

Dietary Carbohydrate Restriction as the Default Diet in the Management of Diabetes. The 15 Theses.

The Basic Principle.

Dietary carbohydrate restriction derives from fundamental biochemistry and has been a traditional therapy for diabetes before and since the discovery of insulin. The strategy is based on the fundamental idea that diabetes is a disease of carbohydrate intolerance (inadequate or absent insulin in response to carbohydrate (type 1) or inability to respond to insulin accompanied by deteriorating pancreatic function (type 2). Control of blood glucose has positive effects on all of the downstream sequelae including lipid markers for and incidence of cardiovascular disease. No experimental or clinical data has shown any contradiction to these principles. The following 15 theses are the basis for re-evaluation of the role of carbohydrate restriction in treatment of type 2 diabetes and adjunct to treatment of type 1 diabetes.

Definitions.

There are many variations of diets based on carbohydrate restriction. Whereas the individual regimen depends on particular case, the principle is to keep carbohydrate as low as possible. If specific diets are referred to, the following guide should be used because it has been published in more than one peer-reviewed journal by people with the most experience.

- **Low carbohydrate diet: less than 130 g/d** or less than 26 % of a nominal 2000 kcal/d. This corresponds to The American Diabetes Association definition of 130 g/d and appears to be some kind of generally accepted point, likely derived from Cahill's study of the onset of ketosis.
- **Very low-carbohydrate ketogenic diet (VLCKD): less than 20-50 g/d** or less than approximately 10 % of the 2000 kcal/d diet. Generally, although not always accompanied by ketosis, this is the level of the early phases of popular low carbohydrate diets such as Protein Power, Atkins and South Beach Diets.
- **Moderate Carbohydrate Diet: 26 - 45 %**. The upper limit is chosen from the approximate carbohydrate intake before the obesity epidemic (43 %). Current consumption is about 49 %
- **High Carbohydrate Diet: Greater than 45 %**. This is the recommended target on ADA websites. The 2010 Dietary Guidelines for Americans recommends 45-65 % of the caloric intake should be carbohydrate.
--for comparison:
- **Pre-Obesity Epidemic (1971-1974 - NHANES I) - Men 42 %** (~250 g for 2450 kcal/d)
- **Pre-Obesity Epidemic (1971-1974 - NHANES I) - Women 45 %** (~150 g for 1550 kcal/d)
- **Year 1999 - 2000 - Men 49 %** (~330 g for 2600 kcal/d)
- **Year 1999 - 2000 - Women 52 %** (~230 g for 1900 kcal/d)

The Fifteen Theses.

1. Almost all of the increase in calories during the epidemic of diabetes is due to increased carbohydrate. Fat, if anything, went down. Consumption of most foods, including fruits and vegetables went down. The exceptions were red meat and eggs.
2. Dietary carbohydrate restriction reduces insulin fluctuations and is the most effective approach to glycemic control, the primary targets of nutritional therapy.
3. Adherence to low-carbohydrate diets is at least as good as to other dietary interventions and frequently substantially better. Adherence is frequently comparable to that for drug recommendations. In practice, diabetes clinics and internet sites recommend carbohydrate counting and “eating to the meter” and many experts and organizations offer guides to compliance.
4. No dietary intervention is better than carbohydrate-restriction for weight loss. Low-carbohydrate diets generally do better than low-fat diets for whatever period they are compared. Long term trials of low-fat diets such as the Women’s Health Initiative have a consistent record of poor performance.
5. Contrary to stereotypes, low-carbohydrate dieters do not substantially increase either fat or consumption. Low-carbohydrate diets are high in vegetables and, in practice, are not particularly iconoclastic. Such diets are relatively low in fruits but researchers emphasize that fruits and vegetables are nutritionally different: per gram fruits, on average have more calories, more carbohydrates, more sugar, fewer antioxidants and lower potassium. Fiber has a small effect compared to carbohydrate restriction.
6. The best predictor of microvascular and, to a lesser extent, macrovascular complications is hemoglobin A1C which is under the control of chronic dietary carbohydrate restriction.
7. Carbohydrate-restricted diets do not require the addition of saturated fat (SF). While plasma SF may increase insulin resistance, *SF in the blood* is more dependent on carbohydrate than dietary SF. In addition, numerous studies have shown that dietary total and saturated fat, again, contrary to popular are not associated with incidence of cardiovascular disease (CVD).
8. Dietary carbohydrate restriction is the single most effective method (except for total starvation) of reducing triglycerides, and is as effective as any intervention, including most drugs, at increasing HDL and reducing the number of small-dense LDL particles. Beyond lipid markers, carbohydrate restriction improves all of the features of metabolic syndrome.
9. Intensive glucose lowering by restriction dietary carbohydrate has no side effects comparable to intensive pharmacologic treatment as, for example, in the ACCORD trial or other agents whose safety is continually challenged.

10. Beneficial effects of carbohydrate restriction do not require weight loss. Under weight maintenance conditions, dietary carbohydrate restriction dramatically improves glycemic control, hemoglobin A1c and lipid markers.
11. Patients on carbohydrate-restricted diets reduce and frequently eliminate medication whereas high-carbohydrate, low-fat diets may lead to increased use.
12. Diets based on carbohydrate-restriction are, in fact, widely practiced clinically, if in an unsystematic way. Contrary to recommendations of government and private health agencies, individual practitioners and clinics frequently recommend dietary carbohydrate restriction.
13. Even as establishment nutrition slowly accepts low-carbohydrate diets there is a consistent failure to recognize or cite the work of researchers in this field. This contentious “two worlds” approach has added to the confusion for patient and practitioner alike.
14. A variety of sources -- input to government hearings, popular books and internet forums -- have documented a large population of patients who are significantly dissatisfied with current medical treatment and feel that they have not been offered a valuable treatment and, in fact, have been harmed by recommendations of their physicians and health agencies. Added to the patients who feel that low-fat recommendations have misled them on obesity, we have created a population of people who distrust all health recommendations.
15. The palpable opposition to carbohydrate restriction of granting agencies has narrowed the focus of basic research. Downstream insulin signaling, for example, is more likely to be funded if it does not mention that carbohydrate is the major stimulus for insulin secretion.

Recommendations.

1. Public hearings sponsored by congress or HHS. All major nutrition researchers are represented. In particular, researchers in dietary carbohydrate restriction meet and discuss issues with their critics.
2. Funding of a long-term comparative study. Researchers in dietary carbohydrate restriction cooperate with critics of such diets to design. We agree on experimental design. We “write the paper first,” leaving room for the data, that is, we agree on possible outcomes and what conclusions could be drawn. No Monday-morning quarterbacking, no disclaimers.
3. Creation of a new oversight organization, possibly under the National Science Foundation or the Office of Science and Technology Policy in which scientists with no personal stake in nutrition, assess bias and accuracy in grant awards and publications and appropriateness of recommendations for prevention and treatment of diabetes.