutrient recommendations; for example, intakes of wholemeal bread and high fibre cereals would need to more than double compared to NDNS data on current intakes at the time the study was conducted. Thus, existing advice on healthy diets is not translating into healthy dietary patterns within the population (i.e. it is not being followed by many) and so simply suggesting that people with type 2 diabetes follow existing healthy eating advice for the population as is currently the case may not support improvements in public health unless ways are found to improve adoption of the advice. Those looking for advice on healthy eating are potentially subject to an ever growing wave of often poor and conflicting advice through traditional and social media and this represents a particular challenge in terms of how the conclusions of the final version of this report are communicated to attempt to tackle this</p> <p>In the systematic review and meta-analysis mentioned above by <a href="#">Fechner et al.</a> (2020) the authors noted that low carbohydrate diets with lower fibre contents were associated with increased LDL cholesterol and that blood glucose was higher on low carbohydrate diets with lower fibre intakes compared to moderate carbohydrate diets with higher fibre intakes. Thus, in the context of the well documented health benefits of dietary fibre, the fibre content of diets, whatever the proportion of carbohydrates, is an important consideration.</p> <p>In a recent paper, <a href="#">Churuangsuk et al.</a> (2020) reviewed the evidence for the use of low and reduced carbohydrate diets in managing and preventing type 2 diabetes. The authors state that there is extensive evidence that low carbohydrate diets can be a valid weight loss treatment up to 1-2 years, although not superior to other weight loss approaches under controlled conditions. They caution about potential negative effects on health, including micronutrient deficiencies, raised LDL cholesterol and the potential for negative effects on the gut microbiome if the dietary pattern followed while restricting carbohydrates is unbalanced, but suggest that these effects can be avoided if prudent food choices are made within the diet.</p>
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Research recommendations	<p>As outlined above, in order to support practical and consistent advice for people with type 2 diabetes who have heard about low carbohydrate diets or may be considering following this approach we would suggest that the following should be included in the research recommendations of the report:</p> <ul style="list-style-type: none"> <li>• Further investigation of the health effects of different levels of carbohydrate restriction</li> <li>• Further investigation of potential adverse effects of low carbohydrate diets, including potential effects of higher protein intakes on kidney function.</li> <li>• Consideration of carbohydrate quality (including fibre) when looking at the health effects of diets with different levels of carbohydrate restriction.</li> <li>• Consideration of the health effects of the substitutions made when carbohydrate intake is restricted (micronutrient and macronutrient).</li> <li>• Investigation of the potential effects of lower carbohydrate diets on the gut microbiome.</li> </ul>
References:	<p>Churuangsuk C, Lean MEJ &amp; Combet E. (2020) Low and reduced carbohydrate diets: challenges and opportunities for type 2 diabetes management and prevention. <i>Proceedings of the Nutrition Society</i>. <a href="https://doi.org/10.1017/S0029665120000105">https://doi.org/10.1017/S0029665120000105</a></p> <p>Fechner E, Smeets ETHC, Schrauwen P &amp; Mensink RP (2020). The Effects of Different Degrees of Carbohydrate Restriction and Carbohydrate Replacement on Cardiometabolic Risk Markers in Humans-A Systematic Review and Meta-Analysis. <i>Nutrients</i>. 12(4), 991</p> <p>Ge L, Sadeghirad B, Ball GDC <i>et al.</i> (2020). Comparison of dietary macronutrient patterns of 14 popular named dietary programmes for weight and cardiovascular risk factor reduction in adults: systematic review and network meta-analysis of randomised trials <i>BMJ</i> 369 doi: <a href="https://doi.org/10.1136/bmj.m696">https://doi.org/10.1136/bmj.m696</a></p> <p>Kickpatrick CF, Bolick JB, Kris-Etherton PM <i>et al.</i> (2019). Review of Current Evidence and Clinical Recommendations on the Effects of Low-Carbohydrate and Very-Low-Carbohydrate (including Ketogenic) Diets for the Management of Body Weight and other Cardiometabolic Risk Factors A Scientific Statement from the National Lipid Association. <i>Journal of Clinical Lipidology</i>. <b>13</b> 689-711</p> <p>Scarborough P, Kaur A, Cobiac L, et al. Eatwell Guide: modelling the dietary and cost implications of incorporating new sugar and fibre guidelines. <i>BMJ Open</i> 2016;6:e013182. doi:10.1136/bmjopen-201601318</p>

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