

## Nutrition Performance

By Anssi Manninen, MHS

### Nutritional & Metabolic Aspects of Carbohydrate Restriction An Interview with Dr. Richard Feinman

*"What right has the federal government to propose that the American people conduct a vast nutritional experiment [high-carbohydrate/low-fat diet], with themselves as subjects, on the strength of so very little evidence that it will do them any good?" —A question posed to Congress by Dr. Phil Handler back in 1980 when he was president of the National Academy of Sciences*

For decades, well-meaning health authorities have proudly taught us that a diet low in fat and high in starch promotes fat loss and decreases the risk of chronic diseases. It should be noted, however, that there's little, if any, scientific evidence supporting this notion. In fact, the current epidemic of diabetes and obesity has been, over the past three decades, accompanied by a significant decrease in fat consumption and an increase in carb consumption. Thus, alternative dietary approaches are clearly needed.

Strength-power athletes already know what science is now showing. Replacing carbs (especially processed carbs) with protein and fat is an effective way to promote fat loss while sparing muscle mass, so it would be wise not to follow the dietary guidelines of the American Heart Association or the American Dietetic Association. Also, purported adverse effects of high-protein/low-carb diets are false or at least greatly exaggerated.

MD tracked down a leading low-carb researcher, Richard Feinman, PhD, to provide us with answers to our questions regarding carb restriction. Dr. Feinman is a professor of biochemistry at the State University of New York Downstate Medical Center with a long career in protein chemistry. His current interest in nutrition and metabolism derives from his many years of teaching these subjects in the College of Medicine at SUNY. Dr. Feinman is also co-editor-in-chief of *Nutrition & Metabolism*, a leading scientific journal in the area of nutritional biochemistry, and an organizer of the Nutrition & Metabolism Society Conference on Nutritional and Metabolic Aspects of Carbohydrate Restriction.

**AM:** I understand you're trained as an enzyme chemist. How did you get involved in nutrition?

**RF:** Well, as you mentioned in your introduction, I've taught nutrition and metabolism in the school of medicine at the State University of New York (SUNY) Downstate Medical Center. I think, however, if there's a single event that prompted me to get involved, it's a seminar I heard in which the speaker was saying that low-carbohydrate diets are no more effective, calorie-for-calorie, than other diets and the speaker quoted the laws of thermodynamics. Now, this was different from what I teach and it also happened that I was doing work in physical chemistry at the time and I knew that the laws of thermodynamics said no such thing. So my colleague Dr. Eugene Fine and I set out to explain why the so-called "calorie-is-a-calorie" idea is wrong.

**AM:** What's the explanation? Most of us think of conservation of energy when we think of thermodynamics. Aren't you limited by the calories you take in?

**RF:** Of course to a large extent you are limited by caloric intake, but there's more to it than that. Conservation of energy, that is, the first law of thermodynamics, is only a bookkeeping law. It does not predict how caloric intake is distributed between weight gain, activity, heat generated and— this may be very important— growth and tissue changes. To know what happens you need the second law, which says, in essence, all processes are somewhat inefficient and particular chemical changes may be very wasteful of energy. We explained that the make-up of a diet, how much carbohydrate, how much protein predicted very different efficiencies for the diets of different composition. We pointed out that the energy necessary for the processing of protein, the cycling of intermediates (running the engine on idle, so to speak) and involvement of uncoupling proteins were the kind of mechanisms that could account for inefficiency in carbohydrate restriction. The important point is that many experiments have already been done showing that low-carbohydrate diets are, in fact, more

efficient for weight loss, that is, more inefficient in storing fat. So, you can always argue about how accurate the measurements are, but many of these studies were very carefully done and, since we now showed that there's nothing theoretically wrong with them, we have to accept that they are possible.

**AM:** But isn't there a spontaneous reduction in intake of calories on a low-carbohydrate diet?

**RF:** That's also true and may be the major effect for most people, but weight loss is really difficult, so any advantage you can get will help. The additional benefit from the metabolic effect can be pretty large for some people. Also, critics of low-carbohydrate diets say that it's just calorie reduction, but they are forgetting that it is not "just"; it is very hard to get people to cut calories and traditional methods that urge willpower to target calorie reduction have no great success— otherwise, we wouldn't have an obesity epidemic. In fact, you would think that a diet that's quite flexible— you only have to cut down on carbs, it's up to you what, if anything you replace it with— you would think that a diet that spontaneously reduced caloric intake would be widely embraced by nutritionists.

**AM:** That brings me to the question: why do you think official organizations and so many practicing physicians and nutritionists are opposed to carbohydrate restriction? And, I guess, what our readers really want to know is, how should they deal with this negative reaction if they want to try a low-carbohydrate approach?

**RF:** Well, first of all, big agencies have many opinions and rely on committees and this is going to give you a consensus approach, which is always conservative, and many of their experts have pretty much made up their minds and aren't interested in any second opinions. On the other hand, although people are slow to change their minds, things are changing and many practitioners are more open-minded than the health agencies and the "experts" you hear on television. We took a survey of an online support group, the Active Low-carber's Forum, which incidentally, has more than 82,000 members ([www.forum.lowcarber.org](http://www.forum.lowcarber.org)). The great majority of their members follow some kind of low-carb diet, most of them quite successfully. We got about 3,000 responses to our survey: about half of the respondents had consulted a physician or other health professional before or during their diet. Fifty-five percent said that the physician was supportive and 28 percent said that the physician had no opinion, but was supportive after they brought in good results. So, I think it's generally a good idea to consult a physician if you're going to undertake weight loss, especially in connection with exercise, which is an important component, but you should not assume that they will be negative about carb restriction. If they are, it's appropriate for you to ask for reasons and to expect that they satisfy you that any objections they have to a diet makes sense (some medical conditions probably preclude low-carbohydrate strategies).

**AM:** Our readers, of course, are very interested in the question of exercise and how it might fit into a low-carbohydrate diet. We certainly hear of the dangers of such diets for exercise.

**RF:** Well, first we have to distinguish between competition athletes who may have very special requirements and people who want to stay fit and engage in athletic activities at a non-professional or semi-professional level. For the latter group, which is most of us, if they're in good health, there's no identified danger of low-carbohydrate dieting. Indeed, most people report feeling better, having more energy and are more comfortable being active. The dire predictions of damage to healthy kidneys have never been found (although, in any case, there's a benefit to low carbohydrates without substituting much protein). The continued warnings about cardiovascular disease are, if anything, backward because most lipid markers improve and epidemiologic studies from Harvard show that replacing unsaturated fat in the diet with carbohydrate is worse than replacing unsaturated fat with saturated fat (again, there's a benefit to low carbohydrates without substituting much fat).

There are all levels of carbohydrate reduction and if your primary motivation is weight loss/fat loss, you may choose a very low-carbohydrate diet along the lines of the first two weeks of popular diets such as the Atkins diet, South Beach diet or Protein Power. Here, you're on a serious diet and some adjustment may be required— this is true of very low calorie diets as well. Usually a period of acclimation is required. Common sense is in order. If you feel weak or dizzy, back off on your diet, whatever it is. If you have just started and feel light-headed, don't

get into a basketball game. This isn't expert opinion, just common sense for any diet. If you're not feeling better in a few days, it's not a good diet for you, again, whether it's low-carb, high-carb, or whatever.

**AM:** There's also the question of performance. Don't glycogen stores go down when carbs are reduced?

**RF:** On performance, there is little evidence of a decrement for most people, but if you're overweight and think you're not performing (perception is part of the mix), you may have to make a decision on priorities. As I mentioned before, an adjustment period may be necessary. Steve Phinney showed that with an adjustment period, even elite athletes can reach high performance. It should be said, however, that we don't know all the answers or all the possible variations. Fine tuning performance can involve the timing of nutrient intake. An area of investigation for competition athletes is whether the benefits of chronic, day-to-day low carb can be incorporated into a program utilizing the benefits of carb-loading before an event.

This gets to your question about glycogen, which is certainly reduced on a low-carbohydrate, typically at the 60 percent level, but it's protected in the sense that the glucose your body produces replenishes glycogen. I assume most of your readers know that on a carbohydrate-restricted diet, your body's requirement for glucose is supplied by the process known as gluconeogenesis where glucose is synthesized from protein [amino acids] or other metabolites. Gluconeogenesis works hand-in-hand with glycogen synthesis on a low-carb diet to maintain a working level. It's important, however to ask what the role of glycogen is. Here, again, there's a difference with competition athletes for whom the bottom line on glycogen may be the more better. For most people doing moderate exercise, however, excess glycogen may not be necessary or even desirable since it's tied into other aspects of metabolism such as blood glucose levels. So, the bottom line is that, whereas there are always individual differences, performance isn't inherently impaired and glycogen stores are within the functional range, but peak performance may require experimentation.

The most important point for most people is that if you're trying to lose body fat, data from Donald Layman's lab among others, has shown that there's not only a benefit to low carbohydrates, but the combination of this kind of diet with exercise is especially effective. Also, work from Jeff Volek's lab and your own commentary in *Nutrition & Metabolism* pointed out the general benefit in increasing lean mass at the expense of fat or carbohydrate restriction, although this is not universally acknowledged.

*Editor's Note: It should be noted that full adaptation of macronutrient metabolism requires a number of weeks, so short-term studies examining the effects of high-carb versus low-carb on exercise performance are scientifically worthless. A free, full-text paper of my recent commentary entitled "Very-low-carbohydrate diets and preservation of muscle mass" is available at [www.nutritionandmetabolism.com](http://www.nutritionandmetabolism.com).*

**AM:** Well, what about competition athletes?

**RF:** This is outside my area of expertise, but my understanding is that for athletes on high carbohydrates, there's going to be a period of adaptation if they're going to switch to carbohydrate restriction. The literature shows that some clearly do better on high carbs, some do the same on high carbs and low carbs, but don't like low carbs, and some do fine on low carbs and, as I mentioned, people are investigating whether both approaches can be combined. Also, it's almost by definition that the peak athlete is outside the norm, making it difficult to present a clear generalization. I myself am hoping for a late blossoming of exceptional athletic ability and should that happen I'll get back to MD on that.

**AM:** Returning to reality, Dr. Feinman, you were the chief organizer of the conference on carbohydrate restriction that was held in Brooklyn in January. I see that the conference covered a wide range of subjects, but if you had to pick a single highlight of the meeting what would it be?

**RF:** Well, oddly I would focus on a couple of the clinical papers on diabetes because we now have the sense that type 2 diabetes (where patients are capable of making insulin, but have reduced responses, a so-called insulin resistance) may be continuous with and even be caused by less drastic conditions that include obesity and susceptibility to cardiovascular disease, which we all have to deal with. So, the demonstration by Mary Vernon and Will Yancy

that many type 2 diabetics who went on low-carbohydrate diets reduced or eliminated medication I consider a demonstration of the impressive metabolic modifications that are possible. If this can be achieved in what can be a severe disease, it may hold potential for subclinical metabolic problems.

**AM:** Where do you see the field of carbohydrate restriction going in the future?

**RF:** Well, it's already beginning to make inroads into traditional thinking and most people are beginning to appreciate the value of carbohydrate restriction. The problem is the continuing emphasis on low fat, which hasn't been a productive piece of advice as indicated by the very dismal performance in the recently published Women's Health Initiative. Of course, if high carbs are preferred for taste or whatever reason, then it's probably good to keep fat lower. Also, for weight loss everybody agrees that reducing calories by removing fat would be a good thing, but the key point is that replacement of fat with carbohydrate is generally deleterious to cardiovascular health and obesity. This is well established in the literature.

In the end, an appreciation of the importance of carbohydrate restriction is inevitable since the science so clearly points in that direction. At that point, I would hope recognition will be given to the people who've been struggling against orthodoxy to produce the data— Steve Phinney, Jeff Volek, Eric Westman and Mary Vernon among others. I would also hope that we could understand as well the contribution of Dr. Robert C. Atkins. Whereas his diet is a popular diet and in the final implementation will undergo many changes, his contribution, especially in the face of very intemperate criticism should be appreciated. It's a historical fact that he proposed an idea that came precisely at the time low fat was being proposed as a goal. Hopefully, the hostile response of the scientific community to Dr. Atkins will be understood in this historical context and it will be realized that it wasn't our finest hour.

### **Bottom Line**

It's becoming increasingly clear that the conventional high-carb/low-fat diet is far from the ideal diet. High-carbohydrate meals raise blood glucose and insulin secretion, thereby increasing the risk of obesity, diabetes and heart disease. The preponderance of evidence strongly suggests that the substitution of carbohydrate for protein and fat will lead to more favorable changes in body composition. Also, a higher-protein/lower-carbohydrate diet increases satiety and stabilizes blood insulin. However, one diet approach doesn't fit all. Identifying specific needs, goals and the activity level of each individual is the key for success.

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