Hey everyone, it's Ariel Hohwani and I'm Chuck Mendenhall and I'm Pete T. Carroll and together we are 3Pac.
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Bruce, we're out of here.
Today's episode is about what Americans don't understand about food and the historical origins of our diet's delusion.
So when I was a kid, my dad's favorite comedian was Louis Black.
And Louis Black had this amazing and in our household, very famous riff on nutrition and milk and how there are way too many kinds of drink these days that call themselves milk but don't actually come from cows.
It's not soy milk, it's soy juice. That was my dad's favorite line. It's soy juice.
But it begins with this great one-liner that basically sums up the state of diet science.
We know so much about health that we know nothing, okay? We know nothing.
The basic point is milk good or bad. I rest my case. You don't know. You don't know.
And when I was a kid, you knew.
Now, I don't want to hold up Louis Black as some kind of expert food historian,
but there is a lot more truth in this joke than you might think.
In the 1960s, we knew that milk was good for us.
But as heart disease increased, scientists fixated on the fact that the U.S. diet had way too many calories
and they scrutinized the most calorie-dense part of our diet, which was fat.
So scientists started to wage a war against fat.
And the diet industry, the food industry, came out with all of these fat-free options.
But as we waged that war, we did so with a very particular weapon, sugar.
And so as low-fat alternatives exploded, something else often replaced the fat in these low-fat alternatives,
a lot of processed carbs and sugar.
So, for example, many people today trying to be healthy swap what Louis Black would call moocal milk, normal fatty milk, for oat milk, which in many cases means swapping milk for sugary oat water.
Now, it's a general rule that richer people across history and across the world eat more sugar.
But it is not a law of nature.
Between 1920 and 1970, sugar consumption per capita in the U.S. actually went down.
Yes, this period included the Great Recession, World War II, it also included 25 years of strong economic growth.
It really is only in the 70s, 80s, 90s that sugar consumption in the U.S. started to skyrocket.
And it just so happens that obesity rates took off at the same time.
Now, I do not want to suggest here that sugar is the only thing that causes obesity.

In fact, what's so interesting about this subject is that it seems to continue to be a real scientific mystery.
Still, no one knows.
Last year, a group of top obesity researchers met at the Royal Society in London to argue about the causes of obesity.
They came to no consensus.
One of those researchers is Dr. David Ludwig, an endocrinologist who has written and researched on the relationship between our diet, our hormones, and our metabolism.
When I read about this meeting in the New York Times, I reached out to Dr. Ludwig and I said,
I'd really love to do an episode, maybe a few, on what we still don't understand about diet.
But I want to take a critical look not only at our relationship with food, but also the history of the American diet,
what we've been told and how we have failed for decades to be able to answer the simplest possible questions about what is good and what is bad,
from sugar to, yes, milk.
Today's guest is Dr. Ludwig.
We talk about the conventional wisdom on diet and obesity, why that conventional wisdom might be entirely backwards in his words,
why traditional diets don't work for most people, and why we've had it wrong on weight gain and obesity for so, so long.
I should say, before we jump all the way into it, this week we're trying out something a little bit different on the pod.
We're trying themed weeks.
So, the theme of this week will be diet and obesity.
On Friday I'm going to talk about the mind-blowing new generation of anti-obesity drugs that are just now coming online
and I think could change America, both our health and our culture, in some wonderful but also some weird ways.
I think these episodes will pair together nicely.
But if you like this thematic structure, if you hate this new thematic structure, please let us know.
Send us an email at PlainEnglish at Spotify.com.
I'm Derek Thompson.
This is Plain English.
Dr. David Ludwig, welcome to the podcast.
Great to be with you.
There is so much that I want to talk to you about.
I want to talk about the state of obesity.
I want to talk to you about drivers of obesity.
I want to talk to you about the perfect diet and the ways, I think, corporations and even the federal government have lied to us over the last 70 years about what comprises the perfect diet.
But I want to start with the state of obesity.
What is the state of obesity in America today?
I know that it increased a lot in the last 40 years.

Has it stabilized or are things still getting worse?
The state of obesity in the United States is unfortunately bleak.
After remaining remarkably stable body weights, we're remarkably stable in the United States from the end of World War II until the early 1970s.
Beginning in the 1970s, something shifted year after year of increasing body mass index, the measure of relative weight to height.
Toward the end of the 20th century, it looked like maybe we were beginning to plateau in the first decade, but that was a statistical fluke.
We got too excited about it.
You'd run it up the flagpole, but it turned out that it was just a temporary pause. Rates have continued upward.
And unfortunately, that has accelerated during the pandemic.
So we're exceeding four out of 10 people in the United States.
More than four out of 10 people would have a weight that characterizes them in the category of obesity.
And if you add in overweight to that, it's more than seven out of 10.
So being a normal, healthy weight traditionally is the distinct minority status.
And why does obesity matter for health?
I mean, there might be some people out there who say, you know, it's irresponsible to assume that just because some people are overweight, they're automatically unhealthy.
What do we know or what do you think we've learned from science that speaks to the risk factors of being overweight or being obese?
On an individual basis, the number on a scale is just a number, and they don't tell you a whole lot about health.
We know that somebody could say be 30 pounds overweight based on, you know, the tables and the charts.
And if that is mostly lean because the person's very physically active, not have to be a bodybuilder, but you're physically active and you've got good muscle mass, good lean mass, then those 30 pounds are going to not be unhealthy.
But unfortunately, at the same time that the obesity epidemic has been evolving, you know, we haven't become marathon runners.
And if anything, it's there's evidence that lean body mass isn't keeping up with the expected increase just to just keep us even so that that excess fat in the body we know is a serious longer risk factor for a range of chronic conditions.
Let's talk about why this is happening. I know that you attended a select meeting of top researchers throughout the world at the Royal Society in London to debate to share ideas on what might be driving the rise of obesity.
The New York Times reported on this discussion that you held this paradigm clash and said that one of the conclusions is that we aren't really sure what's driving the rise in obesity.
I'd love for you to do two things right now. I'd love for you to try to summarize what you consider the prevailing view on why obesity took off in the US in the last half century.
And then after that, I'm going to ask you to provide your own competing view to that paradigm. So first, help me understand what you understand to be the prevailing view. Why is this happening?

The prevailing view is based on what has loosely been turned the energy balance model of obesity. It's really not a scientific model. It's a collection of thoughts about what affects our body weight. But the general thinking is that we eat too much. We don't get enough physical activity. Ultimately, according to this view, the answer in one form or another is to eat less and move more.
We've heard it a thousand times. Now, that exhortation can be couched in many different ways. And there's certainly an attempt to destigmatize and to recognize that this is a societal problem.
It's not a weakness of character, as is so oftentimes the subconscious stigma that takes place.
But ultimately, the responsibility devolves back to the individual, that we have to ultimately control our energy balance. We have to eat less, move more.
During the late part of the 20th century, this notion gave rise to the low-fat diet, the whole low-fat diet craze, beginning in the 1970s.
Because fat has the most calories per bite. It has more than twice the calories per bite or per gram of protein or carbohydrate.
So the thinking was, if you want to reduce your calorie intake, cut back on the most energy-dense, calorie-rich foods, fats, and things should work out for themselves.
Things didn't work out so well. In fact, the rates of obesity began going up most rapidly, just as we began cutting back on fats and replacing them with carbohydrates in the diet.
I want to double down on what you just said, because I think it's so important that at the very moment, in the very decade that we took a harder look at this energy balance model and said, fats might be the enemy, obesity seemed to increase.
And that tells me that this theory might not be the whole story. You have another theory that takes a slightly different look at what might be driving obesity in the last 40 years. What is it?
Let's step back and ask, what is this energy balance notion about? Well, it's based, it derives ultimately from a law of physics, the law of energy conservation, a law of thermodynamics, which says that energy is conserved.
So that any excess calories that go into the body that don't get burned off have to get stored. And our main storage form for excess calories isn't muscle, isn't protein, isn't carbohydrate, it's fat.
We have virtually unlimited ability to store fat. And fat is a wonderful tissue in the body. We have to have it. In fact, there's rare genetic conditions where people can't store fat, and they have very severe metabolic problems.
Fat is necessary for metabolic health in the right amounts. It can historically, through evolution, help us withstand a famine. And it's also insulating. It's a nice thing to have on the body.
So based on this physical principle, the common way of interpreting it is that overeating is driving obesity, driving weight gain. So we know that they have to be linked.
Over-eating, relative to the calories were burned off, has to be linked to fat storage. That's the law of physics. So the assumption is that the overeating is causing the obesity. And that's the basis of prevention and treatment for the last 50 years, really, for centuries.
But as you mentioned, when the same approach is tried again and again with everything that we've got, and obesity rates continue upward, maybe it's time to question basic assumptions. And one basic assumption is cause and effect.
Just as it's possible that the overeating is causing obesity, it's equally possible, according to the law of physics, that the opposite is true, that the process of getting fat, the process of storing excess fat tissue, is driving the overeating.

So according to an alternative paradigm, which has gotten the name of the carbohydrate insulin model, when our fat cells get triggered to hoard too many calories, we get hungry and we're going to overeat. And if we resist that and try just to eat less, our metabolism will slow down and we're going to still gain weight.
So the old model, the energy balance model says, this is a calorie story. You do the basic calorie arithmetic, eat less, exercise more, fewer calories in, more calories out, it's as simple as that.
And your model, the carbohydrate insulin model says, no, actually, the simple math is way too simplistic. Not all calories are alike. In fact, different foods do very different things to us. And some foods trigger our metabolism in this weird, bad way. What are the trigger foods?
Well, that's a great question. And I call it endocrinology 101. You know, we basically understood this physiology for almost 100 years, soon after the discovery of insulin. We know that carbohydrates, not all carbohydrates, but especially the processed carbohydrates.
So white bread, white rice, potato products, concentrated sugars, the many products that flooded our diet during the low fat diet era of the 1980s, 90s and early into the century, that these processed carbs, calorie for calorie, gram for gram, raise insulin more than any other food.
And you can think of insulin as the miracle grow for your fat cells, although just not the sort of miracle you want happening in your body. Insulin is the key fat storage hormone. It's necessary to deposit calories and fat.
And you have to have insulin without insulin type one diabetes, juvenile diabetes develops. And what happens in that condition? Well, without insulin, a child with type one diabetes will start losing weight and become severely emaciated.
And other metabolic problems happen. No matter how much that child is eating without insulin, you can't gain weight.
And so the carbohydrate insulin model says that the processed carbs that flooded our diet during the low fat years has raised insulin too much and caused other hormonal changes that shift where the calories of a meal wind up.
Just a few extra calories wind up being stored into fat cells rather than going to muscle or other lean tissues to be burned. And all it takes is 10 calories a day shift, less than one teaspoon of sugar to explain the whole obesity epidemic on a progressive basis.
10 calories a day explains basically the whole obesity epidemic. And so according to this perspective, focusing on eating less and moving more is symptomatic treatment.
It's focusing on the wrong end of the equation because it's going to provoke biological responses like increasing hunger and slowing metabolism that most people can simply not compensate for over the long term.
But if instead we focus on the quality of the foods we eat to control our hormonal responses to take fat cells out of that feeding pregnancy, then there will be more calories from the meal that stay around to nourish the brain and feed the body.
And we'll spontaneously feel less hungry, more satiated, more full after the meal. We'll have more energy to engage in exercise and we'll naturally move to a negative energy balance. But not because we're controlling the energy balance, it's because we're focusing on the source of the problem at the fat cells.
And the whole thing just makes me wonder why we focus so much on calories anyway if different foods are having such different effects on us. So tell me, why do you think other people are wrong

and you're right?
Like what kind of research results can you share with us that should make us think that you're right?
That's another key point, that if all calories are not alike, then focusing on them makes really no sense, counting calories. If 2,000 calories from one diet makes us gain weight, but 2,000 calories from another diet could actually help us lose weight, then it makes no sense to consider to count calories or even to think about calorie restriction from that perspective.
And there's evidence, there's definitive evidence that this happens in animals. For example, we in many groups have looked at what's called high and low glycemic index diets in mice or rats, where you can control, you know, in human studies, it's hard to control old factors.
In mice, you can, you put them in a cage, you feed them controlled diets. If you feed them, basically it's the difference between processed fast digesting versus slow digesting carbohydrates.
But if you feed them these two different diets, same total amount of carbohydrate, protein and fat, then the group that's getting the high glycemic index diet will get hungry and start to eat more and gain more weight.
If you then restrict its calories, you put it on a diet and you actually feed it less than the control group, it still puts on too much fat at the expense of lean tissue.
So it's cannibalizing its lean tissue to continue feeding its fat. And that's definitive evidence that all calories are not alike to animals.
Does this happen in humans? That's the ultimate question, but there's strong evidence of it.
For example, we did a study and what's called a meta-analysis, where you looked at all the trials of the same thing, suggests the same thing.
We did a study in 2018 in the British Medical Journal, BMJ, in which we put people on low, moderate or high-carb diets after weight loss and we controlled their diets, we controlled their weight, we kept their weight the same by altering food intake and we fed them all their meals for a five month period.
And we found that their calorie burn, their metabolic rate, the number of calories they were burning a day, was about 200 calories a day faster on the low carb versus the high carb diet.
And that would be a big effect if it were persistent. And it's also a sign that the bodies might be happier on a relatively lower carbohydrate diet with less processed carbs.
All right, let's say that I'm persuaded that the carbohydrate insulin model is true, or it is at least true enough in order to direct my diet.
What should I eat? You come along with me to Trader Joe's and we're looking up and down the aisles.
Would it defend something like, say, the famous Mediterranean diet, which prioritizes whole grains, fruits, vegetables, fish that are rich in omega-3 fatty acids like salmon? Is that the sort of diet that your theory would be an exponent of?
Okay, I'm going to answer your question. But before I do, I think it's important to emphasize that there is no one diet that's going to fit everybody.
There's clearly many sources of individual variation. We call it heterogeneity among people. Some of it's genetic, some of it relates to how much insulin we tend to secrete.
And a key source of variability is our health in terms of whether we're prediabetes or developing diabetes. Type 2 diabetes can be defined as carbohydrate intolerance.
It means that when you eat carbohydrate, your blood sugar shoots out of control.

So the diet that's going to help keep a Chinese peasant farmer who's working 12 hours a day and heavy manual labor lean is not going to be necessarily the same diet that we want to use for someone in the United States who's got a sedentary lifestyle, substantially overweight, and is at risk for developing type 2 diabetes.
So with that in mind, the aim of a diet that would emerge from the carbohydrate insulin model is one that controls hormonal response after you eat.
And that involves the hormone insulin we've talked about, which is stimulated by carbohydrates in particular. Protein also stimulates insulin.
And protein does something positive, which it stimulates a hormone that's right next to in the neighborhood in the pancreas, insulin, and it's called glucagon.
Glucagon is the antidote to insulin. They're yin and yang. So protein raises insulin a bit, not as much as carbohydrate, processed carbohydrate, but it also raises glucagon.
And so you want to select foods that are going to give you a gentle rise of blood sugar in the next hour or two after eating that have enough protein to give you that glucagon bounce and that avoid the crash in calories three or four or five hours after eating that are going to drive your hunger and overeating at the next meal.
So what would that look like? For many people, it's just cutting back on processed carbs. It's just substituting, let's say, three servings of processed grains or sugars for maybe one serving of unprocessed grains, like breads that would have been eaten in Germany or the old world or in the United States many years ago.
Maybe a serving of nuts and a little more protein. And that could look a lot like a Mediterranean diet. For someone with type 2 diabetes, we want to go further, and that will involve more substantial restriction of carbohydrate, which doesn't have to be what's called keto, where you're aimed to get rid of virtually all carbohydrates.
But a substantial decrease, that's going to be the most potent way of controlling blood sugar after eating.
I want to pull out two things that you've said that I think are important to consider side by side.
You've just said that the carbohydrate insulin model of diet strongly suggests a driver of obesity in the last 40 years is that in our eagerness to not be fat,
we demonized fat and we placed our faith in low-fat foods that happen to be higher in processed carbs, and these processed carbs trigger this metabolic response that can, ironically, make us fat.
We also established that there is no consensus on the most important driver of obesity.
So how do you square the persuasiveness of your model with the fact that it's not the overwhelming prevailing paradigm of diet science today?
In the interest of full scientific disclosure, we have to recognize that the carbohydrate insulin model hasn't proven, although I think the evidence in support of it is much stronger than the evidence supporting the current collection of ideas around energy balance.
And I have my own perspective on what would be advisable, but let's be clear that this is not conventional thinking. In the 1990s, and this is on record, it's the beautiful thing about the medical literature, the scientific literature,
the scientific literature, the things that get published stay published. People leading scientists and nutrition, heads of nutrition societies, were saying you can't get fat over eating carbohydrate.
The body would regulate itself. And this was the whole notion of the ad lib, eat as much or as little as

you want, low-fat diet.
You cut back on fat, and the white bread, even sugar, was considered relatively helpful. Sugar was considered helpful because it helped people eat less fat, which was considered the fat in the nutrient.
We now know that's nonsense, but it evolved out of a paradigm of calorie balance that has been dominating thinking for a century.
So I think now there is growing, although not total consensus, that process carbs are a problem, whether it be according to the carbohydrate insulin model, that they cause too much insulin secretion,
program our body to fat storage, or according to more conventional thinking that the process carbs are somehow really tasty and they trick the brain into overeating, although that explanation has never been that compelling to me.
I mean, a lot of the process carbs that people binge on are pretty bland, like baked potato chips, dry popcorn, bagel with fat-free cream cheese.
These foods are not, we're not talking about sitting down to a fancy French dinner here.
So I think that the carbohydrate insulin model has a more compelling explanation for the problems with why we crave these things, as opposed to their inherent tastiness or their ability to overwhelm our pleasure and reward systems.
But either way, there is growing consensus that the process carbs are a problem and I don't think it's a controversial notion anymore that we should cut back on sugar beverages and eat less refined grains.
The question is, do we replace those calories with less processed grains or with fats?
That would be one big debate that would distinguish the models.
Talking to you is making me think totally differently about, let's call it the information diet that swirls around me when it comes to what I should and shouldn't eat.
I think about the fact that when I look at a food label, it's the calorie number that is in the huge 25 font and all the other numbers are smaller, as if calories are the one thing that matters.
But one thing you're saying is that not only nutritionists and endocrinologists like you are starting to realize, no, calories aren't the most important number necessarily.
There might be better ways to think about what we put in our bodies because different foods program our bodies to process them in different ways.
I'm thinking about the fact that I grew up in the 1990s with a USDA food pyramid.
I grew up with the food pyramid and then in the 90s, the food pyramid was gospel in my household.
And at the bottom of the food pyramid, as you well know, you've got six to eleven servings of carbs, bread, cereal, pasta.
And then it's at the tippy top at the little cone.
Well, you can actually get up to 13 because that doesn't count the potatoes that were in a different little quadrant there.
Yes, if we add the starch quadrant, you can add even more.
And then it's at the tippy top that you've got the fats.
And next to the fats, it says eat sparingly.
I mean, this seems like a potentially catastrophic piece of advice from the USDA.
How did this happen?

Help me understand how that paradigm of eat as many carbs as possible and by God, stay away from the fats or else you'll get fat.
How did that paradigm conquer the diet industry in the 1980s, 1990s?
Yeah, it's sort of a perfect storm. One component of that storm was, I believe, an overly simplistic translation of the law of physics,
the law of energy conservation, that a positive calorie balance is required for weight gain.
We know that. That's physics.
It's just like saying you have to deposit more money than you take out for your bank account to grow.
That's just, you know, that's mathematics. But it doesn't tell us which comes first.
There is a cultural, I understand this, there's a cultural as well as a scientific tendency to think one causes the other.
Why? Because, well, most people can cut back on calories consciously and lose weight for a while.
And it gives us the illusion that we have long-term control over our body weight.
If you can do it for, if you can cut back calories and lose five pounds in a month, well, why not just do that for 10 months and lose 50 pounds?
But it doesn't translate. And let's use another metaphor.
You can control all sorts of biological systems that we understand are not under long-term conscious control.
Let's take body temperature. If you've got a fever, you know, you're running 104, you have COVID, you can treat that fever by getting into a cold shower or an ice bath.
You're going to suck heat out of the body and your temperature is going to go down.
If you stay in that ice bath long enough, your temperature will go down.
But ice baths are not good treatments for fever. Why? Because the body fights back and it fights back in predictable ways.
We start shivering uncontrollably, blood vessels constrict to hold on to the heat,
and we're going to feel an overwhelming desire to get out of the ice bath.
And once you do, the temperature is going to come back.
Now, that happens quickly. Body weight is a small, is a slower proposition, but the same sorts of things happen.
When you cut back calories, when you restrict calories consciously, the body fights back in predictable ways.
Hunger increases, and if you resist your hunger, which not many people can do for long,
your body fights back in other ways with slowing metabolism.
And that's why so few people can keep the weight off through calorie restriction over the long term without changing the quality of their diet.
So it has fed into a scientific paradigm, it's fed into a cultural paradigm,
and going back thousands of years, even to Hippocrates, obesity has been stigmatized.
And viewed as a weakness of character, something that you just have to use discipline.
But the science, from this perspective, doesn't support those views.
And the carbohydrate insulin model takes the focus away from conscious control and behavior and considers obesity a biological issue, just like fever,
or just like disorders of many other regulated systems in the body.

We have to address the source of the problem, too many calories winding up in fat cells, leaving too few
to nourish the rest of the body, and understand that once we take care of the biology,
the behavior will fall into place without taking discipline or willpower.
That's really lovely. I want to go back to revisit the history just a little bit longer,
because I think it's not just that scientists were wrong, and it's not just that we weren't smart enough
about translating the physics of calories into a more sophisticated understanding of diet.
It also seems to me that we were lied to.
So in the last few years, last five, ten years, The New York Times reported a couple different times
about a trade group called the Sugar Research Foundation, which paid some scientists to publish,
starting in 1967, a review of sugar and fat and heart disease.
And it downplayed the role of sugar to cast dispersions on fat.
The story, I should say, perfectly connects into the story that you told,
which is that there became this lots of attention in the 1970s, 80s, 90s around,
if you want to lose fat, you should have a low-fat diet.
But even into the 1990s, there's evidence that Coca-Cola was paying millions of dollars in funding to researchers
to continue to play down the link between sugar drinks and obesity.
And I would just like you to reflect briefly on the degree to which you think that
our collective misunderstanding of diet in the latter half of the 20th century, early 21st century,
was in part driven by targeted corporate lobbying that demonized fat
to allow a little bit of a halo effect around sugar.
I prefer not to use the term lying, at least with respect to the scientific establishment,
because, you know, for example, there's evidence to this day,
there's all sorts of conscious scientific fraud that happens.
And occasionally it comes to light and blatant forms of corruption.
But for the most part, I don't think that that's what happens.
I think that the industry can manipulate scientists in ways that doesn't require the scientists to be lying.
They can find scientists with light minds and support them so their views grow in dominance.
Something that I've studied as a source of bias in literature is they can shift what studies
and what scientific questions can ask.
And so the NIH, the government funding organization,
has more money for research than any one company,
but that's spread over the whole range of human health.
Whereas a Coca-Cola company can devote its resources to one question
and crowd out at least for a while, you know, competing views.
So I think that there's no question that the food industry has played an insidious role at times.
But I'm also hesitant to blame them too much,
because they got started on the low-fat juggernaut was initiated by public health and science.
The food industry liked it because they could take out fat, dump in sugar and starch,
which is actually cheaper, call it a health food, and go running to the bank.

Oh, that's so interesting.
Right.
So if I'm working for the food industry, I love the idea that all calories are alike.
Because if all calories are alike, it doesn't matter what you eat.
You can always just eat less of something else.
Cheetos aren't unhealthy. Mountain Dew isn't unhealthy.
It's just got a lot of calories.
And if you're going to have a Mountain Dew at lunch, Cheetos at lunch, maybe don't have desserts.
You can always say that.
So these companies are likely to seek out scientists that have already come to the conclusion, potentially,
that all calories are the same.
So that's a story that's out my point about lying.
They didn't have to run far to find scientists that would think all calories were alike.
I think, probably, based on the social media attacks that I endure every time I publish a paper promoting the carbohydrate-insult model, it's not exactly conventional thinking right now.
So most of science right now is still embedded in the calorie-in-calorie-out model.
Again, I call it a model loosely because I don't think it's ever been formulated in a way
with testable hypotheses and sufficient specificity to distinguish it from the carbohydrate-insult model.
I think the carbohydrate-insult model is the only mechanistic, scientific model
for why obesity keeps going up amidst genetically stable populations.
I mean, the energy-balanced model will say, well, you're eating too much, you're not exercising too much,
or there's too much junk food or ultra-processed foods.
But what are the mechanisms and how do you test it?
And we published recently a large paper with one of 17 co-authors that listed 30 specific testable hypotheses
and showed arrows and diagrams exactly what we think going on.
And we also said that this model, we posit that we will admit from the start that the model is not right.
Models are never right for complex diseases.
They can be useful if they guide research.
And yet the other side has not published a similar model.
And yet that paradigm continues to dominate.
And as you say, it's a paradigm that has great appeal to the food industry
because it takes the onus off of them for marketing the most atrociously unhealthy foods
because no matter how bad that food is, if you drink 200 calories of a sugary beverage,
you just have to exercise and then it's a wash,
which is why sugary beverage companies fund sports events.
If food has unique metabolic effects that persist and that alter how our calories wind up,
then that's not the case. Then you can't outrun a bad diet.
I've done a lot of complicated questions at you about the nature of diet and insulin

and the corporate academic complex.
Let's end with a simple question.
My household is about to place an order for groceries this afternoon in a few hours.
What should I not eat and what should I eat?
As we discussed, people are different.
They have different metabolic needs and there can be unique medical conditions.
So whenever you start, you make a major dietary change.
You want to get advice from your healthcare provider.
But from a public health perspective, if I were in charge of the magic wand of public health,
I think there's really no downside. Now that we've got trans fatty acids mostly out of the food supply,
the processed carbs are public health enemy number one.
There's no requirement for it.
In fact, many of your listeners may be surprised,
but there's no human requirement for carbohydrate at all.
There's zero. It's the one nutrient we can live entirely without.
The body can make all the carbohydrate it needs for the brain on a very low carbohydrate diet.
How do we know that?
Well, there have been populations dating back tens of thousands of years
and some still in very northern locations or a few hunter populations in Africa
that can live entirely without plants.
In Alaska, for 10 months a year, nothing would grow.
And carbohydrate comes from plants. There's minimal carbohydrate in animal products.
So there's no requirement for carbohydrate.
That doesn't mean that we can't eat carbohydrates, enjoy them in good health.
I think we can.
Most people, if they're not severely insulin resistant, can eat plenty of carbohydrates.
But we want to reduce the processed carbohydrates, the white bread, white rice, potato products,
sugary beverages, sugary cereals, all the desserts.
We want to reduce those as much as possible and then replace them either with whole fruits,
the temperate fruits, not the tropical fruits so much, less bananas and more berries,
the leafy green vegetables, some grains, if you can see the grains themselves.
So things like old fashioned or steel cutout meal rather than instant oats.
That would be the distinction or some of these old world breads where you can see the whole kernel rise
rather than the finely milled flowers.
So we cut back on the processed carbs, replace them with slow digesting carbs,
or delicious healthy fats, nuts, nut butters, a full fat dairy, especially yogurt,
olive oil, avocado, rich sauces and spreads, even dark chocolate without a lot of sugar,
can be a health food.
And then lastly, we want to be sure to get enough protein.
That doesn't mean that we need to be eating a super high protein diet,
and there could be downsides possibly to that.
But a little more protein than the typical American gets, I think has metabolic benefits.

And you could call that a Mediterranean diet.
It goes by many names, but I think it's just a hormonal, hormonally friendly diet
that would serve basically anybody.
That's great.
David Ludwig, thank you so very much.
My pleasure.
Thank you for listening.
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Thank you.