Fructose and the Ancient Survival Pathway Driving Modern Metabolism Transcript

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Introduction to Fructose and Metabolic Conservation

Besides it being a caloric source, its primary function seems to be sending a conservation signal to the body, to ourselves. And so then it asks a very interesting question where it's like, if we're constantly, relentlessly sending, a conserving signal, and effectively, like any conservation, signal like hitting the eco mode button on your car, we are going to end up storing more fuel, producing less energy out of it.

And so at the root, it suggests that this is a mechanism that resolves why we would overeat in our caloric intake, why way we will have cravings, and why would we have a bias towards fat storage.

All the while feeling inflamed and low energy. You're listening to the Lifestyle Medicine Podcast with Dr. Ivan Rusilko, brought to you by Access Lab, where we explore new perspectives at the forefront of personalized health care.

Welcome back to the Lifestyle Medicine Podcast. I'm Dr. Ivan Rosilko, your host, and we're powered by Access Labs. If your doctor's not checking your labs, then you're not a doctor.

And today we have Chris Mearns, who is going to counsel us on something very unique, the ancient survival pathway to help basically treat the modern metabolic disease and disorder.

So I am super excited to get into this super fast and super in-depth. Chris, thank you so much for being here. It's great to be here, Ivan. Thank you for having me.

Yeah, definitely. Definitely. So I'm very curious, and we were kind of nerding out before this, very seldom do I have guests come on that I kind like, wow, this is super interesting.

I don't really know too much about that. Could you give me an overview of where we're going to go in this conversation? Because there's all kinds of things from fructose and glucose and metabolism, all this kind fun stuff that, I am sure, that i'm excited to get into as well as our actual viewers.

Yeah, absolutely. So basically at the root of this, I dove into how fructose works in the body. And the research suggests that it is, besides it being a caloric source, its primary function seems to be sending a conservation signal to the, to our cells.

And so then it asks a very interesting question where it's like, if we're constantly, relentlessly sending a conserving signal to our body, what's that going to end up looking like?

And effectively, like any conservation signal, hitting the eco-mode button on your car, we are going end-up storing more fuel and we will end producing less energy out of it.

And so, at the root, it suggests that this is a mechanism that resolves why we would overfeed, why would we overeat in our caloric intake, we we have cravings, and why will we will have a bias towards fat storage.

all the while feeling inflamed and low energy. It kind of, it suggests that there's a bottleneck right at the center of our energy conversion that we keep sending a signal that's activating.

Fructose, Mitochondria, and Cellular Energy

And so then you take the end state of that and it's like, if you have a very low-energy performing cell that supporting a system that then starts to do the same thing where it is low, energy and conserving, where's that going to lead?

typically that would resolve with metabolic dysfunction or some other chronic dysfunction where it's like that system has a burden that it just can't pull itself out of.

When it comes to metabolism, you know, everybody is now talking about NAD and then ATP and the whole Krebs cycle, the TCA, this, that and other. Where does fructose fit in on that?

That's a good question. So basically, if we kind of wheel it back and we go back to like high school biology and learn about mitochondria, the energy factories of ourselves, it all plays a role into that.

It's kind saying like, on the basic level, are our cells producing enough energy? Do they have the capacity to do that? And all of these different signals play a roll in that, NAD.

plays a big role in that. But effectively what this is suggesting is that there's a fructose signal that is interrupting that downstream impact on mitochondria.

It's sending an inflammatory signal to the mitochondrion that produces fission so that they break apart. They don't work as efficiently in producing energy.

And it actually steals some of the tools that the mitochondria need in order to regenerate and work efficiently as well. So kind of on both sides of this scale, it's kind pulling fuel.

It's pulling the ingredients out of a pool that it needs. And then it is down regulating their function so that basically you end up with a low energy cell.

So we can do all this good stuff of like focusing on how to boost mitochondria, whether that's like ubiquinol or NMN, like trying to influence NAD plus and all of that.

But I kind of look at it as like we're filling the bucket constantly, but there's a hole in the pocket because sugar effectively is constantly pulling energy out of the system and causing it to conserve.

And so if we don't fix the hole, then all that good work is only going to work so well. So that's unique. So before we even get to the cell, can you kind of go over fructose absorption versus glucose absorption and how that affects the body?

Because I know glucose and frucose have totally different molecular structures, but they're kind similar in ways and completely different in others. Yeah, so probably everyone, it makes sense to kind do like a wheel back on this.

Sucrose, table sugar, is 50% glucose, and 50 % fructose. And we know what glucose does, its fuel. Our brains basically run on it, with the exception of like, ketones, it's sort of our body's major preferred fuel, right?

So, we understand that role and it is kind of weird that we've kind-of said that an excess of fuel is where everything falls off the rails, because that logic doesn't typically hold outside of this story.

It's like, you know, put too much fuel in your car and your card doesn't work, right? It doesn' make sense. So, okay, so that's glucose. It is primarily fuel.

Fructose is sending this signal primarily.

Glucose vs Fructose Absorption and Liver Fat

And so it kind of makes sense why you would pair them together in nature, where if you were to have a fuel and a conserving signal delivered along with it, it would help the organism to survive longer.

Right? Hey, I've got fuel and I want to hang on to that. I don't want use it as much as possible because I have opportunity in front of me. And so then that pairing makes a lot of sense and it makes sense as to why they would

kind of piggyback on each other and work together.

So with that lens, fructose then enters our body as dietary frucose, goes through the digestive system, through your gut lining. through the portal vein and then primarily it will be about whatever makes it through to the liver is primarily absorbed in the livers.

So that's the main site where fructose metabolism happens. There's a relevant story for the rest of the body almost entirely, but really the dietary stuff is what is become, is really about the lever and it's very strong reason it looks like why liver fat is a major story.

Okay, can you spend on that now that I'm curious? Well, if you're sending this conservation signal to the liver, then it's going to create fat stores in the livers.

But it also, like if your liver needs to downshift in its energy usage, all of those cells are going be working slightly slower and they're going have a bias towards storing fat.

And so then it would almost make sense that you start getting fat around your organs, visceral fat. And, so not only is the whole organism now kind of conserving, but it's starting with this critical first cause, first casualty, I would say, of this kind, this fructose signal.

Oh, very unique. So, I mean, it's almost coming away now. Everybody's talking about semaglutide and trisepatide, and all these different types of GLP-1s.

It kind of sounds like fructose is maybe kind-of similar to that in a way. How does frucose and GLp- 1s, because when it comes to regulating how the sugars metabolize that at the liver and how appetite suppression and cravings like that, can you kind expand on that?

Absolutely. There's a parallel there, but it is a completely different mechanism. As it always is. So basically, the GLP-1 is excreted in the gut lining, right?

So it's kind of, it says hormone that basically helps to influence like your motility, like everything's moving through your gut line, you're slowing everything down so that, basically you feel fuller and you don't feel like you want to eat as much.

So it's influencing cravings that way. And then that kind of takes a burden off of all the downstream stuff. So from the illustration of like that car with a fuel tank, if we have already developed obesity, Sort of like we're pulling a fuel trailer behind us a little bit.

We are, we have more fuel than we are going to use because we aren't accessing it with ketosis. Were just, were basically just pulling this extra weight around for no particular reason.

And so as we start reducing the, that weight starts coming off and of course you are gonna have, you're gonna feel more. ability to kind of use your vehicle to do what you need to.

So it's kind, of an indirect way of kind taking a burden off the system. But this goes much deeper because this is suggesting that the fuel is not the problem.

The problem is in the cell because the mitochondria are not performing. That's like saying My car isn't performing, so what do I do? I pop the hood. There's something that's slowing my engine performance down, right?

Fructose, GLP-1, and Cravings

And so if that signal is fructose that is doing that, then when you take that burden off of the system, the engine's performance improves. And then that means that performance and like this feeling of energy improves like systemically and then, that tells the rest of the body, hey, I'm not starving.

I am performing well. And so then cravings turn off because there is a, because what would they be? But like a signal to the brain that there's something, the cells are not getting enough fuel effectively.

that there's like an energy problem happening in the body. And some of the researchers have actually shown this where it's, like, there are two paths to cravings.

One of them is our taste receptors. Interestingly, if you turn those off, you still have craving, and they seem to be coming from this pathway where, because there is an Energy Deficit, then the brain is still getting a stronger actual set of craving because it is like a energy alarm that is happening.

It's like the body's saying, I am starving. And so then we go and actually find food. Now, interestingly, to prove that, they also flipped it. They turned off fructose metabolism, and then the taste preference stuff still exists.

So as though the craving is still there. But now it's just a preference and it is something that we have agency over. I can do without something sweet right now.

Like I could make that choice. The energy alarm thing is definitely a much stronger and harder signal to resist because it basically your biology is screaming like, I'm running out of energy.

So it was interesting to kind of separate the two. Well, it's unique. You always have to take a look at our evolutionary history and sit there and see.

Now this had to make sense back when we were cavemen walking around. Is there a correlation that you can find to why this fructose metabolism, though we don't really study it too awful much in medicine, is there some type of correlation we can kind of figure out as to how this would help us back in the day when were being chased by woolly mammoths and hunting and foraging and things like that?

You don' even need to look that far. Literally look outside your window. Pretty much every, it seems to be a common mechanism across biology where it's seems function as like an energy triage system where if you look at the ebb and flow of like the natural world, we have the biggest source of fructose in a dietary form in the national world is fruit.

Now we think of fruit as very healthy, so like I don't want to, we can come back to that. But basically, when does fruit ripen? It's typically before a season of scarcity.

And then if you look a little closer, you see animals that suddenly get really excited about this fruit. It sweetens, it ripens. it gets brighter, It smells good, its delicious.

and then they'll go and binge on it. Like a bear will absolutely go mental and eat like hundreds of thousands of berries a day if it get the opportunity to.

And so then you think of how that works. This bear needs to survive six months of a total fast, like not even drinking water because they're hibernating.

They need to have as much storage as possible so they can just go to sleep and stretch those resources as many as as. So it's a fantastic idea to send a really, really strong conservation signal before that starts.

And fructose seems to play that role. Now that, that stretches across effectively all of biology.

Evolutionary Role of Fructose in Survival

You have a bird that's trying to make like a thousands of kilometer migration from like Alaska to New Zealand, and it needs to survive the same trip now without water, without any food along the way.

How is it going to makes its big journey? Or you have desert animals that have a different form of scarcity where it's

like, maybe they don't have water.

And when I go for a hike in the desert, like I need like three bottles and here he is running by me completely fine. It seems that at the root of all of this, it is functioning as a bit of a survival signal where anytime there's no homeostasis.

So it runs in anticipation of scarcity when there is abundance. And then when scarcity hits, then it also kicks in through stressors this time, like dehydration, hypoxia, things like that.

And so that this spending of resources now pulls back again. In both cases, one's dietary fructose, the other's endogenous fructose. It seems to send the same conserving signal.

You can also explain that with somebody who's well-fed or overweight, yet they still walk around feeling hungry and just be like, I need to eat. You are overweight and you just ate.

Exactly. And that's the paradox that we've been experiencing for decades now, right? But it actually resolves it. It's saying like you're eating all this fuel, but ironically, you are telling your body to not use the fuel.

And so then it's like, I'm going to, and then, because it is starving, then tells your body to go eat more fuel. And you end up in a feedback loop where you're just like constantly consuming and making the signal stronger.

Doesn't that just kind of resolve it? It's yeah. Huh. Okay. That's definitely kind of unique. And now when it comes to lifestyle medicine aspects of it, so sleep, hydration, stress, you know, overall just the, oh yeah.

You use overall diet in general. How does that affect how, how fructose is metabolized and like this, this poor sleep cause you to want, have more cravings because of the frucose metabolism or, or what's the skinny on Yeah, you got it.

So let's separate it, so you've got dietary fructose and that's typically in the form of added sugars or high frucose corn syrup, which is just a better bioavailable version of the same thing.

Or you have natural sweeteners like fruit and, that kind of thing, I want to be careful to say like, fruit is, i'm not saying fruit isn't healthy at all.

fruit is highly complex. It comes with fiber and polyphenols and water and everything else. And so those buffer this fructose signal because it's kind of a, I want to, okay, so to be clear, this is not saying that frucose is a toxin.

This is saying it is sending a particular signal. And so then, how do I put this? The time under pressure is what matters. It's like it's sending a challenge to your body.

And if your your has the opportunity to respond to that challenge and recover from it, then it is fine. But if you keep sending the same challenge, and the capacity to reach that, challenge is going to drop further and further.

That's what's happening when the fructose is pulling phosphates out of the pool, where it can't recharge your ATP at a certain point. Every time fructose metabolism happens, it pulls the phosphate out of the pool.

And so, as that slowly drips out the bottom, the ability to rebuild your ATP drops off. That's why it's like, you can have research that shows that fructose doesn't really do anything for like 30 days, that's fine.

But then you look at the same study like six months later. It's this recovery capacity that seems to be really important to the story.

Lifestyle Factors That Drive Endogenous Fructose

And so then fruit is generally fine, because we eat it and it is whole and because of that buffering. It's generally not

a big deal. But when we introduce fructose across our diet and we're always eating sugar and the loads become relentless, then you get a bigger problem.

And so that's the dietary side of frucose. So like, what's to take away? Just reduce your sugar. I mean, 2 plus 2 is 4, right? Yeah, right. What about the fructose that we actually create?

Can you kind of go into how we create it or even why are we? Yeah. Okay. So, that's the other side of this story and that is where like all your questions about sleep and hydration, all that play in.

The way the body makes frucose is through something called the polyl pathway. And what happens is it converts glucose levels into fructose. When your glucose spikes.

And it's a curve. So it is hard to say like this amount of glucose will make you produce fructose. It's like the higher your glucose levels, the more that chance is going to happen.

And so that's the requirement then. Anytime you, if you have blood glucose that is in any way high, then this becomes relevant. There's multiple ways that that pathway activates and it kind of depends upon the system that involved.

In the blood, osmolality makes a big difference to this. When we have dehydrated blood or dehydration in general, then all of a sudden it starts making fructose and then our vascular system becomes quite impacted by that.

If you think of how that would work, if you're pulling energy out of your vessels, those vessels are going to dilate a lot less efficiently. that it actually pulls nitric oxide out of the system so that suddenly everything starts tensing up.

And it makes sense as to why that would happen. It's like, if it thinks that we don't have a strong enough hydration level, then it's going to want to like preserve blood flow, right?

It is trying to do this as an adaptation. But then, it becomes relevant where it is like because it has osmolality, not just dehydration. That means that salty food is actually very relevant to that signal as well.

or alcohol is very relevant to that signal as well because that also influences hydration. And so then you've got salty food, dehydration, alcohol, all pulling on this, like, activation of fructose metabolism.

It's kind of interesting. Similarly, if hypoxia enters the equation where you don't have enough oxygen, that, also, triggers frictose metabolism. So then suddenly, just pulling back, you got high glycemic carbs because of those high glucose levels, you've got dehydration, hypoxia, you got alcohol, poor sleep, which is basically that might be related to hypoxia from sleep apnea, or maybe it's just this drained feeling because you're not sleeping well, then your body is not getting the recovery necessary.

So then it needs, it is kind of losing the pool that way. Either way, suddenly we're like talking about all the same diet camps and conversations that we've talked about for decades.

Like now it's not just sugar, it is like the whole gamut of everything that effective. It makes total sense and again here I mean I think sugar metabolism is probably the number one driver of cardiovascular disease.

People who don't know how to do it correctly and sit there and see how much influence things like hormones have over that. Even the Krebs cycle, testosterone, IGF-1, thyroid, all these different things.

That's why, especially in my clinic, When somebody comes in and they're pre-diabetic or they are diabetic or their teetering on it, I'm not only looking at that aspect, obviously I am looking the lifestyle things that we just talked about, hydration, sleet, nutrition, stress reduction, all that kind of good stuff.

But then I also look at the hormones with that. Now do you know of anything, and again I put you in the spot here, do any types of hormones that actually push more towards the creation of endogenous fructose?

Hormones, Brain Energy, and Reproductive Effects

Like if you have a higher testosterone, is it going to push it more toward the fruptose aspect when it comes to the whole glucose conversion or is that something that's not really studied?

That's a very good question and is hormones are absolutely relevant to this conversation. So how do I put this? So when fructose metabolism happens, it's sending that energy debt signal.

It seems to be very connected to leptin and ghrelin, first of all, because it is basically telling the brain, here's some cravings because we need to solve this problem and I'm going to reduce satiety as well because that will allow us to consume more when the opportunity is there and so that we can hopefully fix this energy problem.

And so that's the first cascade. We got some hormones going on there. Now it's maybe important to think about how fructose is influencing the brain. So let's wheel it back.

Fructose does not seem to cross the blood-brain barrier, but there's fructose in the brains. That's been very well studied. It's really interesting. How does it get there?

Well, we know the brain runs on glucose. And so if high glucose levels allow this, the polio pathway to activate so that glucose can be converted into fructose.

Hey, guess what? That's happening in the. Brain. Right. So suddenly it's like, if we've got this spike of glucose in. The brain, why would it, Why would.

It convert it into. Fructose? And the suggestion seems to be that because fructose is dialing back energy usage, it seems our method of triaging energy in the brain.

And so now it's suggesting, okay, energy is unstable. So then we're going to kind of pull back certain areas of the brains in order to make sure that we are preserving the right energy flow throughout.

Now what's interesting is that what would you try to triage in your brain when that happens? probably not survival functions, but functions that would be expensive, like expensive programs.

And so then you look at what happens is like, when we have cognitive dysfunction, we typically can still see, can we still move, certain things are preserved, even in Alzheimer's patients, until very end states.

But unfortunately, there are other programs that seem to be higher, like more expensive, that seemed to down-regulated. And what would those be, but like long-term, or short- term memory, because it would make us a little riskier.

Maybe we'll go find more food if we don't have that short term. like higher reasoning, that kind of thing. And also, interestingly enough, reproduction, because I can survive if I need food to survive, but guess what?

Reproduction is expensive and it can even be risky. So it's interesting when you look at some of these targets of fructose, like where is frictose metabolism most active in the brain?

It seems to be related to these areas. Of course, one of them would then involve like chispeptin and like the regulation of hormones. And suddenly, you're kind of resolving this idea where it's like, why would sugar produce opposite hormonal reactions in men and women?

If you are turning the regulator off in the brain, then that gender bias of how hormones are going to be controlled starts to make sense. Where it is like hey, no wonder testosterone is dropping in man because we are turn the control center off.

Or no wonder that like the dysregulation of like cycle regularity happens in women. It's like, it's kind of, because

energy is unreliable, then the cycle becomes unrelyable as well.

And so then PCOS starts to get worse. Can fructose transition back into glucose aswell? Or is it just a one way shot? I believe it can, but I'm less familiar with that.

I forget, I might be in the gut, But there's something about that, yeah. Yeah, I was just curious because if you take a look at something like T3 and T4, the whole thyroid gland produces inactive and inactivate versions of it.

It goes out into the system. If you need more energy, boom. T-4 turns into T 3. You have too much stress, T 4 turns it into reverse T three, which is kind of, if I had to parallel anything with it with fructose, it's going to be reverse t3 in the brain because it is doing the exact opposite of that.

So yeah, just kind curious to see if your brain gets too overwhelmed. Like, stop fruptose. Shuttle it over there. But it's fascinating, and that's why I think every physician who really gets into the weeds of it, this is a very in-depth holistic part of what medicine is, getting into fructose metabolism, something that I haven't even, I'm going to now, obviously I'll be a nerd tonight and jump on my frucose learning here.

Fruit, Dietary Context, and Metabolic Risk

But it's unique because, you know, everything does come back to actual lifestyle medicine. You know how you function throughout the day is how it influences everything from sugar metabolism to cholesterol to sex energy, fitness, fat loss, energy and everything else under the sun.

And it just kind of unique to know that, that your body has this ancient aspect built into your entire system to preserve or conserve energy or kind like sabotage you in a way.

So it's super unique. And now I'm curious though, so back to fruit, because I know I get bombarded with questions here. So is there a healthy amount of fruit?

Is there are type of fruits that's healthy to eat when it comes to the fructose levels? What's the deal with all that? Fruit is so complex. That's a problem.

Like you can buy the same fruit and leave it on your counter and it softens, it ripens. The sugars get sweeter, the fiber drops off. And we're literally just talking about one fruit, much less every species and everything like that.

So I think it's important to recognize that there is a signal there, but don't be afraid of it. just understand how it works and like the research is very clear where it's like, the more the fruit gets away from whole fruit or less fibrous or sour, like that the sweeter and the the process it is like juicing or drying, then the metabolic risk appears.

that's well documented. And so it's not to say that fruit is unhealthy. It's just, it will think of it this way. Basically, the plant is discouraging the animal from eating it initially when it is unripe by packing it full of all the fat burning stuff, all of the fiber and all this sourness.

Now we take it all the way to the other end of the equation and now it really wants you to eat it. So no wonder it's delicious to us, right? So it is giving the animal an opportunity to improve their survival chances.

It works very well. Symbiotic and it helps the plant produce like distributed seeds. When we start to recognize that ebb and flow of like the natural world, then it We can use fruit in a much more knowledgeable way where it's like, I'm not afraid of it.

I love it, it it delicious and it a lot better than eating added sugar, but it yeah, we still have to recognize there's a signal there. Makes total sense.

And again, so now there's in this world full of high fructose, high sugar, preservatives and everything else. There has to be a product that kind of figures it out to kind to help us with that.

I was kind nerded out on your page and every thing. You've kind have done some white pages and actually developed something that's actually gonna help with the whole frucose aspect.

I hope so. There's a lot of fantastic researchers behind this stuff and they're working towards like pharmaceutical tracks where basically it asks the question of, can we modulate fructose metabolism itself?

Because if you've got dietary frucose, you have got high glycemic carbs and alcohol and dehydration and all these different inputs, like there's so many inputs into this system.

And then they're redundant as well. It works like an alarm system. Or it's like, if someone that has an alcohol dependency cuts alcohol, guess what? They started eating sugar like crazy.

That is well documented. And so like the body's trying to help us with this survival pathway. Trying to handle this with restriction is super hard. and that's why it makes sense as to why we've got, we're trying all these different things.

On the other hand, if the entire system relies upon fructose metabolism, because that's where ATP is converted into uric acid, it causes that inflammation, and it pulls a phosphate out of the pool, all that biochemistry happens, then that is the linchpin.

That is where this entire pathway turns off. And so all these researchers are looking at maybe, can we influence this? And there are trials that suggest that we can.

My interest is not in pharmaceuticals, but that's really interesting to me. So the same researchers identified botanicals that also help pulse on these levers.

Now they don't have the significance of like human trial data, But there's things already on the shelf.

Targeting Fructose Metabolism and the Supplement Approach

That's the cool part. And so for me, I started experimenting and that experiment basically turned into now this is what I'm doing because it's so fascinating and it seems to be absolutely pulling on the same biology that we're focusing on here.

And, so, the polyphenol that were most interested in is called lutein and is something that's safe and has been in our diet for thousands of years. It's in celery and green peppers and thyme and parsley and all sorts of things.

But in order to make it useful for the system, it seems to makes sense to use a liposomal delivery because then it survives a digestive attack. Otherwise, otherwise it doesn't really do much, right?

And so that it's been studied to help modulate fructose metabolism. And that's basically what ended up being that we developed a supplement in response to that.

That's great. That super good. Again, I think that's what like, you know, medicine is or everything like that is finding those little unique biochem things that people don't pay attention to, which has downstream effects.

You know what I mean? Fructose metabolism. And again, this is kind of new to me. I like to think I try to do everything in this industry. So I find it fascinating.

To be able to kind manipulate something such as fructose metabolism, that will probably help. Like I got to say, definitely putting my thinking cap on here with this whole frucose thing.

I'm excited because it's very like low, it seems to be a very low level argument for where this is all starting from. It's like if we're literally crippling on the regular basis the function of our cells and it seem to related to everything that all of the systems that we worry about with metabolic illness, whether it is like cognition, the vascular system, like

organ function, like visceral fat, obesity, diabetes, the whole thing.

Then it's like, okay, if we're constantly telling all those systems to conserve, what happens if don't? And that's the cool part is people that do restrict sugar, they just feel fantastic.

Like it's really hard to take it with a restrictive diet. But like typically like by week three or four, they find that they don't have cravings, their energy comes back on like the light switch on.

And then because you have agency over your food intake, and suddenly you start dropping your caloric intake and you started losing weight. So it is a very almost like insanely repeatable pattern that we're seeing even in people that are now taking sugar shield because they're basically doing the same thing without diet.

It's kind of, well, hopefully. We don't have human data, but if it is influencing fructose metabolism, it explains why when I started taking it, like three weeks later, I woke up with a feeling, the bounce in my step I've never felt before, and I simultaneously stopped craving carbs.

And I was like, whoa. Then I lost like 25 pounds over the next few months. So it's like- That's a very good snowball effect. Wait, this is awesome. Who do I tell?

Oh, that's good, Chris. Chris, I gotta say thank you very much. You've definitely lit a fire under me here. Where can people learn more about you? Our website is livehealth.com, L-I-V-3 health.

com. And to be clear, we're suggesting that there is, when you wheel back, it looks like there's an energy-centric metabolic model that almost starts to resolve here, where it's like, If energy regulation is trying to be controlled and fructose metabolism is the biggest drag on our energy, then suddenly it kind of reframes everything that we thought we knew about metabolism.

And so we want people to challenge that because what more will happen other than we'll learn.

Closing Thoughts and Where to Learn More

But the cool part is it appears to almost like a self-experiment thing because we can We can try it, whether we try restricting sugar or whether try sugar shield or whatever, it's like there are ways that we can actually experiment with this and see if it actually makes a difference that it does, besides all the biology and lab work that I hope also challenges it as well.

But so far, like, five years in and I can't break it. Like I'm trying so hard on the daily to break and it's just not happening. So it is exciting to see.

I have a YouTube channel as well called The Fructose Model where I try to breakdown all of the many, many ways that this seems to stretch out into biology and metabolism and everything because we've got so many experiences that are downstream of this fact it seems.

No, for sure. And again, Chris, I gotta say thank you so much for stopping by. This has been great, guys. Check them out. I live three days dot com. Yeah, dotcom.

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