Arguments for Carbohydrate Restricted Diets in the Treatment of Diabetes and Other Diseases

INTRODUCTION

To eat or not to eat carbohydrate rich foods: that is the question. Diabetes is a disease related to carbohydrate intolerance[1], which is why on first sight it would make sense for diabetics to radically reduce their daily intake of carbohydrates. Nevertheless, current dietary approaches to diabetes treatment recommend the opposite – the emphasis is on fat reduction rather than the limitation of carbohydrate intake. However, in order to meet the target intake of calories, it is generally recommended to *increase* the daily amount of carbohydrates. This approach might be rooted in the fact that vascular diseases are commonly associated with an increased intake of fat. Nonetheless, this does not take into account the negative effects of carbohydrates to heart disease and obesity and, this applies for people with diabetes, the consequences of higher carbohydrate intake for blood glucose levels[2]. Carbohydrate causes variations in blood glucose and hence increases the need for insulin[3].
However, the silver bullet has yet to be found and both dietary approaches are still very much in dispute. This article attempts to give a summary of pro-low carbohydrate diet argumentations.

DEFINITIONS OF CARBOHYDRATE RESTRICTED DIETS

Reviewing the literature on this topic one can find different terms for a diet which involves a reduction of carbohydrates. Westman et al. refer to LCD (low carbohydrate diet) in an article from 2007[4], whereas the same authors refer to CRD (carbohydrate restricted diet) in an article from 2008[5], describing the same procedure.
However, more important than finding a name for this dietary intervention is to set valid boundaries as to what a carbohydrate restricted diet entails and how it can be defined. There still appears to be confusion about the daily amount of carbohydrate intake that would classify as a carbohydrate reduced diet. Westman et al. suggest a carbohydrate intake of around 50-150 g/d[6].
Additionally, the question has been raised whether reducing carbohydrate means that it should be replaced by protein and fat. A recommendation to only reduce carbohydrate intake may cause confusion about the degree of daily energy intake from protein and fat. Even if subjects following a carbohydrate reduced diet do not increase the absolute amounts of fat and protein, the percentage of fat and protein will rise automatically. For that reason carbohydrate reduced diets are also defined as “low-calorie” diets that entail an increase in the percentage of calories from protein and fat[7]. As a consequence, it is essential to clarify which type of fats should be

[1] Feinman RD et al.
[2] Raab R
[3] Raab R
[4] Westman EC et al.
[5] Feinman RD et al.
[6] Westman EC et al.
[7] Westman EC et al.

taken in. The emphasis can be, if one desires, on mono- and polyunsaturated fats rather than saturated fats[8]. But it is clear that there is enormous controversy around the issue of saturated fat in the diet. The scientific evidence supports the hypothesis (or fact) that it is high carbohydrate which results in high insulin that is a major part of the mechanism which leads to dietary fat causing damage.

BENEFITS OF CARBOHYDRATE RESTRICTED DIETS

Carbohydrate restricted diets can be advantageous not only for diabetes patients but also for individuals who would simply like to live a more conscious lifestyle and for the treatment of other conditions. Lower carbohydrate intake means less glucose availability and thus leads the body towards fat oxidation and away from fat storage, which is eventually accompanied by weight loss. That means that low-carbohydrate diets are at least as effective as low-fat diets if one intends to lose weight.[9] However, the procedure also brings along numerous other benefits for the improvement of diseases and, therefore, has therapeutic potential.
Carbohydrate restriction is for example very effective at improving high fasting glucose and insulin, high plasma triglycerides, low HDL and high blood pressure.[10] A reduced carbohydrate diet may also improve the features of metabolic syndrome.[11]

Nevertheless, carbohydrate restriction also bears therapeutic potential in the treatment of diabetes. The carbohydrate limitation ameliorates glycemic control and reduces variations in insulin levels[12], which leads to a decreased need for insulin injections in diabetic patients. Since there might be a connection between high insulin doses and the development of vascular disease it would be beneficial for diabetes patients to reduce carbohydrate intake in order to reduce insulin doses[13]. Additionally, lower blood glucose levels, which could be achieved by following a carbohydrate restricted diet, could help prevent gastroparesis and potentially life-threatening diabetes complications, such as the “dead-in-bed” syndrome.[14]

Other reasons supporting lower carbohydrate is that it impossible to measure with the degree of accuracy needed to maintain normal blood sugars in diabetes, both the amount of carbohydrate, and the rate at which it enters the blood as glucose, with the degree of predictability needed to maintain normal blood sugars. Take for example, pasta, rice, bread, cereal, potatoes etc of 100 gms of carbohydrate. If measuring this is 20% inaccurate it could be actually between 80 and a 120 gms. The difference of 20 gms has a large effect on blood glucose levels. In addition the rate at which the these enter the blood as glucose is variable from day to day, and unpredictable. The only way to maintain normal blood sugars on an ongoing basis in this context is to lower the carbohydrate significantly. Small numbers (insulin, carb etc) lead to small variations. All the data supports this.

The reduction in use of medication in diabetes treatment is one of the biggest assets of carbohydrate restriction[15]. However, Westman et al. express a number concerns regarding unsupervised dietary attempts at home. The effects of the diet should be

[8] McFarlane SI
[9] Feinman RD et al.
[10] Volek JS, Feinmann RD
[11] Feinman RD et al.
[12] Feinman RD, et al.
[13] Raab R
[14] Raab R
[15] Feinman RD et al.

clinically monitored in order to prevent hypoglycemia and hypotension due to overmedication.[16]

PRACTICAL IMPLICATIONS – WHAT IS ALLOWED ON THE TABLE?

It has been pointed out above that there is some confusion about what actually constitutes a low carbohydrate diet. It has also been illustrated that it is essential to concentrate on unsaturated fats rather than on saturated fats while following a carbohydrate reduced diet, because monounsaturated and polyunsaturated fatty acids have been associated with a decrease in risk for cardio vascular disease.[17] Hence, which types of food should be avoided? First of all, the intake of starch and sugar can be reduced by for example abstaining from bread, pasta, rice, potatoes and sweet indulgences. But more importantly, what *can* be eaten? In order to fulfil the requirements of a carbohydrate reduced diet one should focus on the intake of proteins and unsaturated fats. Ron Raab, a diabetes patient himself, who outlines the benefits for carbohydrate restricted diets, gives one simple example of a low carbohydrate meal in the December issue of the *Diabetes Voice* in 2007:

"soup made from stock, garden salad with olive oil and grated cheese , a medium-sized serving of fish, cooked vegetables and avocado "[18]. There are many examples including on the internet of low/er carbohydrate recipes.

In summary, the cited sources, whether they were scientific articles or comments based on personal experience, identified and proved the benefits of carbohydrate restricted diets for health in general and for the treatment of diabetes and other diseases.

References

1. Volek JS, Feinman RD. Carbohydrate restriction improves the features of metabolic syndrome. Metabolic syndrome may be defined by the response to carbohydrate restriction. *Nutrition & Metabolism (London)* 2005; 2:31

2. Raab R. Why I adopted a reduced carbohydrate approach. *DiabetesVoice* 2007; 15-17

3. Westman EC, Feinman RD, Mavropoulos JC, et al. Low-carbohydrate nutrition and metabolism *Am J Clin Nutr* 2007; 86:276-84

4. Feinman RD, Volek JS, Westman EC Dietary Carbohydrate Restriction in The Treatment of Diabetes and Metabolic Syndrome *Clinical Nutrition Insight* 2008; 1-5

5. McFarlane SI Dietary recommendations for people with diabetes: Time to reduce the carbohydrate loads. Recommendations should take account of current evidence for carbohydrate restriction. *Special to ENDOCRINE TODAY* 2005

[16] Westman EC, et al.
[17] McFarlane SI
[18] Raab R