The “Calories In, Calories Out” Myth Transcript

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Introduction: Glucose vs. Fructose

One will save your life and one will kill you. Who's a coward is not a coward. And finally, the one that I have made the most, you know, hay on, and then my research for quite a while now, fructose and glucose.

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Gluconeogenesis. So fat will get turned into glucose in the liver. Amino acids will get turned into glucose in the liver. That's how important glucose is.

Fructose, on the other hand, the sweet molecule in sugar. is completely unnecessary to all vertebrate life on this planet. There is no biochemical reaction in any vertebrate organism that requires dietary fructose.

It is completely vestigial to all life. And as it turns out, because it is a mitochondrial toxin, it actually inhibits mitochondrial function. So one is essential, save your life.

The other one is unessential and actually is a poison. This is Dr. Talks, real talk from real doctors on the issues that matter to you most. Welcome to Vitality Made Simple.

This is the podcast that equips you to feel better, look better, and to enjoy better relationships.

Why Calories Are Not Equal

And I'm your host, Dr. Debbie Osmond. It's quite an honor to have Dr. Robert Lustig today. Welcome, Dr. Lustig. Thanks for having me. I really appreciate it.

Oh, it is a high honor. I followed you since 2013. You really changed my paradigm in several ways. Dr. Lustig is emeritus professor at the University of California of San Francisco.

He is a pediatric endocrinologist. And I think that's given you quite a distinctive perspective when you start to see what the next generation is experiencing.

So Dr. Lustig, to get started, I know that you've been very brave challenging the conventional narrative on calories. A calorie does not equal a calorie.

Let's start there. Let's start there. So I'm going to tell you that the reason we are in this boat This metabolic disease boat, this chronic disease debacle worldwide is due to one word, calorie.

because we have assumed that all of the diseases are due to the obesity epidemic. And we assume that obesity obeys the first law of thermodynamics, which says that the total energy inside a closed system remains constant.

And in human terms, basically it's calories in must equal calories out. Or if you're going to eat it, you better burn it or you're going to store it. That's all comes from this one word, this notion of calorie.

And if you believe in calories, then you would believe that obesity is due to two behaviors, because the increased calories in is gluttony, increased calories out is slough.

Therefore, if you're fat, it's your fault. Therefore, Diet and exercise is the only thing that works. Therefore, any calorie can be part of a balanced diet.

Therefore, don't pick on our calories, go pick on somebody else's calories is the mantra of the food industry. All of that comes from this notion that our problem is related to this phenomenon called calories.

It couldn't be further from the truth because none of the things that I just said are true. They're all false. But they are the normal zeitgeist. They are what's out there in the blogosphere.

They are what you hear on TV. They are what your friends and neighbors tell you. They're what your doctor tells you. And none of it's true. So how do I know?

Why am I right and all of them are wrong? That's what it comes down to. Well, let's take the concept of calorie apart. What is a calorie? It's the amount of energy required to heat one gram of water one degree centigrade.

Okay, it's a measure of heat. It's a measure of physics. And God knows that is the definition of a calorie, and I don't argue that. Wilbur Atwater, a scientist back in 1902, had a newfangled machine called a bomb calorimeter, and he threw different types of foodstuffs into the bomb calorimeter and exploded them.

And he saw that fat gave off nine calories per gram. and protein gave off four calories per gram, and carbohydrate gave off four calories per gram. So therefore, fat was denser, had more energy per gram than either protein or carbohydrate.

Therefore, if you're fat, it must be because you ate fat or didn't burn fat. And therefore, fat was the bad guy. And that pervasive notion, you know, has been with us now for basically 120 years, is that dietary fat makes you fat.

Now, it was given legs by the fact that we learned that dietary fat raises your LDL, you know, the bad cholesterol, the particle that is supposed to be involved in estrogenesis.

And so you had dietary fat has more energy density and dietary fat raises your LDL. So now you had the limpid heart hypothesis. So we expanded this notion that it was calories to it was fat and LDL and basically all of it's wrong.

All of it's wrong. It's all based on correlation, not causation. It's all based on a faulty premise. The reason is we're not bomb calorimeters. Well, these things are our cells called mitochondria.

The mitochondria are not bomb calorimeters. So, you know, that's where we went off the rail. Well, and then in the eighties, I just remember this big war against fat.

And that seems, at least in my mind, Dr. Leslie, when people started getting crazy sick, I started noticing my patients that were seriously low fat were sicker than everybody else.

The Aha Moment: Juice, Obesity, and Pediatric Practice

Indeed. So the question is, why is it wrong? It means that mitochondria don't run on calories. They run on either glucose or fatty acids. And it turns out that 40% of what you consume is given off as heat.

And those are not captured in the calorie story. In addition, not every calorie from each food is metabolized the same way. So example, almonds. That you eat 160 calories in almonds.

How many of those calories do you actually absorb? 130. So what happened to the other 30? The fiber in the almonds, the soluble and insoluble fiber, formed a gel on the inside of the intestine, preventing early absorption.

So you only absorbed the 130. The other 30 went further down the intestine where the microbiome, the bacteria, shoot it up for its own purposes. So even though you consumed it, you didn't get it.

And it doesn't matter how many past your lips. What matters is how many past your intestinal brush border. So a calorie is not a calorie because it comes to the fiber.

Those calories weren't for you. They were for your bacteria. So that's problem number one. Problem number two, protein. If you eat protein, the majority of the protein will go to building new proteins in your body.

The amino acids will get broken down from the protein and will ultimately allow you to form new proteins such as actin and myosin and muscle, okay? Or, you know, proteins and neural links, et cetera, okay?

And it's like little building blocks that you put together, okay? But if you consume excess protein, There's no place for your body to store it, so what happens to it?

The excess protein goes to your liver. The liver has to take the amino group off the amino acid. It becomes an organic acid, and then the organic acid can enter the Krebs cycle, the mitochondria, in order to be burned for ATP, you know, the chemical energy that runs cells.

Okay, so any excess protein will end up getting turned into chemical energy. But in order to take that amino group off that amino acid, it costs twice as much energy to take that off as it would be to prepare carbohydrate for entering the credit cycle.

So there's actually a net loss. of calories. There's a net loss of energy because you have to expend energy to get the energy out. Whereas it's carbohydrate, you didn't.

So calories not a calorie because they cancel protein. It's inefficient. Number three, here we have omega-3s, heart-healthy anti-alzheimer's, save your life.

Or here we have trans fats, okay? Consumable poison, it will kill you. They're both fatty acids. They're both nine calories per gram. One will save your life, one will kill you.

Because a calorie is not a calorie. And finally, the one that I have made the most, you know, hayon, and then my research for quite a while now, fructose and glucose.

The glucose is the energy of life. Every cell on the planet burns glucose for energy. Glucose is so important that if you don't consume it, your body makes it.

Gluconeogenesis, it can work. Gluconeogenesis, right. So fat will get turned into glucose in the liver. Amino acids will get turned into glucose in the liver.

That's how important glucose is. Fructose, on the other hand, the sweet molecule in sugar. is completely unnecessary to all vertebrate life on this planet.

There is no biochemical reaction in any vertebrate organism that requires dietary fructose. It is completely vestigial to all life. And as it turns out, because it is a mitochondrial toxin, it actually inhibits mitochondrial function.

So one is essential, save your life. The other one is unessential and actually is a poison. They're both carbohydrates. They're both found in dietary sucrose, you know, table sugar.

Okay. One is essential and the other one is poison. They're both four calories per gram. One will save you. One will kill you. Because a calorie is not a calorie.

So there are a whole host of reasons to doubt this thesis about calories.

Fruit, Fiber, and Why Smoothies Fail

And what I've been doing for the last, I would say, 18 years, really, since I came to the realization that this was the case, is trying to make this work within the confines of medicine.

And for the general public, they understand that it's not how much you eat, but rather what you eat. that matters. It's

not the quantity, but the quality of the food, which means you've got to change the food.

So Dr. Lustig, what did you see in your practice as a pediatric endocrinologist that was like your aha moment? I mean, as a physician for 40 years, you've seen some big changes.

I have. Look, this whole thing happened on my watch. To some extent, I feel partly responsible for it because after all, I'm a doctor and more kids are coming to my doorstep, more and more obese, sicker and sicker, more type 2 diabetes.

What did I have to help them with? Well, I think the aha movement came when I was doing a satellite clinic in Salinas, California, which, you know, all of these are, you know, children of immigrant mothers, you know, they're all undocumented.

They basically get their food from WIC, you know, women, infants, children. And I remember seeing the six-year-old who was wider than he was tall. And the mom was very concerned, but didn't know what to do.

And I took a dietary history. And this kid did not drink soda, but he drank a gallon of orange juice a day. And when I added up the calories in that, it was 112 pounds per year, just a juice.

So I said to the mother, la fruta es bueno, la jugos es malo, the fruit is good, the juice is bad, eat the fruit, don't drink the juice. And the mother said to me, then why does Wick give it to us?

And she thought she was, she thought she was a great mom giving him orange shoes, you know, boosting his vitamin C. That's what she thought. So that, I think, was probably the moment when I realized that I couldn't just be a doctor, but I had to be a scientist and a public health advocate too.

So I'd say that's probably my most important aha moment from my career standpoint. Now, I had several aha moments scientifically along the way. when I realized that insulin was the driver of weight gain, not calories.

That occurred back in 1995. And then when I realized that fructose was actually metabolized more like alcohol than it was like glucose. And that occurred in 2006. So it was a slow build.

And then I wrote Fat Chance in 2013. And, you know, have a look back. No, and we're very happy you haven't. Of course, I read Fat Chance in 2013. That was an interesting time for me because being naturally thin, I had a package of Oreos under my car seat all the time.

And you know, we'd just eat Oreos on the way home. Well, how could that be bad? And then about that time when I had just done a, you know, 80, we were big boy scatters.

Dr. Lustig had done a, uh, 11 day hike with 50 pounds, you know, in super shape, go to the doctor and I'm pre-diabetic. And so it was like, well, how can that be?

And about that time I found your book and, um, and started, you know, re rethinking all of this because, uh, you know, we just think, like you said, if somebody's fat, well, they're just lazy.

And, and often nothing could be further from the truth. Well, and the dietitians, when they would see an obese patient, you know, they'd give them a dietary plan, and then they'd come back just as obese or even more so.

And the dietitian only had one thing to say to them. You're non-compliant. Yeah. You know? Maybe it was because the advice was wrong in the first place.

But of course, they didn't consider that. No, and I think that's even the current thought process among dietetics. What I'm seeing, at least here in Oklahoma, it's pretty crazy.

Well, your most recent book, Metabolical, of course, is an whole update. You talk about there, protect the liver and

feed the gut. So you've, you've built on this.

I don't want to forget to have you talk about just the job that fiber does for fruit test, because I'm sure a lot of people are thinking, I love fruit.

I mean, when I first started reading your information and listening to you, I was like, well, dang, I love oranges. I love blueberries. I love, you know, So there's a big caveat there.

Yeah. Well, it's not so much of a caveat when you understand the science, then the caveat basically melts away. So obviously fructose is fruit sugar. It's what makes fruit sweet.

So everybody's saying, well, then you can't have fruit. No, no, absolutely. You can have fruit and you should have fruit. You should have fruit the way God made it, not the way man altered it.

That's the difference. All right. So when you eat an orange, how many grams of fructose are you getting? about four or five, total of 10 grams of sugar for the whole thing.

So four or five fructose. In addition, you are getting a huge dose of fiber on the order of about 10 grams of fiber. So you're getting more fiber than fructose.

Turns out that fiber, as I mentioned with the almonds, the soluble and insoluble fiber in the orange sets up a gel. It becomes a secondary barrier. It forms on the inside of your duodenum.

You can actually see it on electron microscopy, a thin whitish gel that forms on the surface of the endothelial cells of the duodenum. And what that's doing is that's presenting a barrier.

That's preventing fructose and glucose for that matter from being able to be absorbed rapidly. And so what that does is that lowers your glycemic response, your glucose response.

And what that does is that lowers your insulin response. Think of it like a fishnet coated with kelp. So you're dragging a fishnet through the ocean and the water can basically get through and you'll catch some fish.

But what if the amount of kelp ultimately saturates all of the holes in the fishnet? Now you can't drag it through and you can't catch any fish. Well, the same kind of thing is happening on the inside of your intestine.

It's presenting a barrier because of the fishnet and the kelp or the insoluble fiber, the cellulose and the soluble fiber like the pectin and the inulin that's in the orange.

Another way to think of it. You have a spaghetti colander and you pour water through it. It goes right through the holes. Now take a blob of petroleum jelly and throw it into the middle of the colander and you run the water.

It still runs through. It just goes around the jelly. Now take your finger and rub it all the way around the inside of the colander. now run the water.

Now the water does not run through because you have created a barrier. So the colander is like the insoluble fiber, the jelly is like the soluble fiber, and then you need the geometry of all of these holes being plugged and you have created a barrier.

Well, that's what happens every time you eat an orange.

Protecting the Liver and Feeding the Microbiome

But if the fiber's been removed, if it's been pulverized, if it's been macerated into smithereens like a smoothie, or if it's been strained away like frozen concentrated orange juice where the fiber's been removed, Okay, then you can't set up that gel.

And so your glucose and your fructose are going to spike in your blood, and that's going to generate a metabolic response, which is going to drive insulin, which is going to drive weight gain, and it's also going to drive chronic metabolic disease.

So when you actually look at the data that's out in the literature, fruit consumption is associated with diabetes prevention, whereas fruit juice consumption is associated with diabetes generation.

Same product, except it's not. It's not. But go back to re-imagine the smoothie, Dr. Lustig. So in other words, if somebody throws the whole, you know, peels the orange, throws it all in there, pulverizes it, is that gonna act differently in the intestine than eating the orange?

Yes, exactly. That's why smoothies are not the answer. And every time I see a Jamba Juice, you know, close, okay, I just do a little fandango. This is news we can use folks this big because people think I'm going to grab my smoothie and head out the door and be healthier tomorrow.

Not the way it works. That's wild. Well, talk about just looking at daily consumption as protecting the liver and feeding the microbiome. I mean, that's a very good filter when people understand why it's so important.

Right, so the microbiome, all the bacteria in your gut, and it's not just bacteria, but there's viruses, and there's fungi, and there's a whole ecosystem going on in your intestine.

They have to get fed. You are 10 trillion cells, but you have 100 trillion bacteria in your intestine. They outnumber you 10 to 1. Well, they got to eat something.

Okay? And what do they eat? Well, they eat what you eat. The question is how much did you get versus how much did they get? And it turns out when you feed them, you actually increase microbial diversity.

Because the fragile bacteria can basically feed on what you fed them, as well as the hardy bacteria. And so you have an increased type of bacteria, which turns out to be metabolically beneficial.

And some of those bacteria make things that get absorbed that are good for you. and they act like little factories themselves, and so they can actually detoxify toxins.

And they don't provide a foothold for the bad bacteria to gain hold, like, for instance, Clostridium difficile, which is a disaster when it takes hold.

When does C. difficile become a problem? When you take antibiotics and you kill off those bacteria in your intestine and you provide a place for the C.

difficile to grow into. That's when you get it. So anything you can do to feed your bacteria turns out to be good. But what happens if you don't feed your bacteria?

And by the way, the food for the bacteria is fiber. That's what they like to eat. They eat fiber. So what happens if you don't provide the fiber? You're basically starving the bacteria.

Well, they don't want to die. So what are they going to do? They're going to eat the mucin layer right off your intestinal epithelial cells. They are going to denude your intestine.

They are going to chew away the mechanical barrier that separated those bacteria from your body. and then it's much easier for the cytokines or the lipopolysaccharides or the whole bacteria to get through the intestine and show up in your bloodstream.

And now you've got a nidus for inflammation and possibly inflammatory bowel disease and possibly irritable bowel syndrome. And ultimately that inflammation is going to lead to insulin resistance and that insulin resistance is going to lead to chronic metabolic disease, all because you didn't eat your fiber.

And so consumption of fiber has been shown to be inversely related to virtually every chronic disease that we know of. The more fiber you consume, the less chance for those chronic diseases.

And the less fiber you consume, the more chances for those chronic diseases. So we need to eat our fiber. The problem is food industry stripped it away on purpose.

The in one of the lectures I heard you talk about how you can't find fiber at McDonald's or, you know, just at these fast food places. It was so interesting.

And, you know, as as the decrease in fiber has or the increase in ultra processed foods has increased, Dr. Lustig, autoimmunity is skyrocketing. I mean, that's just one of the reasons, but kind of talk about those like seven, seven foods at McDonald's that don't have added sugar.

I mean, it's so serious. Quite a while ago, but I'll do my best. So the question about fiber and autoimmune disease is a very prescient one. I mean, autoimmune disease going through the roof.

And the question is, of course, why? So we don't know this for a fact yet. This is still hypothesis. But the data fit the hypothesis. So it has yet to be proven.

But this is our working hypothesis right now, is that what's happening is because of the lack of fiber, And because of the irritable bowel and the inflammatory bowel disease, you develop something known as leaky gut.

Basically, the cells in your intestine, they are tied together to each other with proteins like this that basically don't release. And these proteins are called tight junctions.

and that when there's inflammation, these tight junctions separate transiently. They become functionally permeable like so. And that provides a pore. And so stuff in the intestine can now get through into the bloodstream.

so that it can include cytokines and lipopolysaccharides, stuff that the bacteria make, and also whole bacteria, which you can actually assess, you can see, which you can get rid of with antibiotics.

But it also means pieces of food. So proteins that are being chopped up now are peptides. They should not be absorbed until they are down to their component amino acids.

But because of the leaky gut, Those peptides can now basically get through these permeable pores that have been created because of the leaky gut. And those peptides can enter the bloodstream.

And then your immune system notices them and says, wait a second, that does not look like something that is normal. That looks like something that's foreign.

I better develop an antibody to it. And so now you have a clone of B cells that make an antibody. And now you've got an antibody antigen complex, which activates a bunch of T cells.

And now any time that peptide is seen in the blood, it's going to activate the immune system.

Leaky Gut, Autoimmunity, and Oral Microbiome Shifts

Now, sometimes those peptides resemble proteins in your body. And so the immune system, through a process known as molecular mimicry, will mistake your own cells, your own proteins on surface of cells for this piece of food that was never supposed to get into your bloodstream in the first place.

And now you've got an autoimmune disease because the T cells are activated against a portion of your body because it was mistaken for a piece of food.

Well, and somehow we have the perfect storm here, Dr. Lustig, because I think the food is upstream, the fructose.

In my work, I test the oral microbiome for oral pathogens, and then I test the gut microbiome.

One thing I'm seeing increasing is a bacteria called fusobacterium nucleotum. It's an oral pathogen. that now I'm finding an increasing numbers in the gut.

Now in the gut, it contributes to leaky gut, permeable bowel syndrome. But what's crazy is I've been testing oral microbiomes for 15 years, as soon as I realized this test was available, that I'm seeing a whole different composition of bacteria.

You know what I'm saying? I'm seeing, I'm seeing Fuso. I mean, I can look at tests I had from 15 years ago and, and people, their Fuso was low. Maybe they're, you know, you hear about porphyromonas gingivalis, the, the bacteria Alzheimer's disease.

Yeah. They found the DNA for P gingivalis in the brains of Alzheimer's. That doesn't mean it's the cause of Alzheimer's. Right. It's certainly an enticing concept.

But now we know that this Fusobacterium is a bridging species. It's a commensal bacteria that makes everything worse. It's like the bad kid in the class that starts the problems.

But for some reason, Fuso is increasing in people generally. And I think it has to be just the increase in the difference in the food supply. More chemicals, more fructose, more of everything that's really hard to measure.

Well, I couldn't agree more. There was a paper of years ago, I show it at dental meetings frequently. There's a paper that looked at the microbiome in the mouth and in the GI tract across eons of time.

from the mesozoic area and the paleozoic area all the way up to modern times. And they could basically figure out, based on 16S RNA, they could figure out what species were populating the oral microbiome versus the intestinal microbiome at what time in evolution.

And what they saw was that a particular bacteria called firmicutis used to be a denizen of the mouth way back in ancient times. And now that firmicutis is not in the mouth at all, but it's in the lower GI tract.

Firmicutis, by the way, has been associated with chronic disease. And so if firmicutis went away, what took its place? A whole different set of bacteria called proteobacteria.

And those proteobacteria are associated with different diseases. So in ancient times when we ate probably other animals, or I suppose the original hunter-gatherers, and they didn't have all these additives, and they didn't have sugar, and they didn't have God knows what else in the food, the microbiome of the mouth and of the gut were completely different.

And now what those bacteria have done is they have found the place in the intestine where they are now safer. And it turns out that when that happens, that seems to portend, you know, chronic disease for us.

Yeah, no, it's super interesting to see these trends after this much time. Well, you know, nobody likes to be hijacked, but you talk about how these processed foods and fructose has hijacked our reward system.

Please expand on that. Well, so everyone has a reward system. You need a reward system. Without a reward system, you commit suicide because life isn't worth living.

You can't get out of bed in the morning. That's what happens in depression is basically you become anhedonic. Nothing feels good. Something has to feel good in order to make life worth living.

So we have this thing called a reward system. And the dopamine neurons of the reward system start in an area in the midbrain called the ventral tegmental area and then they fan out.

But the most likely place they're going to connect in synapse is in an area in further north called the nucleus accumbens. And we call that the reward center, nucleus accumbens.

Whenever dopamine makes it into the nucleus accumbens, you get a feeling of reward. And there are many things that can generate that reward. certain chemicals, so cocaine, heroin, nicotine, alcohol, sugar, and certain behaviors, shopping, gambling, internet, gaming, social media, pornography.

They all activate dopamine. They all impinge on the nucleus accumbens, and they all generate a reward signal. And so you get the feeling of, I like this.

Give me more. I like this, give me more. The question is, those neurons, those nucleus accumbens neurons, they have those dopamine receptors to accommodate the dopamine that's being released.

Of course they do. And if they didn't, you would die because you'd commit suicide. So you need those receptors. But what happens is those neurons like to be tickled, not bludgeoned.

Chronic overstimulation of any neuron leads to neuronal cell death. Dopamine excites the next neuron. Chronic dopamine excites the next neuron to the point of exhaustion and ultimately neuronal death.

That's been shown time and time again in virtually every condition. Inhibitory neurotransmitters don't kill cells. Excitatory neurons do. Dopamine always is excitatory.

Dopamine always excites the next neuron. So we were meant to have short bursts of dopamine, not chronic long-term dopamine. Chronic overstimulation of any neuron leads to neuronal cell death.

So the postsynaptic neuron has a plan B. It has a defense mechanism against dying.

Reward Pathways, Sugar Addiction, and School Food Policy

What it does is it downregulates the dopamine receptor. So there's less chance that a ligand, dopamine, will find a receptor to bind to because the receptors have gone way down.

So that reduces the stimulus. That reduces the chance that the neuron will die. So what this means in human terms is you need more and more to get less and less.

The law of diminishing returns, which in medical parlance, we call that tolerance. So that's the phenomenon of tolerance. If you keep bombarding those dopamine neurons, even with tolerance, there's a good chance those neurons are going to die.

And when they die, they don't come back. And then you try to go off whatever the substance or the behavior was that caused it. And now you got like no dopamine.

Now you got withdrawal. So tolerance and withdrawal is what makes addiction. Well, it turns out sugar fructose stimulates dopamine. In fact, anything that stimulates dopamine in the extreme is addictive.

All those chemicals and all those behaviors that I just mentioned. So sugar addiction is a real thing, and I just wrote an article for Frontiers in Psychiatry called The Battle Over Food Addiction, because until we understand that individual foods, especially ultra-processed foods, are addictive, We're not going to be able to solve this problem.

And I will mention that here in California, we are about to embark on passing an assembly bill that is currently in the California legislature in Sacramento called AB 1264, which is to get ultra-processed foods out of public schools.

That's fantastic. I mean, that reminds me, Dr. Lustig, of that African breeding. I'll probably butcher it. Kasserian agera, have you heard about it? Anyway, in Kenya, these Maasai tribes greet each other by saying, basically, how are the children?

They don't say, how are you doing today? You know, what you've been up to. They say, how are the children? Because how are the children denotes, you know, are they safe?

Are they happy? Are they healthy? Are they, how's the wellbeing of the children? And, you know, that explains how the society is doing. I mean, in grade schools, that's crazy in grade schools.

Yeah. Well, I understand that completely. Ultimately, our only purpose is to raise our children, and their purpose is to raise their children, because that's the propagation of the species.

Somewhere along the way, we seem to have forgotten that. And one of the ways we forget that is when we're addicted. When you're addicted, there are no children.

There's just you. There's, right. Wow, that's profound. There are no children. There's just, they're just you. Well, and that's why I think you have such a incredible perspective being a pediatric endocrinologist.

So you're seeing, you're seeing it early and you've talked about how with these children, their livers have the propensity to just enlarge and large and large and large and large.

Tell our listeners about that. That was news to me. So there is this disorder called fatty liver disease. Now, we've known about fatty liver disease since we've known about alcohol.

It's what causes cirrhosis. It's what causes liver cancer. So we've known about fatty liver disease forever. However, Prior to 1980, if you saw somebody with fatty liver disease, there was only one cause, alcohol.

But then 13-year-olds started showing up with fatty liver disease, and 12-year-olds, and now five-year-olds are showing up with fatty liver disease, and they don't drink alcohol.

So the question is, how come fatty liver disease, which used to be an adult disease and a disease associated with alcohol, is now occurring in five-year-olds?

And the answer is because five-year-olds consume a substrate that is metabolized virtually identically to alcohol. And that substrate is called fructose.

Turns out fructose and alcohol are metabolized in the liver identically. And it makes sense if that be the case, because after all, where do you get alcohol from?

Fermentation of fructose is called wine. So the adults have their beer, and the kids have their soda. And ultimately, they're doing the same thing. to the liver, causing fatty liver disease, which then causes insulin to go up, which causes all these other chronic metabolic diseases, which ultimately leads to cirrhosis and or diabetes and or Alzheimer's.

I mean, you pick your degenerative disease. Insulin is the driver. And the reason the insulin went up is because the liver is sick. Yeah, it gets to be pin the tail on the disease, really.

It's all the same thing. Um, so, so through, through all of this, you know, I think an email I told you, we have a granddaughter, which, um, has, you know, it changes everything when you have another baby.

And so I started researching baby formula. Oh my gosh. It's disgusting. And our daughter is, you know, super healthy. Our daughter and son-in-law are on the same page.

But I thought, well, what if, you know, what if something happens? She needs some backup formula. I'm going to buy some. Dr. Lustig, the added sugars, which led me to a research paper on added sugars in infant formula.

It'll just, it'll just curl your hair. I say, you know, mine used to be straight. Curl my hair. Mine's already been. Everything curls my hair. I had to have it cut off.

This article, this research paper, US infant formula contains primarily added sugars. And it goes into the percentages. Well, breast milk is 7% sugar in the form of lactose.

Lactose. That's the key, is it? That's the key. Protein-bound. But in infant formulas, it's greater than 50%. It's sometimes sucrose. It's often sucrose, especially if it's in a lactose free formula.

And so this is a problem and it's been shown that these lactose free formulas actually generate fatty liver. Oh, my goodness. Yeah, they were upwards of 85, 87% added sugars in those lactose-free formulas.

Well known to me. So, you know, we actually had a lawsuit against a formula manufacturer last year, you know, over this issue. So, you know, it's not like we don't know about it.

You know, getting the public on board and getting the judges on board, you know, is not exactly a simple task. No, and getting other doctors on board, I mean, that's the whole genesis of this podcast is because before COVID, I used to lecture to dentists about, you know, salivary diagnostics and whole body health related to the oral microbiome.

And I decided this really has to be to the people. This has to be, which is what you're doing. People have to be informed to go to find the right doctor that will address the root cause issues and not just treat the symptoms.

Fatty Liver in Children and Early-Life Programming

You know, I think that's the only answer. That's the goal. I mean, you've got to address the root cause. And it turns out the root cause is almost always, not always, but almost always in our diet.

Right, right. No, it really is. In one of your books, and please correct me, I want to say it's like developmental programming or something that this can even start in utero with.

Yeah, so everyone's heard of now of epigenetics is basically changes in physiology unrelated to changes in DNA. Okay, the DNA sequence, but it can be methylation or something else.

Ultimately, you know, environment changes the expression of DNA. Okay, and so we learned that maternal stress can affect the fetus, maternal diet can affect the fetus, maternal air pollution that mother breathes can affect the fetus.

All these things ultimately impact on the baby before the baby is even born. I edited a book back in 2010 called Obesity Before Birth. maternal influences on the offspring.

The entire book was about genetics, epigenetics, and developmental programming, and environmental insults, toxicants, that can ultimately impact on the way DNA is expressed and lead to changes in the baby before the baby is even born.

And everyone blames the obese child. It's a lot harder to blame an obese infant, and it's even harder to blame an obese newborn. But that's what we've got.

No, totally, totally different. I know in your clinic, you talked about four things or maybe more by now that you tell people to do. Number one, of course, is get rid of all sugar.

Get rid of the added sugar. So keep going because I love the fourth one. Eat your carbohydrate with fiber. What were the other two? Well, one I love, Dr.

Lustig, is that kids have to earn their TV time with play. I mean, harder to do, but that is genius. Well, it's very hard to do, unfortunately, because the screen was given to the baby or the child as a babysitter.

And so it's been very, very difficult to get that instituted. It's much easier to actually fix the kid's diet than to take

away the kid's screens. Right.

Because then the parents have to be a little more connected. But you said, you know, for a minute, I think that is fabulous. I'm going to do that with our granddaughter.

You know, I mean, I don't want her coming over here sitting in front of the TV. It's not going to happen. We don't even have a TV that works right now, so it'll be kind of difficult, but still.

Unfortunately, that's good for your grandkids, but your grandkids' friends are another story. And so that when your grandkids go over to the grandkids' friends, they're going to be treated very differently.

Right. And they'll probably be glued to the TV, Dr. Lustig. When I was a kid, there was a boy down the street that his parents didn't have a TV. And so, boy, he came down to our house every day at like three o'clock to watch Roy Rogers.

And he was just stuck to it, you know, because, you know, I guess he was getting that dopamine hit you talk about. Yeah. So I know your time's about…

There are others. I watch Dark Shadows, but you know. Yeah. So everybody had their thing they watched. I was more Andy Griffith. So I want your input on GLP-1 agonist.

From my perspective, I'm seeing a tsunami coming that we're not going to like. So what do you think? Well, we're not going to like it. We already don't like it.

But let me try to put this into context. I wear three different hats. I have the clinician hat. I have the scientist hat. And I have the public health advocate hat.

And how I feel about GLP-1 analogs depends on which hat I'm wearing at the moment. So when I'm wearing my clinician hat, I'm glad they're here. They work.

And some people, God knows, need them. They've tried everything else. And their BMI is still 40 or 45. And nothing else has worked. And the only thing left is bariatric surgery or death.

So GLP-1 analogs have a role to play. And I'm glad they exist. I think the problem is that way too many people are getting them that don't need them. But for those who are in extremis, I'm glad they're here.

So that's the clinician hat. Now I'm going to change hats and I'm going to put my scientist hat on. Why do GLP-1 analogs work? Well, they work in two places.

They work on the brain to actually modify that reward center we talked about to make reward less rewarding. And that's, by the way, one of the reasons why GLP-1 analogs are right now being tested in various other forms of addiction, like drug addiction.

Not just food addiction, but drug addiction and heroin addiction, what have you. And the reason is because if they can temper down that dopamine signal, maybe you can get out from under that tolerance.

Infant Formula, GLP-1 Drugs, and Closing Advice

So that might be a good thing. It might also cause suicide. Now, we haven't seen a suicide signal yet, but we're on the lookout for it. There was a drug released 20 years ago in Europe called remonabant, which was the anti-marijuana drug.

It was an endocannabinoid antagonist. It bound to the CB1 receptor in the brain and basically reduced reward. And it got approved in the EU. And within two months of its approval, there were 21 suicides.

So basically, when you inhibit reward, life ain't worth living. So we're on the lookout for that. But so far, we haven't seen a suicide signal. Where's the second place it works?

It works on the GI tract. And that's really the reason it works because what it does is it delays gastric emptying. It delays the stomach from moving the food through.

And that's why it works is because how can you eat when your stomach's still full? Right? So it reduces total calories ingested because your stomach's still full.

But that's also why you get all the side effects, the nausea, the vomiting, the pancreatitis, and also the gastroparesis. Stomach turns to stone. 3.4% of people who go on GP1 analytics get gastroparesis.

And a lot of them, when they come off the medicine, the gastroparesis doesn't get better. 3.4%? Yeah. Wow, so folks were talking about a zympic and all of those kinds of drugs.

So that's a big problem. In addition, when they lose the weight, what kind of weight did they lose? Turns out they lost equal amounts of fat and muscle.

Now, losing fat is good, but losing muscle is not. In fact, losing muscle contributes to earlier death. Sarcopenia is a risk factor for early demise. Not good.

All right. What else causes equal loss of fat and muscle? Starvation. That's why the damn thing works. So you're starving because you can't eat. Exactly.

I mean, that's not really a very good way to do this. And in addition, it only works in one third of people who take it. They only tell you about the responders.

They don't tell you about the non-responders. And whenever you stop taking it, all the weight comes roaring back, because you haven't actually treated the problem.

You've only treated the result. You haven't fixed the cause. You've only fixed the symptom. So this is not so good. And then finally, my last hat, my third hat, my public health advocate hat.

Now, these drugs work. I'm not arguing. They do. I said so when I had my clinician hat on. They do work. 16% weight loss. That's not chicken feet. That's real.

And that's good. 16%. Keep that number. If everyone in America who qualified for a GLP-1 analog actually got it, that would be worth $2.1 trillion to the health care system per year.

Our current healthcare system is 4.1 trillion per year. So this would be a greater than 50% surcharge over what we're currently paying. And we can't afford that because Medicare is gonna be broke by the year 2029. Okay, you wanna add a 50% surcharge on top of that?

Conversely, if we only reduced added sugar down to USDA guidelines, we would have not a 16% weight loss, we'd have a 29% weight loss, and we would save $3.0 trillion, and there'd be no side effects.

So which one is better? Exactly. We'd have happier people too, Dr. Lustig. Of course. I mean, because- We have people who still knew what reward was. Exactly.

I mean, Thanksgiving's no fun if you're not hungry, right? I mean- So to me, these drugs are a band-aid. They're not solving the problem. They're not medicine.

They're band-aid. They help, but they're not the answer. But another thing I'm seeing is people are sort of chronically and intentionally dehydrated because they're full, so they're not drinking water either a lot of times.

So who knows, you know, what, how that's contributing. Oh my goodness. So there's a lot of things about these drugs that are, I think, you know, more than just a little problematic.

You know, having said that, you know, you have to do what you have to do when you're a doctor. Right. Right. No, I can see, I'm glad you presented several angles because nothing is one-sided.

Well, in closing, tell our listeners what your lifestyle looks like. What do you do at age 68 to stay young? I basically eat real food. I walk my dog.

Okay. And I try to enjoy, um, the work I'm doing so that I don't need some other form of reward. Well, I appreciate your generosity of time for a vitality made simple.

I know you're busy. You were speaking in London when I first, uh, contacted you, you're headed to London to be the keynote there. I was having real FOMO cause I was like, dang that That conference sounds so good.

That may be one of these days. Um, I can hear you speak a lot because I really appreciate your information, appreciate your tenacity, uh, in your, uh, commitment to truth.

I know that, uh, it hasn't been easy cause you were absolutely one of the first people who started trying to help, um, Larry. This is the spear, you know.

That's right. That's right. And it's worth it. This is life. It's truly life. Well, thank you. And thank you, listeners. Please subscribe. Send this to somebody who can be helped.

I'm sure you have a friend that would love to hear Dr. Lustig give an array of all of his information. And leave me a review. I appreciate it. Vitality Made Simple is growing.

We're in a bunch of countries. And it's because you all are doing the kindness of sharing this. Dr. Lustig, how can people find you? I'm easy to find.

www.riotwilson.com is the website. You can find me on the UCSF website. I'm way too easy to find. No, I understand. And you guys join me on Instagram.

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