

Two Types of Very Low-Carbohydrate Diets

The report¹ based on survey data that reveal that a very low-carbohydrate diet (VLCD) might be effective in some patients with type 1 diabetes mellitus may represent an important advance in the therapy of this condition if researchers in randomized clinical trials confirm its potential advantages in terms of better blood glucose control with less risk for hypoglycemia. However, there are several issues of concern. One is the general use of the term “very low-carbohydrate dieting” to describe the diet when there are in fact 2 distinct forms.

One type of ketogenic diet is the very low-calorie diet, or semistarvation ketogenic diet,^{2,3} which is severely hypocaloric and provides <800 kcal per day and usually <400 kcal per day and is intended for the weight loss phase in the medical treatment of obesity. When these diets to allow for starvation ketosis (which reduces hunger) occur, 0 to <50 g of carbohydrates are provided, and dietary fat intake is markedly reduced.

A second type of ketogenic diet, called a eucaloric ketogenic diet,⁴ is also used to restrict carbohydrate intake to a similar degree but contains substantially more total calories because fat is intended to provide sufficient energy to allow growth in children while helping to establish seizure control, maintain weight and athletic performance in adults of a normal weight,⁴ and recently, allow modest weight loss in moderate-to-severe obesity complicating type 2 diabetes mellitus by reducing hunger with improved glucose control and reduced medication use.⁵ To avoid confusion, the diet described in the present article should be viewed as being in the second category.

A second concern is that although no greater risk of adverse events was

noted from the survey, there should be clinical concern in subsequent trials that patients who have mild starvation ketosis with lower ambient serum insulin levels could develop diabetic ketoacidosis more rapidly with the onset of intercurrent illness and the development of insulin resistance, although there is some experimental evidence in animals that β -hydroxybutyrate has substantial anti-inflammatory activity.⁶

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CONFLICT OF INTEREST: I am a consultant to Virta Health, which is studying ketogenic diets in type 2 diabetes mellitus.

REFERENCES

1. Lennerz BS, Barton A, Bernstein RK, et al. Management of type 1 diabetes with a very low-carbohydrate diet. *Pediatrics*. 2018; 141(6):e20173349
2. Vertes V. Very low calorie diets—history, safety and recent developments. *Postgrad Med J*. 1984;60(suppl 3):56–58
3. Palgi A, Read JL, Greenberg I, Hoefler MA, Bistrian BR, Blackburn GL. Multidisciplinary treatment of obesity with a protein-sparing modified fast: results in 668 outpatients. *Am J Public Health*. 1985; 75(10):1190–1194
4. Phinney SD, Bistrian BR, Evans WJ, Gervino E, Blackburn GL. The human metabolic response to chronic ketosis without caloric restriction: preservation of submaximal exercise capability with reduced carbohydrate oxidation. *Metabolism*. 1983; 32(8):769–776
5. Hallberg SJ, McKenzie AL, Williams PT, et al. Effectiveness and safety of a novel care model for the management of type 2 diabetes at 1 year: an open-label, non-randomized, controlled study. *Diabetes Ther*. 2018;9(2):583–612
6. Nandivada P, Fell GL, Pan AH, et al. Eucaloric ketogenic diet reduces hypoglycemia and inflammation in mice with endotoxemia. *Lipids*. 2016;51(6):703–714

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Management of Type 1 Diabetes With a Very Low-Carbohydrate Diet: A Word of Caution

The public often looks to nutrition to improve health, and reporting on nutrition findings from the scientific literature in the popular media often reveals unproven benefits.¹ Lennerz et al² present data collected via an online community and conclude that exceptional glycemic control in type 1 diabetes with a low risk for adverse events is possible with a VLCD, and research is needed to confirm the generalizability of these findings. Although it may be true that a VLCD can be useful, we find the study of Lennerz et al to fall well short of the level of scientific evidence that merits the media and professional attention it seems to have garnered. The online community was not a general type 1 diabetes community; rather, this was a community following a specific type of VLCD as promoted by the authors of 1 book. And of the estimated 1900 community members, only 493 responded to an eligibility survey, with 316 being included in analyses (17%) and 148 with confirmed medical data, representing only 8% of the community.² Of the small subset of participants with self-reported lipid concentrations ($n = 82$; 4% of the community), 62% had dyslipidemia,² which clearly is not desirable.

We suspect that only individuals who “believe” in the VLCD approach as promoted by the authors of the book would be in the community and respond to this survey. We can appreciate the effort made by the authors to confirm the diagnosis of type 1 diabetes, glycemic control (the hemoglobin A1c), and adherence to the diet; however, ultimately, those efforts pale in comparison with the problem of selection bias. Furthermore, respondents who report following the VLCD likely have other attributes that are likely contributors

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