Two Types of Very Low–Carbohydrate Diets

The report 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, 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, 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, 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. 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.

Bruce R. Bistrian
Professor of Medicine, Beth Israel Deaconess Medical Center
E-mail: bbistria@bidmc.harvard.edu

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

REFERENCES


doi:10.1542/peds.2018-1536A

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. Lennerz et al 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. Of the small subset of participants with self-reported lipid concentrations (n = 82; 4%) of the community, 62% had dyslipidemia, 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.
to excellent glycemic control, such as
careful monitoring of blood glucose
(blood sugar) levels, meticulous
attention to insulin administration,
vigilant exercise management, etc,
which can confuse or confound
attribution of the VLCD to glycemic
outcomes. Nutrition guidance for
patients and families living with type
1 diabetes must be made on the basis
of appropriate scientific evidence,
on what more closely resembles
testimonials. We agree with the
authors that VLCDs may confer
benefits for some patients with type
1 diabetes and that rigorous science
is needed on this topic. The problem
we now face is that it is far too easy
for the potential benefits and safety
of VLCDs to be publicized broadly on
the basis of this report because
although findings were definitive,
they could be used to potentially
mislead the public and add to the
substantial confusion that exists
around whether VLCDs should be
used in type 1 diabetes.
Promulgating such methodologically
weak although enticing data broadly
through the media creates a risk that
patients or providers may pursue
such plans without adequate insulin
adjustment, resulting in serious
issues with hypoglycemia as well as
risk for nutritional deficiencies
without adequate monitoring
because of the substantially reduced
intake of fruits and vegetables while
on the VLCD.3,4

Elizabeth J. Mayer-Davis
Chair, Department of Nutrition, University of
North Carolina at Chapel Hill
E-mail: mayerdav@email.unc.edu

Lori M. Laffel
Chief, Pediatric, Adolescent, and Young Adult
Section, Joslin Diabetes Center, Harvard
Medical School, Harvard University

John B. Buse
Chief, Division of Endocrinology and
Metabolism, Department of Medicine,
University of North Carolina at Chapel Hill

CONFLICT OF INTEREST: The authors have
indicated they have no potential conflicts
of interest to disclose.

REFERENCES
1. O’Connor A. How a low-carb diet might aid
people with type 1 diabetes. New York
Times. May 7, 2018. Available at: https://
www.nytimes.com/2018/05/07/well/live/
low-carb-diet-type-1-diabetes.html

2. Lennerz BS, Barton A, Bernstein RK, et al.
Management of type 1 diabetes with a
2018;141(6):e20173349

3. Smart CE, Annan F, Bruno LP, Higgins LA,
Acerini CL; International Society for
Pediatric and Adolescent Diabetes. ISPAD
Clinical Practice Consensus Guidelines
2014. Nutritional management in children
and adolescents with diabetes. Pediatr

Nutrition therapy recommendations for
the management of adults with diabetes.
Diabetes Care. 2014;37(suppl 1):
S120–S143
doi:10.1542/peds.2018-1536B

Authors’ Response
Mayer-Davis and colleagues criticize
the professional and media attention
to our study, but we do not think that
the suppression of information about
a novel treatment of type 1 diabetes
is in the public interest.
For decades, the professional diabetes
establishment focused almost
exclusively on drug and technology
development to the neglect of
research into nutritional therapies.
Unfortunately, the management of
type 1 diabetes remains suboptimal,
placing many at increased risk for
life-threatening complications.
In our study, we document
exceptional glycemic control, low
rates of complications, and high
patient satisfaction among a
community of children and adults
following a VLCD. In our study design,
we included an extensive review of
medical records and a survey of
diabetes medical care providers
to confirm diagnoses and validate
reported data.
The study was observational, and we
fully acknowledged the limitations of
this design in our article. But to
document a phenomenon that is not
thought possible by many diabetes
professionals, this design is an
appropriate next step. The estimates
by Drs Mayer-Davis, Laffel, and Buse
regarding potential selection bias may
be exaggerated because a significant
number of members in the social
media community were likely not
active or did not have type 1 diabetes
themselves.

In any event, those at Pediatrics
considered the findings of sufficient
importance to commission an
accompanying commentary.1
The American Diabetes Association
considered our study of sufficient
merit to publish a DiabetesPro
SmartBrief.2
The New York Times coverage was
balanced, including opinions from 2
highly regarded diabetes experts with
no role in the study.3 In that article,
we urged caution, saying “because
our study was observational, the
results should not, by themselves,
justify a change in diabetes
management.”
Of special significance, reader
comments on the New York Times
article included hundreds of
testimonials from people with type
1 diabetes who overwhelmingly
reported remarkable benefits from a
low-carbohydrate diet that were often
dismissed by their doctors.
Of course, media hyperbole can be
a problem in any research area of
interest to the public. Scientists,
physicians, and public health experts
are certainly within their rights to
correct misleading stories. However,
we should avoid selective
enforcement against research that
challenges (versus supports)
conventional thinking. On that
account, we would note that a
relatively high–carbohydrate diet is
actively promoted for people with
type 1 diabetes despite the lack of any
high-quality clinical trials revealing
superiority.
Management of Type 1 Diabetes With a Very Low–Carbohydrate Diet: A Word of Caution
Elizabeth J. Mayer-Davis, Lori M. Laffel and John B. Buse
Pediatrics 2018;142;
DOI: 10.1542/peds.2018-1536B originally published online July 31, 2018;
Management of Type 1 Diabetes With a Very Low–Carbohydrate Diet: A Word of Caution
Elizabeth J. Mayer-Davis, Lori M. Laffel and John B. Buse
Pediatrics 2018;142;
DOI: 10.1542/peds.2018-1536B originally published online July 31, 2018;

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://pediatrics.aappublications.org/content/142/2/e20181536B