

## **Joe Mercola, D.O. Interview With Jeff Volek, Ph.D.**

Jeff Volek, Ph.D., and registered dietitian and professor in the Human Science Department at Ohio State University, has done enormous work in the field of high-fat, low-carbohydrate diets, investigating how it affects human health and athletic performance.

Volek has published many scientific articles as well as several books, including "[The Art and Science of Low Carbohydrate Living](#)," and "[The Art and Science of Low Carbohydrate Performance](#)."

Both of these books were co-authored with Dr. Stephen Phinney, a physician and true pioneer in this field, who has studied low-carb diets even longer than Volek.

Starting out as a dietician, Volek was taught that low-fat diets were healthy and that saturated fats and cholesterol should be avoided. But in working with diabetics, he kept feeling that something was "off." Why should diabetics eat so many carbs?

*"In essence, it drove me to want to understand metabolism and nutrition at a much deeper level,"* he says.

*"I was also into self-experimentation ... I was at the time into very low-fat diets, thinking that was how I would optimize my own health. But I decided to experiment with a very low-carb diet."*

### **Low-Carb Diets Can Benefit Athletes and Non-Athletes Alike**

His experimentation began in the early '90s and, to his great surprise, his low-carb experiment proved to be anything *but* harmful. This fueled his passion for understanding how humans respond to diets that are very low in [carbohydrates](#), and led him to continue his education.

He has now spent the last 15 years conducting research in this area, and the outcomes from most experiments have been very encouraging.

*"The science continues to point in the direction that there are a lot of applications for these diets for a large number of people.*

*We're still sorting out a lot of the details, but clearly we need to change the way we feed Americans and the way we think about nutrition in order to reverse ... obesity and diabetes."*

He's also done research on low- and non-fiber carb diets and athletic performance, and here too results have proved quite positive — despite running counter to everything he was taught about diet and performance in school, and in most of the scientific literature as well.

*"It's been an interesting journey to say the least ... The things I was reading, the things I was taught were not really based on a lot of science, and were a lot of half-truths and misinformation, which still persist today,"* he notes.

### **Is Your Diet Driving Your Metabolism in the Right Direction?**

Most of the food (fuel) people eat these days is moving their metabolism in the wrong direction. The Westernized diet constantly biases you toward using more nonfiber carbs for fuel.

Most Americans are primarily burning glucose as their primary fuel, which actually *inhibits* their body's ability to access and burn body fat.

Healthy fat, meanwhile, is a far preferable sort of fuel, as it burns far more efficiently than carbs. As noted by Volek, humans evolved to primarily burn fat as fuel — not carbs — and yet that's not how we're feeding our bodies.

*"As a result, we're running into a lot of metabolic problems, because we're constantly inhibiting our body's ability to burn fuel that we evolved to burn,"* he says.

We all have to eat; we need fuel to live. Without generating ATP you cannot survive at all. The question is how to do that efficiently, without generating harmful reactive oxygen species (ROS), which can destroy your mitochondria and contribute to disease?

It's all about keeping your mitochondria healthy, and [low-carb, high-fat diets](#) tend to do that far more effectively than high-carb, low-fat diets.

### **Healthy Fat Is a 'Cleaner' Burning Fuel**

An indirect measurement included in one of Volek's books shows that when people burn fat as their primary fuel, their respiratory quotient can go down as low as 0.7 as opposed to 1, which suggests they're generating less carbon dioxide.

Regardless of the fuel your body burns, you're going to generate carbon dioxide and water. But when you burn fat, you generate 30 percent less carbon dioxide, suggesting it's a lot "cleaner" fuel.

*"To use the term 'clean,' that's kind of a provocative term, but I think it is an appropriate one because ... there's a lot of 'exhaust' associated with burning carbs for fuel ... free radicals, reactive oxygen species ... That contributes to the metabolic problems we're seeing in this country."*

Also, the most efficient way to train your body to use fat for fuel is to remove some of the sugars and starches from your diet. According to Volek, that's true for everyone, whether you're an elite athlete or a sedentary diabetic.

In essence, the reason why low-carb diets work so well is because it helps you escape this non-fiber, carb-based metabolism that depends on insulin levels to drive blood sugar into cells and use carbs for fuel.

Volek also introduces another term: "carb intolerance" — a metabolic impairment that you suffer from if you're insulin resistant or prediabetic. As noted by Volek:

*"It really makes no sense if you're carb intolerant to be consuming half your energy from nonfiber carbs, and to be trying to force your body to burn more carbs."*

### **Healthy Versus Harmful Fats**

Most Americans consume harmful fats like processed vegetable oils, which will invariably make your health worse. So when we're talking about dietary fats, we're referring to natural, unprocessed fat, found in real foods such as seeds, nuts, butter, olives, [avocado](#), or [coconut oil](#).

Another good one is raw cacao — it's a phenomenal source of healthy saturated fats and many beneficial polyphenols. Fats are critical for a number of health reasons. They contribute to the formation of cellular membranes, for example, and it's really difficult to

have good biological function with impaired cell membranes.

So, dietary fat serves two purposes: it serves as fuel; but it's also a foundational structural component of your biology.

If you're trying to lose weight, training your body to access your body fat is key, or else you cannot shed it. So if you're overweight, you want to teach your body to burn excess fat, and then, once you've reached your maintenance weight, the majority of fat your body will be burning is that from dietary sources.

But how do you make this conversion — to allow your body to become adapted to burn fat as your primary fuel — starting with any excess body fat you already have?

### **How to Make the Conversion from Burning Sugar to Burning Fat**

In short, the key is to restrict *non-fiber* carbohydrates. It's important to make the distinction about which carbs we're talking about here, as vegetables are "carbs" too, but fiber carbs will *not* push your metabolism in the wrong direction — only the non-fiber ones will (think sugars and anything that converts to sugar, such as soda, processed grains, pasta, bread and cookies, for example).

You calculate the dangerous non-fiber carbs by simply subtracting the grams of [fiber](#) from the grams of total carbohydrate in the food.

Another important point is this:

*"Your body can burn both carbs and fat, but your body will burn carbs **first**. As long as you're eating carbs, your body will try to burn those first. They're like the bully cutting in line. You may just think of them as kind of a throw-away nutrient too, because your body cannot store high levels of carb.*

*You have to try to oxidize them and burn them first. But if you're carb intolerant, which is highly prevalent in this country, you can't burn carbs, by definition, very well.*

*Your body then only has one alternative, and that's to convert the carbs you eat into fat. That happens to a greater extent to folks who are insulin resistant or carb intolerant. That really sets the stage for a lot of metabolic problems. Again coming back to how do you train the body to burn more fat; it all starts with removing the availability of carbohydrate because, as long as it's there, it's going to take precedence, and will simultaneously inhibit burning of fat.*

*These are very sensitive and exquisite mechanisms in place for this to work. You eat just a single meal of carbs and your fat-burning shuts down right away.*

*This is why a low- nonfiber carb diet works so well to shift fuel use over to fat. You restrict the amount of glucose and starches that you're consuming, and your body naturally shifts over to preferring fat for fuel. It does take some time to adapt to that. Your cells have to shift over their machinery to handle the increased levels of fat and lipid-based fuels. It takes a matter of weeks to get that adaptation.*

*But once it's there, they're fairly robust adaptations that don't just go away. This is why there is an adaptation period to a low-carb diet. It can be disrupted though if you reintroduce carbs. But a lot of the adaptations do remain."*

### **Finding Your Ideal Carb Level**

According to Volek, a level of non-fiber carbs that allows you to enter into nutritional ketosis (a metabolic state associated with an increased production of ketones in your liver; it's the biological reflection of being able to burn fat) is on average about 50 grams per day or less of digestible or absorbable carbohydrates. However, we all vary how we respond to the same food, so this is not an exact recommendation.

Some people can be in a full fat-burning state with full ketosis at a level of non-fiber carbs that's higher than 50 grams; maybe 70 or 80 grams. Others, especially if you're insulin resistant or have [type 2 diabetes](#), may require less than 40 grams or even 30 grams per day.

Again, it bears repeating that when we say carbohydrates, we're referring to non-fiber carbs only. If you look at the nutrition facts on a processed food package, it will list total carbs, and that's not what we're talking about. Don't get confused about this or you'll get really nervous. You do need carbs, but you need most all of them from *vegetables*.

By volume, vegetables are not very calorie-dense. You could have an 85 percent fat diet, and the volume of the fat would be one-tenth the volume of the vegetables you're eating.

To find your personal carb limit, it's important to actually measure your ketones, which can be done either through urine, breath, or blood. This will give you an objective measure of whether or not you're truly in ketosis, rather than just counting the grams of carbohydrates you consume.

*"That even varies within a person over time," Volek says. "You may be able to tolerate more carbs when you're in your 20s, but suddenly now you're in middle age and the same level of carbs is resulting in a few extra inches on your waist, your blood sugars are creeping up, you now have prediabetes, or worse.*

*The appropriate level of carb for an individual is bit of a moving target, but it is a very important element to personalizing a diet, which I think is fundamental to this idea of personalized nutrition. It's finding the appropriate level of carb for you at any given point in your lifespan that allows you to maintain health."*

Research has shown that ketosis is a very safe and a therapeutic metabolic state to be in, especially if you're diabetic or suffering from carb intolerance. But there are people who are naturally very insulin sensitive and carb tolerant that don't need to be in ketosis to thrive. So there's certainly room for flexibility, depending on your individual situation.

### **Ketogenic Diet Can Benefit Many Chronic Health Problems**

Beyond insulin resistance and type 2 diabetes, there are a number of applications for a well-formulated ketogenic diet, including [epileptic seizures](#), especially in kids who are unresponsive to drugs, and neurological conditions such as Alzheimer's and Parkinson's. [Cancer](#) is another area where ketogenic diets show great promise.

*"I think that is the next frontier of ketogenic diets," Volek says. "There are multiple reasons why many cancers would benefit from a ketogenic diet, not just the decreased glucose availability influx (which many tumors depend on) but also the lower insulin response and less inflammation, as many tumors thrive in a pro-inflammatory environment.*

*There are multiple potential mechanisms by which a ketogenic diet would benefit, including epigenetic effects. We now know that the principal ketone body, beta hydroxybutyrate, is more than a metabolite. It's more than just an alternative fuel for the brain.*

*It acts like a hormone or a potent signaling molecule that affects gene expression, including upregulating genes that are protective against oxidative stress and enhance the antioxidant status.*

*Our knowledge and perspective on ketosis is expanding almost daily. It's all pointing toward positive health effects, which is quite interesting considering that for the last three or four decades, we've been demonizing ketones because we only associate it with ketoacidosis."*

Other benefits include the resistance to sugar and other food cravings, as you're never that hungry once you've made the shift. Mental clarity is another great boon. According to Volek, the U.S. military is showing great interest in ketones for this reason — along with the fact that it boosts physical stamina and endurance.

Being an efficient fat burner may also predispose you to a longer life. Dr. Ron Rosedale told me many years ago that the single most important variable for controlling the aging process is the ratio of fat versus carbohydrate you burn. The more fat you burn, the slower you're going to age in general. More recent research supports this notion.

### **How Ketogenic Diet May Promote Longevity and Increased Muscle Mass**

Recent research has found about a dozen genes associated with longevity. The primary function of one of these genes is to cripple the degradation of branched-chain amino acids, such as leucine, which can be useful for building muscle mass. Interestingly, in one of his books, Volek mentions that ketones share a close structural similarity to these branched-chain amino acids, and seem to be preferentially metabolized.

In other words, ketones spare those branched-chain amino acids, leaving higher levels of them around, which promotes longevity and increased muscle mass.

*"We learned a lot about ketogenesis from the classic work done by people in the '60s studying starvation ketosis. One of the reasons why we can survive so long without food is we enter into ketosis, and ketosis spares protein breakdown. One of a more consistent effect we see in people on a ketogenic diet is that leucine levels go up in the blood, because they're not being oxidized to the same level.*

*Ketones are sparing oxidation and breakdown of important structural proteins, and therefore their levels or concentrations in the blood increase and allow them to do other important signaling-type functions.*

*I do see a very positive interaction here with nutritional ketosis and protein metabolism in general in sparing of the branched-chain amino acids in particular, which are unique in that they are a preferential fuel, unlike other amino acids, which don't really serve as a fuel substrate," Volek explains.*

### **The Importance of Eating Moderate Protein**

There's also a "sweet spot" regarding protein. You don't want more protein than your body actually needs. As noted by Volek, this is an important point because there's a

common misconception that low non-fiber carb diets are high-protein diets. In reality, a ketogenic diet must actually be moderate in protein because excessive protein is anti-ketogenic.

On the other hand, you don't want to consume too little protein, as this may push you into a negative nitrogen balance. As a general rule, I recommend eating one-half gram of protein per pound of lean body mass per day, which for most sedentary folks is 40 to 70 grams, but this may be higher for athletes and larger individuals.

The best approach is to measure ketosis to know you are not over-consuming protein. For details on how to calculate this, please see my previous article, "[The Very Real Risks of Consuming Too Much Protein.](#)"

*"It's also important to maximize the quality of the protein," Volek says. "I am a general proponent of high-quality protein sources [such as] whey protein. Most animal sources of protein maintain these essential amino acids [discussed above]."*

*I do think, with the potentially unique characteristics of leucine and branched-chain amino acids, we may discover that it's beneficial to include extra leucine even within a context of a ketogenic diet ... Especially if you're an athlete wanting to enhance lean body mass, there could be some benefit to specific use of leucine in particular after exercise or even before exercise ...*

*I generally think including all three [is best]. Leucine is a potent stimulator of mTOR and protein synthesis in skeletal muscles. It's one thing to turn on the machinery, but you still have to have the building blocks in order to build proteins. I do think it's important that you have full complement of the essential amino acids to make sure that you have all the material there to take advantage of the signaling effect of leucine."*

### **Low-Carb Benefits for Athletes**

The dogma in sports nutrition for the last four decades has been that in order to perform at a higher level and recover adequately, athletes need to consume high amounts of (non-vegetable) carbs before, during, and after exercise. However, in more recent years, the understanding of how low-carb diets can augment performance in certain athletes is starting to catch on.

It has certainly gained a great deal of traction in the ultra-endurance world, where athletes are exercising continuously for several hours.

*"To be quite frank, they're challenged from a fueling perspective," Volek says, "because if they're eating carbs, they're inhibiting their ability to burn fat optimally. They're putting themselves in a situation where they're increasingly dependent on providing more carbs."*

*You can only store a limited amount of carbs in your body as glycogen, about 2,000 kilocalories, and if you're exercising for more than a couple of hours, you're burning through the majority of that stored carbohydrate.*

*That's when an athlete hits the wall. We know that's associated with obvious decrements in performance. How do you avoid that? You can carb-load. That's been the traditional recommendation; to try to pack even more carbs into your muscles ... but that will only delay exercise fatigue by a half hour or so. That doesn't really solve the*

*problem.*

*It actually exacerbates the problem in some ways. The alternative is to train your body to burn more fat. If you're burning fat and sparing carbohydrates, you don't hit the wall. That's one of the most commonly perceived benefits of a low-carb diet for athletes."*

Athletes who adopt this strategy can become exceptionally good at burning fat. Even if they're not eating calories during exercise, lean athletes have at least 20,000 to 30,000 kilocalories on their body in the form of adipose tissue that they can access during exercise. That's more than enough to finish even a 100-mile race. So from a fueling perspective, it makes sense that you'd want to burn more fat as opposed to carbohydrate.

Ultra-endurance athletes who have switched to low-carb, high-fat diets are now winning races and, in some cases, setting new course records. They're also experiencing other benefits, such as speedier recovery rates, improved metabolic health, and a leaner body composition.

### **More Information**

Mounting evidence suggests low- non-fiber carb, high-fat diets may be the key that many people have been looking for, as it solves more than one problem. Not only does it help you shed excess body fat, it does so while simultaneously improving metabolism, boosting overall energy levels, and promoting optimal health and maximizing longevity in a number of different ways.

It can also help ward off neurological dysfunction, boost mental clarity, and improve athletic performance.

For those who struggle with insulin resistance or diabetes, it's certainly one of the most efficient ways to reverse the condition. Even those suffering with more serious conditions, such as cancer, may reap significant benefits.

To learn more, I highly recommend picking up one or both of Volek's books — "[The Art and Science of Low Carbohydrate Living](#)," and "[The Art and Science of Low Carbohydrate Performance](#)" — the latter of which is geared toward athletes in particular.