

# Shifting the Paradigm on Carbs, Cortisol and Glucose

## A Special Interview With Georgi Dinkov

By Dr. Joseph Mercola

### Dr. Joseph Mercola:

Dr. Mercola helping you take control of your health, and you are in for an amazing treat. We're being joined by Georgi Dinkov, who is just beyond amazing. For those of you who don't know who he is and haven't encountered him before, he came to the United States in 1997 from Bulgaria. He studied at Georgetown University to become an IT professional. Unfortunately, it was hard time to [inaudible 00:00:27] because of the dotcom issues and such. Because he was at Georgetown, he was able to pick up an IT job with the biochemistry department. Not just any biochemistry [department]. He was at Georgetown. As Johns Hopkins in the National Institutes of Health, these guys were high level, and Georgi wanted to socialize so he had to connect with them. Didn't have to, but he chose to. Just the language of connection was biochemistry. So even though he has absolutely no formal academic training in health and medicine, he essentially, in my humble estimation, has the equivalent of a Ph.D. in molecular biology and then some.

So, we are going to dive deep into the science. We really are. Well, before I go into that, let me just explain that Georgi is an advocate of bioenergetic medicine developed by Ray Peat. Really rescued him from his personal health problems, and he's discussed that story on a previous episode. It did a lot for him. So, he basically learned biochemistry by himself, which is an amazing testimony that you can do this yourself. The reason I want to share that, it's so critical you understand this, because the information is there. All you have to do is put in the time and effort. Here's the best thing: It doesn't cost anything. It's for free. You can just watch it. I just want to share with you what I've been doing this year. Pretty much every day this year, I've listened to two to three hours of Georgi's podcast.

You say, "Are you nuts?" No, because almost every time I listened to him – and many of the podcasts I listened to two, three, four times because there's so much information. My nickname for Georgi from last time is "The Fire Hydrant" because he's just a flow of incredible insights. So, this information is there, and I'm going to put links in here to show you how to configure Google, or YouTube actually, so that you can bring up all his interviews and chronologically sort them. You can do the same thing I've done. So, I've learned so much this year. He's just opened my eyes to so many foundational basics because I was one of the key catalysts for promoting keto. It was me. I wrote the book "Fat for Fuel," which was the No. 1 book sold in the United States the week it was launched.

It was No. 1, more than any other book sold in the United States. I was doing the best I could. I thought that fat was the ideal, optimal fuel, and we're going to talk about that. But it turns out I was mistaken. It appears it's actually glucose, which is demonized, essentially demonized for probably over a century or even longer. Sugar is the darn evil. Well, not really. And I know that's a really, really hard concept to digest. Just me saying it is going to probably prejudice you against anything else I'm going to say. So, if that's what it is, that's what it is. But believe me, it's in the process of changing my life, adopting these principles. I'll share some of the specifics as

we go along. But it's radical, it's mind-blowing.

Every day I wake up, I'm just so excited to learn more information and I listen to Georgi. I listen to him on podcast, and I don't listen to 2X. I'm listening to single X. And some of his podcasts, largely because of his accent, he's from Bulgaria so it's a little bit more difficult to pick up. He talks so fast, so I like to listen to 0.75 to get it. But boy, a lot of times I'm learning new things and just reinforcing it and seeing it from a different perspective. I think you might have the same thing.

So anyway, all that large introduction to let you know that this may seem enormously complex and there's a lot of complexity to it, but the foundational truths are pretty basic. Once you get them and you apply them, your metabolism, which is the whole crux of what Ray's work is, improving your metabolic rate and your metabolism and getting your mitochondria, which is largely responsible for controlling that, to run the way they were like – You've got this super engine in each and every one of your cells and it's not working well because it's given dirty fuel and it just messes it up. It's not running like it should, but it can. With some simple tweaks, you can make magnificent things. So, with all that massive introduction, I can't thank you enough and welcome for joining us Georgi.

**Georgi Dinkov:**

Thank you. Thanks for inviting me again. Hopefully the information we put out there is useful and people can improve their health.

**Dr. Joseph Mercola:**

From our very first conversation, what literally blew my mind was the information you shared about cortisol. Of course, everyone knows about cortisol. We're certainly taught about it in medical school. If you look it up, you'll see that cortisol is responsible for glucose homeostasis, it's what they typically do – for regulating glucose levels. While that's true, it really doesn't explain what it does. It's a rescue hormone and its primary function – It's a glucocorticoid, means the first part of it is glucose. That's what it does. It increases your glucose levels because if you go too low, you will go into hypoglycemic coma and you are dead. So, it's a rescue hormone and thank God it's available. Its only secondary component is an anti-inflammatory. So what Georgi explained is that when your glucose levels drop, you have to do this to shred your protein. It's a very highly anticatabolic protein.

I was listening to one of your podcasts this morning, Georgi, where you explained that the primary benefit of anabolic steroids to build your muscle mass is that it's anti-cortisol. That's how it works. It's like, who would have known? You would've thought it'd have some direct action on the muscles directly, but no, it's anti-cortisol. I was like mind-blown again. This is another mind-blowing – so that does this, but it's also the primary driver for aging. It is the hormone responsible for accelerating your aging process. One of the reasons I got into this, and most people are biohackers, is that they want to throttle that down, throttle it back, so you're slowing the aging process. Yet virtually no one, and I know almost every major leader and thought leader in this space, and I've never really heard anyone talk about this.

This is mind-blowing information. So, with all that massive introduction, I don't think I've ever given a longer introduction before an interview to anyone, but this is going to be a long interview, so it's worth it just to frame it. So, why don't you comment on what I just said?

**Georgi Dinkov:**

I fully agree. I think there's hardly a chronic condition where you cannot look at the condition and don't see [it's] cortisol-implicated. Usually in majority of cases, it is elevated cortisol versus the low cortisol. In fact, the only situation we have [of] low cortisol and it becomes problematic is probably Addison's disease, which is truly adrenal failure. And that's rare, very rare. In fact, the only high-profile person that I know that had it was President Kennedy, John F. Kennedy (JFK). He took for life, I think he took cortisol injections every couple of days. But for everybody else – Now if you look at John F. Kennedy, even with those injections, he basically was in a state of relative cortisol deficiency. But if you look at him, he looked remarkably young and handsome. Not that he was very old when he became president and [was] killed, but he looked younger than what other people at this age look like.

Especially people at this age, if you look at them these days, they're going to look on average a lot older than JFK. Studies as far back as the 1950s and the '60s demonstrated that you can produce every single phenotype of aging if you inject cortisol or at least create a state of relative glucocorticoid excess in the animal. So, you can do that either by injecting synthetic or natural glucocorticoids, or you can do it by reducing the levels of the natural anti-cortisol steroids in the body. Those are pregnenolone, progesterone, DHEA (dehydroepiandrosterone), but in males, testosterone and also dihydrotestosterone. So if you reduce the levels of those anti-cortisol steroids and keep the cortisol levels normal as they are in the animal, you'll still achieve the same phenotype of aging.

That's actually pretty much what happens to people as well. It has been shown that the cortisol levels do not decline with age unless you really have adrenal failure. While the levels of all of these anti-cortisol, youth-promoting hormones decline with aging. Pregnenolone, DHEA, progesterone, by the time you're 80, their levels are at about 20% of what they used to be when you were in your twenties. So really what happens is that cortisol stays the same, but basically your relative state of cortisol increases because there's nothing to oppose the cortisol that is already there.

Multiple intervention studies have demonstrated if you administer agents that oppose cortisol, block it at the receptor level or reduce its synthesis, you can achieve really good both health results and also the way you look. The anabolic steroids are probably the best-known example. It's really a misnomer because they're not anabolic. They're actually anticatabolic. Muscle has one of the highest expressions of the glucocorticoid receptor through which cortisol shreds the muscle. It binds the receptor and increases a number of different proteolytic enzymes.

**Dr. Joseph Mercola:**

I did not know muscle's the highest. It is, really?

**Georgi Dinkov:**

Yes. And the gastrointestinal tract and brain. So these are the three places where the receptor is the highest.

**Dr. Joseph Mercola:**

Cortisol actually shreds your brain tissue, too?

**Georgi Dinkov:**

Exactly.

**Dr. Joseph Mercola:**

Wow.

**Georgi Dinkov:**

It causes massive brain atrophy, and it's been well-established for the last five decades that cortisol can actually cause depression. People with depression have smaller brain mass and brain volume than people that don't have depression. This is probably one of the most convincing arguments to classify depression as actually a physiological condition, in addition to being purely mental as well. They looked at MRI (magnetic resonance imaging) scans of people with depression. They saw they have, depending on how severe depression is and for how long it went untreated, these people had much smaller brain volume and a number of brain cells as well, number of neurons.

So they said, okay, can we form the hypothesis that maybe cortisol can cause depression if it's chronically elevated? Let's test it. Let's administer an anti-cortisol medication to animals and people and see what happens. Within 48 hours of the glucocorticoid blocker, RU-486, being administered to people with clinical treatment-resistant depression, they experienced remission. So, I think it's a very good argument that cortisol is catabolic to the brain, and clearly if it's catabolic to the brain, it's probably not going to improve your mood. If anything, it's going to worsen it.

**Dr. Joseph Mercola:**

Yes. Well, thank you for that. So ultimately, as I mentioned, when your blood sugar level drops, that's a trigger for you to increase cortisol. This is the last thing you want to do. Really, one of your primary goals in achieving optimal health is to literally limit the elevation of your cortisol. Much more dangerous than sugar level elevation, which almost everyone is focusing on. They've got monitors, the 24/7 glucose monitors, continuous glucose monitors called CGMs, that you can wear, and pretty much every five to 10 minutes, you're going to get a reading because they're so concerned how dangerous glucose is. But that's not the issue. The issue is cortisol.

**Georgi Dinkov:**

Yep. And fats, right? So if your blood glucose is rising-

**Dr. Joseph Mercola:**

They're connected. That's what we're going to talk about. They're connected.

**Georgi Dinkov:**

So instead of asking, okay, is elevated blood glucose a symptom or a cause of the pathology? So far, we've only been told that, "Hey, high blood glucose is the devil. You got to do everything in your power to lower it." However, all of the drugs on the market, especially the more recent ones that actually target lowering HbA1c, the glycated hemoglobin, all of them increase all-cause mortality. So clearly messing directly with the levels of blood glucose, it's not something you want to do. You may temporarily decrease the biomarker, the glycated hemoglobin, but it does not mean you're getting healthier. There was a famous Harvard medical professor who said that the moment a biomarker becomes a goal, it ceases to be a biomarker. So, you're starting to chase something that's just a symptom.

Unfortunately for many conditions, simply because medicine says it doesn't know what the cause is, then you're kind of relegating yourself to symptomatic treatment. That's really what most of these blood glucose-lowering drugs do. They may lower your blood glucose, but they may kill you in the long run faster than the elevated glucose would've done by itself.

**Dr. Joseph Mercola:**

Yeah, we won't go into details. Maybe we will, but Metformin would be the classic example. It's been used by many, many people. Relatively safe. It's an extractive, a natural product, but it is basically [a] mitochondrial toxin.

**Georgi Dinkov:**

Yep.

**Dr. Joseph Mercola:**

And it's going to make your health decline long-term. So, having said all that, Georgi, I just want to make it clear that we are not saying that it is not important if your blood glucose is elevated.

**Georgi Dinkov:**

Yeah, absolutely.

**Dr. Joseph Mercola:**

But it's a symptom. You don't want to hit that directly. You want to address the fundamental foundational cause and then everything else comes into place. And just to give you an example, on my first interview with you, I was still relatively high in fat, 70% to 80% fat. And now I realize that wasn't [inaudible 00:14:25]. Fortunately I could tolerate it. I didn't have too many bad side effects, but it wasn't optimizing my health.

Now I am down to like 27% fat and 57% to 58% carbohydrates. So having said that, you say, "Oh my gosh, you must be diabetic or something." No, I lost 5 pounds more. I really was at a healthy body weight, and my blood sugar, I just had it done, it went down. My fasting blood

sugar went down 10. So that's just, to me, personal anecdotal proof that it's not the carbohydrate ingested. It's what's happening at the mitochondrial level. And to help us understand that, I created a graphic because this science can get somewhat complex when Georgie describes it.

I just thought having a simple graphic – now if you look at this, it looks complicated, but when we discuss it, it will be okay. So basically, it shows that you only have two primary fuels that you can burn in your body from food, and that's fats and carbs. The fats are broken down from a process called beta-oxidation and ultimately wind up going to acetyl-coA, which gets fed into the Krebs cycle.

Now carbs are different chemical structures. So, they are six-carbon molecules, and when they're broken down, they break down to pyruvate. This is really important because pyruvate then can also turn into acetyl-coA, but it has to be enzymatically changed through an enzyme called pyruvate dehydrogenase (PDH), or some people call it PDC, pyruvate dehydrogenase complex. So, when this complex or the enzyme itself is inhibited, we've got major problems because the substrate pyruvate cannot go into the electron transport chain. Instead, it has to go backwards, not really backwards, but to another pathway, a primitive pathway, one that all the central single cell organisms have, bacteria and such. And that is glycolysis, where it essentially anaerobically ferments that fuel to create energy. It's very inefficient. It doesn't create a lot of ATPs (adenosine triphosphates). The lactate molecule itself, when produced in large quantities systemically as a result of glucose being shunted, will wreak havoc with your system.

Your body has a metabolic switch. In many ways, this switch is a switch very similar to the one on a railroad track where the train comes along and then you throw the switch and it goes down on a different track. It can only go down one track at a time. The train can't split itself in two and go down both tracks. So there's a switch, and actually this switch has a name. It's called the Randle cycle. It essentially describes a process where your tissue can only burn one fuel time. It can't burn fat and glucose at the same time. Glucose is a synonym for sugar. So the threshold appears to be, and this is different for different people, but it's about 30%. What do I mean? If your fat level is above 30% and you're not going to be able to take that sugar, that glucose, and run it through your mitochondria, which is a small organelle within almost every cell in your body, except for the red blood cells, that produces cellular energy in the form of ATP.

That's really one of the primary differences between higher order organisms and lower order ones like bacteria. They don't have mitochondria. We do, and it's very efficient at creating energy. However, if your fat content, the percentage of fat that you're consuming in your diet, is over 30%, then this sugar is backed up and it can't go through the mitochondria. It has an alternate source. That alternate source is called glycolysis and essentially is very inefficient. You can take one molecule of glucose and you only make two ATPs, that's it. It also doesn't require oxygen. So we think, well that's great. It's not going to create many reactive oxygen species. That's actually quite to the contrary because it's so inefficient, it's going to create a lot more reactive oxygen species. We'll talk about that in a moment.

So if your fat level is under 30%, and in some cases where there's some pretty severe metabolic inflexibility, like [in] obesity or diabetes, that level may have to decrease to 15% to 20%, which

is pretty extreme. That's a pretty low-fat diet. I don't think it ever really should go under 10%. But the lower you can go, the better that you can tolerate. Usually diets under 10% fat are going to be very hard to tolerate. They're just not doable for most people. But the thresholds appear to be 30%. If you have less than 30% of your total calories as fat, then the glucose that you're ingesting can be used efficiently in your mitochondria and we'll talk – there's some different ways that you can burn that even within the mitochondria if your fat is less than 30%, and we'll talk about that in a moment. But that's the primary principle, is you've got to get the fat level right first and foremost, and then you can hope that you're going to have a chance at burning this.

**Georgi Dinkov:**

The ideal ratio is not really known, but the epidemiological studies kind of show that about an equal percentage in terms of calories is probably optimal for long-term health, unless you're trying to tackle a specific-

**Dr. Joseph Mercola:**

Wait a minute, equal of fats and carbs?

**Georgi Dinkov:**

No, no, I'm saying 33%, 33%, 33% for a healthy person-

**Dr. Joseph Mercola:**

Oh. No, here's where I would very respectfully disagree because – and that's in a whole other discussion, the protein – I've got so many insights from you, but most people don't get enough, but you can get too much. So in my case, I have some kidney challenges because of mercury fillings that I had removed incorrectly over 30 years ago. As a result, I have to be really, really, really careful. I think most people – I've heard you say before that you don't really need a lot more than 120 grams, most people, because you just can't burn – After 30, 40 grams in a meal, you're not getting much benefit and you're just burdening the kidneys and, if you already have a compromised kidney function, it's a challenge.

**Georgi Dinkov:**

That's true.

**Dr. Joseph Mercola:**

I think for most people it's about 15% protein and that level stays the same. The real challenge for everyone is to figure out the balance between carbs and fats.

**Georgi Dinkov:**

Carbs and fats, yeah. I agree.

**Dr. Joseph Mercola:**

That's [the] key thing. Once you understand what your protein level is, that doesn't change. You pretty much should have the same amount of protein continuously. The only other thing is to

figure out what's the fat, what's the carbs. That's a central argument or a central challenge for everyone to figure out.

### **Georgi Dinkov:**

So for the protein, in fact, I think we have a pretty good idea, it's about 1 gram per kilogram of lean body mass. So it used to be [inaudible 00:21:29] increments, I think like 0.5, which I think is too low, but also 1 gram per kilogram of body weight turns out to be too much for some people too, because a lot of your tissue, which is fat tissue, is not metabolically active with the protein that you ingested. So it's really mostly for the lean muscle mass that you ingested as protein. For most people, let's say they're about 20% fat and another significant percentage bone. So you're about 0.7 grams per kilogram of body weight, that's probably what you need to be striving for protein-wise. Now for fat, basically I guess the level at which the fatty acid oxidation will compete with the glucose oxidation and kind of shut it out is different for different people and depends mostly on the endocrine balance.

If you look at older people, and sick people as well, they have metabolic inflexibility. So if you give them a meal that's comprised of equal number of calories of carbs and fats, they're going to oxidize mostly the fats and the carbohydrates will go unmetabolized. So they'll raise their blood glucose and also the lactic acid, which is the byproduct of unsuccessful fermentative carbohydrate utilization. So, I guess you need to play with a ratio. But I've noticed that between 15% and 20% is probably where most people in their current health state are, at which they can metabolize the fat without causing problems through the Randle cycle for the glucose. Diabetic people, especially Type 2 diabetes, most of them are overweight. In fact, most of them are obese, which means they have plenty of supply of fat.

In fact, they have two sources supplying fat. One through their diet and the second one from their fatty tissue, basically because there's always some process of lipolysis going on, which means shredding the fatty tissue and supplying the rest of the body with the fatty acids from a fatty tissue. So they have two supplies, two sources of fat. So for diabetic people, [it's] probably a good idea to lower the intake of fat from their diet because they already have a lot coming from their own bodies. In fact, there are many clinics around the world that treat and even cure Type 2 diabetes by putting diabetics on this really restrictive diet until they lose most of their fat and then suddenly the metabolism of glucose gets restarted.

So, I think this directly shows you that the problem with the glucose wasn't the glucose itself. It wasn't the glucose that was fattening them up and the glucose that's causing the problems, but they had too much fat in their bodies. Once you get rid of that fat, no matter how you do it, you can do it through fasting, you can do it through uncoupling agents such as dinitrophenol, which raises your metabolic rate. Once you get rid of the fat, the problems with metabolizing glucose disappear, which to me is a great test for the Randle cycle. So, for healthy people, I think they can probably intuitively gauge-

**Dr. Joseph Mercola:**

Oh wait, let's stop there. Once you get rid of the fat? So that means, the fat being ingested or fat being released through lipolysis, or percentage of body fat that you have? What are you specifically referring to?

**Georgi Dinkov:**

So, there's always some baseline lipolysis going on. In the rested state, your muscles actually prefer to oxidize mostly fat. So if you have a decent amount of muscle mass, you can actually burn most of this fat through the baseline lipolysis by simply resting and preferably raising the amount of lean muscle mass you have. The ratio of lean muscle mass to total body weight is the primary determinant of your basal metabolic rate. So, it's very important to not lose lean muscle mass. I think a lot of people get themselves in a situation where, through extreme fasting or extreme exercise, they're losing a lot of body weight, but they're not paying attention to how much they're losing each of the two components: fat mass and lean muscle mass. Multiple studies have shown that over a long-term fasting or a long-term exhaustive exercise, such as in the show "Biggest Loser," these people lost a lot of body weight, but about 80% of that was lean muscle mass.

So by the time they were done with the study, they were much leaner, but their basal metabolic rate was much lower than what they started with because they lost most of their muscle mass. So when they quit the show, they went back to their normal lives and stayed on a reduced calorie regimen. They still regained all of their weight and they were devastated. They said, "How is this possible? I went through hell to lose all this weight and now I'm actually living in a slightly less of a hell because I'm still restricting my calories and I'm back to my previous weight. In fact, I overshot it."

Most people that were part of the study overshot their weight, and there was a study associated with it that said, "Of course what did you expect?" Your basal metabolic rate went down by 50%, five-zero. So unless you stay on this severely restricted calorie diet, you will regain all of these pounds. So really, the important thing is [to] maintain muscle mass, restrict a little bit of the dietary intake and don't overshoot with the lipolysis. Every time you stress yourself, you're going to increase this rate of lipolysis. And if you flood too much fat into the bloodstream, you will shut down the glucose oxidation, and that will contribute to the lactic acid and all the other downstream effects that you mentioned.

**Dr. Joseph Mercola:**

So, this is the classic and widely held belief that the simple summary of conventional medicine's view about weight loss, and that is calories in, calories out, which there's some kernel of truth to that, but the details really destroy that as being effective way because what's not integrated into that equation is the metabolic rate.

**Georgi Dinkov:**

Exactly.

**Dr. Joseph Mercola:**

It's totally controlled by the concentration [inaudible 00:27:16] the macronutrients that you're consuming. So, question on the Randle cycle, because I think you're in agreement that normally the fat content should be below 30% to make sure that the healthy carbohydrates you're ingesting, and we'll talk about that in a moment, are shifted to the mitochondria, burned in the electron transport [inaudible 00:27:41] correctly with very minimal – we're going to talk about reductive stress next. You just sent me an email this morning that blew my mind three times. We'll talk about that next. But that has really radically shifted my mind as to what was the most efficient and cleanest burning fuel. It is glucose going through the mitochondrial transport chain because there's virtually – there's almost no reactive oxygen stress if you do that, which is really the key to what a lot of science believes is damaging, this oxidative stress. So anyway, the question on the Randle cycle is, is it the organism level, that percentage of fat concentration? Is it throughout the day? Is it through each meal? Is that cycle shifted in each mitochondrion? Or it's the cell level or the tissue level? So I wanted to dive into some of the specifics of where is that control mechanism. I think, ideally, you'd probably want – certainly the average for the day should be that, but should you also go to the effort of seeking to have that ratio of not more than 30% at each meal?

**Georgi Dinkov:**

So different tissues have different preferences for the amount of fat versus the amount of glucose they burn. As I mentioned, the muscles at rest, but not during activity, prefer to burn predominantly fat. The brain prefers to burn predominantly glucose. In fact, now they're saying that the reason that ketogenic diet is beneficial for things like epilepsy is because it has a glucose-sparing effect. There is something about the brain of epileptic people that don't utilize glucose as much. By the way, they do produce a lot of lactic acid as well, which means they don't metabolize it, which means they need a lot more of it. And by giving them a little bit of ketones, they can basically get by on a lesser amount of glucose. So, the brain prefers to burn glucose, the reproductive system prefers to burn glucose. The gastrointestinal tract prefers to burn glucose.

I think the liver can go both ways. It can actually produce, it can use lactic to convert back into glucose and then oxidize that. It can oxidize fat, right? But different organs have different preferences, and I think the best way to gauge whether you're eating too much fat is cognitive function. If you're eating too much fat to the point where you're basically interfering with glucose metabolism, you'll start getting the so-called brain fog. Your thinking process will slow. You'll start basically spending more time searching for words. Your reaction time, coordination time, will basically decrease.

You'll kind of feel out of it a little bit. That's actually notorious for people with Type 2 diabetes and even Type 1 diabetes. Their cognitive symptoms are overwhelming to the point that sometimes some of these people basically say that there are certain days they cannot get out of the house because they feel like if they get in the car they're going to crash it, or if they go to a meeting, they can't even compose the normal set of words that they need to compose in order to actually get through the meeting.

So, brain fog is a great one. I think sleep quality is another great example of whether you're consuming the wrong ratio of macronutrients. Also, exercise capacity. So if you're always catching your breath and you're feeling fatigued all the time, that is actually a great sign/symptom of elevated lactic acid. In fact, many different interventions that lower lactic acid are used as performance-improving substances. Vitamin B1 being one, niacinamide also being a great one. I'm going to talk about this later, I guess. So really, I guess the goal would be to eat the fuel with each meal. Probably different macronutrients depending on the time of the day. I would say eat the more fat-heavy meals earlier in the day, breakfast and maybe lunch. And eat the more carb-heavy meals at night because your brain and many of the other organs will really need that.

It's very common that if you don't consume sufficient amount of carbs before going to bed, you will have trouble sleeping. People on high-protein diet know that it's notorious, but they shouldn't be on the diet to start with. But people on a high-fat diet also have problem with sleeping. I think one of the reasons is that if you don't consume sufficient amount of glucose, you will of course raise cortisol at night, and elevated cortisol at night – which, by the way, is already higher than what it should be. The cortisol is lowest at around 3:00 or 4:00 p.m. and it starts rising with the coming darkness. Cortisol is highest at around 6:00 to 8:00 a.m. in the morning. So it keeps rising from about 4:00 to 5:00 p.m. on the previous day until eight o'clock in the morning or the next day. But if you don't consume sufficient amount of carbs, that cortisol will be that much higher, up to 40% higher.

There was a study that measured the cortisol level of people on low-carb diets and found them to be not statistically significantly different than people with Cushing syndrome. So basically people that do not eat sufficient amount of carbs at night before going to bed. I think, to me, that's probably the greatest example, because sleep quality can determine so much more than just whether you're going to feel rested the next day. People with sleep disturbances are known to have much higher rates of every chronic disease out there. Cancer, diabetes, Alzheimer's disease, Parkinson disease. In fact, now they call it the shift worker disease. People that are now working these night shifts are suing various governments around the world and saying, "These night shifts are killing us, you need to pay us 10 times more because we need to compensate-"

**Dr. Joseph Mercola:**

They are. That's well-documented.

**Georgi Dinkov:**

Yeah. I think the reason is, basically, they work throughout the night when they should be resting. Their cortisol is higher when they're actually active because at least when you're asleep, cortisol doesn't have to maintain an additional activity, which, if there's no fuel, the cortisol basically – if you're awake during the night, the cortisol has to be that much more higher to shred your muscles and provide you with additional glucose. But even without the extra activity, if you're not consuming sufficient carbs at night, you'll have problems sleeping and you will wake up feeling unrested and probably jittery the next morning because cortisol and adrenaline will be too high for comfort.

**Dr. Joseph Mercola:**

Okay. Well, you just walked into one of my three dozen or more questions I compiled since the last time I interviewed you because I've been keeping track for this interview. So, there is a lot of evidence. [inaudible 00:33:59] being one of the primary researches out of California's Salk Institute, that suggests that there's great benefit to not eating three to four hours before you go to sleep to essentially enhance autophagy regeneration repair mechanisms. So I think there's probably still some value to that, but I just want to tease out the details with you because it would seem, from my perspective, that you don't want to eat a big meal before you go to bed.

But there's still this issue, and I think I violated this rule, that I thought it was no calorie. But from just what you said, it appears that there's some value to eating some clean carbohydrates. That's going to be the next question we discuss, what is a clean carbohydrate, before you go to bed. So, I'm wondering if you could talk about any potential impairment for autophagy and regeneration response with respect to the timing before bed. I imagine a clean carbohydrate would be like honey or maple syrup, even some fruit, but what is the quantity and the timing before you go to bed?

**Georgi Dinkov:**

So, a couple of things in autophagy. I know it's the hot thing right now, just like AMPK (adenosine monophosphate-activated protein kinase) activation. I had a recent blog post about that, but AMPK and autophagy, and by the way AMPK promotes autophagy, are actually implicated in cancer. You do not want to mess with autophagy too much. It has a lot of beneficial effects in terms of getting rid of dead or metabolically deranged tissue. However, if you do have an already present formed tumor, autophagy and AMPK can actually drastically increase its aggressiveness and promote metastasis. Number one. So, let's say you do want to increase autophagy. I think it's a bit of a myth that eating will somehow suppress autophagy and put it at a suboptimal level. I sent Dr. Saladino several studies demonstrating that actually several of the carbohydrates are autophagy enhancers. Fructose is, trehalose, which is a fungal sugar – yes it is. Sucrose is.

**Dr. Joseph Mercola:**

Fructose and sucrose enhance, increase autophagy? Who would've known? Who would've known?

**Georgi Dinkov:**

Yes, similar to the link that I sent you. Cortisol increases inflammation, right? If you say this in the medical school, they'll probably throw you out. They'll say you are out of your mind.

**Dr. Joseph Mercola:**

Right. So, what is the quantities and what do you find? I know it's a range. The timing, is it like right before bed? Is it an hour before bed?

**Georgi Dinkov:**

I would say an hour before bed because if you eat a meal that's too high in carbohydrates, basically there's the infamous fructose malabsorption. There's only a certain amount of carbohydrates that your gastrointestinal tract can absorb per unit of time. So, you need about an hour or two before basically the meal, if it's composed of simple carbohydrates. God forbid you ate the resistant ones because then you-

**Dr. Joseph Mercola:**

We'll talk about that next.

**Georgi Dinkov:**

Yeah. Then you need about an hour, or two hours for people with really slow digestion, to get these things into your bloodstream. Then I think at that point you'll probably be very relaxed at that point and you'll naturally be inclined to fall asleep. Now, if you'd eaten the resistant starch, then basically, you're going to have this issue of endotoxin buildup and you're going to have the so-called restless leg syndrome. For a long time, medicine has been mystified by this condition, but they've noticed that people who eat resistant starches have a high incidence of restless leg syndrome. Why would that be? Then one scientist said, "Okay, so it's probably something to do with the bacteria because these people always complain of bad digestion at night." So they administer drugs that block either the TLR4 receptor, which is the endotoxin receptor, or they give them the dopamine agonist known as pramipexole, which also turned out to be blocking many of endotoxin effects.

In both cases, the restless leg syndrome disappeared. So, the issue with basically being jittery and not being able to relax at night has to do with two things. Either increased inflammation due to the increased endotoxin coming from your gastrointestinal tract if you eat non-easily digestible foods, and/or the subsequent elevation of cortisol, which is already high because it's at night. The cortisol has to keep you alive, don't let blood sugar drop too low. But if you're eating resistant starches, then you're going to raise cortisol even more. So you have high inflammation and high cortisol going throughout the night.

I think most people who eat primarily resistant starches, especially the vegan types, if you go to the message boards on the internet, they're notorious for complaints of like, "Okay, I love this diet. I lost a lot of weight on it, but it's really destroying my sleep. What can I do about it?" And so far, based on what I've seen in these message boards, nobody has really proposed any solution, simply because I guess it's kind of not kosher to admit that eating certain type of carbs is going to mess up your digestion, which is fairly well-established in the research circles. It's just not very widely publicized.

**Dr. Joseph Mercola:**

So, this is another huge, massive, important concept that people need to understand because in the introduction I mentioned that I'm eating about 60% of my diet is carbohydrates, but it's not just any carbohydrates. You have to be very, very specific, and people thinking you just throw them on there, and no you can't. And especially when the Randle cycle is activated toward fat burning. My experience clinically, and from what I read, is that if your fat intake is over 40%

and you throw these carbohydrates on there, you're going to disrupt your lipoprotein profiles. You're going to increase your risk for heart disease, you're going to shoot out triglycerides, because you are not metabolizing the carbs, and it's going to disrupt your lipoprotein. So you do not want to do that. The fat has got to be below 35%, somewhere in that range.

But anyway, the carbs are not just for this restless leg syndrome at night. This is for the whole day. You want to eat the right types of carbs because this endotoxin is a huge deal driving increased cortisol levels and inflammation in the body, with the endotoxin and serotonin. It's massive – we'll talk about these resistant starches. So, why don't you expand that a little bit, and I have some questions about some of the healthy carbs that are grains or tubers, like potatoes and rice, that probably don't qualify, or can be safe carbs but not quite as good as ripe fruits.

**Georgi Dinkov:**

Just three days ago, basically, mainstream media admitted that endotoxin drives obesity and diabetes. I thought I would never see this in a mainstream news media, but The Guardian and The New York Times, and I think The Washington Post, because they were copying each other's articles.

**Dr. Joseph Mercola:**

Oh, yeah.

**Georgi Dinkov:**

They all came out and said, endotoxin is probably what's making you fat. It's not so much basically how much you exercise, or the amount of calories eaten. If you're eating, which means, really, the calories in versus calories out. That article for me kind of did it in. It said, okay, it's not so much about that. It's about what you eat and how you metabolize it. So, the resistant starches are starches that are basically resistant to hydrolysis, which mostly happens in the stomach and the small intestine, which means they arrive almost undigested to the colon where the massive microbiome, which outnumbers our cells in at least, I think, 10-to-1, something like that.

There's like 10 copies of you in your colon. Then they say, oh yummy, give me those resistant starches. They have the necessary enzymes and the acids to actually hydrolyze them into simpler carbs that they can actually consume and digest. However, every time you get a bacterial colony food, the turnover of the bacterial cells into the colon is going to increase. All of the gram-negative bacteria, there's gram-positive and gram-negative, have this component in their wall called endotoxin. So all the bacteria die, they rupture, they spill it out into your colon. That amount of endotoxin basically can attach to your intestinal wall. Just the presence of endotoxin, just physical adsorption to the colonic wall can cause an inflammatory reaction, which makes the cells of the colon produce a lot of nitric oxide and serotonin. Both of these are actually very inflammatory.

Over time, if you keep producing this endotoxin and that colonic wall is chronically low-grade inflamed, you're going to compromise the gut barrier. Basically, what's going to happen is some of the endotoxin will get into your bloodstream and it is known universally, even if you pick up a

mainstream doctor off the street, he'll tell you endotoxin in your bloodstream [is a] major problem. We don't want that. We're using it to test for various immunosuppressive reactions, immunoactivating reactions. A lot of the adjuvants in the vaccines are actually acting like endotoxin. They're triggering an inflammatory reaction to wake up your immune system and say, "Oh, pathogen. Start producing antibodies against that pathogen." But it's known that chronically doing that – you don't get injected with a vaccine every day and it's for a good reason. These adjuvants can actually wreak havoc. So, they act the same way as endotoxin.

Every time you're eating long-chain carbohydrates that are not capable of hydrolysis in the stomach by the gastric acid, which is mostly hydrochloric acid, they reach the colon, the microbiome, and then they start feeding the bacteria there and causing you a chronic inflammatory reaction. To make things worse, as your metabolic rate declines, the amount of gastric acid you produce also declines. The gastric acid is the primary barrier for bacteria present in the food and in general surroundings, basically in the nose and the respiratory system, from actually going through your digestive system and starting to colonize the small intestine. Ideally, the small intestine and the stomach should be as close to sterile as possible. Now, you may have an *H. pylori* infection, which causes ulcers and whatnot, but that's relatively rare and can be treated with antibiotic. The *H. pylori* does not really cause these metabolic disturbances that the regular bacteria that's in your colon can cause.

So once you start colonizing the small intestine, that compromises its nutrient absorbent abilities. So with advancing age or declining metabolic rate or increased inflammation, you produce even less acid. So more of these carbohydrates that you ingest, even the simple ones, may not even get properly digested and end up in the colon or even the small intestine now colonized by bacteria. All of this process drives the chronic production of endotoxin every time you eat. So with each meal, whatever does not get digested and absorbed in the stomach and the upper third of the small intestine becomes food for bacteria, and ultimately that's a huge problem down the road for you health-wise.

**Dr. Joseph Mercola:**

Yeah. So this is something we generally want to avoid, and this is really one of the central tenets of your and Ray Peat's work, is to avoid these for the most part. Now I'm wondering if there's any variability in there. I suspect there is because there are some people – Well, we all have pretty different complex microbiomes. For those who have a predominant gram-positive one like the *Lactobacillus* and many, many others of course, and not many gram-negatives, would the impact of those resistant starches be different?

**Georgi Dinkov:**

Yes, it would be less harmful. However, the problem is we always have at least some gram-negative bacteria. By the way, the main benefit of taking these probiotic supplements, even though most of them get destroyed by the stomach acid, but whatever makes it to your colon, basically the main benefit is simply as you said, it's overcrowding and pushing out, out-competing the gram-negative bacteria by providing more of the gram-positive one, which does not result in the production of endotoxin.

**Dr. Joseph Mercola:**

Yeah, there's a term for that. It's called competitive inhibition.

**Georgi Dinkov:**

Exactly, right. I think the fecal transplants that they recently started doing as well, they're actually doing the exact same thing. They're carefully selecting species of bacteria that are not endotoxin-producing. You don't want to get somebody a fecal transplant with mostly E. coli. That's going to probably kill them, right? So yes, for people whose microbiome is composed predominantly of gram-positive bacteria, they will probably have less problems with resistant starch. Now, however, they still produce endotoxin. If at some point, actually it's not if, it's when, the gut barrier gets compromised, even the gram-positive bacteria can cause problems because they can translocate into the bloodstream. People with rheumatoid arthritis, periodontal disease and even Alzheimer's disease have been known to harbor even intact bacteria or bacterial fragments, both gram-positive and gram-negative, which could have only come from the gastrointestinal tract. So, basically, even the gram-positive bacteria on a longer term basis with a compromised gut barrier is probably not ideal.

But is it preferable to having more gram-negative? Yes, of course it is. Also, gram-negative is also more resistant to antibiotic treatment. So really, you can be in a better state health-wise if you have more gram-positive than gram-negative. But ideally, you want to keep the total bacterial count down, because outside of them generating a few short-chain fatty acids and helping the conversion of vitamin K1 into K2, there really isn't that much of a known benefit to the bacteria in your microbiome. There've been multiple studies with animals mostly where they sterilized completely they're gastrointestinal tract, and these animals are impossible to get fat unless you give them a pure PUFA (polyunsaturated fatty acid) diet. Only then they get fat. But other than that, they eat like five to 10 times the calories. And if they don't have a microbiome, they never get fat. Clearly not practical for us. Nobody wants to be on antibiotics their entire lifetime. So, keeping the microbiome shifted towards gram-positive and total bacterial count down is probably the practical approach for most people.

**Dr. Joseph Mercola:**

Alright, so, a slight tangent to this are the commercial sodas and the food item identified as high-fructose corn syrup or HFCS. So that was, I think, invented or discovered in the early '50s, 1950s. But it was commercially, widely adopted probably in the early '70s. Of course, that's the main ingredient. Almost all processed food is sugars because it's so cheap. It's dirt cheap. It's a lot cheaper than cane sugar for sure, or beet sugar. So that's why it's widely used. So that's one of the reasons why processed foods or ultraprocessed foods are so detrimental, because they have this high-fructose corn syrup. And one of the stories you're fond of sharing is that the commercial Coke with high-fructose corn syrup has about 400% or 500% more calories because of these acid hydrolysis-resistant starches that are in there, that are not identified on the label. I think it might be a loophole in the labeling requirements.

I asked you for some data to support that. You sent me an abstract, it was just like a poster at a meeting or something. They just cited the data, but there were no materials or method sections or anything. But my CEO was very skeptical of that. So what we're doing, I just wanted to give you an update that we actually are getting samples and sending it to a commercial lab to do the

analysis with acid hydrolysis to see if that pans out. We're going to measure Coke and measure the commercial high-fructose corn syrup that's available that you can purchase. So, we'll see. I'll let you know when we get that result. Might even publish it if it's interesting results.

**Georgi Dinkov:**

If you manage to do that, you'll have a lot of friends and a lot of enemies, especially in the Big Agriculture.

**Dr. Joseph Mercola:**

Well, the truth is the truth, and there's a lot of different journals now that we can do it. Actually, that's one thing I neglected to mention in the intro is that you have a blog too. It's called HAIDUT, H-A-I-D-U-T.me. I've known about this blog for a long time, three years at least. That's not that long, but long enough. But I first found it because I was passionate about linoleic acid, which is what really attracted and drew me to Ray Peat's work, and then you. I didn't realize, that's one of the essential cores, because we're going to get into PUFA. We're talking about fats and carbs now and endotoxin and stuff. But really PUFA is like the giant elephant in the room that just destroys everything and is destroying everything.

So we've got to address that. But interestingly, when you listen to your work and Ray's, it's certainly acknowledged, but it's a relatively minor component compared to the metabolic component. But anyway, that's a tangent. What I really want to share about your blog is I wrote a paper on vitamin D that was published by Nutrients in October 2020. It was on COVID-19. Got a lot of flak, but it was, this was like the second most downloaded study they ever published on their site. So, I wrote another review paper, this one on linoleic acid. The reason I'm sharing this is that it's actually in review now, and I've got the feedback from the reviewers. So, they asked for more studies to support this.

So guess where I went to find the studies? I went to your blog. It is so good. You can just type into keywords and it comes up, and it's just a wealth of information. So not only your podcast, but your blog if you really want to dive deep. You shared with me your strategy for finding these articles. Because that's a problem, you got to find them. But it's just wonderful. It's the science supporting these concepts. This is not some harebrained scheme that Ray came up with and they're just – there's solid science documenting this stuff. So, it's great. It's really great.

**Georgi Dinkov:**

Yeah, there are groups around the world that have bent their careers on it. So, in other words, the gateway keepers to the information decide what the public gets to see. It just so happens that the dominant theory that the powers that be want us to know is that PUFA is great, lowering cholesterol is great, eating a lot of low-carb, high-PUFA diet is great, taking your statins is great. But all of these things, if you actually look into the science, you'll find multiple established scientists all over the world often not even knowing about each other's work, which to me is a great testament that it's actually true.

If multiple independent researchers discover the same thing without knowing about each other, chances are that this is part of the objective truth. So, all of these concepts that we're being told

as like the God-given truth, almost all of them are heavily disputed if you know where to look. And they're disputed with evidence, right? This is experimental science. They provide evidence and then you decide which way the evidence leans. Unfortunately, science should not be done by committee. It's not a consensus thing, which is what we've been hearing for the last, I think, what, three years?

**Dr. Joseph Mercola:**

Yeah, yeah, for sure, for sure. So, let's get back and finish up that carb component. Because that's such a central element of what this approach embraces. So, you've got to be careful with your carbs. You made it abundantly clear that we want to avoid these starches. So, what's another word for starch, like grains? That's most all grains. Not all grains, most all grains. You can have almost anything in small quantities. But if you want to have grains regularly – in my very first book, Georgi, you probably don't recall that I ever wrote, was in 2004. It's called the “No Grain Diet,” which is probably a good strategy for most people. Not only do we have the issue with gluten, but we've got these resistant starches, and then the linoleic acid is really high, too. So, the PUFA. Why don't you give us some insights about the carbs and specifically as it relates to ripe fruit being the best, and are there any fruits that we should avoid specifically, like maybe kiwis or bananas?

What about starches that are reheated? I know you're a fan of well-cooked potatoes, especially if they're boiled because potatoes can be high in oxalates, so the boiling will get out the oxalates. So, well-cooked potatoes and you put them in the refrigerator and you reheat them because that's pretty well-documented that can lead to resistant starch. So, when you reheat it, is that going to be – or when you use it again after it's put in the fridge, is that going to be an issue? Then talk about rice as being, in my view, probably one of the only acceptable starches. Not brown rice, white rice.

**Georgi Dinkov:**

White rice. Yeah.

**Dr. Joseph Mercola:**

That's actually one – I have about 8 ounces of white rice a day now. Tastes so good.

**Georgi Dinkov:**

So, if you are eating starches, basically, especially the well-cooked starches that are not resistant starch, such as white rice and potatoes, and you have a decently functional pancreas producing a decent amount of amylase, then I think it's okay. Starches are probably going to be quickly digested, broken down into the simpler component glucose, and then that quickly gets absorbed and, if you're healthy, metabolized or stored as glycogen. However, if you're not producing a sufficient amount of amylase or there are conditions such as SIBO, small intestinal bacterial overgrowth, which is secondary to low gastric acid production and many other causes. But if you get that, then you're basically going to get in a situation where a portion of that starch will not get properly broken down and converted to glucose. So, it'll start passing through the gastrointestinal tract undigested.

Now, depending on how compromised the gut barrier is, or in general, the barrier between the intestine and the portal vein, you may get some undigested starch particles into your bloodstream, and that has been shown to be universally interpreted by the immune system as identical to a bacterial attack. So, you'll actually mount an allergic reaction first and then second, there'll be an inflammatory reaction with phagocytes running around and trying to basically – by generating a lot of oxidative stress, which we're going to talk about later actually, reductive, but that's how they're trying to get rid of these foreign invaders.

So yes, if your digestion is good and the starch is well-cooked, then it's probably okay, and it's not much different than eating pure glucose. Now, other probably preferable sources of good, easily digestible carbohydrates are ripe fruits. Fruits that grow in tropical conditions are usually preferable, not only because they basically have mostly a high fructose kind of component of carbohydrates, but also they contain a lot of flavonoids that help to digest the sugars. Oranges are a great example.

Multiple studies have shown that if you give people a glass of warm water with some sucrose in it, or even pure glucose or even starch dissolved in water, and if given a glass of orange juice with the equivalent amount of calories from carbohydrates in the glass of orange juice, the glass of orange juice invariably causes a much lower glycemic response. So, there's something in the orange juice, probably more than one factor, that contributes to the proper metabolism of glucose. Some educated guesses are that the flavonoids apigenin and naringenin, which are present in high amounts in orange juice, are contributing to the metabolism of glucose. One mechanism through which they do that is they're actually lowering the NAD (nicotinamide adenine dinucleotide) to the NADH (reduced nicotinamide adenine dinucleotide) ratio. So they're stimulating the pyruvate dehydrogenase, and they're helping you metabolize that glucose. While when you are consuming pure carbohydrate without any of the cofactors-

**Dr. Joseph Mercola:**

So, they're increasing NAD plus?

**Georgi Dinkov:**

Yes, exactly. Yes. They're acting like quinones. Yes, apigenin and naringenin, and most of the other flavonoids, are actually two to three electron acceptor molecules. So, they can actually act as oxidants and actually help increase the NAD and promote the oxidation of glucose.

**Dr. Joseph Mercola:**

Now, is there a difference between tangerines and oranges?

**Georgi Dinkov:**

Not so much in terms of the benefits that you're going to get, but some of the flavonoids, there's a flavonoid called tangeretin, which if you look at it, it's actually kind of like apigenin and naringenin, but with I think an extra hydroxyl group. They're all equally beneficial. It's just that now the science is saying that some of them may be more beneficial for specific conditions. I think tangeretin has some very good clinical studies, including with humans for dementia, while apigenin and naringenin are known and now have basically some very good evidence for

estrogen receptor positive breast cancer, because both of these are actually known to act as antiestrogens, both at the receptor level and also as aromatase inhibitors.

**Dr. Joseph Mercola:**

So, the naringenin and apigenin aren't as high in tangerines?

**Georgi Dinkov:**

It's not as high. It is the tangeretin that's higher, but it's a very structurally similar molecule. Actually, tangeretin is basically apigenin with I think one or two extra hydroxyl groups. So, it's really the same core. It's like a steroid. So, it's like the difference between pregnenolone and progesterone, really, is just that one group – the difference in the position three. Pregnenolone has a hydroxyl group, progesterone has a ketone. That's pretty much the structural difference between the different flavonoids in different citrus fruits. Lemon has them as well. But the key here, you want to consume things that are not sour-tasting. Why? Well, because a lot of the sour taste comes from citric acid, and even though citric acid is a component of the Krebs cycle, you're producing it naturally in significant amounts. If it builds up, it can lead to two things.

First of all, it's the precursor, it's actually the raw material for the enzyme fatty acid synthase. So, you can actually synthesize more fat from citric acid. And it's also known to activate dormant tumors. The mechanism is not exactly known, but if you have a tumor that's being kept in check by the immune system, there's plenty of such examples, especially with prostate cancer. Very slowly growing tumor, for most men it's not a problem unless it's the aggressive type. They usually die of old age before the cancer actually kills them. But multiple studies have shown that if you take actual [an] human tumor that's slowly growing, a human prostate cancer, and you give it citric acid, it rapidly degenerates into a highly aggressive and metastatic cancer, which obviously you don't want.

So, the sour taste usually is an indication that the fruit is not ready to be eaten. Remember, the plant produces the fruit with the idea that it'll be pleasant to you. You will want to eat more of it so that you can ingest the seeds. Since they passed undigested, then you excrete them. If the fruit is not pleasant to taste, chances are the plant has put some things in there to make it unpalatable, to prevent wasting of the seeds by the fruit being eaten prematurely.

**Dr. Joseph Mercola:**

Alright. I want to take off on the citrate for a moment because I recall one of your previous podcasts, not with me, but I've heard you mentioned when you were discussing I think Ray's work that citrate as a supplement you weren't fond of primarily because it was, I think, obtained from a bacteria, I think aspergillus niger, and could be problematic. But I wasn't aware that citrate was negative, even from natural sources. So, in general, you don't recommend supplements or mineral salts that are citrates?

**Georgi Dinkov:**

No. Exactly.

**Dr. Joseph Mercola:**

Because it's interesting, the citrates are really very useful for lowering oxalates.

**Georgi Dinkov:**

Yep. They're very common supplements, as you mentioned, calcium citrate, magnesium citrate-

**Dr. Joseph Mercola:**

Yeah. But you don't like those?

**Georgi Dinkov:**

Nope, because the reason they're selling these is because citric acid is so cheap, makes such an easy salt of the metal. It's very [inaudible 01:01:35] but industrial citric acid is heavily contaminated with acid residues and heavy metals. Vitamin C and citric acid as a supplement are the most contaminated supplements you can take-

**Dr. Joseph Mercola:**

Really?

**Georgi Dinkov:**

Especially if they're imported from China. Yes, multiple studies on that.

**Dr. Joseph Mercola:**

Wow. Wow. Okay. So, there's not really – any time I'm listening to you, I'm always learning new things. So that is really useful.

**Georgi Dinkov:**

I have a blog post on that. I'll send it to you. Citric acid and vitamin C, really, if they're in bulk, truly produced industrially in these metric ton quantities, it's probably not something you want to take as a supplement on a regular basis.

**Dr. Joseph Mercola:**

That's a game changer. So, I interrupted you with the citrate question, but you were in the process of explaining other fruits, and I'm wondering if you could touch on some fruits, other than the citrate fruits and the sour fruits, which you shouldn't have, any others?

**Georgi Dinkov:**

Papaya, mango, I think even pineapple would be okay, but the pineapple has a relatively high amount of serotonin in it, preformed. So it really depends on how your digestive system functions. If you're getting loose stools from eating pineapple, chances are your serotonin is either already higher than optimal or the pineapple that you ate, and the more ripe the pineapple the more serotonin it has, then it's probably you've eaten too much. So, pineapple is not something to be eaten in liberal amounts. I think just a few chunks is enough. The biggest benefit that I see from pineapple is improving the digestion of protein. If you look at these supplements-

**Dr. Joseph Mercola:**

Papain.

**Georgi Dinkov:**

They have digestive – exactly, the papain. They contain papain because it's closer in structure to the protease enzymes that are produced by the pancreas. But again, ripe tropical fruits. So plums are probably okay-

**Dr. Joseph Mercola:**

Are bananas high in serotonin, too?

**Georgi Dinkov:**

Bananas are high in serotonin and also tryptophan as well. Now, depending on how much – so you don't want to eat too much tryptophan. Not only [a] precursor to serotonin, [it's] the only amino acid in nature that is directly carcinogenic. It's not a coincidence that it is rare in nature. So, if you try to eat it as food – even in our own bodies, tryptophan, I think in terms of total amount, we have the fewest amount of tryptophan compared to any other amino acid. There's a good reason for that.

Mostly for us, the benefit of tryptophan is number one, synthesizing niacin. But we can take niacinamide for that, right? And number two, synthesizing serotonin. But the amount of serotonin we need is really, really very low. The biggest role of serotonin is gastrointestinal motility. And for everything else, any increase, even minor increase of serotonin, has been known since the 1920s to rapidly lead to fibrosis. The most successful antifibrotic drugs on the market currently are serotonin blockers. Specifically the-

**Dr. Joseph Mercola:**

We're going to go deeper on that in the future podcast with you, because that's a big rabbit hole we can dive down, because so many people are taking drugs, especially. I think it's like 40% of women over 40 are on SSRIs (selective serotonin reuptake inhibitors). So this is a big issue for a lot of people and I don't want to dismiss it and treat it superficially, so we'll go deeper on that. It's just another one. But the other fruits, maybe if you can – watermelon, I'm sure you like watermelon.

**Georgi Dinkov:**

Watermelon is fine.

**Dr. Joseph Mercola:**

I eat 4 pounds of watermelon a day.

**Georgi Dinkov:**

Yes, watermelon is fine. Melon is fine too, but again, it should be ripe. A lot of people buy melon that basically was picked up when it was still not fully ripe. It basically got exposed to different chemicals. I don't know what they – not carbon dioxide, but they bathe-

**Dr. Joseph Mercola:**

Ethylene dioxide.

**Georgi Dinkov:**

Exactly, which is carcinogenic. So, you definitely don't want that.

**Dr. Joseph Mercola:**

Oh, really? I didn't know that.

**Georgi Dinkov:**

Oh yes. Oh yes. Ethylene dioxide is carcinogenic. Residues remain on the fruit, and if the fruit has cracks, it will get into the fruit and eventually you'll eat it. So melon, watermelon – grapes are great. Grapes are great.

**Dr. Joseph Mercola:**

Really?

**Georgi Dinkov:**

Yeah, 70% of the grapes are fructose. Pears.

**Dr. Joseph Mercola:**

Wow.

**Georgi Dinkov:**

Pears are great.

**Dr. Joseph Mercola:**

Grapes are the classic one in keto they say to avoid like the plague.

**Georgi Dinkov:**

Because of the high sugar, of course. That's why they tell you that. But yeah, ripe grapes, I think, are pretty good. You should not be – if you swallow them with the seeds-

**Dr. Joseph Mercola:**

Don't eat the seeds.

**Georgi Dinkov:**

Yeah, or at least don't chew them because the toxins get released. Most of these cyanide and other toxic things that are in the seed, remember the plant wants to protect the seed. So, the way it protects the seed is the biggest toxins are in the layers surrounding the seed to basically discourage animals from chewing and eating the seeds. Even birds, when they eat the seeds, they pass them mostly undigested. That's kind of nature's mechanism for spreading the plant. So yeah,

if you eat the grape with the seeds, don't chew them. Just swallow them whole. Not the grapes, but the seeds. Chew the grape, but don't chew the seeds and then just swallow them.

**Dr. Joseph Mercola:**

Wouldn't it be better just to spit them out?

**Georgi Dinkov:**

You can spit them out if you want. When I recommend this to people, they're like, "I don't want to look weird in a social gathering constantly spitting stuff out."

**Dr. Joseph Mercola:**

So, you don't think they're broken down because they're-

**Georgi Dinkov:**

They're not broken down.

**Dr. Joseph Mercola:**

They're full of LA (linoleic acid), too.

**Georgi Dinkov:**

Exactly. Yeah, they're full. But if you don't chew them, if you don't destroy their coating, the layer, they're relatively harmless.

**Dr. Joseph Mercola:**

This is going to save me a lot of time. So, is this also true for watermelon seeds?

**Georgi Dinkov:**

Yes.

**Dr. Joseph Mercola:**

Okay. So you can just swallow the seed. Just don't chew.

**Georgi Dinkov:**

Exactly, and [[crosstalk 1:06:50](#)].

**Dr. Joseph Mercola:**

That makes life so much easier. So much easier.

**Georgi Dinkov:**

Even ruminant animals, when you feed them watermelon, they have really like the tricamera stomach with a lot of bacteria.

**Dr. Joseph Mercola:**

Yeah, yeah.

**Georgi Dinkov:**

They're very good at processing things that we cannot process. Even they pass out the seeds undigested.

**Dr. Joseph Mercola:**

Wow. I'll tell you, I've got nine chickens, and watermelon is one of their favorite fruits. They just love it to pieces.

**Georgi Dinkov:**

It's really good. It's got a lot of insoluble fiber. It's a really good food to help digestion. So, the good carbohydrates you'll quickly absorb. And the bulk, right, basically the insoluble fiber is going to contribute to improved intestinal transit. It's going to reduce the microbiome. If there's a bacterial film, these are colonies of bacteria attached to your colonic wall, that insoluble fiber will scrape it out literally. So, it's a great alternative to charcoal.

**Dr. Joseph Mercola:**

Oh, okay. We finished the fruits. I think we are pretty good about that. Finishing up on the grains, because in the Ray Peat community there's a number of people like your friend Danny Roddy, who I think uses and recommends oatmeal or oat bran. I know a lot of people in the Peat community are embracing that. So, I'm wondering what your views are on it.

**Georgi Dinkov:**

I used to do great on oatmeal when I was younger, and then around 2009 and 2010 when my health was really in the drain, I could not handle even a small cup of oatmeal. It will give me – it wasn't a so-called impacted colon or intestinal blockage, but it would drastically slow my digestion for several days and I couldn't eat it anymore. It's not as bad now, but I do not tolerate oatmeal anymore. So again, the test is, try it. If it improves your digestion, which means if it doesn't give you gas, it increases frequency of bowel movements, it's probably a good thing for you. If it slows digestion down to the point of basically you skip a bowel movement a day, then it's probably not something you want to eat on a regular basis.

**Dr. Joseph Mercola:**

Okay. And the other concern, it's relatively high in linoleic acid. You can get a few grams easily if you have a significant amount of oatmeal.

**Georgi Dinkov:**

Yeah. Like most seeds, the linoleic acid is mostly present in those seeds. So, seed oils that's what they call them.

**Dr. Joseph Mercola:**

Yeah. It's interesting. We've been into this for a while now. We barely touched on PUFAs and linoleic acid. I'd say that they're there. They're huge. We're just not discussing them because there's so many other things there. The elements for metabolism that you need to understand in addition to linoleic acid, other than avoiding it, those rules are pretty simple. I've gone over them a number of times in many different articles. Alright. Well, thanks so much, Georgi.

**Georgi Dinkov:**

Appreciate it.