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Take Control of Your Health

Intro to the Bioenergetic Theory of Health

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STORY AT-A-GLANCE

- While insulin resistance is routinely identified as a root cause of most chronic diseases, it too is only a symptom of a deeper problem. At the root will be impaired cellular energy production in the mitochondria
- Insulin resistance occurs when the cells are unable to properly oxidize or burn glucose
- When your body shifts into fat burning this results in lowering your metabolic rate, which is antithetical to optimal health. For optimal health, you need a high metabolic rate, and this is facilitated when your metabolism speeds up when you're burning glucose in your mitochondria
- A general baseline for most average-sized people is between 150 grams and 250 grams of healthy carbs per day. If you're very active, it could be as high as 500 or 600 grams a day. Keep in mind that as you increase carbs, you also need to cut down fat. Fat intakes above 30 to 40% or so of daily calories will tend to inhibit glucose metabolism
- Healthy carb choices include fresh whole fruit, fruit juice, root vegetables such as potatoes, sweet potatoes, parsnips and carrots, white rice, raw honey and maple syrup

In this video, I interview independent health researcher Jay Feldman, who has a podcast called "The Energy Balance Podcast." I recently came to understand the importance of the late Ray Peat's work, which I had previously dismissed for over three decades, largely due to confirmational bias.

Peat was a biologist and physiologist, and a cofounder of the prometabolic diet based on the bioenergetic theory of health.[1] After re-exploring his work, I've come to realize just how ahead of his time he was. Feldman is among the few health researchers out there who has also embraced Peat's work and understands it at a level that allows him to explain it in layman's terms.

As some of you may know, I'm in the process of creating a master class in preparation for the next pandemic crisis, which I believe is inevitable, and it became obvious to me that Peat's work is a really crucial component of being metabolically resilient and prepared for the next crisis.

You don't have to wait for my master class to learn about Peat's work, however. You can just dive into Feldman's podcast. There are more than 100 episodes and I suggest starting at Episode 1 and working your way up. Feldman does a terrific job teaching you how to easily and practically implement these strategies.

What Causes Disease?

Well before I encountered Peat's work, I was convinced most chronic disease was rooted in insulin resistance. I still think that's a primary problem, but I'm convinced it's not caused by excess sugar. High linoleic acid (LA) levels are the primary factor that drives insulin resistance, and LA is clearly far more damaging than sugar, especially in the long term.

As explained by Feldman, insulin resistance occurs when the cells are unable to properly oxidize or burn glucose, resulting in a backlog of glucose metabolites and a buildup of glucose in the cells, along with the production of lactate.

This forces the cells to rely on fatty acid oxidation, and the combination of fatty acid oxidation and glucose buildup prevents the cells from taking up more glucose, causing elevated blood sugar. It's a symptom of a deeper problem, namely impaired energy production in the mitochondria:

"I always come back to the idea that the amount of cellular energy available is what's going to drive our health, and the lack of energy is what's going to lead to disease processes, dysfunction, degeneration.

When it comes to insulin resistance, I think there's a bit of a misnomer. It's a helpful term for encapsulating a larger idea, but we get caught up in the idea of insulin.

If we're going to say that there's one driver [of disease], it's typically a lack of energy caused by issues with energy production, or inefficiencies in producing energy, due to mitochondrial dysfunction, and that causes insulin resistance.

Those things go hand in hand. When we're talking about insulin resistance, we're talking about a situation where the cells aren't able to properly use glucose, so the glucose builds up. And regardless of how much insulin we have, it's really hard to get more glucose into the cells, and we see rising blood sugar and all of the other downstream effects.

So, insulin resistance is there. I think it's just a matter of what we call it. Do we call insulin resistance the fundamental problem, or energy dysfunction — low metabolism issues with energy production?

From my view, I would say that's where we start, and insulin resistance is an effect of that. And the only reason why I would make that distinction is because we can get caught up in the idea that insulin is the problem and things that increase insulin will cause the cells to stop responding to insulin.

We need to figure out why the cells aren't responding to insulin, and if we get down to that deeper layer, it comes back to an issue with producing energy."

That said, Feldman agrees that fasting insulin is a good marker for health, in that it provides you with a good estimate of the efficiency of your cellular energy production. So, provided you're consuming a healthy amount of carbohydrates, your fasting insulin

is a good marker for how well you're using that glucose and how well you're producing energy.

Understanding the Underlying Problem

Just keep in mind that while you can lower your fasting insulin by avoiding carbs, that won't fix the underlying energy production problem. In fact, if you're on a low-carb diet, you're causing insulin resistance. Sometimes you might not realize it because your insulin and glucose levels are so suppressed. Eventually, however, you might notice that your glucose level starts to rise.

As explained by Feldman, the underlying problem is not that you're eating too many carbs. It's that you cannot properly burn carbs. That's what caused your glucose and insulin levels to be elevated in the first place. Cutting carbs will lower glucose and insulin, making it appear that all is well, but can you burn carbs? That's the question.

If you've been on a ketogenic diet for some time and are experiencing deleterious effects like sleep disturbances, anxiety, a drop in testosterone and/or T3, reduced energy and exercise performance, then you may have "stealth insulin resistance."

In other words, your cellular energy production is fundamentally impaired and the low-carb diet was just a Band-Aid masking the symptoms. The real problem persists, because carbs were never the driver of insulin resistance in the first place. An inability to properly oxidize (burn) the carbs was.

How to Safely Add Carbs Back In

So, how do you bring carbs back in so that you actually improve your ability to use them and minimize negative effects? First and foremost, avoid omega-6-rich polyunsaturated seed oils, as they effectively interfere with energy production and the utilization of glucose. Instead, use monounsaturated and saturated fats.

Next, add carbs back in very slowly, to allow for the upregulation of enzymes that increase carb utilization and conversion to energy. Start by adding easily digestible carbs that won't cause intestinal irritation or endotoxin production, such as whole fruits.

If you have microbial overgrowth in your gut, you're producing a lot of endotoxin. In this case, you need to be careful about introducing fermentable carbohydrates, including fruit fibers, so fruit juice may be a better choice than whole fruit. Just be mindful of the juice you select. Apple juice, for example, has fermentable carbs.

Assuming you don't have an underlying digestive problem, whole fruit is a great place to start. If you start eating whole fruit and notice an increase in gas or bloating, gurgling or belching, or if you feel sluggish or lethargic afterward, you likely have an intestinal issue such as SIBO (small intestinal bacterial overgrowth). You can also try having whole fruit sometimes and fruit juice at other times and see if you notice a major difference.

"If you feel a lot better with the fruit juice, then that's a pretty clear sign that you are having some issues with fermentable carbohydrates," Feldman says. In this case, you need to restore your microbiome before you add in more carbs. In the interview, we also discuss the use of antibiotics, either herbal or pharmaceutical, to treat small intestinal bacterial overgrowth (SIBO), so for more information on that, listen to the interview.

> *"Typically, we want [gas and bloating] to be minimal. This is central. In the same way we can't overstate the importance of avoiding PUFA, we cannot overstate how much endotoxin — these bacterial byproducts — destroy your health.*
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> *You see it in every chronic health condition. In every degenerative condition you see this mild endotoxemia. You see it in fatty liver disease and diabetes, obesity, atherosclerosis.*
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> *This is one of the main reasons why people feel better on a low-carb diet or when they're fasting. They're avoiding anything that's feeding the [bacteria in the] intestines. So, if you are one of those people who felt way better and lost weight and noticed a bunch of improvements [on a low-carb diet], there are two main reasons why that would be the case.*

One is reductions in endotoxin ... The other possible reason is, if they were extremely insulin resistant going in, they were having a lot of trouble using glucose, and so switching to fat and ketones led to a lot of relief.

That's likely also a situation where your utilization of the carbohydrates is going to have to be ramped up slowly, and your capacity for that might be a little bit lower. So, we want to work on resolving that issue. It could be caused by endotoxin, polyunsaturated fats, by nutrient deficiencies, a lack of sleep and other forms of stress.

If you didn't have these major benefits on low-carb, you might be able to bring in the carbs much faster and feel much better quicker. But that's why it's all dependent on the individual's context."

Quick Summary of How to Start

Feldman recommends starting with one piece of fruit with each meal for a week or two. If your appetite increases and you feel better overall, that's a good sign that your metabolic rate is increasing. As long as you're feeling good, increase to two pieces of fruit per meal and go from there. If you're having negative effects, decrease your intake and go slower.

Feldman suggests the baseline for most average-sized people is between 150 grams and 250 grams of healthy carbs per day. If you're very active, it could be as high as 500 or 600 grams a day. Keep in mind that as you increase carbs, you also need to cut down fat, as fat intake above 30 to 40% or so of daily calories will inhibit glucose metabolism. Other healthy carb choices include:

- Organic dried fruits without added sugars, additives or preservatives
- Root vegetables: potatoes, sweet potatoes, parsnips, carrots
- White rice (well-cooked) and ideally consumed with saturated fat to prevent the rice from feeding bad bacteria

- Raw honey
- Maple syrup

Carbs that may be tolerated by some but not others include grains that are traditionally processed, fermented, soaked and/or sprouted. Sourdough bread is one example. On the more harmful end are unprocessed whole grains and brown rice, as they're high in anti-nutrients that impair all aspects of digestion.

They contain anti-nutrients like trypsin and amylase inhibitors, phytic acid and oxlates, which can inhibit the digestion of protein and starch while also reducing vitamin and mineral absorption. Most grains are also high in LA. And, of course, processed foods are also on the list of carbs to avoid.

Troubleshooting

Hopefully, if all goes well, you'll make this transition and realize that both your glucose and fasting insulin are still at healthy levels, or maybe even lower than before. But what if you've made the transition to a higher-carb, lower-fat diet, and still have a fasting insulin level of 7 or 8?

Ideally, it should be below 3. Maybe you're also gaining weight and still feeling sluggish. What's going on? In short, these are all signs that you're still metabolically inflexible. So, now what?

> *"There are a number of things I would go to,"* Feldman says, *"but again, the question is, what is causing the issue with [not] converting those carbohydrates to energy?*
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> *We talked about endotoxin being a huge one. If someone's already cut out the polyunsaturated fats, endotoxin is really common, so we want to make sure that we've fixed everything up gut-wise. If not, that would be my target.*
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> *If that's doing pretty well, and we're generally not overstressing, we're getting some good comfortable movement in, we're eating carbohydrates from the right*

sources, and we're still not seeing the benefits that we were looking for, we're still not seeing the restoration of insulin sensitivity, then I might look for some other support for glucose metabolism.

That could be B vitamins ... I know you've talked a lot about niacinamide. Thiamine is another one that is crucial for producing energy from carbohydrates ... Supplementing with those would be potentially warranted there.

I would also look at other hormonal indications. I'd look at thyroid status at that point, because if we've made some of these shifts but we're not seeing the conversion from T4 to T3, or we're not seeing good thyroid hormone production, that could be a higher level issue that's causing a ton of things farther down the chain, and that can include insulin resistance.

If that's the case, I would look toward doing everything we can to restore that ... I would also look at the steroid sex hormone production for women, maybe there's too much estrogen, maybe not enough progesterone. That can be another huge factor here that can drive or contribute to insulin resistance.

For men, I'd be looking at low testosterone. There's certainly a place for things like pregnenolone, progesterone, maybe a bit of DHEA to help support that hormonal state as well."

Why Glucose Is the Ideal Fuel

As explained in the interview, glucose is the optimal fuel for creating energy in your mitochondria. Two byproducts of that process are metabolic or deuterium depleted water, and carbon dioxide. While commonly thought of as a waste product, Peat has made abundantly clear that carbon dioxide is a massively important molecule, and a far superior vasodilator than nitric oxide.

When you are low on carbon dioxide, you can't be optimally healthy, and if you're oxidizing (burning) fat in your mitochondria rather than glucose, you're not going to generate as much carbon dioxide, which also protects proteins from being glycosylated,

and lipids from being oxidized. Carbon dioxide also counteracts ROS and RNS (reactive nitrogen species). That's not the only reason glucose is a better fuel than fat, though. As explained by Feldman:

> *"I think it's always helpful to put this in the larger biological context. In any situation where we are starved, where we're under major stress, when things are dysfunctional, we shift into fat oxidation, fat burning. And this includes when we're not eating anything. This is why when we're fasting, we will shift into ketosis, and we can mimic those states by going on a low-carb, high-fat diet, and low protein.*
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> *The biological context there is that our bodies view that as a situation when we're under stress, when we don't have a lot of fuel available, when we're in a famine, when we need to survive for a long period of time. In a situation like that, we want to decrease our metabolic rate.*
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> *We don't want to use a lot of energy on reproduction, cognition, digestion, growth and repair. We want to conserve energy because we don't know when we're getting food. So, everything around fat burning involves a slowing of the metabolic rate, and we see this again on that bigger picture level.*
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> *We see it when we look at thyroid hormone conversion, which gets impaired when we're low in carbohydrate intake. We see it in terms of testosterone, and we also see it on the mitochondrial level, because on the mitochondrial level, that's where this all starts.*
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> *That's how our body senses whether it's burning the fats or the carbs. When it's burning fats, it has a number of different places that slow down the actual respiration, that slow down the conversion from the fats to energy. And again, this is all healthy and adaptive in that it allows us to survive if we're starving.*
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> *But it's not ideal for thriving. It's not ideal for optimal function. It's not ideal for reproduction. Our bodies don't want to reproduce if there's no food available. It's not ideal for high-level cognition.*

When we zoom into the mitochondria, what we see is that the primary difference between glycolysis, the starting of burning carbs and the bad oxidation of the fats, is a difference in the amount of NADH and FADH2 that gets produced.

And when we finish out through the Krebs cycle, and then go to the electron transport chain, depending on the length of the fatty acid, there will be considerably more, sometimes 250% more FADH2 relative to NADH than if we were to oxidize glucose.

What happens is, because we have this major drop off of electrons at Complex 2 through the FADH2, relative to Complex 1, we end up with reverse electron transport. [This is] reductive stress, and that's because Complex 1 and Complex 2 both use the CoQ electron acceptor.

If you're favoring Complex 2, you're going to reduce the amount of electrons that can be dropped off at Complex 1, and you're going to reduce the amount of electrons at Complex 1 that can keep going down the chain.

So, you get a buildup there, and you get this reverse electron transport and major production of ROS at Complex 1. The other thing that happens is, because of this buildup at Complex 1, the NADH can't drop off its electrons, so you get buildup of NADH, relative to NAD.

Our bodies are really smart when they see this, because this then affects everything further up the chain. It affects various steps of the Krebs cycle. There are three different steps that need the NAD, so each of those get reduced. So, we're slowing the activity through the Krebs cycle. We're getting buildup of citrate, for example, that increases the synthesis of fat, and that gets built up even further.

We end up with a buildup of acetyl-coA that reduces the conversion of pyruvate to acetyl-coA, which also is dependent on NAD, so we've got two ways that that's being inhibited.

And then when you look back up at glycolysis, there's a number of steps there that get inhibited as well due to this high NADH to NAD ratio, this highly reduced state of the mitochondria. That is just a part of the natural braking mechanism that happens to make sure that when we're burning fats, we're doing it slowly. We also produce a lot of ROS, which slows this down.

As a result of this, you'll eventually induce things like uncoupling, which will fully stop ATP production. So, we've got a number of different mechanisms that basically are signals. It's telling our body that when we're burning fats, we need to slow everything down, we need to slow our metabolic rate, and we're going to produce a lot more ROS. We're going to be slowing things down in the electron transport chain.

This is not ideal if energy is the currency of our health, if that's what allows us to function and get us out of this constant stress state ... That's the crux of this difference between the carb and fat burning. And then we have the CO2 as the cherry on top ... because it protects against the oxidative stress, or reductive stress, as well as being the main thing that oxygenates the cell, which keeps respiration going faster.

Again, that's another braking mechanism. The cell will take up less oxygen because it's producing less CO2, which it needs for that uptake of oxygen itself. I was in the low-carb sphere as well and got hooked on the idea that sugar burning is the one that's the unhealthy and produces all the oxidative stress and everything, but totally missed what's actually going on."

Simple Way to Gauge Your Metabolic Rate

Feldman also takes a deeper dive into how glucose and fat burning affects your thyroid function but, basically, when you burn fat in the mitochondria, you inhibit your thyroid gland, which in turn invites weight gain, as your thyroid is your main metabolic regulator.

So, the answer to many a sluggish thyroid is not thyroid hormone supplementation, but eating the correct fuel so that your body has the energy it needs, and your thyroid doesn't need to downregulate your metabolic rate. He also notes that many people are simply not eating enough calories. Low-calorie diets will also suppress your metabolism, for all the same reasons as detailed above.

While the ideal amount of calories vary based on your age, metabolic rate, physical activity and more, as a starting place, Feldman suggests using a typical **calorie calculator** to estimate your daily calorie requirement, and if you're eating fewer calories than that and are gaining weight or maintaining your weight, your metabolism is low.

After you've estimated your daily calorie requirement, calculate how much protein you need. The formula for that is 0.6 to 0.8 grams of protein per pound of lean body mass or ideal body weight. The amount of protein you need should be about 15% of your daily calories. Then divide the rest into 45% to 65% healthy carbs and 20% to 40% healthy fats. In closing, Feldman has the following advice:

> *"If someone's insulin resistant, they're not using the carbs coming in, and if they're not going to fix it, then sure, we might as well avoid carbs for a period of time. But I would say the better route is to work on fixing it. And in the vast majority of cases, the people who are in that state are not coming from a whole food, fruit, root vegetables, low PUFA fat sources type of diet ...*
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> *So my suggestion would be, just go to that. We don't even have to over-complicate it ... just shift toward whole food, low PUFA, easily digestible foods, away from the grains. For the vast majority of people that gets them to where they need to go without needing something as restrictive and inherently stressful as keto and carnivore.*
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> *If that is the only way for someone to move forward, if it's that or sticking with what they're doing, then yeah, do it. Do keto or carnivore. There is an inherent long-term negative to it. There's inherent stress that comes with it, but if that is the route that someone needs to go to make a change, then I think it's fine to start there. I would just say let's not stick with that long-term.*

I'd really prefer to shift to including healthy carbohydrates as soon as possible. And that's because whether the stress is for three months or a year, it's always going to be a negative. What happens is, we have these major benefits from reducing the endotoxin, and relief from throwing carbs into an insulin resistant state, but once you've attained those benefits, the negatives will start to creep in.

I'd rather get all of those benefits without the negatives. I'd rather lower endotoxin by taking out grains and raw vegetables, raw leafy greens, those kinds of things, lowering fiber if we need to, but keeping carbohydrates so we can avoid the stress. I'd way rather get that benefit in that way as opposed to just taking out all carbohydrates."

More Information

To check out more of Feldman's work, visit his website, **JayFeldmanWellness.com**. Again, I recommend starting with Episode 1 and working your way up for a life-changing, immersive-learning experience on implementing bioenergetic medicine. Each episode has show notes and links to studies cited. You can also listen to his podcast on Apple Podcasts, Google Podcasts, Stitcher and Spotify. Just search for "The Energy Balance Podcast."

Sources and References

- [1] Umzu. Who Is Ray Peat?