Clinical Chemistry

Dietary Fat: Friend or Foe?

Article:
Cara Ebbeling, et al.
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Clin Chem 2018;64:34-41.
http://clinchem.aaccjnls.org/content/64/1/34

Guest: Dr. Cara Ebbeling is co-director of the New Balance Foundation Obesity Prevention Center at Boston Children's Hospital and Associate Professor of Pediatrics at Harvard Medical School.

Bob Barrett: This is a podcast from *Clinical Chemistry,* sponsored by the Department of Laboratory Medicine at Boston Children's Hospital. I am Bob Barrett.

For many years, low fat diets were the cornerstone of public health and clinical guidelines for preventing and treating obesity. These recommendations were based in part on the idea that consuming fat promotes obesity because fat is the most concentrated source of energy in the diet. Therefore, dietary fat was viewed as a foe to good health from 1984 through the 1990s.

Even today, healthy eating examples appended to the current *Dietary Guidelines for Americans 2015–2020* (Eighth Edition), reflect an upper limit for total fat of 35% of calories, suggesting continued reluctance to promote higher fat consumption.

These public health messages had unintended consequences as during the era of low fat diets, the food industry replaced fat with added sugar, salt, and simple carbohydrates in many products. Data shows increased consumption of refined carbohydrates has adverse effects on risk factors for metabolic and cardiovascular disease and associated health outcomes, which include increased prevalence of obesity, metabolic syndrome, and type 2 diabetes mellitus.

Furthermore, other evidence indicates that low carbohydrate, high fat diets may be more effective than low fat diets for promoting weight loss in patients with obesity. Therefore, over the last two decades, the prudence of low fat diets has come under intense scrutiny.

Now, this doesn't mean that nutritional recommendations for weight loss and prevention of disease are now clear. There are still many differences of opinion about the most safe and effective diets and the quest continues to understand the health and the metabolic effects of different diets.

The field is starting to explore the concept of personalized nutrition. Recognizing that responses to any diet vary

widely among individuals, and that the optimal diet for preventing and treating obesity in any one person may vary by their genotype and phenotype.

A panel of nutrition experts discusses these topics in a Q&A article in the January 2018 *Clinical Chemistry* special issue on obesity. Dr. Cara Ebbeling, a guest editor of the special issue and a moderator of the article, joins us in this podcast.

Dr. Ebbeling is an internationally recognized expert in interventional nutrition research design and quality control. She's co-director of the New Balance Foundation Obesity Prevention Center at Boston Children's Hospital and Associate Professor of Pediatrics at Harvard Medical School.

So Dr. Ebbeling, why did you decide to do a Q&A on dietary fat for the special obesity issue of *Clinical Chemistry*?

Dr. Cara Ebbeling: Well, we anticipated that the question and answer format would provide an excellent opportunity for concisely summarizing perspectives of invited experts on dietary fat. This topic has been the focus of considerable attention and sometimes debate. It is both historical and contemporary.

Let's first consider the history. For many years, low fat diets were the cornerstone of public health and clinical guidelines for preventing and treating obesity. The U.S. Senate Select Committee on Nutrition released the first guidelines in 1977. At that time, *Dietary Goals for the United States* included recommendations to increase carbohydrate consumptions to between 55% and 60% of energy intake and reduce fat consumption from over 40% down to 30% of energy intake. These recommendations were based in part on the idea that consuming fat promotes obesity, because fat is the most concentrated source of energy in the diet.

Despite limited data, the recommendation to reduce dietary fat was underscored in 1984 by an expert panel at the *NIH Consensus Development Conference on Lowering Blood Cholesterol to Prevent Heart Disease*, and again in 1987 by the National Cholesterol Education Program (NCEP). Dietary fat was viewed as detrimental to good health from 1984 through the 1990s.

Now, let's fast forward to the present. The current *Dietary Guidelines for Americans* focus on eating patterns and associated food in nutrient profiles rather than nutrient intakes. While there is no explicit limit on total fat intake, the guidelines continue to advocate less than 10% of energy from saturated fat, consistent with recommendations in developed countries internationally.

Interestingly, the daily nutritional goals and healthy eating examples appended to the guidelines reflect an upper limit for total fat of 35% of energy, suggesting some continued reluctance to promote higher fat consumption.

Recognizing that recommendations for dietary fat remain a contemporary topic, we aim to query nutrition experts regarding their perspective.

Bob Barrett: Doctor, talk about the expert perspectives on previous national and international guidelines, which focused on limiting total dietary fat.

Dr. Cara Ebbeling: Sure. Experts who participated in the Q&A agreed that low fat dietary guidelines had unintended and negative consequences in terms of promoting obesity and related morbidities, while also recognizing that the obesity epidemic does not have only a single cause.

Unintended consequences were due in part to the food industry replacing fat with refined carbohydrates in many products during the era of low fat diets. Data from perspective cohort studies and randomized controlled trials show adverse effects of refined carbohydrates on health outcomes and risk factors such as decreased insulin sensitivity and more atherogenic dyslipidemia, characterized by high triglyceride and lower HDL cholesterol levels, and increased small, dense LDL particles.

Over the last two decades, the prudence of low fat diets has come under intense scrutiny. Experts also agreed that type of dietary fat is an important consideration. Industrial trans fat, previously marketed as a healthful replacement for saturated fat, is now recognized as unhealthful due to its adverse effects on cardiovascular disease risk factors.

In contrast, monounsaturated and polyunsaturated fats have cardio protective properties. Saturated fat generally is considered unhealthful in that it increases LDL cholesterol. However, some experts pointed out that the chain length of saturated fatty acids and particle size of lipoproteins influence biological actions to some extent.

The increase in LDL cholesterol produced by saturated fat may be a relatively less harmful subtype comprising large buoyant lipoproteins. Regardless, replacing saturated fat with unsaturated fat rather than carbohydrate, particularly refined carbohydrate, reduces risk for disease. Low carbohydrate diets have become increasingly popular.

Bob Barrett: Well, let's talk about those diets, because they are becoming popular. The low carbohydrate diets, they're the topic of much debate also. What is that debate all about?

Dr. Cara Ebbeling: You are so correct that the low carbohydrate diets are the topic of much debate. A question about low carbohydrate diets elicited somewhat different responses among experts during the Q&A. Some pointed out that there is no clear definition of a low carbohydrate diet, making comparisons among studies difficult.

There was also concern regarding lack of data on long-term efficacy, adherence, and safety of low carbohydrate diets for obesity management and prevention, particularly, with regard to the most extreme very low carbohydrate diets.

On the other hand, there also were some discussions about evidence indicating that low carbohydrate high fat diets may be more effective than low fat diets for promoting weight loss in patients with obesity, due at least impart to the effects of attenuated postprandial insulin secretion.

To address a primary concern about low carbohydrate high fat diets, one expert noted that the benefits can be obtained with an emphasis on unsaturated rather than saturated fat to avoid an increase in LDL cholesterol. An example of a practical message in this regard would be more olive oil, less butter.

Another expert took a middle-of-the-road approach when suggesting that there are ranges of dietary fat and carbohydrate conducive to good health, so long as the emphasis is on whole foods. This seems to be a prudent perspective based on available data at the current time.

Bob Barrett: Do you see a path forward in resolving this debate?

Dr. Cara Ebbeling: Certainly. Debate and dialogue help to advance science. Data from randomized controlled trials are the strongest level of evidence for developing dietary recommendations for preventing and managing obesity. However, one must pay close attention to study design when interpreting results from such trials.

The study design continuum ranges from explanatory to pragmatic trials. Explanatory trials are conducted under ideal conditions to minimize the likelihood of confounding and this has high internal validity, whereas pragmatic trials have high external validity or generalized ability to real world settings.

A systematic approach to resolving the debate must include explanatory trials to understand biological mechanisms by which dietary composition affects metabolism and health outcomes. When successful, explanatory trials provide a

foundation for further research along the study design continuum culminating with pragmatic trials.

Establishing external validity is an iterative multi-step process that requires several trials with intervention strategies ranging from controlled feeding to nutrition education and behavioral counseling. Much research remains to be done on the effects of low carbohydrate compared to other diets.

Results from short-term feeding studies conducted in metabolic wards to maximize internal validity are available, but may not be relevant when the questioning long-term effects of low carbohydrate diets. On the other hand, results from long-term trials of popular diets are based on what can be described as intervention packages, differing in not only dietary recommendations, but also educational and behavioral strategies for promoting adherence.

As such, definitive conclusions cannot be drawn regarding the metabolic effects of diets varying in carbohydrate and fat per se. We need more well-designed research using sophisticated approaches that aim to address the biological drivers of excessive weight gain, and also considering the potential for personalized nutrition.

Bob Barrett: Well, there's a term! What do you mean by that, "personalized nutrition?"

Dr. Cara Ebbeling: The emerging field of personalized nutrition recognizes that individuals differ in response to dietary components including fat and carbohydrate based on their genome, metabolome, microbiome or other factors. Methods to inform this field are rapidly evolving.

In the years to come, we may be able to predict how individuals will respond to different diets and thereby, optimize dietary prescriptions. Of course, any prescription also must take into account other lifestyle factors, environment and social context.

Bob Barrett: Well, finally Dr. Ebbeling, I think it's clear the need for further well-designed dietary intervention studies. But based on available data, what are the most important public health messages right now for preventing obesity?

Dr. Cara Ebbeling Discussion during the Q&A highlighted the importance of intervening early in life, emphasizing breast feeding during infancy, appropriate introduction of healthful foods in early childhood, and nutrition education in schools.

To further address this question, I will take the liberty of briefly explaining our approach to nutrition education for

obesity prevention at Boston Children's Hospital, which is broadly consistent with the perspectives of several experts.

We succinctly convey main messages corresponding to healthful dietary patterns based on available research. For each main message, we use concise language that children will remember. We then build on the message and use counseling strategies to encourage and support implementation of the message.

To be more specific, one message is, "Eat balanced meals, follow a plate model." Building on this message, we provide further instruction to, 1) fill half the plate with low glycemic vegetables and fruits; 2) add protein like fish or poultry to a quarter of the plate; and 3) add beans, a starchy vegetable other than white potatoes, or a whole grain to the remaining quarter of the plate. Finally, we encourage adding healthful fat in the form of foods such as oil, nuts, seeds or avocado.

Food lists provide choices for each section of the plate, so that children and families understand how to replace unhealthful with more healthful foods.

Another message is, "Eat paired snacks when hungry between meals." A paired snack is made by choosing two foods, one serving of a low or moderate glycemic carbohydrate and one serving of protein or fat.

Examples of paired snacks include carrots with hummus, apple with peanut butter, and blueberries with yogurt. Appropriate implementation of these messages results in moderate intakes of carbohydrate and fat.

To conclude, I would like to note that the importance of focusing on dietary patterns rather than a single nutrient, and types rather than exact amounts of fat and carbohydrate, were primary themed that emerged throughout the Q&A.

Bob Barrett: Dr. Cara Ebbeling is co-director of the New Balance Foundation Obesity Prevention Center at Boston Children's Hospital and Associate Professor of Pediatrics at Harvard Medical School. She's been our guest in this podcast from *Clinical Chemistry*. I'm Bob Barrett. Thanks for listening.