To Keto or not to Keto? - Ref135

with Gary Taubes

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TRANSCRIPT

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Steven Bruce
We're kicking off this new year with a look at diet, probably quite appropriately after the festive season. It's a topic which has always, I won't say baffled me, but it's intrigued me since I qualified as an osteopath. Understanding what sort of advice we should be giving to our patients, making sense of the conventional wisdom, the five a day stuff and all that. And I was therefore very intrigued recently to read a review of a forthcoming book, a review written by one of my previous guests, in fact, Malcolm Kendrick, who's been on the show a number of times talking about the bad science around the cholesterol hypothesis, but he was talking about a new book called The Case for Keto. And my guest this evening is Gary Taubes, Gary is the author of The Case for Keto and he's joining us from California. Gary, welcome to the show. We've lost your microphone for some reason.

Gary Taubes
Thank you for having me. How's that?

Steven Bruce
I was looking at your bio on Wikipedia. And you've a fascinating history because you're actually a physicist by training from Harvard University, aren't you, and then aeronautics at Stanford and then you went on to Columbia to study journalism. What prompted the switch from sort of physics and so on to your current role, which is largely investigative journalism into healthcare issues?

Gary Taubes
My advisor, my junior year at Harvard, I got a C minus in quantum physics and he suggested that I might consider an alternative career. And I had always been fascinated with journalism and investigative reporting and it took me a while to wind down my science career and get into that. And then it turned out that once I became a science reporter, there was plenty to investigate. Plenty to be sceptical of, let's put it that way.

Steven Bruce
You started out investigating your base subjects, didn't you, investigating physics and things like that, but now it's more healthcare related issues. And you've won 3 awards from the National Association of Science Writers for what you've done, you've been featured in The New York Times Magazine, as I said earlier on, The Observer was writing about you in this country. So it's diet that seems to concentrate your effort at the moment.

Gary Taubes
Yes, since about 1999 I've been focusing almost exclusively on nutrition and chronic disease. My obsession, so when I started in physics, I spent 10 months, what we would call today, we would say was embedded with physicists at the European Centre for Nuclear Research outside of Geneva. And I had gone there because I thought I was going to be covering a great discovery in particle physics. And it ended up that the physicists involved, a collaboration of 150 very smart men and women, had screwed up to use a non-technical term, discovered nonexistent fundamental particles. And so I chronicled how they had learned that they had made a mistake. And I became obsessed with this question of how difficult it is to do science right and how easy it is to get the wrong answer. And my second book was on a more famous scientific fiasco known as cold fusion, in which I was, again, obsessed with the same issues, how

could something so obviously wrong have gotten so much play. And after doing that book, my friends in the physics community, of which I had many, said if I was interested in bad science, what they call pathological science or the science of things that aren't so, I should look at the research in public health because they found it completely unacceptable by their standards. And I began that in the mid-90s, with some articles on prospective epidemiological research, which is hypothesis generating but there's no, you know, if you think of science simply as hypothesis and test, you have a whole field of research that all it does is generate hypotheses, which is a problem. And then that led me into a series of investigative articles for the journal Science of Nutrition and that in turn to what may have been among the most controversial articles the New York Times Magazine ever ran on diet and obesity and then my books.

Steven Bruce
My reason for saying what I just did is to establish your credentials as a scientific mind because when someone writes a book about a diet, it's often easy to assume that they are just promoting some sort of fad diet. And you recognise that in your latest book, which I thoroughly enjoyed reading. And you presumably yourself are a fan of the keto diet and something must have taken you down that route originally.

Gary Taubes
I did. I want to say though that recognising the issue doesn't stop it from happening. As we were going on the air, I mentioned that there were two major reviews of my book in the British journalism. So the London Sunday Times panned it and called my arguments scary and treated the arguments I'm making in this book as promoting a fad diet that's little different than the celery juice diet promoted by someone known as the Magical Medium. The Guardian gave it a rave review and said anyone who struggles with their weight has to read this book. And so the question is, how do you, I would argue that the London Sunday Times reviewer was a closed mind that had little understanding of the subject and took the conventional viewpoint, which is anyone who argues for fad diets does not have to be taken seriously because they are by definition, fad diets are dangerous and they're unsafe and how do you get somebody like that to open their mind to the possibility that mistakes have been made over the past 120 odd years of addressing, or actually 200 years of addressing this question of what causes obesity and how do you reverse it by dietary means, if it is possible to reverse it by dietary means? And yeah, everything in writing the book and your introduction, everything is about establishing the credibility to get people to read on to the next sentence and ideally open their mind to the possibility that mistakes have been made and tragic mistakes in this case.

Steven Bruce
So would you say then that you find it fairly straightforward to pick up a piece of medical research and analyse that research and spot the obvious flaws in it, if there are obvious flaws? Because most of us, being an osteopath myself, if I look at a medical piece of medical research, actually I barely get beyond the abstract, which very often doesn't even accurately reflect the author's own findings.

Gary Taubes
Well, that was one of my revelations in doing this. So as an investigative journalist writing for science in the 90s, I mentioned that I'd done two major investigative pieces on nutrition and diet. The first one was on sodium and blood pressure, and I had stumbled into this purely by accident, purely serendipitously, I

had no idea that there was an even a controversy about the benefits of a low salt diet. And I spent nine months on a single magazine article, I interviewed I think it was 80 or 85 researchers and investigators, and I collected all of the relevant literature, which back then meant going to the library or paying a student to go to the library and Xerox it so I could then give that literature, and I printed out stacks as a journalist that were about a foot and a half high and I sent them off to three of the best epidemiologists I knew. Epidemiologists whose critical thinking I respected and who had never written on this subject, because I had established that if they had written on the subject, they were probably biased already. All three of these epidemiologists, one was a biostatistician at UC Berkeley, one was at UCLA, who had co-edited a major epidemiology text in the US, and one was at Harvard. And they all agreed on the multiple, multiple issues in the literature and in the studies and how the studies are interpreted and the methodology of the studies and whether or not they actually report off. And for my own take I just the process of going through the references to you know, you, you read the articles and as a journalist, I'm going back in time from this article to the to what was established in the past. So you follow the reference train back in time, which is why they're there and as a journalist, to learn that the references often were didn't make the point that they were referenced to make, or occasionally made the opposite point or occasionally were just random references. And so you'd have these articles arguing and restriction and blood pressure and none of the references or virtue effectively none of the references supported the arguments being made in the paper. So in the field I grew up in physics, had people done such slipshod scholarship, they'd have been thrown out of the field they'd be. This was part of the problem with nutrition research in general. So it got to the point that, for the most part, I don't trust anything I read, which I admit is a problem.

Steven Bruce
Yeah, I think that we are now in a kingdom where, you know, the importance of evidence-based medicine has grown. And almost at the same time, a growing distrust of the evidence has emerged as well. So there are now people saying, well, it's all very well being evidence based, but when you contrast the evidence, what do you actually do, how do you give advice to patients?

Gary Taubes
This is one of the fascinating aspects of what I've gotten to do as a journalist, and I've become a historian of science by virtue of having to do this, but, um, I wrote some of the first articles in the US, I wrote the first articles in the journalistic articles in the US on the Cochrane Collaboration. And the founders became, you know, I got to know them, I went to the evidence-based medicine movements in the US in the 90s, the conferences, and I became friends with the clinical investigators pushing for rigorous clinical trial evidence for any medical interventions. In the course of doing my research, I'm now working on a book, specifically on diabetes. And it's given me a new opportunity to go back into literature to the 19th century. And now because of Google Books, and effectively, any article ever written or book ever published can be found and downloaded on the internet. So you can do this safely while sheltering at home on what medicine used to be prior to evidence based medicine, was physicians, clinical experience, I did this to my patient, they seem to get better. So I did the same thing to another patient, they seemed to get better. And I'm going to recommend that other physicians do the same thing. And if there are professional societies, and we all get together and enough of us believe this is possible, this is going to be part of our standard of care recommendations. And for some therapies, and some of the questions you're asking, that's a valid way to do medicine. Because if you're asking, if you're saying I have an intractable medical condition, for instance, obesity, or type two diabetes, that's a degenerative condition that's guaranteed to

get worse and worse. And I tell my patients to abstain from carbohydrates. And the obesity reverses itself. So say they go from 300 pounds, something they've never been able to do before. And that turns out to be a reproducible phenomenon with many patients, that has to be taken seriously. *audio drops out* If you've established that it's safe, so you haven't killed anyone yet. And now you recommend it to your patient, say, look, I think I'm going to put you on this ketogenic diet, which is abstaining from carbohydrates and replacing those carbs with fat. And I expect that you'll lose weight relatively effortlessly, and you won't be hungry, and your risk factors for heart disease will improve. And if you're diabetic, we may be able to get you off all your drugs. If you're type two diabetic, however, it's risky. And there's a slim chance you may kill yourself. And if so, I apologise, you're gonna have to accept that risk if you do it, because we don't have the clinical trials to tell us the long-term risks and benefits. So there are ways in which you know, if that patient gets healthier, if he goes on the diet and loses the excess weight and gets off his diabetes medication, then you can be pretty confident that it was beneficial to that patient, what you don't know is whether they're going to live longer, and whether you've increased or decreased their future risk of chronic disease. That's what you need the clinical trials for. So what happened with the era of evidence based medicine, there were two things that happened, first, a lot of poorly designed, poorly done, clinical trials have been done. The pharmaceutical industry is better at doing clinical trials in nutrition. And the problem with nutrition is you can't blind people to what they're eating. And it's very difficult to control what they're eating. It's not just a pill versus a placebo. And so two of the fundamental necessities for a scientific experiment, which are you know, blinding and careful control are virtually impossible to achieve. So if you're going to have an evidence based medicine movement, and none of this did I ever think about in the 90s, if you're going to have an evidence based medicine movement, you have to make sure that the evidence you're basing it on it is meaningful, that the clinical trials are really done, well designed, well planned, rigorous, and that you can interpret from them what you need, and it's a mess, the end result is a mess. And when you have a conflict, like over the ketogenic diet, known as the Atkins diet still is in some places.

Steven Bruce
What's the difference between ketogenic and Atkins?

Gary Taubes
Not a lot.

Steven Bruce
Atkins had some bad review.

Gary Taubes
Atkins had some bad reviews, because Atkins was arguing for a high fat, high saturated fat rich diet and then diet that you could, he was making the claim, as I do, that weight could be lost without consciously trying to eat less. So the conventional wisdom is that in order for a diet to work, it has to create a negative energy balance. So the fundamental, what every diet does is it somehow gets people to eat less. And the logic that we'll talk about behind the ketogenic diet is the well, there's a lot of confusion here. But ultimately, you're saying eat as much as you want, just don't eat carbohydrates. And you're guaranteeing that not only will they lose weight, they won't be hungry, they might end up eating less, but that won't be why they're losing weight. Atkins versus keto, when Atkins wrote his book, often diet book doctors do

this, they want to give a prescription, a unique individual prescription. So it's not enough to just say, look, carbohydrates are fattening, don't eat those and replace it with, you know, healthy meat, fish, fowl, dairy or green vegetables. Because that's been said, people have been saying that for 200 years. So instead, you say, here's my diet, you're going to do this for four weeks. And then you're going to do this for a month, and then you're going to measure this and depending on what that does, you're going to do that. And one of the things I point out in the book is virtually all diets restrict the highly refined grains and sugars, especially nowadays, white flour and sugar. So they're restricting some carbohydrates. And they probably work based on how well they restrict all carbohydrates in terms of how well they help people achieve and maintain a healthy weight without hunger. And, again, you know, you have to sort of see past all the Malcolm Gladwell called these the patent claims of the different diet book doctors to see what they're all telling you to do, which is ultimately don't eat sugars, starchy vegetables, and grains. And don't drink beer.

Steven Bruce
Can I get something out in the open here straightaway. We all know, my tongue in my cheek that the only way to lose lose weight is to alter the bad calories you take in and the calories that you put out. So you've got to eat less and exercise more, that's got to be the way to lose weight, doesn't it?

Gary Taubes
Yeah, that's the conventional wisdom. It's argued that that is a direct consequence of the laws of thermodynamics. And a more correct way to put it would be if you're losing weight, you are taking in less calories than you're expending. Or you're expending more than you're taking in, if you're gaining weight, then doesn't matter whether you're getting fatter, you're a 15-year-old boy who's getting taller, if you're gaining weight, you're taking in more calories and you expand, your body mass is increasing. Going back to physics, mass and energy are equivalent give or take the speed of light squared. Weird. And so if your body mass is increasing, you're in positive energy balance, if your body mass is decreasing, you have a negative energy balance, so statements are tautological. And what happened in the nutrition community, and one of the arguments I make in my book is one of the problems in nutrition obesity researches is people learn the dogma, they don't learn the history of the field, they don't learn on what data, what evidence the dogma was based. In physics, you learn the physics with not only the names attached, like Maxwell's equations and Newton's laws of gravity and Einstein's laws of relativity, you learn what experiments were done to test those hypotheses. So not only what you're supposed to believe, but why you're supposed to believe it, in obesity and nutrition. Nutrition does a little more than obesity research. But what happened in obesity research is back in the days when thermodynamics was relatively new and people were the fashion of the day and science was all you could really measure that was relevant to obesity was energy intake and expenditure. Researchers confused a tautological association, positive energy balance is equal or is the equivalent of weight gain, and negative energy balance is the equivalent of weight loss with a causative function. So the way you lose weight is you create a negative energy balance. And the way you do that is you change how much you eat and exercise. And the way you gain weight is you've obviously created a positive energy balance. And the way that happened is you ate too much, or you got slothful, and didn't exercise enough.

Steven Bruce
audio problems

Gary Taubes
Ah, it does, yeah, I mean clearly, but then even then, when people restrict calories and it gets it, they're more complicated because, for instance, I could argue that if I starve a growing child or inhibit his growth or her growth, so I'll cause their growth to be stunted, so you could say that creating a negative energy balance by undernutrition inhibits growth, but you would never consider that a meaningful way to do it. Even though clearly you can do it in some people, children, when they're growing. That's one aspect is it's not enough to say that that's the way it should be done. Another aspect is typically when people restrict calories or carbohydrates or 50% of your calories or 60% than a typical modern diet. So if you're restricting calories, you're restricting carbohydrates. And even in the clinical trials, when you look at the data, that puts a subject on a low-fat diet, for instance, at these trials done by Christopher Gardner at Stanford University, and you compare a low-fat diet to a low carbohydrate diet and a low fat diet, they're eating maybe 500 calories a day less. But of those 500 calories, 300 calories are usually carbohydrates, because even on the low-fat diet, they stop drinking sugary beverages. They stop eating sweets, and pastries between meals because they think of that as cutting back on fat, but they're cutting back on carbs. So from a scientific perspective, it is true that you can reduce your weight by starving yourself or semi starving yourself. And some people might be able to keep this up for years to decades, stay in weight stability, by always eating less than they would prefer, by effect always being hungry. But we also know the negative sequelae of hunger. We know the complications of long-term hunger, and few people can sustain that. So one argument for why all diets ultimately turn out to be unsustainable, is if those diets require people eating less than they would like to eat and walking away from every meal hungry, and then it's going to fail. Eventually they will binge eat when food is available and the study I discussed in the book is the famous Ancel Keys' University of Minnesota nutritionists in the beginning of early years of the Second World War ran a study using conscientious objectors at Minnesota, excuse me, where he put them on 1600 calorie a day diets of the kind that you would expect to, we expected to find people eating in Eastern Europe when Eastern Europe was liberated. So vegetables, you know root vegetables like potatoes and turnips, a little bit of lean meat. So what we today would actually consider a healthy diet. And the subjects in effect, slowly went crazy. And the books, a two-volume book that Keys and his colleagues wrote called The Biology of Human Starvation, documented what they call the starvation, neuroses and even psychosis, two of the subjects tried to mutilate themselves to get out of the study. And they were being fed 1600 calories a day. It wasn't anything like what we tell obese people they have to eat to lose weight.

Steven Bruce
1600 calories or was he cutting out specific food groups?

Gary Taubes
You know, the green vegetables, potatoes, turnips and lean meats, that's what they were eating. And they dreamt about food, they obsessed about food, they had an institute of body systems so that they wouldn't let him to leave the laboratory setting without a body because otherwise they would cheat. Some of them took the chewing 40 pieces of gum a day. I mean, they were also making them physically active. So they were trying to keep them in negative energy balance, which is of course impossible, because

eventually they'll lose weight and their metabolism will slow down to match what they're being fed. And the other interesting thing is even at 1600 calories a day, they didn't lose that much weight. I forget the details, was about a pound a week for the first 12 weeks, and then it slowed to about a quarter pound of weeks for the rest. And then of course, when the study was over, and I should also say most of the subjects were lean, and this was, you know, so, BMI under 25, they didn't have that much fat to lose, but some of them were overweight. When the study was over, they had to control their feeding because the subjects all wanted to binge eat, so they had to refeed them slowly. And one point that Keys made was that they all put on more fat than they had lost by the time they were done refeeding. So they ended up with about 50% more fat tissue than they had originally.

Steven Bruce
Why would that happen? Why would they not just eat to fill up their natural weight?

Gary Taubes
Well, because we don't know what their natural weight was. Sort of, I mean, the way you could think of it is your body is trying to replace the fat loss. So *audio problems* interesting to do the refeeding with different levels of macronutrient ratios to see if the macronutrient ratio played a role in this. Yeah, the term Keys and his colleagues used was, I think, post starvation obesity to describe what happened. And I just make the point that virtually everyone who struggles with their weight, yeah, those of us who the phrase I use in the book, which I admit comes from 1950, zero diet doctors, but it seems appropriate. Some of us fatten easily and some don't. And those of us who fatten easily, this is yo yo dieting, right. You go on a diet, you starve yourself, you think about food all the time. You eat little handfuls of tuna fish on lettuce for lunch, and small portions of food for dinner and breakfast. And you carefully weighed out the seconds until you can have 10 potato chips for your afternoon snack, and you think about it all the time. And then when you fall off, you end up fatter than you started.

Steven Bruce
And you cited, I think we've cited a number of examples, but one that stuck in my mind, I think was actually a physician, a doctor who had been trying to lose weight for a very long period of time eating I think five Ritz crackers an evening, trying to lose weight and it just hadn't worked at all. And that baffles a lot of people. How could you not lose weight in that way?

Gary Taubes
Well, and this wasn't a physician doctor, this was a woman whose plight was along with others, like her was described in the Huffington Post here in the US in a magazine article saying we have to rethink how we think about obesity. Because here are these people who are, literally seem to be starving themselves. In this case, you know, it was a young woman who weighed around 300 pounds, I can't remember the details, and she had an issue, would wake up, basically, she would try to smoke her hunger away, and count her calories and count the number of potato chips she could have. And she could lose weight doing it. But she was, in effect torturing herself. And eventually her mother forced her to stop because she believes she had an eating disorder. And we should talk about the eating order issue on the show because it's very dependent on the same assumptions about why we get fat and you know, what we had to do to reverse that process. But yeah, the world is full of individuals who I would argue, probably struggle harder to eat in moderation. Or eat not too much as Michael Pollan famously put it, than lean individuals

because they have to, they're struggling with their weight all the time. That's what it implies to struggle with your weight is to struggle with your eating and exercise behaviour.

Steven Bruce
Sorry, I was gonna say, you talked in the book about the psychological effects as well. And one of the individuals you mentioned was a young lad who had suffered lots of physical or psychological abuse when he was at school because he was overweight, and also couldn't participate in sports with others because he was overweight. And then long-term effect would be blamed for his own obesity must have taken a serious toll on him.

Gary Taubes
Well, and this is obesity, we know this. I remember study done about 10 years ago, and it was published in JAMA here in the US it said the quality of life for children struggling with obesity. Their conclusion was that it was worse than the quality of life for children with cancer, which I find almost impossible to believe but that was what the conclusion was. It's um, you know, we know this, the world is full of books written by writers who struggle with obesity discussing the incredible burden of this disease, psychologically as well as physically throughout their life, and the assumption that it's fixable. And this is sort of one of the fundamental arguments that I'm making in this book, and I've made in my other work. I'm gonna give you an example, a young man that I am, sorry, I just got a text from a friend who must be watching our congressional hearings on the election of the new president, and while we're doing this, and it included a scatological term, so are you watching this blank? And I forgot that I'm not and I suspect, I'm glad I'm not. I made a friend. I've made a lot of friends doing this work. This is a young man who weighed 400 pounds when he was 18 years old. This is the young man we were talking about in the book.

Steven Bruce
For a UK audience, ten stone would be 140 pounds. So you know, he's three times that weight for people to put that into context. A lot of Brits don't understand pounds in terms of body weights.

Gary Taubes
Okay, so almost 30 stone, let's say 27 stone, he said his scale peeked out. And what we would have said it's 380 pounds, he just knew it was above that, he had been ridiculed for his weight as a child. He was a tall kid, about two metres tall, a little less than two metres. So just to give you a perspective, by the time I met him, he was getting his law degree at Yale University. So he was very smart. Young man, he now works for the governor of California. And so 30 stone at 18, never walked and never in his life that he said that he ever finished a meal without still wanting to eat more. So he had never been satisfied. He didn't believe he ate any more than his lean friends who might have been less than half his weight. But he ate the same crap they ate, to use a non-technical terminology pizzas, Coca Colas, when he was 18, his father gave him a copy of this New York Times magazine article I wrote back in 2002, when he in fact, ate nothing with green vegetables and fatty ground meat that his father bought at the kind of store we call them big box stores here in the US, Costco. I don't know if you have them in the UK, but his father would buy 30 pounds of ground meat a week and he that's what he would eat every day five, six pounds a day and he lost 130 pounds. So that's what are we talking, nine stone in four months. And for the first time in his life was sated and would never go back he said to eating differently at the moment, he weighs about 17 stone six years later, and you know eating a diet of meat fish and green leafy vegetables and

that's all. He can maintain his weight if he doesn't diverge from that kind of eating but he's not hungry, and he's happy with it. So you know, the problem is what we do with these children, the typical advice for a child like him, is to eat less and exercise. So first you take a child who's 400 pounds from exercising, certainly running or endurance, any kind of endurance exercise is torture, and you torture them that way. And then you try to get them to eat less now that you've got them to build up an appetite and the end result should guarantee, you know, that it does fail shouldn't be a mystery then to anyone.

Steven Bruce
We just lost your audio for a second there, Gary. Are you back with us?

Gary Taubes
I don't know why.

Steven Bruce
You're fine. We've got you back now. Since we got a break. A couple of observations sent in. Michael was talking about the review of your book in The Times asking whether it was the review by David Aaronovitch, he says that he didn't really pan the book, he said it was more of a lightweight, not really adding anything type review. So hopefully that makes you feel a bit better about what' in the Times.

Gary Taubes
Think what he might have said about the book, it was really kind of a lightweight, not adding anything kind of book, which to the author is a pan.

Steven Bruce
It was a lightweight, not really adding anything type of review, not the book.

Gary Taubes
Yeah, no I'm just saying that what made it a lightweight not adding anything review was that he then said that the book was a lightweight not adding anything kind of book. I did notice that he referred to my arguments as scary. Authors never forget critical, negative reviews like this, say they walk around with them in their heads for, I will be spending the next 30 years of my life should I live that long on my diet? Or off my diet for that fact, you know, hoping to run into David Aaronowitch someday, it's just the way authors are programmed.

Steven Bruce
That's a very interesting point he makes, isn't it? Because I would like to think that a responsible journalist who says your article, your arguments are scary would have evidence why they're scary.

Gary Taubes
Well, he knows that he's lost weight on any diet. So and the arguments always are, because obesity is such an intractable disorder. And because there's such a huge psychological burden, the idea is that the obese are prey to snake oil salesmen, they always have, as with any individuals with intractable disorders, you could come along and sell them hope in the form of a diet or a, you know, some kind of phoney diet. And I understand that and it's one of the things that makes what I do so difficult is again, how do you

build up credibility so people understand that it's more than that, when I read a review like Aaronotich's, I feel that the failure ultimately is on me because whatever I did, I didn't manage to open his mind which the book is called The Case For Keto, for a reason. I would like anyone who reads it to wonder why anyone would do a diet that restricts you know, all of our favourite things. Why this is possibly something not only viable, but I'm arguing perhaps that should be the standard of care for obese and diabetic patients. You know, I'd hope they read the book with an open mind so they could see why do people like me who, why do reasonably critical skeptical science journalists find this so compelling? And it's not just that I control my own weight on the diet. If I didn't, I wouldn't write about it, clearly. But because, and this is something we should talk about, which is the conversion experience concept.

Steven Bruce
But again, still on the subject of risks. Steve has sent in a question saying, well, putting the obesity aside for people of a healthy weight. Is there any data on the risk of bowel cancer with the ketogenic diet?

Gary Taubes
Not that I've ever seen. So remember, ultimately, ketogenic diet is a diet that restricts sugars, grains and starches. So you're not adding anything to the diet, unless you well, you can do it with a significant amount of red meat and bacon and a lot of people do, but you don't have to. So a priori, I would not know a reason other than the absence of fibre that you might expect this diet to have negative sequela in the bowel or the, you know, the GI tract. There are populations, human populations that evolved effectively with fibre free diets and did not have high levels of cancer. So the hunter gatherer or the pastoralists like the Messiah in Africa are the usual example, the Maasai warrior class which lived on milk, meat and blood from the cattle they heard and the Inuit, the Native Americans, Plains Indians in the US most of the year did not eat, did not have fibre rich diets by any stretch of the imagination and had, at least when people tried to assess these numbers back in the early 20th century had surprisingly low levels of cancer. On the other hand, I'm not that interested in the lean healthy individuals at the moment when I write this book, and I say that in the first sentence, those lean and healthy people because of their diets might eventually become overweight and then obese and struggle with their weight but as long as they're lean and healthy now then they're tolerating the carbohydrates in their diet relatively well. The question is what do you do with these people have been fighting a weight problem their whole life? And they need to think about this differently to solve them.

Steven Bruce
Okay. Elizabeth has sent in a question from the other perspective if you like, she wants to know whether there's any information about whether a keto diet would help a person with lipoedema which is something she suffers from.

Gary Taubes
Ah, I just saw a paper published in the past month on ketogenic diets and lipoedema. So the issue with lipoedema is it may not be diet related. So because of the localisation of the fat tissue, it could be related. It's an argument against the caloric balance hypothesis because it does appear to be resistant to, certainly to semi starvation diets. But one of the arguments I'm making you could Google, you know, ketogenic diet and lipoedema, you'll pull up the paper I'm thinking of and it's worth a try. The argument that I'm making in this book we now have, well, when I first started writing the book, things that made me

take this seriously is the first five clinical trials really ever done comparing a ketogenic diet with the Atkins diet versus the kind of low-fat American Heart Association diet we'd been told to eat. And there were five of these trials, they hadn't been published, yet. They had been discussed in conferences so I could discuss them. And they all have the same thing. People on the ad libitum Atkins diet lost more weight, and had better heart disease risk factors than people eating the calorie restricted, low fat American Heart Association diet. So since then, we now have if you go to clinical trials.gov, and put in ketogenic as a keyword, you'll pull up about 100 trials that have been completed, I'm going to assume half of them are on paediatric epilepsy and aren't particularly relevant, but the other half are not. And then there's another 160 or so that are now in progress. When the American Diabetes Association, a couple years ago, published their review of the nutritional therapy for diabetes, they said the very low carb diet, which is keto, and the low carb diet had more evidence and more consistent evidence in any other trial, any other diet being prescribed for diabetes. So the argument is, we know it's safe, you can do it as an experiment. And again, part of the reason I'm writing this book is if we're going to do an experiment, I want you to know how to think about your experiment, how to do it, right. If it helps your lipoedema, and if it does, you don't need a clinical trial to tell you efficacy, you only have to worry, again, about safety. And we now have those, we have more than we have for any other diet.

Steven Bruce
We are getting there.

Gary Taubes
Okay, at what point did we lose me? Can you hear me?

Steven Bruce
You said there is now the evidence that it's safe when there's more evidence for this than there is for any other diets.

Gary Taubes
Yeah. And that's, that's what you need to know to do an experiment, you have to know, if I'm not gonna die, if the evidence strongly suggests that this is at the very least safe, I can test whether it's effective on myself. Okay, now I just have to do it. And again, the reason I wrote this book is so that people would know how to think about it. So when they did decide to try it themselves, they wouldn't undermine their own attempt by doing it incorrectly or not understanding the basis of you know, why they were doing this and what they hope to achieve.

Steven Bruce
That's one of the concerns and I think in your book, you say that the mainstream medical profession will often make this allegation is that we don't have any evidence, any clinical trials, which show what the long term effect of the diet is. So if someone wants to reach a pure keto diet for the rest of their life, starting at the age of 20, would they live longer, would they be healthier? Or would something dreadful happen to them under the age of 50 that wouldn't otherwise have happened?

Gary Taubes
Yeah, and we don't know. I mean, it's interesting, on one level, and I use actually an Instagram quote from a woman in Wisconsin, a real estate agent in Wisconsin who just really captured that she said, you know, I went on this keto diet, I think she was 340 pounds and so I lost 110 pounds. And suddenly my friends are worrying about how much bacon I'm eating. Right? Is the bacon I'm eating gonna kill me. I'm 110 pounds lighter than I was, can I possibly? So a 20 year old who goes on a ketogenic diet, if he's a 400 pound 20 year old who gets down to 230 and his lipid profile is now ideal. So he's had terrible insulin resistance and all the bad risk factors that go with insulin resistance have now resolved, we can talk about LDL and we should talk about LDL. But you have an individual who's definitively healthier. And you can guess that if he adds back carbohydrates to his diet, his weight status, I see weight as do the researchers and physicians in my world. It's just another symptom of metabolic disturbance. And it's part of metabolic syndrome, if you think about it, it's not just low HDL and high triglycerides, and then high blood sugar and high blood pressure, it's an increased waist circumference. So if you think of the increased waist circumference is another symptom of what's ultimately insulin resistance, then you resolve all of that, it's a very, very good chance you're going to be healthier. Now, what's interesting, remember, I started my career, I told you, I did two investigative articles for the Journal of Science. The first was on salt and blood pressure. And while doing that article, one of the worst scientists I'd ever had the joy to interview, and my second book was called Bad Science. And it was about cold fusion. And I thought I interviewed the worst scientists in the world for that. But know there were worse in nutrition and chronic disease, one of the worst I'd ever interviewed. They were at least as bad, told me, took credit, not just for getting Americans eat the low salt diet we'd all been eating, but the low-fat diet. So I got off the phone with this fellow. And I called on my editor at Science, and I said, when I'm done writing about salt, I'm going to write about fat. I don't know what the story is, I had been eating a low-fat diet like everyone else at the time. I just know if this guy's involved in any substantive way, there's a story there. And then I spent the next year of my life researching and I interviewed 140 odd researchers and administrators and physicians for that one magazine article on, we never had the evidence that the low-fat diet was beneficial. And that's the thing people forget. So now we're saying, look, you've got to forget about the low-fat dogma, these clinical trials that I'm talking about in all these ketogenic diet trials, and virtually all of them they're saturated fat rich. And in virtually every trial, these subjects eating the diet come out healthier than they do, compared to whatever the comparison diet is, which is often an American Heart Association, mostly plant diet. And what I would love to see is a comparison between a ketogenic diet or a low carb, high fat, nearly ketogenic diet and the Mediterranean diet to kind of put these discussions to rest. But the only evidence we have that eating any other diet is beneficial is observational epidemiology. Remember, I started off talking about that these are surveys that give you an association between what people eat and their health status. And then the assumption is that if they're healthy, that's because of what they ate. And if they're unhealthy, that's because of what they ate. And that's a hypothesis. And we don't have the clinical trials to test that either. So what you're left with is, and this was phrased to me very well by a physician, so one of the things I did for this new book is I interviewed 120 odd physicians who have converted to this way of thinking and prescribe low carb, high fat ketogenic diets to their patients and think it's vitally important that they do so. This one, Martin Andreas, who practices from South Africa, and he practices outside of Vancouver and British Columbia in Canada. And he said for 50 years, we've been taught to prescribe diets by hypothesis, when you put a patient and say you should eat a Mediterranean diet or a DASH diet, or any kind of low fat diet or a low salt diet, you're prescribing diet by hypothesis, there's virtually nothing you can measure that will tell you whether or not

the diet is going to lengthen your patient's life or not. If the patient lives to be at or lives to be 100 or dies at 60 of a heart attack, you will have no idea what role the diet played. You can measure lipids, but they only give you probabilities, they won't give you any knowledge and the alternative is you put them on these low carb, high fat ketogenic diets and you watch them get better. There's a physician and I forget if it's England or Ireland and I apologise Dan Murtaugh who I interviewed who said you know, a couple of his patients, you have a 300 pounder on hypertensive drugs, diabetes drugs, you take him off carbohydrates and tell him to eat fat and eggs and bacon as much as he wants and you have a 200 pounder who's no longer on any medication, are you going to tell that person to go back to eating potatoes, because we don't have any long term clinical trials that give us some probability that they're going to live longer.

Steven Bruce
It baffles me though, because Ancel Keys and Atkins, surely, they were promoting in their research that their theories in the 1960s are safe, that we ought to have long term evidence by now, surely.

Gary Taubes
But you need long term clinical trial evidence, and we never got it. The assumption was, the fundamental assumption of risk factor epidemiology, these prospective cohort studies that are done by everyone in the world because they're relatively inexpensive to do is that you can follow people and monitor how they eat and control for all other factors and come to something long term conclusions about weight and diet, the health status and diet and it's just, I find that argument completely uncompelling and it sort of flips the paradigm of what science is. So one thing we knew about sciences, I mean, you're taught in eighth grade, control your variables, change one variable. And that's an experiment, then you can understand what your experiment, how to interpret it, that if I change one variable, then whatever I see, whatever effect I see, I can assume is caused by that change on the kind of arguments that Claude Bernard made in 1865 in his introduction to the study of experimental medicine, which every doctor should still read, the translation is not great I've been told, but it's the only one there is. And Claude Bernard was a very, very smart, witty man. But instead, we have a whole field of research that's willing to sort of jettison the idea, the hypotheses that experiments are even necessary to test hypotheses. And we should all live by their hypotheses. And I always think back to Ernest Hemingway in the last line of the Sun Also Rises, I think, wouldn't it be pretty to think, you know, you have to tell us these hypotheses. But when it comes to the short-term risks and benefits, you can do those yourself when it comes to weight and diabetes status, you don't need the long term drugs to know if you're getting healthy for a year or two.

Steven Bruce
Again, when I announced discussion to our members, I did say that we'd be talking about insulin. And I wonder if actually, you'd like to talk us through the mechanism by which the keto diet works.

Gary Taubes
Okay, well, and again, I'm going to flip the question a little bit, and we're going to talk first about the mechanism by which we get fat. So the conventional thinking is we get fat because we eat too much, we take in more energy than we expend. And that energy is stored in fat tissue. And the way to fix it is to eat less and exercise more, create a negative energy balance. One of the arguments I'm making the book, it's very good and in fact, some of the leading endocrinologist and obesity researchers in the world from

the 1920s to the 1970s made the same argument is, if you think of obesity as a disorder of excess fat accumulation. So if you go to the textbooks right now, and the articles will also say obesity is a disorder of energy balance, which is an assumption, what we know is obesity is a disorder of excess fat accumulation, if you have a subject in front of you who weighs 300 pounds, and it's fat, then what you're worried about is your excess fat. And by the 1960s, we had come to understand the metabolism, researchers, physiologists, some very brilliant research done from the mid-1930s to the mid-1960s, had established the hormonal enzymatic regulation of fat accumulation. And for your listeners, go to your biochemistry textbooks and look up lipolysis for instance, that'll get you there or adiposide or fuel metabolism. And that process is dominated by the hormone insulin. So virtually every hormone works to get fat out of fat cells. Because every hormone is telling your body to do something and then in doing it, they also make the fuel available which means trying to get fatty acids into circulation so your body can burn them for fuel. In fact, the first time we had a tool that allowed to measure fatty acids in the circulation, which was in 1956, or 58, three groups around the world came up with assays. And one of the first thing they realise is you give adrenaline to a subject and their fat tissue dumps fatty acids into the circulation. And the adrenaline is prompting you to flee or fight and the fatty acids, the assumption is they're there to fuel that fleeing and fighting if necessary. The one hormone that dominates works to put fat into fat cells is insulin. And again, this was textbook medicine by 1965. So insulin upregulates an enzyme called lipoprotein lipase on the adiposide membrane and lipoprotein lipase works to break down triglycerides and whatever lipoproteins are passing by in the circulation, breaks them down into fatty acids, the fatty acids flow across the cell membrane, and then they're reesterified or esterified in the fat cell. And then there's an enzyme, a series of enzymes called hormone sensitive lipase, it's inside the fat cells that break the triglycerides down to the fatty acids so they can get out again. So if what you're worried about, not how much people eat and exercise, but how much fatty acids are taken up by the fat cell or mobilised by the fat cell, that process is dominated by insulin. So you elevate insulin, you increase fat accumulation and inhibit fat mobilisation, insulin shuts down lipolysis in the fat cell, and you lower insulin, you reverse that process. And in 1965, Salomon Berson who, with Rosalyn Yalow develop the radio immuno assay that allowed hormones to be measured accurately in the bloodstream for the first time. Yalow won the Nobel Prize for this work after she passed away. In 1965 they pointed out in the Banting Memorial Lecture at the annual meeting of the ADA that for the fat cells to mobilise fat, you need the negative stimulus of insulin deficiency. So, fat cells are so sensitive to insulin, the term used by the metabolism researchers who I interviewed when I started this research 20 years ago, and you often see this term in the textbooks, excuse me, their articles is fat tissue is exquisitely sensitive to insulin. So if there's a tiniest bit of insulin in the circulation, your fat cells are in storage mode; that insulin will inhibit lipolysis, inhibit the process of getting the fat out of the fat cells and having a burn for fuel. So basically, what you need to do, if you just care about what is indeed textbook medicine, and you assume it's applicable to obesity, to get fat out of the fat cells, your fat cells have to see this negative stimulus of insulin deficiency. Another phrase I use over and over again in the book. The way you minimise insulin, is you remove the carbohydrates in the diet, replace them with fat. And now you're eating a ketogenic diet. It's a high fat low carb diet, but it minimises insulin levels. And it guarantees that your fat cells will spend the maximum amount of time per day seeing this negative stimulus of insulin deficiency. So, you know, in the course of my research, I never imagined when I started this, that I would ever write a book called The Case for Keto. It still keeps me up at night, the fact that I did, but one of the things that's so compelling is that what metabolism researchers had worked out and biochemists and some very good, mostly British biochemists I might add, Philip Randall, and his collaborators, what they had worked out by the 1960s was all the various

ways that insulin sort of determined fuel partitioning in the human body. And when insulin is elevated, what it's doing is it's telling cells to burn carbohydrates and to store fat. And if you become insulin resistant, then your insulin is elevated most of the day, it's elevated for an abnormal amount of time. And even Yalow and Berson proposed that all you had to do is elevate insulin a little bit to cause obesity. So the causality is not necessarily that obesity causes insulin resistance, but that a tiny bit of hyperinsulinemia from a tiny bit of insulin resistance begins the process of excess fat accumulation.

Steven Bruce
Okay, and you've talked about dumping fat into the bloodstream. Have you seen any research on the relative merits of fats over glucose for fueling the cells?

Gary Taubes
Well, I'm getting complicated. And now we're asking which cells. The argument against ketogenic diets, one of the many arguments against them historically had been that the brain requires 100 to 130 grammes of glucose a day to fuel it. And it is true that your brain will run on glucose when you're eating a carb rich diet, but, and this was worked out mostly in the 1960s. It was, ultimately, it was common sense. And I've been reading a lot about this lately in the context of the diabetes literature. But in the 1960s, when again, when the tools were available to do these studies, researchers realised that when you're, the question always is what synthesises ketones when when it's not being fed carbohydrates and you're eating a high fat diet or you're fasting so after a day of fasting or even after an overnight fast your liver starts upping its ketone synthesis. And the question is why, and as it turns out, it was discovered primarily by George Cahill and his collaborators at Harvard, the brain, the ketones fuel the brain, so in the beginning of a fast or carbohydrate free diets, you'll get glucose from the protein that's being broken down and you'll get glucose from the cholesterol molecule that's released from the triglycerides or lipolicised into fatty acids. But your body is trying to conserve protein. So what it does is it synthesises the fat that's being released from the fat cells and the liver synthesises then the ketones and then your brain runs on ketones. About 75% of the energy comes from ketones, 25% from glucose, from again, the glycerol molecules mostly from the fat. So there have been arguments and evidence that the brain runs more efficiently on ketones than glucose and that's why ketosis feels so good to some people. I have no idea if my brain is running efficiently or not, because I have nothing to compare it to. There have been arguments made for the heart as well. Usually using, you know myocytes heart cells in vitro. You know, the body runs perfectly fine, your krebs cycle and your mitochondria and don't particularly care if it's burning fatty acids or glucose. One of the arguments against burning glucose, you get fewer reactive oxygen species burning fatty acids than burning glucose, so you get less oxidation and oxidative damage to cells burning fatty acid, there's a lot of arguments you can make for the benefits of burning fatty acids. The problem is, if you're eating a carb rich diet, and particularly if you're drinking carbohydrate rich beverages between meals, then you're basically burning glucose all the time. So you're never, and that's why your argument would be why you're not accessing your fat, why you're not losing fat, is because your body is, the insulin is secreted in response to these carbs, is telling your lean tissue to burn carbs. And again, the diet book doctors use phrases like carb burning machine and fat burning machine and unfortunately, there are appropriate phrases, catchy as they may be or corny as they may be.

Steven Bruce
You mentioned ketosis earlier on. And I imagine that that might be alarm bells with people because of course with a diabetic, one of the consequences of hypoglycemia is that ketoacidosis, which is a sign of a fairly dangerous development in diabetes.

Gary Taubes
Yes, and this is one of the again, one of the things that's fascinating when you take a historical perspective to the field because, and I've been reading a lot of literature from the pre insulin era and then the early years of the insulin era in diabetes, so the standard diet for diabetics prior to insulin was known as the animal diet and it was effectively a ketogenic diet. It was fatty animal products and green vegetables that had been boiled three times to remove all the possible carbohydrates in them and vitamins also. They knew back then that a carbohydrate restricted diet created ketosis, added elevated ketones and this was a perfectly normal aspect of the metabolism because it also happened after a 12 hour fast or a 24 hour fast. And so there was clearly a healthy metabolic response with some ketosis. And then there was the pathological phenomena that ended in diabetic ketoacidosis, coma and death. And the discussions, in mostly the European textbooks, but even some of the US books and articles would discuss this difference. But once insulin was discovered, and coma, for the most part was eradicated by the use of insulin, some of the clinicians led by Elliott Jocelyn in the US who by virtue of his clinic, and the number of patients he had, and his prolific writing and his textbooks became the leading diabetes influencer in the world, became scared of high fat diets because they would, Jocelyn saw that as perhaps the reason why so many patients had died of coma prior to insulin coming on. So instead of the high fat diets keeping them alive, only to eventually die of coma, this would be the type one diabetics, he thought maybe that fat had killed them. And because there were no real discussions of this, this idea that the ketosis that you get when you abstain from carbohydrates, and ketosis from fasting could somehow slip into diabetic ketoacidosis or was somehow related to it just became one of the accepted ideas in the medical research community, I suppose a lot of diabetes researchers still do. It's one reason why a lot of diabetes researchers and diabetologists are still scared of ketogenic diets for even type two diabetics, because they fear that somehow you're on a slippery slope. And if you get a little ketones, you'll end up with diabetic ketoacidosis. And it's both physiologically and practically naive, but it is told doctors think, to not take risks with your patients life. So I'm not belittling that.

Steven Bruce
In the book, I think you made the observation that on a keto diet, you might end up with something like five millimoles per litre of ketones in your bloodstream as opposed to 20 if you're a diabetic in ketoacidosis.

Gary Taubes
Yeah, I mean, five is difficult to get to. And what *audio drops out* do is they stimulate insulin secretion as a feedback mechanism. So the one reason the insulin will inhibit ketogenesis and hepatocytes. And so if you lower insulin to nothing, or if you're a type one, and you don't have any insulin to secrete, then ketogenesis can run out of control. But if you have insulin, as most of us do, then ketones will stimulate some insulin secretion, which will prevent a runaway cycle from happening. So it's a natural response to ketosis to keep it and you know, the kind of negative feedback loop you see in any healthy homeostatic system, which is ultimately what we're trying to do, is restore people to a healthy weight by allowing the

homeostatic mechanisms in their body to work the way they're supposed to work. And the way you do that is by removing the, is theorised to be the cause of the problem, which is the carbohydrates

Steven Bruce
I'm going to get through some of the questions that have been coming in, Gary and Gillian sent one in a long time ago about intermittent fasting, and I thought you might touch on fasting at some point. So I've left it until now. You talked about specific short term and fasting, she's talking about intermittent fasting, is there a benefit to that, do you know?

Gary Taubes
I do but first of all, just to give you some background on this is a little naive of me, but I am restricted eating and intermittent fasting. So for instance, I think of myself as intermittent fasting because I stopped eating at eight o'clock at night and I don't eat again until, you know, one o'clock the next day when I have lunch. So I think of myself as fasting for 16 hours or 17 hours. But the flip side is because I have lunch at one o'clock and then I have dinner at seven o'clock and I'm done by eight I'm restricting my eating to seven hours a day instead of 10. So they're kind of the same thing, flip sides of the same thing. By the way, in the diabetes literature the term intermittent fasting comes up all the time because virtually everyone acknowledged that occasional intermittent fasts of half a day or a day, for whatever reason, allowed people to control their diabetes both with insulin and without insulin. A couple years ago, the British Medical Journal, and the Swiss reinsurance company Swiss Re cohosted a meeting in Zurich on diet and chronic disease. And on the Saturday was the BMJ aspect of the meeting. And on Sunday, Swiss Re at a meeting for people in my world who prescribe low carb, high fat diets for obesity and diabetes. And then there were 50 of us sitting around an enormous conference table in Zurich, and it was all the major figures in my field, and I asked them, how many of them were doing intermittent fasting, and 45 of the 50 raised their hand, so 45 of the 50 were either not eating breakfast anymore, or not eating dinner anymore, or skipping a day going 24 hours without eating. I did it as an experiment, began about four years ago, and I've been hearing a lot about it, so I thought I might as well try it. And I did. And I felt better. So I had more energy in the morning. I didn't miss breakfast. After a few days, I found I wasn't hungry in the morning, and I lost a dozen pounds that I didn't really care about. I didn't think I needed to lose. But it was nice. And I've kept doing it because I feel better. I have more energy. I haven't eaten lunch, haven't eaten yet today, and it's quarter to, well 1245 going on lunchtime, and I'm not hungry. So it's the kind of thing again that I advise anyone could try. Jason Fung the Toronto nephrologist who pioneer promotion and thinking on intermittent fasting said, you know, anyone could agree that going a day without eating, you're not telling anyone to eat too much saturated fat or too much salt or not enough carbs, you're just going a day or half today without eating that can possibly harm people. Extended fasts can be dangerous once you get past two or three days, but certainly the short fasts and there's a lot of evidence that they improve metabolic risk factors and lead to weight loss compared to standard American and British eating. Whether they are better or worse than what we would call a sad diet, a standard American diet but fast two days a week and be healthy or as healthy as you would like to be, we don't have the evidence to say that.

Steven Bruce
Okay. Rob has asked whether there is any danger of electrolyte loss on the keto diet he's thinking specifically of potassium he's heard about.

Gary Taubes
Yes, and there is and you know, people know it because they cramp usually or they sense the Atkins, used to be called the Atkins flu. Now it's called the keto flu. You're losing a lot of water in this diet because your body pretty much burns through its glycogen supplies, you're not restocking glycogen and you store the glycogen, each glycogen molecule is stored with, I forget if it's three or four water molecules. So there's a lot of water loss. Insulin also inhibits sodium retention by the kidney, which is one reason why it's possible that insulin resistance is also the cause of hypertension, an argument that I've made in previous books. So you lower insulin, you tend to flush sodium out of your body with the water. Most clinicians who recommend, virtually all clinician who now prescribe these diets do it with drinking a cup of broth a day to supplementing with potassium and magnesium to heavily salting foods. Again, another reason why it's hard to get established medicine to agree that this is a reasonable treatment for obesity and diabetes, let alone standard of care because you're telling people to up their salt intake. On the other hand, because it's virtually impossible to do this without eating any processed foods that you buy in supermarkets, you are restricting your sodium intake significantly by not buying the foods that typically have high salt content. So but yes, supplement, particularly magnesium, sodium and potassium are often recommended and certainly drinking chicken or you know, some kind of animal broth.

Steven Bruce
Not surprisingly, I've had quite a lot of questions in asking what you do if you're a vegetarian or a vegan.

Gary Taubes
It's more difficult to do as a vegan, certainly, but there are Facebook groups. And again, I recommend people Google these or vegan ketogenic diet Facebook groups or vegetarian ketogenic diet Facebook groups, you end up using a lot of oils for your fat stores. If you can eat, eggs *audio problems*, actually one of the, when I first wrote my book, Good Calories, Bad Calories, I got a letter from a physician, a graduate of the Duke University Medical School who said to me that he was a vegetarian, was a vegan. And he had heard me on a radio show, and he had decided that I was full of crap. And he thought of himself as open minded, so he was going to read my book, which in the UK is called The Diet Illusion. And he figured he'd get a couple of chapters in, and he concluded that it was crap, and then it could go back to his life. And he said, much to his dismay, he found my arguments compelling. And what he had done was added back eggs, and some dairy to his diet, and he lost 20 pounds. Ultimately, it's about improving the quality of the carbohydrates you're eating. So we're restricting sugars and sugary beverages and ultra-processed flours, which are, you know, the proponents of vegan diets will talk about healthy vegan diets as diets low in sugar and white bread in it. And then, using a lot of oils to add fat to the foods and trying to shy away from starchy carbohydrates like potatoes, beans, and legumes, it's harder to do, it's harder to pull off, but people find ways to do it. And if you're eating a vegan, vegetarian diet already, you're already working pretty hard to control the content of your diet. And a lot of this is arguing that, you know, those of us who put on fat easily, who can control our blood sugar, we just have to put in that control, we have to put in that effort. But we also have to make sure that what we're doing is actually right, and not the misguided nutrition advice of the last 50 years.

Steven Bruce
Helen's asked what the long term effects are on weight loss. Do people on a keto diet put it back on the way people on other diet seem to?

Gary Taubes
Well, the argument is to find a different way to think about diet. And the argument I make is that every diet is a theory attached. Right. So with most diets the theory is you get fat because you eat too much. And so you eat less, you lose the weight, and then hopefully, you'll somehow continue to eat less enough that you will maintain that weight loss and it always fails. The theory behind this diet is that carbohydrates are fattening but not because of the calories they contain but because of our insulin response, they're not fattening to everyone but those of us who get fat, it's the carbohydrates in the diet that trigger it. So we can't eat carbohydrates. It's unfortunate, or let me rephrase that, we can't eat carbohydrate rich foods. And that's unfortunate but that's a fact. So if we want to fix the problem, we remove those foods, if we ever go back to eating them, we tend to have the same effect they always did. Which is make us fatter.

Steven Bruce
One of the surprising things I saw in your book was, I'm not sure I remember this correctly, you're saying that actually eating carbohydrates makes you hungrier.

Gary Taubes
Well, it's funny. That's a very well-known phenomenon actually, because if you think about it, the role of an appetiser in a meal is to make you hungry, that's why it's called an appetiser. The French have a phrase and I'm not going to mangle the French by saying it in French but the appetite begins with the meal and as you start eating, you actually get hungrier and I recommend to anyone when they sit down, it's very well known if you pay attention to how your body works, and if you have children this is very clear, just sit him down, call them down to the dinner table, say two hours before dinner and put a plate of french fries in front of them or chips as you'd call them and then see whether or not kids who weren't hungry suddenly become hungry. The argument is that insulin is on one level it's increasing the signaling in your lean tissue and your organs to take up the glucose that should be available if insulin is being secreted and to burn that carbs for fuel and then to, it inhibits fatty acid mobilisation oxidation. So in effect it empties your fuel, your circulation of available fuel as soon as you start secreting it and there's something called the cephalic phase of insulin secretion, cephalic that means, you know, from the neck up. And it's a Pavlovian response, is how you could think of it. So we start thinking about eating, if I mentioned, for instance, you know, hot cinnamon buns, many of us will start salivating, just on hearing those words, but we also start secreting insulin. And the insulin prepares the circulation for the fuel to come and in the process makes us hungry. So the argument is, when your insulin is elevated, you're lacking, you're inhibiting the use of fat for fuel, you're inhibiting the use of protein for prime fuel. So not only will you be hungry, but you'll crave carbohydrates particularly. And when your fat cells are perfectly happy, lipolycise fat to get the fatty acids into the circulation. And so you shouldn't be hungry. And again, when I said one of the reasons I bought into this was, I kept finding the same hypothesis coming up in multiple fields of science. So for instance, the idea that carbohydrates are the inherent cause of chronic disease, heart disease, diabetes, obesity was, well, it's refined carbs and white flour and sugar were a common theme in the British nutrition literature going back a century and then a Research Scientist named Peter Cleave writes a book in the mid-60s called the Saccharine Disease and Cleave makes that argument that carbs are the cause of obesity, diabetes, and heart disease. And then another British nutritionist makes the argument and oh, I'm gonna forget the fibre guy, basically, takes that argument that refined carbs cause disease, and flips it to say the absence of fibre is the problem and we embrace the fibre hypothesis. But then there's a field of science called Phyl psychology, or psychological

physiology, which is the idea that our fundamental behaviours are caused by underlying physiological states that dates back to Claude Bernard and Pavlov and Walter Cannon who coined the term homeostasis. And this field of science came to the conclusion in effect that insulin is, you know, going to determine hunger levels, and fuel availability in the periphery. It's whether or not your brain is well fed because your brain is well protected against food shortages. But whether your cells are well fed that will then particularly, your liver cells will determine your hunger status. And again, you elevate insulin, you will get hungry, your liver cells will burn through the carbs, and you will crave more. So a whole slew of disciplines sort of coming to the same conclusions, all of which are ignored by the mainstream researchers who believe that we get fat because we eat too much. It's a psychological eating disorder and we get the heart disease because of the fat content of our diet.

Steven Bruce
Gary, we got five minutes left just about and it's a chance so we can run through some questions really quickly, because I hate to see people disappointed by not getting the answers that they were looking for. Jane has asked whether the diet might address obesity in someone with familial hypercholesterolemia.

Gary Taubes
It's worth a try, I would expect it to, for all the reasons we've said, I would expect it to be worth literally lying on the obesity and then monitor the lipid level. And again, I'm not a doctor, I'm a journalist, I'm not allowed to give medical advice and I certainly wouldn't be allowed to do it with a different nation, but I would monitor their lipids. And you know, I'm verse to statin use when necessary. But if the goal is to reduce fat accumulation, then the argument is you're gonna have to lower in some levels and the ketogenic diet will do that, will do that better than anything.

Steven Bruce
I also say to Jane that, I mentioned Malcolm Kendrick at the beginning of this discussion, Jane, if you read his books, he's got some very interesting views on hypercholesterolemia, which we won't go into here. Someone who hasn't given the name asks whether you would change anything about a keto diet for menopausal women and whether you think it might change some of the issues that come with the menopause.

Gary Taubes
Answer is again, the ultimate aspect of the ketogenic diet is the idea that carbohydrates are fattening. In fact, an article I quote in all of my books, first sentence of 1963 British Journal of Nutrition Article, coauthored by one of the two leading British dieticians in the 1960s, whose name I'm going to forget, every woman knows that carbohydrates are fattening. And this is what every woman knows. So going through menopause, weight is gained during menopause, fat is gained during menopause because of the change in hormonal status. The way to affect that through diets, if it can be affected, is to lower the carb content of the diet. And if a woman wants to try keto, I would advise that this is a safe and could be a very beneficial way to do it.

Steven Bruce
Jamie would like to know about how the diet might affect mood and psychological pathologies.

Gary Taubes
If you look at clinical trials.gov, a lot of clinical trials going on now are diet and the ketogenic diet for depression and mood in the short term, again, it's just hard to say, people respond differently. Some people report feeling wonderful in ketosis removing the carbs. Atkins used to get in trouble because he said ketosis feels better than sex. Other people clearly had mood issues. So it's the kind of thing with patients I would prescribe it, I would have them do some research on their own, so they know what to expect. And then I would monitor it, but if they do have mood issues, I would experiment with the idea, can I keep the carb content of the diet low and address the mood issues? Or maybe they can ride it out? You know, but it is the kind of thing, I've struggled with mood issues my whole life, I don't want to belittle those for a second.

Steven Bruce
Last one, the last one we have time for I'm afraid. Somebody unknown asked whether the keto diet makes the body too acidic. And that acidic environment might be a precursor to the disease?

Gary Taubes
Well, again, if it is then you would see in the clinical trials and you don't. So you know, that's why you want to do ideally the long term clinical trials. And if you know if you have any exceedingly wealthy listeners, and they want to donate to clinical trials, just look me up on the internet, and I'll get them done for you. But at the moment, there is no sign of any increased disease risk from these diets. LDL cholesterol will go up for some people, but every other risk factor will get better for most people.

Steven Bruce
I guess on the subject of LDL cholesterol I can only recommend Malcolm Kendricks work again, because I think a lot of the science around that is biased, possibly because of the pharmacological marketing and so-called research behind statins. We will probably have to leave it Gary and it's been fantastic talking to you. It really has. I apologise to Liv and David and Elvina, Jamie, others. I haven't had time to ask your questions. And I'm really sorry about that.

Gary Taubes
If they want to email me through my website, I will respond to virtually every email at least once.

Steven Bruce
Fantastic, I'll put that on our website as well. As I say it's been great talking to you. Earlier on in this discussion, Gary did say he wasn't sure whether the diet was making his brain work more effectively but it might. I leave it to you, the viewers to judge that, he knows more about homeostasis and the biochemical prophecies, what goes on in our body, even knows about the Krebs cycle and I gave that one a miss during my osteopathic study. I think his book is very revealing. There's a lot more science in the book. I can only recommend that, The Case For Keto. Gary is the hardback copy available in the UK yet?

Gary Taubes
UK only has paperback and Kindle and probably audible book, but the UK edition is paperback.

Steven Bruce
I seriously recommend it. As Gary said earlier on, and the whole business about science is read somebody's opinion, read their research and question it by all means, but there's some really hard science in the book and it makes for a very good reading.