

A Surprising Reason Why You May Need More Carbs in Your Diet

Analysis by [Dr. Joseph Mercola](#)

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STORY AT-A-GLANCE

- › A ketogenic diet can be very useful initially when transitioning people who are metabolically inflexible. However, continuing in ketosis long term can lead to problems, including stubborn weight gain or the inability to lose unwanted weight
- › The reason for this has to do with cortisol. Your body needs glucose, and when deprived for too long, your body will release cortisol to stimulate the production of glucose by your liver. Cortisol also promotes inflammation and central obesity, so you don't want chronically elevated cortisol levels
- › Your metabolic rate is strongly affected by the type of sugar you consume. High-fructose corn syrup promotes ill health while whole fruit, raw honey, and pure organic cane sugar are readily metabolized without promoting weight gain
- › When adding in more carbs, you also need to reduce your fat intake to avoid elevating your triglycerides
- › Restricting dietary fat and/or blocking the oxidation of fat inside of the cell have strong therapeutic effects against cancer by forcing the cell out of its excessive fatty acid oxidation state

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In this interview, Georgi Dinkov and I continue our discussion about diet, diving into some of the finer details that can make or break your health. Dinkov is a student of Ray Peat, who passed away around Thanksgiving 2022, leaving behind a legacy of iconoclastic wisdom on how to optimize biological health.

For example, a ketogenic diet can be very useful initially when transitioning people who are metabolically inflexible, which is about 95% of the population of the United States. So, in the short term, the vast majority of people can benefit from going keto. However, if you continue in ketosis long term, you're going to run into problems.

Elevated Cortisol Leads to Central Obesity

As just one example, while weight loss is a typical response when going on a ketogenic diet, months later, maintaining that weight loss often becomes a struggle again. Dinkov experienced this firsthand. Once he started following Ray Peat's recommendations, he lost the weight again and kept it off.

"My take is it's an endocrine problem," Dinkov says. "So if you're struggling with weight you cannot lose, I think it's a good idea to do a blood work [panel] for the steroids ... Every single person that has been struggling with excessive weight that has emailed [me] their blood results, without exception, their cortisol is either high-normal or above the range, both the AM and the PM value.

Their thyroid is less than optimal, in fact, pretty bad for most people ... They're at the upper limit of normal. A very large number of people are basically hypothyroid ... I think we are eating foods that are lowering our metabolic rate. We're living an excessively stressful lifestyle.

That's probably not a surprise for anybody. Many people think, well, stress is good for you. It's good as a hormetic response in an acute situation, but not when you have chronically elevated cortisol. Every doctor will tell you if you have a chronic elevated cortisol, you will develop the so-called spectrum of Cushing syndrome ...

One of the defining features of elevated cortisol is that you have central obesity. So that, to me, is really the problem. We have higher than desirable levels of stress, suboptimal diet, and we're surrounded by a number of different endocrine disruptors which are now proven to reliably cause obesity in animal models, even in very small amounts. Most of those are found in plastics."

Why I Changed My Mind About Low-Carb Diets

One of the foundational concepts of health that I've had to radically revise my thinking on, based on the work of the late Ray Peat and his student Georgi Dinkov, is the idea that eating a low-carb diet long-term is the best way to optimize your metabolic and mitochondrial health.

I now realize that this was misguided, and the reason for that has to do with the fact that your body requires glucose and if you aren't eating it you will go into a hypoglycemic coma and die. Obviously, your body has safeguards to prevent that and the major one is the hormone cortisol.

In medical school, we learned that cortisol is a glucocorticoid. Gluco means glucose (sugar) and cortico means it comes from the adrenal cortex. It's also another word for steroid. We were told that cortisol is responsible for maintaining glucose homeostasis but led to believe its primary purpose was for inflammation.

Well, that's just not true. While cortisol certainly contributes to glucose balance, its primary purpose is to raise your blood sugar when it is too low and you don't have enough glycogen reserves in your liver.

How Does Cortisol Work?

But just how does cortisol increase your blood sugar? It does it by breaking down your muscles, bones, and brain. It sacrifices your lean muscle mass to release amino acids that your liver converts to glucose in a process called gluconeogenesis.

So, ultimately, cortisol also is going to cause inflammation and impair your immune function. And it increases food cravings. So, you do not want your cortisol to be elevated. For a long time, I was a proponent of a low-carb diet, but now I realize that chronic low-carb is not a good idea.

As a fuel, glucose is vastly superior to fat, and this was something I simply got wrong. The same thing goes for fasting. Both low-carb and fasting are great interventions in the short-term for those who are overweight and metabolically inflexible.

However, once you've regained your metabolic flexibility, it is important to revise your strategy and add healthy carbs back in, or else these strategies will backfire and lead to decreased metabolic health, compromised mitochondrial function, and impaired metabolism.

Cortisol happens to be the primary aging hormone. If it is chronically elevated, you simply will die prematurely as it is highly catabolic, meaning it will break down your body tissues. To stay healthy as you age, you need to be anabolic and build healthy tissues like muscle and mitochondria. Elevated cortisol will seriously impair those efforts.

Important Cautions Before You Increase Carbs

So, it is clear that you need to be doing everything you can to keep your cortisol levels and chronic inflammation low. But it would also be a major mistake to increase your carb intake if you are still on a high-fat diet. I did this experiment in the mid-80s after I read the book by the Diamonds called Fit for Life.

They suggested having fruit only for breakfast which I tried. Then I did my lab work and found my fasting triglycerides and lipoprotein profiles had exploded for the worse. I prematurely concluded that a high fruit diet was nonsense and remained relatively low carb for nearly four decades.

This was until I encountered Ray Peat's work and reevaluated my initial impression. I now understand that I was missing important parts of the strategy. And now I eat 3 to 4 pounds of watermelon (without the rind) virtually every morning at 5:30 as my first meal, followed by three eggs and eight ounces of white rice and two ounces of maple syrup 1 to 2 hours later.

That sounds like a lot of carbs, and it is. I have additional fruits later in the day and now my carb intake is about 475 grams a day and comprises about 60% of my daily calories. You might wonder what has happened to my weight and blood sugar with all these extra carbs.

Well, I thought my weight was good at 192 as I increased my muscle mass, but it has decreased by ten pounds to 182 with no change in muscle mass. My fasting blood sugar has dropped ten points. So far it seems to be working for me.

The Vital Metabolic Switch You Need to Understand

This is one of the most important principles in food science that I never learned or understood until later. My strong guess is that this is also true for most natural medicine clinicians. Low-carb diets have helped at least tens of millions of people improve their health for a very good reason and that is there is a stealth switch that controls what fuel your mitochondria can burn as they can only burn one fuel at a time, either fat or glucose.

The switch has been given the name the Randle Cycle, but it is more helpful to visualize it as a railroad switch that changes the tracks of the train, and the train can only travel down one track not both. This is because only one type of fuel can be burned at a time.

The best-case scenario is you metabolize, or burn, glucose in your mitochondria without any reductive stress (a term I will explain in my upcoming interview with Georgi Dinkov). When you do this, you will only generate 0.1% reactive oxygen species (ROS).

Not only does this route generate less ROS but is also incredibly efficient at energy production by creating 36 to 38 ATP for every molecule of glucose that is metabolized. It will also generate metabolic water and carbon dioxide which are also important for your health.

For this to occur you will need to consume less than 30% of your calories as fat. When you consume significantly more than that amount the switch changes to burn fat in your mitochondria and you will not be able to burn glucose until your fat decreases to less than 30% of calories.

Since glucose is unable to be shuttled into the mitochondria to burn it winds up backing up into your blood stream raising your blood sugar. This is a major contributor to diabetes. What little glucose is burned for fuel is done by using glycolysis which is a primitive pathway that bacteria and cancer cells use.

It is great we have this pathway as you absolutely need it for quick fuel when you are activating your type II muscle fibers. But if this is the primary way you burn glucose you are in a catastrophic metabolic state as you are creating loads of lactic acid as a waste product instead of healthy CO₂, and you are only generating 2 ATP for every molecule of glucose, which is 95% less energy.

Lactic acid increases reductive stress, which causes reverse electron flow in the mitochondria and causes reductive stress which increase the ROS to 3% to 4% which is 30X to 40X more than when glucose is burned efficiently in the mitochondria. You likely don't yet understand reductive stress, the opposite of oxidative stress, but will have done an interview with Georgi on this and will be posting it later this month.

How High-Fructose Corn Syrup Causes Disease

One factor that makes a big difference in your metabolic rate is the type of sugar you consume. Contrary to popular belief, there's a dramatic difference between high-fructose corn syrup and cane sugar. They're really two different foods. If the high-

fructose corn syrup is properly processed to remove all starch, then it's very similar to cane sugar because it's about 55% fructose and 45% glucose.

However, studies have shown beverages sweetened with high-fructose corn syrup contain a tremendous amount of starch, which isn't accounted for in the calories listed on the label. Once the starch is factored in, the caloric content of many sodas can easily quadruple that on the label, so you're getting FAR more calories than you think.

Additionally, because the starch is made up of such tiny particles, they can enter your blood circulation unprocessed via your digestive system, causing an allergic reaction.

They can also trigger a low-grade inflammatory reaction, which will trigger the release of histamine, nitric oxide, and serotonin. As noted by Dinkov, if you're sneezing and have itchy eyes even though it's not allergy season, you may well be having a reaction to something you ate or drank, and high-fructose corn syrup may be the culprit.

Starch particles also serve as fuel for pathogenic bacteria in your gut, and the endotoxins from these bacteria contribute to inflammatory conditions. Small intestine bacterial overgrowth (SIBO) is one example of what can happen, especially if you're on a proton pump inhibitor, as these drugs decrease the amount of stomach acid you're producing. Stomach acid is there not only to help with digestion but also to keep bacteria in check.

"If you're not producing a sufficient amount of acid, you're going to get bacteria colonizing your small intestine, either from food or creeping up from the large intestine. And that's not a good thing. Basically ... the portion of the intestine that is supposed to be clean and just focused on absorbing food is now harboring a microbiome.

And then, if you give it any kind of a food that the bacteria can process, you're increasing the turnover [which] result in the endotoxemia that is now accepted to cause a large number of diseases, especially cardiovascular disease, obesity, and neurological disease.

Alzheimer's has been conclusively tied to chronic low-grade endotoxemia. They're still claiming there's a genetic component to it, but they're now admitting that endotoxin is a causative factor in Alzheimer's disease," Dinkov says.

Can Cane Sugar Be Part of a Healthy Diet?

Most people who embrace natural health believe sugar is a pernicious evil, but Peat's and Dinkov's position is that the negative effects are primarily caused by high-fructose corn syrup, and that pure cane sugar can actually be a useful strategy to counteract some of the challenges that people can get into when on a strict low-carb diet. Dinkov explains:

"Cane sugar, if it's pure, has a very different overall systemic health effect than high-fructose corn syrup ... I think most of the sugar sold in the crystal form, especially organic ones, is pretty safe. Heavy metal contamination used to be a problem in sugar distillation but it looks like most of the western countries have sorted this out ...

Now, some people that have an issue with sugar are saying, 'Well, it's just empty calories and whatnot.' Multiple studies demonstrated that honey, which is very similar in composition to plain white sugar, does not trigger the normal hyperglycemic response that most of the other simple carbohydrates do. In fact, it improves the hyperglycemia in Type 2 diabetic patients despite being pure sugar.

I think that's the greatest confirmation that we have that sugar is not evil. It depends how you're getting it and in what form. One animal study demonstrated that rats, when given free access to [Mexican] Coke sweetened with cane sugar, they were eating the equivalent of 8,000 calories daily ... without gaining an ounce of fat.

So sugar is not dangerous. It's perhaps the only nutrient that we evolved to metabolize for fuel. But the other two micronutrients, even though we can metabolize them as fuel, come with a lot of strings attached ...

If you're oxidizing PUFA, then all hell breaks loose. If you're oxidizing saturated fats, it's far less dangerous. But in the long run it still puts you, due to the Randle cycle, into the semi-diabetic state because it decreases your insulin sensitivity.

So pure sugar is what we are meant to oxidize for fuel. If you get it from ripe fruit, great. If you can get it from [raw unadulterated] honey, probably just as good if not even better. But if not, then the pure white variety, preferably organic, that you get from the store, I think is a very good source of most of the carb calories that you intend to eat throughout the day."

The Glucose-Cortisol Link

In my book "Fat for Fuel," I argued that healthy saturated fats generate fewer free radical species in the electron transport chain than sugar. However, I'm starting to revise my views on this, based on Peat's work.

The problem is that if your glucose level is low because you're on a low-carb diet, your body is going to compensate by self-generating glucose, and that stimulus to make glucose is part of the obesity puzzle, because one of the ways in which your body produces glucose is by secreting cortisol.

And, as explained by Dinkov, if your cortisol is chronically elevated, you end up with central obesity and chronic inflammation, which clearly isn't good. So, you've got to have a certain amount of glucose, and it's best to get it from your diet rather than forcing your liver to make it, as cortisol is then also being churned out. Dinkov explains:

"If glucose is oxidized properly going through the Krebs Cycle and electron transport chain, it generates more carbon dioxide per molecule of glucose oxidized than do fats.

Now, carbon dioxide has this kind of controversial role in medicine. It used to be considered a metabolic byproduct that could be dangerous. People with chronic obstructive pulmonary disease have higher than normal levels of carbon dioxide in the blood.

But then, medicine started to look into this more closely, I think, over the last 10 years, outside of Dr. Pete's research, and said, 'Hm. Carbon dioxide seems to have a lot of positive effects in the body.' One of them is vasodilation.

So basically, if your metabolism is not working properly, if you're not oxidizing glucose properly, you're not going to produce sufficient amounts of carbon dioxide. What happens then? Vasoconstriction. And since that is actually a problem, it raises blood pressure and all kinds of other things; all hell breaks loose. The body then releases an emergency vasodilator, known as nitric oxide. And that is now acquiring a bad reputation.

Even in mainstream medical circles, they've started seeing that people who are taking the drug nitroglycerin, which used to be the mainstream drug for angina — chest pain — for cardiovascular disease and blood pressure.

With nitroglycerin, you'll quickly lower blood pressure. But over time, the inflammatory nature of nitric oxide ensures that these people actually get worse. And, in fact, most people who take nitroglycerin on a long-term basis die from a heart attack or ischemic stroke.

So, if you're not eating enough glucose, your body will make it. And, in fact, the primary evolutionary role of cortisol, the acute role, is actually preventing blood glucose from dropping too low, because that will put you into a hypoglycemic coma.

In the longer run its secondary role is to dampen down inflammation. So really, the acute, the lifesaving role of cortisol on a daily basis, is to prevent you from dropping into a coma because your blood glucose went too low.

But we don't want that process because it's going to get the glucose from the tissues. So, we need glucose [in our diet]. I think even the ketogenic proponents are now getting to the point of saying, 'We cannot be always in ketosis.' In the long term, it's not good."

Will Sugar Feed Cancer?

Ketogenic diets have also been hailed for their ability to prevent and treat cancer, but even this may turn out to be a misunderstanding in the end.

"I think some of the ideas around glucose feeding cancer stem from two basic misunderstandings," Dinkov says. "One is that cancer is an evil cell, genetically mutated, and that your only chance is to kill all of those cells because they're not going away by themselves.

First of all, that's not true. Spontaneous remissions of cancer are known, and they vary depending on the cancer. Prostate cancer has a pretty high rate of spontaneous remission ... A paper that came about five years ago ... from the MD Anderson Cancer Center in Texas ... said it's always been the position of medicine that cancerous mutations [happen] and after that, the cell becomes metabolically deranged.

But it looks like we've had it backwards. It's the metabolic derangement that happens first, and, over time, this triggers the genetic mutations, because the cell, being in an energetic deficiency, cannot properly maintain its structure. That was a huge admission ...

So what we need to be doing here is not trying to kill the cancer cell, because it is not a cancer cell. It is actually a normal cell that is metabolically deranged.

If we could compare it to anything, it'd be a diabetic cell [and] diabetes is now known to be caused by hyperlipidemia – too much fat in the body, too much fat in the blood. Basically, the cells are getting stuck in oxidizing fats, due to the Randle cycle.

And then, the glucose that's floating around in diabetes, a good portion of it – because it cannot be metabolized – is being peed out ... or you're converting it into lactic acid. This [MD Anderson] paper said the exact same thing is happening in cancer.

We are seeing an abnormal rate of fatty acid oxidation, because the cell is stuck in the cycle due to oversupply of fat.

The glucose, the 'cancer cell' cannot actually metabolize it, but because the cell needs its glucose for a variety of purposes – not just synthesizing energy, but also synthesizing DNA and RNA, and those two ... can only be synthesized from glucose, not from fats – the cancer cell says, 'Oh, I'm in a state of extreme deficiency of glucose. Give me more.'

So, it increases the synthesis of these glucose transporters known as GLUT1 through GLUT4. Basically, that's why when you give a patient with cancer a little bit of radioactive sugar, it accumulates mostly into the tumor, because the tumor has a much higher capacity for uptake of sugar.

However, and this is the key difference, it has a much lower capacity for oxidizing that sugar. So, you're going to see a lot of radioactive sugar accumulation in the tumor, but most of it will get converted to lactic acid. So this paper that came out said, 'We need to do something that gets the cell out of its stressed state.'

And I think we already agreed that excessive oxidation of fat is a stress state. Right? We don't want to produce lactic acid, and as long as we are over-oxidizing fat, we will be producing lactic acid, and we will be uptaking more glucose ...

Several studies have come out since then ... and they said, 'OK, how can we restrict the supply of fat?' assuming the fat is the problem. There's only really two macronutrients that can go to the cell. Assuming cancer is a metabolic disease, and assuming a cell can only oxidize fat or sugar, then if it's not the sugar, it's got to be the fat. There's nothing else.

And if it's not the mutations, if the mutations are secondary to the metabolic derangement, it's got to be one of these two macronutrients that we can manipulate to actually try to cure the cancer. They already tried glucose restriction ... That did not cure cancer. It did have a sensitizing effect to chemotherapy, but it did not result in actual cancer remission.

So now we're back to the other micronutrient, restricting the supply of fat. Multiple studies ... I have at least 30 on my blog ... have shown that restricting lipolysis by administering the beta blocker propranolol ... lowers lipolysis.

The way [propranolol] lowers blood pressure is by blocking adrenaline. If you're blocking adrenaline, you're also lowering lipolysis, because adrenaline is the primary activator of the hormone-sensitive lipase enzyme. Basically, you're going to be restricting the supply of fat from your own tissues to the tumor.

What else can be done? Well, that's not the only source of fat. You're also getting it through the diet. Other studies have tried doing low-fat diets for cancer, and are getting actually good results. Not cure, but good results. The propranolol induced full remission in the cancer."

Summary

Dinkov also cites research in which the beta oxidation inhibitor etomoxir, prescribed for heart disease, induced full remission in neuroglioblastoma, which is thought to be incurable. So, in summary, either restricting dietary fat or blocking the oxidation of fat inside the cell appears to have strong therapeutic effects against cancer by forcing the cell out of its excessive fatty acid oxidation state.

"And, once you do that, there's no metabolic damage preventing the cell from oxidizing glucose," Dinkov says. "It's all functional. If you flood the cell with fat then, basically, that's what the cell will oxidize, because it's overabundant relative to the glucose that is getting to the cell. If you stop that process, or at least greatly restrict it, the cell starts oxidizing glucose again."

The Devil in the Details

Here, I'd like to share a personal story. In an effort to adopt this new knowledge, I increased my carbohydrate intake to about 250 grams to 300 grams, depending on the day and the fruit availability. When I got my blood work back, I was surprised to find my triglycerides were in the low triple digits, just over 100, which is abnormal.

Normally, I'm closer to 50. In my clinical experience, elevated triglycerides is almost always related to excessive carbohydrate intake, which seems to conflict with what Dinkov just explained. But here's the key: When you increase carbohydrates, you also have to lower fat. If you don't, you could end up with complications, as just happened to me. So, now I'm lowering my fat intake. Dinkov confirms my experience:

"Most of the animal studies say, 'High sugar diet causes this. High sugar diet causes that.' But if you look at their diets, these animals are already on a high-fat diet. All they did was add more sugar on top of it. Well, of course, in a situation like that, you're going to have an increase in the triglycerides, increase in LDL cholesterol, because the body can synthesize cholesterol from the sugars.

So, you're going to get these biomarkers associated with cardiovascular disease to increase, but it's actually not really a fair comparison. What you should be doing is keeping the diets isocaloric, the same. And also, not increase the total amount of calories, just replace some of that fat with sugar ...

Another thing that is probably important is that since there's always some baseline lipolysis going on, when you're increasing the carbohydrate intake, the excess that cannot get metabolized will get converted to triglycerides and then stored.

When you are increasing the carbohydrate intake, you should be decreasing the amount of fat. If you're not, then at least you should be taking something that stimulates the oxidation of carbohydrate so that it doesn't result in the raising of triglycerides.

Aspirin, caffeine, especially vitamin B-3 niacinamide, all of these are known to lower triglycerides and, by now, the consensus mechanism of action is that all three of these components are increasing the oxidation of carbohydrates.

So, if you're increasing carbohydrates and you're getting an increase in triglycerides, two things, either you're eating too much fat or your baseline metabolic rate is not where it should be, so you can use some metabolic stimulation from these substances."

In addition to increasing the oxidation of glucose as fuel, aspirin, caffeine, and niacinamide may also inhibit the oxidation of fatty acids, specifically linoleic acid, and the most foundational strategy that anyone could implement to improve their health is to lower their linoleic acid, the omega-6 intake. These supplements will also lower inflammation, which in turn will lower your baseline cortisol.

The metabolite of aspirin, salicylic acid, also has an inhibitory effect on the enzyme 11-beta-hydroxysteroid dehydrogenase Type 1. This enzyme synthesizes active cortisol from the inactive precursor cortisone.

"So, aspirin will actually lower your synthesis of cortisol directly, not just by lowering inflammation, but also lowering the actual synthesis of cortisol," Dinkov explains. "A study demonstrated that baby aspirin, 81-100 milligrams daily, decreased fatty acid oxidation by about 30% ...

Aspirin also has an anti-lipolytic effect, not as strong as niacinamide, but it's got these three different things that are basically helping to lower both the supply of fat to the cell and excessive oxidation of fats even at these tiny dosages."

Be mindful about the aspirin you use, though. Immediate-release aspirin made with cornstarch is the preferred version that is now hard to find. Extended-release aspirin is not recommended due to the additives they put in it. Your best option would be to use a salicylic acid or willow bark supplement.

Benefits of Vitamin E

Dinkov also reviews the benefits of other supplements, such as vitamin E, which inhibits lipolysis, improves glucose metabolism, acts as an estrogen antagonist and helps counteract much of the damage caused by linoleic acid and other polyunsaturated fats (PUFAs).

According to Dinkov, research suggests your need for vitamin E can be directly calculated by your PUFA intake. You need about 2 milligrams of vitamin E from all sources per gram of PUFA that you're eating. So, if you're eating 50 grams of PUFA daily — which is about 10 times what you should be getting — you need about 100 mg of total tocopherol.

Importantly, PUFAs aren't just the omega-6s. It's also omega-3. In the interview, Dinkov goes into detail as to why omega-3 supplements such as fish oil are mostly garbage and shouldn't be used. I also wrote an article about this very [topic](#).

Whole food, in this case, small fatty fish and wild-caught Alaskan salmon are really your best bet. It's virtually impossible to find fish oil that's not rancid. So, to review, when you're calculating your PUFA intake you also need to include your omega-3s. Ideally, your daily PUFA intake would be below 10 grams.

Dinkov's Dietary Suggestions

In closing, Dinkov reviews some of his top dietary recommendations for optimal health. No. 1 is keeping PUFA intake below 10 grams; below 5 grams would be even better. No. 2 is to avoid high-fructose corn syrup when adding carbs. Stick with the simple sugars from ripe fruit, raw honey (make sure it's not adulterated with high-fructose corn syrup, as many are) and/or pure organic cane sugar.

As for the macro composition of your diet, equal amounts of fat, healthy carbs, and protein seem to be best for otherwise healthy individuals, so he recommends getting one-third or 33% of your daily calories from each. If you have metabolic problems or some kind of inflammatory disease, he recommends cutting down on fats.

Lower fat intake will also allow your body to digest protein better, as bile acids are released in response to fat, and bile interferes with the absorption of protein. Next, he recommends adding:

- **Vitamin E**, based on your PUFA intake (as detailed above)
- **Aspirin or willow bark extract**
- **Niacinamide** at a dose of 50 mg to a max of 100 mg, three times a day. In addition to [antiobesity effects](#), niacinamide will also help synthesize [NAD+](#), which has [important health benefits](#)
- **Caffeine** — BC powder, sold as a headache remedy, contains both aspirin and caffeine. According to Dinkov, research has shown that taking caffeine with aspirin increases the blood concentrations of both and prolongs their effects. Taking 50 mg of aspirin with 50 mg of caffeine can raise your metabolic rate by about 7% and keep it elevated for up to 12 hours
- **Copper** — Copper is the rate limiting factor for cytochrome c oxidase (Complex 4). With aging, the amount of copper in that enzyme decreases while iron increases, and the less copper you have, the lower your metabolic rate. Ideally, get your copper from whole foods such as liver, oysters, shrimp, or acerola cherry. If using a supplement, bisglycinate is a good option with high bioavailability

How to Apply This When Using Time-Restricted Eating (TRE)

If you're using time-restricted eating, or considering starting, then this final side note will be important. If you're metabolically inflexible, insulin resistant, and unable to easily switch between burning sugar and fat as your primary fuel, then a TRE program, such as that described by [Dr. Mindy Pelz](#) in my interview with her, may be quite beneficial, and this is true whether you're eating a ketogenic diet or not.

However, once you regain your metabolic flexibility, which can take anywhere from a few weeks to a few months, you will need to increase your eating window. The reason for this goes back to the glucose-cortisol connection, Dinkov explains in this interview. Your body needs glucose, and if you deprive it for too long, it will produce cortisol to stimulate your liver to make it.

This increased cortisol can contribute to chronic inflammation and cellular damage. Therefore, once you are no longer insulin resistant, it is best to vary your eating window between eight and 12 hours, and avoid going lower or higher than that window. It is also best to avoid eating before sunrise or after sunset and at least three hours before bedtime.

More Information

To learn more, be sure to listen to the entire interview, as we dive into far greater detail than what I've summarized here. Georgi is an absolute fire hydrant when it comes to biochemical details.

Also check out Georgi's blog at www.haidut.me or [follow him on Twitter](#). You can also obtain a major sampling of Ray Peat's work for free by going to these two sites: wiki.chadnet.org/Ray-Peat and RayPeat.com.