



THE FAT SUMMIT

Separating Fat From Fiction

Transcript:

Interview with Nina Teicholz
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Interview by Mark Hyman, MD
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Dr. Hyman: Hey, everybody. This is Dr. Mark Hyman. Welcome to the Fat Summit. I'm here with my good friend Nina Teicholz, who's an amazing journalist. When I actually thought of writing my book on fat, her book was the first book I read, called "The Big Fat Surprise," which is an amazing book that I devoured on the beach and had underlined every word, every paragraph pretty much. It's dog-eared, and looked at every reference, dug into every footnote, because it was just a treasure trove of investigative journalism that was a masterpiece, both in terms of its content and also the sentences you create are beautiful. It was just a pleasure to read.

Anybody that's interested in this topic, they have to read Nina's book. Of course, it was an international bestseller, it was a *New York Times* bestseller, and it was The Best Book of 2014 by *The Wall Street Journal*. It was noted by *The Economist*, *Forbes*, *Mother Jones*, *Library Journal*, and it's just an amazing, amazing book.

It really highlighted, not from a doctor's point of view, but from a journalist's point of view, what's the story? What impressed me was that you really had an eye toward not just reading the headlines but reading between the lines and trying to understand the origins of how we got into this big fat mess of this enormous epidemic of obesity, diabetes, food-related illness by this concept that we should all be eating a low-fat diet.

Now, I know I certainly ascribe to that. I went to medical school in the '80s at the heyday of the low-fat diet, at the time we should all be shunning egg white omelets and skipping the butter and the steak. I was a vegetarian, and eating tons of carbs. Pasta was a health food. Bagel was the healthiest breakfast you could have, and you couldn't even put the butter on it.

Now everything seems to be turning around. You did a beautiful job of identifying the myths that we have of looking at the history of how we got into this, and I think it's important to go back through that story a little bit, because most of us don't understand how we got here, and how could we have gotten it so wrong, and how did we miss the boat on what we should be eating, and how did the government and all the scientists fall into line around the story that fat is bad and carbs are good?

Could you help us unpack that a little bit? I know it could take hours, but just give me your version of how...

Nina: Well, first of all, thank you for having me on. It is truly an incredible story. The description I like best on my book is it's a nutritional thriller, which it is. You just can't believe what happened and how it happened.

Dr. Hyman: There are a lot of bad guys and good guys in there. It's interesting.

Nina: Yeah, that's all the personalities and the politics. It's just fascinating, and it affects us all so much. The story really starts in the 1950s when the nation is in a panic over the rising tide of heart disease. It had come from pretty much out of nowhere and had become the nation's number one killer. You imagine men your age, their fathers had lived to old age, and yet their colleagues are all dropping down in the golf course from heart attacks.

President Eisenhower himself had a heart attack in 1955. He was out of the Oval Office for 10 days. This really traumatized the nation, and there was a desperate need to figure out what was causing heart disease. There were a number of ideas about that. Maybe it was vitamin deficiency. Maybe it was car exhaust, but there was one man, a pathologist who...

Dr. Hyman: It might still be car exhaust a little bit.

Nina: Actually, I think that's been pretty well not even disproven, but who knows? There was one man, a pathologist from the University of Minnesota named Ancel Keys, and it was his idea that it was saturated fats that was causing heart disease. Saturated fats would cause your total cholesterol to go up. That was the only thing they could measure in those days. Would clog your arteries and give you a heart attack. He called that idea the diet-heart hypothesis. That was his idea. He was this incredibly aggressive, outsized, highly persuasive individual, who was able to get his idea implanted into the American Heart Association.

In 1961, the very first advice to the public, any public anywhere in the world, to cut back on saturated fat and dietary cholesterol came out of the American Heart Association in 1961. That was the beginning of this whole idea. I just want to note back then it was only saturated fat. There was no idea that an overall low-fat diet was good, but you were supposed to get rid of saturated fat, the kind of fat in meat, butter, dairy, eggs. Remove that, and instead replace it with polyunsaturated vegetable oils. In fact there's a whole story in my book about how the vegetable oil industry was behind the American Heart Association really from its major national launch.

Dr. Hyman: I want to get into that a little bit.

Nina: It was the president of the AHA holding a bottle of Crisco Oil and advertising it, so there was industry influence from the beginning, but it was really Ancel Keys who drove that through, and he was a true believer.

Dr. Hyman: Tell us, how did he come up with this idea that saturated fat is bad, and what was it based on, and was the evidence good, or was this just all a House of Cards?

Nina: Pretty much a House of Cards. His first idea was that it was overall fat that caused heart disease. He had traveled around Europe, and he really was somebody who understood that maybe diet was driving disease, so that was an important contribution. He just got the heart of the diet wrong. He went to these countries. He saw rich people basically eating diets that were big, heavy meals, and compared to the peasants who didn't really eat, had very bare-bones meals, and Ancel Keys thought it was the fat in the meals that was causing heart disease.

He didn't notice that these people also ate a lot of dessert, had a lot of sugar in their meals, and that was another difference. He was just so focused on fat, and he was completely convinced that he was right, and then he went off, and he did the biggest ever study, what I also call the big bang of nutrition studies.

Dr. Hyman: That was the Seven Countries Study?

Nina: The Seven Countries Study. Two thousand papers in nutrition science, they all telescope back to this study. It was on nearly 13,000 men in 7 different countries. Mainly Europe, but also the US and Japan. He went in and he tried to see if diet correlated with heart disease. He already had an idea that it was fat and saturated fat. He was basically trying to prove his idea.

One of the things that I did in my work was really I dove into that study just down to the very nitty-gritty, and looked up all of the obscure protocols and stuff, and to see what was wrong with that study, if anything. I found out that it was...

Dr. Hyman: Well, what was wrong?

Nina: What?

Dr. Hyman: What was wrong?

Nina: Well, a lot of things were wrong with that. For one thing, out of the 13,000 men, they only sampled the diets of fewer than 500 of them, which is not even nearly a statistically representative sample, and then they sampled the diets in a number of different ways and they found that nothing really correlated with each other very well.

One of the emblematic points that I like to bring up about this study, which reveals how methodologically flawed it was, was that their star subjects were on the island of Crete, these peasants that seemed to live to old age and worked the fields. These are actually the people who became the founding men of the Mediterranean diet.

First of all, he only sampled the diets of 33 or 34 of them, and he went during three separate weeks, study periods. One of those weeks it turned out was during Lent, when they were not eating meat, so that means he must have undercounted the amount of saturated fats.

Dr. Hyman: What he did was he asked them what they ate. That was how he did the study. He did dietary reference, like food recall.

Nina: Some were food recall, but then he threw all those records out, because he realized, as you and I do today, that those records ... People don't record accurately what they eat. He threw all that out, but he actually took samplings of everything everybody ate, and tried, and ground all those samples up and sent them back to his lab in Minnesota to study their fat content, but he only did that for 33 of the men, or 34.

Dr. Hyman: Out of 13,000.

Nina: Yeah, out of the ... No, on the island of Crete, there were like 600 men and he only sampled the diets of 33 or 34 of them. He tried to freeze the samples, send them back to the University of Minnesota. He took the samples in different ways. That study was so deeply flawed, but it's important to note that at the time that the American Heart Association came out with this its first recommendation, that study was it. There was a doctor saying, "I don't think Ancel Keys is right, but he's got this huge study behind him, and we don't have any data to ... We don't have any other data."

One of the really important things about the Seven Countries Study that is still true today as a problem, which is that it's an epidemiological study, which means it can show association but not causation.

Dr. Hyman: Meaning it doesn't prove cause and effect. It just show a relationship but it doesn't tell you if it's related or not, right?

Nina: It can't show cause and effect. We don't have to get into all the methodological reasons, but you can't measure everything in somebody's diet, so you just don't know if something is a cause-and-effect relationship. Even if Keys

had done a really good job with his study, which he didn't, it would still only show this relationship that maybe due to saturated fat, maybe not. We don't know.

Dr. Hyman: But he excluded other countries. The seven countries he picked were the ones that supported his hypothesis, but he left out for example France and Switzerland, where they have low rates of heart disease but high fat diets, right, so it was kind of like cherry-picking his countries.

Nina: Right, and Germany.

Dr. Hyman: He left out countries that contradicted his point of view.

Nina: Yes, he did do that. It's fair to say that he cherry-picked his countries and he went into that study trying to prove his hypothesis. In science, you're supposed to do exact ... He wasn't really a scientist in the sense that scientists are supposed to try to disprove their ideas, not to prove them. He went in trying to prove his ideas. He cherry-picked his countries. He did everything he could to the data to massage it in the form that he wanted it.

Dr. Hyman: What I found fascinating was later on I think in 1984, he published a paper that sort of questioned his own thinking about this, right? Do you remember that?

Nina: He did. Well, he eventually retracted, not on saturated fats, but he did say that he didn't believe the dietary cholesterol portion of it anymore. He didn't believe that the cholesterol you eat, like in egg yolks and shellfish, which that becomes translated into the cholesterol in your blood, and that's because when they finally did clinical trials on that in the late '70s, early '80s, they found out there really wasn't a correlation. You can eat 40 eggs a day, and your body will just produce less of its own cholesterol, so in the great majority of people, they don't have to worry about the cholesterol they eat.

Dr. Hyman: There was another scientist who was part of the study that you wrote about in your book who went back and analyzed all the data and actually found that the biggest correlation wasn't the fat or lack of fat or saturated fat. It was the sugar and the refined carbs that actually drove so much of the disease. Is that accurate?

Nina: Yeah. That's another fascinating study, which I think was a paper in 1989 where one of his colleagues went back and looked at all the correlations between diet and heart disease, and he found that actually what correlated much better with cardiac death was sugar. Just sugar.

He said that, and I called him up, and I said, "What about this finding? Why did you not consider sugar," because there was at the time a huge debate. There were people in Ancel Keys's day saying it's the sugar. It's not the fat.

Dr. Hyman: Like Dr. Yudkin, right?

Nina: There was a guy named Dr. Yudkin, exactly, in England. This researcher said to this colleague of Ancel Keys, said, "We debated it at the time, but Keys was just so focused on fat," and so that finding was just kind of lost. Now we see it today. This is 50, 60 years later now. We're now having the same debate again. Is it the fat? Were we wrong about the fat? Was Keys wrong? Is it really the sugar? I think there's a lot of data to show that that's true.

Dr. Hyman: That's true. It's clear in all the research that you uncovered and the research I uncovered from my book. It just seems clearer every day that fat may be not the issue. In fact, I was telling you during the run up to our conversation that I recently had a meeting with the head of cardiology at Cleveland Clinic where I now work, the number one heart hospital in the world, and I kind of went to just getting a heads up about my book that's coming out. It was going to be controversial. It was about fat, that fat actually isn't bad for you, and questioning this whole hypothesis.

I look at the diet for heart patients in the hospital, and it's a very high-carb, low-fat diet from the dietitians, so I thought, "Oh, this is going to be a problem." He said, "You know, Mark? I think we got the whole story wrong on fat, and I think we might even have got the story wrong on saturated fat," and I'm like, "Wow, that's really stunning to hear from the number one of the number cardiologists in the world who spends his life studying and researching." He says he's got 125 staff researchers on his team if someone like that is saying this, I think we have to re-think everything.

But how has this impacted us? We have followed these policies. Started in the '70s with the McGovern report on nutrition and the dietary guidelines that got established, and kept going with the food pyramid, where we are supposed to eat 6 to 11 servings of rice, bread, cereal, and pasta every day. We listened. I certainly ate a lot of bread and pasta, and got flabby from it. How has that all impacted our society and our food industry and everything?

Nina: Well, let me continue a little bit on the history so people understand. The question that looms in everybody's mind is, okay, one guy, Ancel Keys. How could he drive the policy of an entire nation? So I just want to tell them a little bit more...

Dr. Hyman: Yeah, please.

Nina: ... of that story. 1961, American Heart Association launches the low saturated fat diet, the diet that's Ancel Keys's hypothesis. In 1970, the American Heart Association expands that to be all fats. We went from just saturated fats to all fat. That's formally the beginning of the low-fat diet, the official low-fat diet. Cut back on all fats. Anywhere between 25%, 35% of your calories should come from fat. Over the years, that's been the low-fat diet.

The American Heart Association launched that in 1970. Then the whole big federal government gets onboard with, as you said, the US Senate Select Committee led by McGovern has a hearing on what causes the killer diseases, because at that time there was not only heart disease, but now cancer we're starting to see come on the rise. It's important to note that obesity and the diabetes epidemics really hadn't begun by then. Still, this late '70s, they had not taken off.

Dr. Hyman: It was like what, 1 in 10 Americans were overweight in 1960, and now it's like 1 in 3, or actually even more.

Nina: I don't know the numbers off the top of my head, but I know if you look at the curve of the CDC data, the government data on this, obesity is more or less flat, and then 1980, vroom! Takes off. What happens in 1980? The US government gets involved and officially recommends for all Americans to eat a diet low in fat, so it's low in total fat and low in saturated fat.

You just cannot underestimate the impact that this had on the entire country, because it's not just the advice that everybody's given, the food pyramid that we all followed. Like you, I ate like five bagels a day with no cream cheese on them, and I was fat, and I was a young woman. My heart disease markers were all out of whack. I still have an old record going to the doctor where there's a little note on it saying, "Reduce your saturated fat, because your HDL isn't high enough."

The federal government, by getting on board with this diet, it means that all cattle stocks are now to be lean. All food goes low fat. In order to get a healthy claim on your food, you have to take the fat. It has to be below a certain amount of fat in any kind of packaged food, so the whole food supply goes low fat, and then all the feeding programs that the federal government pays for, school lunches, food stamps, now called SNAP, Women and Infant Children, programs for the military, programs for the elderly. All of those go low fat. That's when you see obesity just take off as a huge epidemic.

People say, "Okay, well then, how is it that we got off going down the wrong track? Weren't there critics? Didn't authorities review the science?" There's a big story there, and it is something you just kind of have to read the book, because it's so long and complicated, but the short answer is, yes, food industries were involved, and as I described, there's the vegetable oil industry that was very much involved in trying to shift consumption away from saturated fats to unsaturated fats. The biggest increase of any food item in the United States over the last 100 years is vegetable oils. Since 1970, those have increased by 90%.

Dr. Hyman: That's huge.

Nina: They didn't exist in the 1900s.

Dr. Hyman: They didn't really exist 100 years ago, right? There was olive oil. That was it.

Nina: What?

Dr. Hyman: There was olive oil. A hundred years ago, there wasn't safflower oil and canola oil and soybean oil. Those didn't really exist, right?

Nina: Yeah. Soybean oil, corn oil, canola oil, none of those existed until ... Basically; they were introduced into the American food supply as Crisco in 1911. That was it, a hardened form of those oils, because they're really not stable when they're in their oil form, and that's still true today. Something else we could talk about, but...

Dr. Hyman: We'll get to that. We're going to get to that. I want to get the whole omega-6 story.

Nina: But the rise of those has been ... It's like 100,000 times over since... because they came out of nowhere, so the food industry has been involved. The other part of the food industry that promoted the government's food pyramid was all those companies. Standard Food, Best Food, Quaker Oats, Kellogg's. Those are all carbohydrate producers, and so they were interested in promoting this high-carbohydrate diet, and they had an effect.

Currently in the media, all we hear about is the meat industry and the dairy industry, but that's really a campaign I think to criticize those industries, but in fact, if you look at the record, they completely lost out. How could they be so powerful? They lost in this whole debate.

Dr. Hyman: It's true.

Nina: The food industry is one piece of this puzzle about why...

Dr. Hyman: But they actually just jumped on board because the scientists and the government were like, "Let's do this," and they were like, okay, and they created 600,000 new food products, which are full of sugar and refined carbs, as opposed to shifting us to a better diet. They did what any business would do, is they just jumped on the bandwagon.

Nina: Actually they were producing those foods long before the federal government got involved, and you're talking like in the 1940s.

Dr. Hyman: But they marketed them as health foods. That was the difference.

Nina: They could market them as health foods, but these companies, they formed something called the Nutrition Foundation back in 1940, recognizing how important it was to influence nutrition science in order to get their products promoted as healthy, and they were involved very early on in stacking the Institute of Medicine board in their favor with the National Academy of Sciences. They funded university professor chairs. They got a bunch of scientists. They basically bankrolled a whole lot of science to promote their products, and they were successful.

Dr. Hyman: Science is not really that objective is what you're saying. It's science for sale, and there's spin doctors who are shaping conversation by only funding certain studies, designing to get certain outcomes. My friend and our friend David Ludwig did a study where he looked at industry-funded studies, eight times more likely to show a positive benefit for their product as an independent scientist studying the same thing. That's a big difference. It's an 800% more likely positive outcome for your stuff that you're studying. That makes us question, how do we even, as a consumer, begin to understand the research on science, because it's one thing even just in terms of the research, but then you have to dig back into who designed it, who funded it, how it happened. It's very challenging.

Nina: Who has the time? I spent 10 years researching my book. Who has that kind of time to go ... We don't have time like that, and we live in an environment where nutrition journalism has become so watered down, where the latest headline on this, and nobody ... It's so non-rigorous, so it makes it hard to have trusted sources of information on this stuff.

Just to circle back, I want to say the food industry is one big influence in this, in why we got it wrong. The other big influence is really simply getting, rolling out a hypothesis about what causes heart disease, and institutionalizing that before the science was conclusive. You have institutions that are invested in this. First, the American Heart Association. Very early on the National Institute of Health was onboard with this hypothesis.

Then the federal government came onboard. What happened is that you enshrine and you kind of entomb this hypothesis before it's really been proven, and then you can't back out of it. It's what I call kind of the oxymoron of institutional science. Science has to be flexible, self-doubting, self-questioning. It needs to be able to flip-flop. That's the opposite of what an institution needs to do to survive. This is the situation we face today where the federal government, the American Heart Association, the National Institute of Health doesn't want to say, "We may have gotten it wrong."

Dr. Hyman: As a consumer, as an average person, when all of these esteemed institutions and our government and these science academies are all saying one thing, and then a bunch of crazy people like us are saying something else, who do you believe? How could they have gotten it so wrong?

What's really interesting now is that they're starting to shift. The new US dietary guidelines that are emerging this fall are actually coming out and saying, "Gee, fat isn't so bad, and we shouldn't even worry about fat in the diet anymore, and we shouldn't even worry about cholesterol. It's no longer a nutrient of concern." This is like, "Wow, after 40 years of telling us to eat low fat, all of a sudden these scientists who are part of this advisory committee, and like, oops, we might have gotten it wrong. Now, it still remains to be seen what happens when the dietary guidelines emerge, because they're not published yet, but I'm anticipating, I'm sure you are, this whole story. I know you wrote about this in the British Medical Journal. I'd love that you lend your perspective on what's happening now with all this, and what's right about it, what's wrong about it, and what should we should be aware of?"

Nina: I think you're right first of all that it's very hard to know who to trust. One of the things that I think is obvious is that we have always trusted the PhDs, the expert nutritionists on this subject, but it's not clear that ... Since they've been wrong on a number of really important big issues, I don't know that we can automatically trust them with the same, as much as we would like to.

What's happening with this year's dietary guidelines? Well, there's an advisory committee, like a scientific committee of 14 people who write this report that's

supposed to be the foundation of the dietary guidelines. That report came out in February. That report, you have to hunt for anything about the low-fat diet. Actually, the last dietary guidelines don't recommend the low-fat diet. What's happened is that when they finally did clinical trials on the low-fat diet ... That's the experiment that can actually show cause and effect. It was a spectacular failure. They tested that diet on nearly 49,000 women for 8 years. At the end of that time, that low-fat diet, the women were weighed one pound less than the other, the control group, and there was no benefit for heart disease, any kind of cancer, diabetes. It was just a complete failure.

Dr. Hyman: It's the Women's Health Initiative. That was like a billion dollar study from NIH, right?

Nina: Seven hundred million dollars NIH funding. Actually, since the last guidelines and the last American Heart Association statements, they stopped talking about limiting total fat. It's what I say. I say that they tiptoed away from the low-fat diet.

Dr. Hyman: They just didn't mention it anymore. They didn't say, "It's not what we should be doing," but they didn't say it is what we should do, and they just sort of didn't mention it, right?

Nina: Yeah. They've gone silent on the low-fat diet.

Dr. Hyman: But this guidelines committee, did they go silent, or did they actually lean into it a little bit?

Nina: Everybody's kind of gone silent on the low-fat diet. Does America know the low-fat diet is over? No. In this expert committee, which I did for this British Medical Journal piece, I did this incredibly rigorous look at that committee's work. Their report says now the low-fat diet is not recommended because it induces dyslipidemia, which means that it makes all your blood markers for heart disease look worse. Not all of it, but it makes your HDL...

Dr. Hyman: Your triglycerides go up; your good cholesterol goes down. You get small particles. It's bad, right?

Nina: Right. HDL goes down, triglycerides are up. They say, "We don't recommend a low fat diet anymore," but it's not ... You have to really dig around in the report for that. It's not a top-line message, so whether or not that's going to be a top-line message coming out in the dietary guidelines when they are published later this year, I don't know. It should be a top-line message, but again,

there's this problem of reversing out of a hypothesis out of advice that is extremely uncomfortable for any institution to do. What are they going to say, "We got it wrong for everybody?"

Dr. Hyman: That's right. Oops.

Nina: Like, I'm so sorry that all about all that obesity and diabetes...

Dr. Hyman: I'm sorry we just killed a few hundred thousand Americans and caused morbid obesity in 30% of the population. It's true. It's very scary. That was sort of right in the report. What was wrong and what else did they come up with that you either agree with or that you think is just a mistake?

Nina: They did come out and say, "We are reversing ourselves in dietary cholesterol," which is good. Every other Western nation has also had to reverse themselves out of the dietary cholesterol advice a long time ago, which again, that's the cholesterol in eggs and shellfish and organ meats.

Dr. Hyman: So we're avoiding shrimp and we should never have been avoiding shrimp, or egg. Having egg-white omelets, that's not what we should be doing.

Nina: No. Here's another fundamental issue, which is that where are the nutrients in food? We stopped eating liver because of the cholesterol. Liver is an incredible nutrient-dense food. We have a number of nutrient deficiencies right now in the country, and you need nutrients.

Dr. Hyman: Massive.

Nina: Where are the nutrients in eggs? Not in the egg white. They're in the yolk, including something called choline, which is essential for fetal brain development.

Dr. Hyman: That's right.

Nina: So you need those foods for the...

Dr. Hyman: Also help grown-up brains too.

Nina: Not mine, apparently. I don't know...

Dr. Hyman: Your brain's doing okay, Nina. That's all right. I'm not worried about you.

Nina: Sorry?

Dr. Hyman: Your brain's doing okay. I'm not worried about you.

Nina: I don't know. Some days. I think the Dietary Guideline Committee got that right, but they didn't do a formal scientific literature review on that. They just say it in two lines. Technically, if you believe in the good process for creating policy, they should have done a formal scientific literature review.

Dr. Hyman: Well, what they did was they used the American Heart Association American Cardiology Consensus Report, which reviewed all this, and they concluded that, "Oh, we really shouldn't be worried about dietary cholesterol. It doesn't really have an impact on heart disease or on your own blood cholesterol, except in a very few people with genetic issues." They used that I think as the benchmark, and then they go, "It's no longer a nutrient of concern," which I love that language. It's like, oops, stop worrying about it, after telling you for years it's the bad guy. That's clear, but was there stuff in there that you have issue with, that you think is wrong, that they didn't get right, because I have a feeling that some of that you weren't happy with.

Nina: Yeah. My overall critique of the report really has to do with the fact that that Committee didn't use systematic reviews, a systematic methodology, for a great majority of the reports. There is actually a methodology they're supposed to use. They're supposed to use something called the Nutrition Evidence Library, and it's supposed to do with these reviews. This is how science gets done. You have to have certain criteria for selecting studies and evaluating them and all of that.

The reason that you have it is to prevent bias from creeping in. What is the bias of this committee? The bias is to not be wrong for 35 years, and what you see when you look at the ways in which the topics that they don't systematically review, they just do it on their own ad hoc way. They just select studies they want to select. They do that on saturated fats. They select some studies, and they represent them in a way that isn't quite accurate, and then they don't select the ones that don't support their hypothesis, so they come out saying saturated fats still cause heart disease. They just ignored a bunch of papers that ... They selected seven review papers, and they ignored the seven that totally contradicted them.

Dr. Hyman: Right, so that's a challenge, Nina, as a doctor and a science reader. I'm not a scientist, but I'm I guess very deeply interested in the science just to figure out what to do with my patients, because that's what I do every day. I want to help people feel better, get better, prevent disease, and I'm ... Here's

what I should eat so I can live to be a hundred, because I like life and I want to keep going, so it's personal too.

When I read the literature and I talk to experts ... You talk to guys like Ronald Krauss, and he's like, "Most saturated fats are not the bad guy," and then you talk guys like Walter Willett, and they're like, "Oh, saturated fats. You know, butter is really not back, like beware." You've got these really smart people in the scientific community saying opposite things, and you've got people caught in the middle, which is the average consumer. You've got doctors trying to figure out what it all means, and then you've got journalists like you trying to sort through it all, and honestly, I'm confused about it, because from my reading, there's a large meta-analyses, there's large observational data, there's some experiments, but I don't feel like we know the whole story, and is it same for everybody? There are a lot of genetic differences in who should be eating what. I'm very curious at what your perspective is on this, because I think its story hasn't all been told yet. You're like, "Let's eat butter, and let's eat steak."

Nina: Should I just talk about saturated fats?

Dr. Hyman: Yeah.

Nina: Just saturated fats.

Dr. Hyman: Let's just dig into saturated fat, because that's the big ... Like you said in the report, you're like, "Okay, don't worry about fat, don't worry about cholesterol, but saturated fat, stay away," and everybody's still on it.

Nina: Remember, saturated fat, that's the original boogeyman since Ancel Keys. There have been in the last like five years a number of efforts to go back and take another look at all the data on saturated fats, and particularly the clinical trials. Those are more important. Again, they're more rigorous, conclusive kind of data that shows cause and effect.

The record on clinical trials ... because they did test Ancel Keys's hypothesis. It's not like they never tested it. They had some of the biggest ever clinical trials in the history of nutrition science were on saturated fats. Altogether like 50,000 people, and the kind of experiments you can't even do today anymore, because they're considered unethical, where they fed people in the mental hospitals and in veterans hospitals where you can really control their diet. Those kinds of experiments tend to be more reliable than the ones where you just give somebody a diet book and send them on their own. You really don't know what they're going to be eating. These trials taken together, 50,000 people, and experiments lasting up to 12 years long.

Dr. Hyman: Like the Minnesota Heart Study, right? The Minnesota Study.

Nina: The LA Veterans Study. There's a Finnish Mental Hospital study, the Oslo Study. There's something called the Soybean Trial. In general, on these studies what they did is... Sorry, the Minnesota Coronary Survey is another one, on 9,000 men and women. Huge experiments, and in general what they did is to get rid the saturated fat, they would feed people, instead of butter, they'd feed margarine. Instead of cheese, they'd fill ... Regular cheese, there would be soy-filled cheese and soy-filled milk. They tend to be experiments high in soybean oil. They were all, by the way, funded by a lot of food companies, many of them that produce...

Dr. Hyman: Omega-6 fats.

Nina: ...soybean. They found at the end of those experiments that ... Some of them found a tiny decrease in heart attacks, but they did not find any decrease in cardiovascular death, meaning you didn't die any less frequently from a heart attack, and they found a worrisome increase in cancer death in all of these trials where people were eating more soybean oil.

The overall effect was no savings on total immortality. You were just as likely to die if you restricted saturated fat as if you didn't restrict saturated fat, and it looked probably likely that you were trading off maybe a heart attack for cancer instead. There was a tremendous amount of concern about all this in the day. In the early 1980s, the NIH had a series of very high-level meetings where they tried to figure about this side effect of cancer, and they were like, "Oh, we can't figure that out."

Dr. Hyman: But they didn't ... From all these huge studies, they didn't ship off saturated fat as bad podium.

Nina: They were already barreling along down that. It was like a runaway train.

Dr. Hyman: Like, "Don't confuse me with the facts. My mind's made up"? It was sort of like that?

Nina: Yeah, and including the guy who ran the Minnesota Coronary Heart Survey. That was the biggest ever tested of 9,000 people of Ancel Keys's hypothesis. He didn't publish his results for 16 years.

Dr. Hyman: That's amazing.

Nina: When he was asked why, he said, "Well, we were just so disappointed in the way they turned out." You have data that was suppressed, basically. Finally, people, in recent years went back and looked at all those trials again, trying and be more objective about it, putting backing in that Minnesota Coronary Heart Survey that had been not included for so many years because they just wouldn't publish it.

They concluded there are a number of these reviews. The major reviews saying we can't find any association between saturated fat eating and heart disease that reflects epidemiological evidence. We can't find any cause and effect that reflects the clinical-trial evidence. We can't find any cause and effect with cardiovascular mortality. Now there have been four or five of them. There has been some that have come and said, "Well, there might look better for polyunsaturated fats, but it definitely doesn't look better for carbohydrates. Carbohydrates universally look worse."

Dr. Hyman: I've seen some of these things where they go "Don't swap you saturated fats for carbs. Swap them for polyunsaturated fats," right?

Nina: Yeah, but just think of the logic of that statement, right? It's a crazy logic in the sense that, okay, so, if you can get rid of dairy, meat, eggs for the saturated fat, what do you replace that with? Are you going to go out and drink a bowl of canola oil for dinner? No. That's just not a food item. What are you going to do? What else do you have there for dinner? Maybe you'll have vegetables, largely carbohydrates. Maybe you'll have rice, grain, beans. All carbohydrates. Basically, that's a high-carbohydrates diet. You can't really get rid of saturated fats unless you're eating a high-carbohydrate diet, and all the literature shows that a high-carbohydrate diet is worse than saturated fat, so you better just go back to the meat, butter, dairy, eggs, cheese, because that's healthier.

Dr. Hyman: But Nina, just to be fair, is it grains and beans or is like refined carbs and sugar? Do they make that distinction? I don't think so, right, in the literature?

Nina: No. The study data really doesn't. That's another thing that I think researchers are now trying to explain, because they just are so uncomfortable with animal foods, but trying to say to people when they eat junk food instead, but if you look at all these trials, these trials, the data is on unrefined carbs, or it just doesn't make any distinction, so you really don't know, but you can be sure that in these clinical trials they didn't say we're going to take away your meat and instead we're going to give you a Twix bar for dinner. No, they gave them healthy meals, right?

Dr. Hyman: Or what they thought were. Pasta, rice. But those are refined carbs.

Nina: Yeah, pasta, rice, soy-filled cheese, whatever. That's where the data is. The data does really not distinguish between refined and unrefined carbs. It may be that, and I personally think the data is stronger on refined carbs, but it's not true that Americans, and it's not true that in this trials that they shifted the people away from animal foods to eat junk foods. That's not entirely what's been going on.

Dr. Hyman: No, no, no. No, it's true. One of challenges around saturated fat is another conversation that I hear around inflammation, and how that actually causes more heart disease, and that it increase your total cholesterol. How do you sort all that out?

Nina: There are some small clinical trials that have shown saturated fat to cause inflammation. Those tend to be trials in the context of high-carbohydrate diets, so what you're seeing is maybe some kind of interaction effect between saturated fats and high-carb diets. You do not see that. You do not see that if you keep carbs lower. I mean I'm saying even just not that low, like below 40% of your calories. Then you don't see those kinds of effects. What the data shows is that if you're going to eat a high-carb diet, maybe it's better to have vegetable oils then, but saturated fat is not the driver of that problem.

Dr. Hyman: That's a really important point. As I read all the literature, the two things that jumped out at me around saturated fat as a caution was if you eat in a context of a high-carb diet, which causes high levels of insulin, it's bad news, and if you eat it in the absence of omega-3 fats, which are anti-inflammatory it's bad news. If you take fish oil and you cut out the sugar and flour and processed carbs and reduce your glycemic load of your diet, it seemed to be like a neutral thing or even a beneficial thing, right? Did you find that when you looked at the literature?

Nina: Yeah. I don't know about the omega-3 interaction, but I think what the literature says overwhelmingly is just don't eat a high-carb diet. If you're going to be healthy, you just need to reverse out the high carbs, and then saturated fat is really no problem.

Dr. Hyman: It's interesting. I see clinically differences in patients. I had this one woman who struggled with her weight, who had a cholesterol of 300 something, whose triglycerides were 250 or more, and we just tried everything, and finally I said, "Okay, look. Let's just do an experiment. We don't know if this

going to work, but let's put you on what we call ketogenic diet. It means 70% of your diet should be fat."

She ate grass-fed butter, she ate coconut oil, which is almost all saturated fat, and she ate olive oil, and she cut out the omega-6 oil, she cut out pretty much all starch. It was vegetables, protein, and fat. She came back, she lost 20 pounds, she felt great, and her cholesterol went from 300 to 200 or less, like 190, and her triglycerides dropped from like 250 to like 70. It was stunning to see that. I'm like, and here she is eating tons of saturated fat, and yet other people will increase their saturated fat intake, and actually their cholesterol actually goes up.

That happened to me, but I think my overall profile looks good, but actually it increased it. I think it's very variable depending on the person and genetics. I talked to Dr. Krauss about this. I think we don't know the whole story, because we're all biochemically individual. Functional medicine is really the science of personalized medicine and understanding that we're all genetically a little different, and so were kind of digging into the genetics and who responds to what.

I've been doing some interesting genetic profiling in patients with some stuff out at South Africa that looks at, how do your genes relate to the food you eat, to the fat, your insulin resistance, your ability to convert saturated fats or polyunsaturated fats? Fascinating research. I think we're just some dabbling in it now, but I think it's interesting you know, and the whole story is yet to be told.

Nina: I think that is an incredibly important point, and one of the things I found in my research is that even though ... Going back to the dietary guidelines, it's been a concern that the dietary guidelines really recommend a one-size-fits-all diet for all Americans, everybody. When you go to your nutritionist and your medical doctor, unless you're lucky enough to have Dr. Mark Hyman, all they know is what their doctor who got one day worth of nutrition education. It all comes from dietary guidelines. It's a one-size-fits-all diet still, even though now they say they have a range of diets. They're all same. Same amount of all food. Everything's still the same.

As you say, for some people, especially for people who have stubborn kind of real obesity, and also diabetes, this ketogenic diet is, which has been really well studied now on many hundreds of people, if not thousands, over a fairly long periods of time, to show that that diet is incredibly effective for people. It seems like a ridiculously high amount of fat and really low carbs, but it has been extraordinarily successful for people whose metabolism has basically tipped into really unhealthy state.

Dr. Hyman: That's right. Dr. Joslin, who was the namesake for the Joslin Diabetes Center at Harvard, the diet that they recommended in the '20s for treating diabetes was 70% fat, 25% protein, and 5% carbs as a way of controlling the insulin. You talked about the centenarians, the native Americans, and the Lakota and Plains Indians, who ate buffalo and very high-fat diets, and they lived to be over 100 in numbers greater than almost any population They used to have pemmican, which is like 70% fat, like 25% protein, like 5% carbs, and little berries, and that was the food that actually fueled the migration of Americans across the nation was these huge pemmican bars, and you'd have half pound a day for a woman, and a pound a day for man, so you had 30 pounds. That was a month's food you just carried on your back, and that was your meal. It was this dried meat and fat and tallow and all this stuff. It was fascinating to go back and look at the history of that.

I think we're just sort of in the state of really crappy nutrition science. Our friends like Gary Taubes and Peter Attia, they have the Nutrition Science Initiative, and they're really trying to dig in and ask these questions, but it's tough. There's so much crappy nutrition science out there that it's difficult to decipher, and you've done an amazing job of trying to dig into that story.

One of the aspects, before we roll up the ending here, is the omega-6 fats. You wrote a lot of about it in the book, but you also talked to me personally about there's a whole other untold story here about omega-6, the history of it, what it actually does in your body, the dangers of replacing trans-fat with more omega-6 fats, which people didn't even think about now that trans-fat is the bad guy. We all agree, and the FDA says we shouldn't be having any more trans-fats or margarine or shortening. What do we replace it with? You brought it up in your book a little bit, but I think it's an important story for people to understand, because we're like, "Okay, what do we do now?"

Nina: The omega-6 story is really the vegetable oil story. We talked about how they were introduced into the food supply as Crisco, and they were introduced in the hardened form. That was like imitation lard, right? They were hardened. They're hardened through a process of hydrogenation because they are unstable at room temperature. That means they oxidize really easily. They latch on to oxygen molecules, and that is the source of inflammation, right?

Dr. Hyman: Right.

Nina: That's why they had to harden these oils. Then they figured out how to just kind of harden them, just to what it's called touch hydrogenation. Then they could sell it to us just as oils, like corn oil, safflower, and sunflower.

Dr. Hyman: Even those liquid oils are hydrogenated?

Nina: Just a tiny bit. Just a little bit. The problem with hydrogenation is it produces trans-fats, so if you have just that touch hydrogenation, you have a little trans-fats. If you have a lot of hydrogenation, like to make a candy coating or something that's hard, that's a lot of trans-fats. Research on trans-fats was taking place all along, but it finally became recognized that trans-fats were a problem in the early 90s really, so we got rid of trans-fats. What are we replacing? Trans-fats came to dominate the ... It's the whole backbone of the food industry.

Dr. Hyman: I grew up on Fleischmann's margarine. That's what I ate as a kid, right?

Nina: Everything, right. All margarines were hydrogenated oils. All Crisco that's... so some margarine was to replace butter, Crisco was to replace lard, and then every single like...

Dr. Hyman: It can't be good for you, because a fly won't even land on top of margarine, right, because it's not really food.

Nina: I didn't know that. That's good. These were to replace butter and lard. Until 1900, butter and lard were pretty much the only fats that Americans cooked with. And also a little bit of tallow and a little bit of suet, and the unsung virtue of those fats is that they're solid and stable. They don't oxidize, and they don't oxidize even when they are heated, and that is key, because vegetable oils, they oxidize like crazy when they're heated. One of the impacts of trans-fats is to get rid of trans-fats those hydrogenated oils were used in every restaurant fryer in the country.

Dr. Hyman: Deep fryers.

Nina: Deep fryers for french fries, everything. McDonald's used to put their french fries in tallow, but everybody switched over to this hydrogenated oils in the late 1980s, mainly due to activists in Washington, and now they have to get rid of those oils out of restaurant fryers. What are they replacing them with?

Dr. Hyman: That was a soybean industry, because that's all soybean oil hydrogenated fat mostly.

Nina: Right. The soybean industry is another big industry player in all of this, and I talk about that a little in my book, but they're taking out the hydrogenated oils, and they're putting in just regular, old vegetable oils. Non-hydrogenated,

still highly unstable, oxidized. They create hundreds of oxidation products, especially when heated.

The way I came into this story was amazing, because the vice president of an oil company said, he said, "Do you realize what's happening in restaurants now?" He said, "After they got rid of trans-fats, they now have this gunk building up on their walls like shellac. It's clogging all their drains." They had to create new cleaners, high-powered chemical cleaners, to get this stuff off. This sludge, he called it a witch's brew, that was so unstable, and highly oxidizable, that the uniforms that the workers were wearing were exploding in the laundry trucks to take them away, just spontaneously exploding, and they would explode in the dryers, because the heat again, would set them off.

Dr. Hyman: Amazing.

Nina: That's pretty much what replaced trans-fats in all these fryers. Now, there are other solutions that they're trying...

Dr. Hyman: We should be worried about eating french fries, because you go to a restaurant, you eat french fries or deep-fried anything, and it's now coated in all this unstable oil is what you're saying.

Nina: All these unstable oils that absorb into your ... There's experiments to show that it absorbs into your bloodstream. It's highly inflammatory product.

Dr. Hyman: So no more Shrimp Tempura, huh? Oh my God.

Nina: I would rather get something fried in lard, or ... and that's the problem, because to get out of trans-fat we need to go back to basically saturated fats. We need to be able to fry again in stable, solid fats. Tallow, butter, lard.

Dr. Hyman: What about coconut oil or palm oil?

Nina: Or palm oil. That's also saturated and stable. Olive oil is kind of an in-between one, because it's a monounsaturated fat. It only has one.

Dr. Hyman: Coconut oil.

Nina: Coconut oil's good, but we can't use that because of the saturated fat, because we have these limits on saturated fat by the USDA dietary guidelines, and we can't get rid of them.

Dr. Hyman: That's true.

Nina: Because they won't review the science.

Dr. Hyman: No, it's amazing. When I was a kid, I worked as a sandwich delivery boy for Mother's Sandwich Shop, and my job, besides driving around delivering sandwiches, they were like grinders, and I would have to go in the back at the end of the night, at 11:00 at night, and have to clean the oil. This machine, I would take the oil and I would dump it in the machine and filter it and get all the chunky parts out, and then I'd put it back in the thing, and we'd only change the oil once a month. It wasn't like you had fresh oil every day. We'd reheat it, reheat it, and reheat it.

People don't realize actually what's going on when they eat fried food, and I think if you want to fry something at home in lard or butter or coconut oil, okay, but be careful. Like you said, it creates these oxidized products, but what does that mean? Well, it's basically cholesterol's only a problem for heart disease when it goes rancid in your blood, and what makes it go rancid? Well, free radicals, and where do you get those? From oxidation that comes from these unstable fats. That's one place.

That's where we get into big trouble, and this data is really pretty strong about how oxidized LDL is really the problem with heart disease, not just LDL cholesterol, which everybody thinks. I think what you're saying is pretty frightening, I think people should beware of fried foods, and they should beware of also these high amounts of omega-6 fats. That's sort of the sinister background that you talked about in terms of how the food industry's played a role in this. Can you give us any insight about that?

Nina: Well, the story that I like to tell is about how Procter & Gamble launched the American Heart Association, which is that the American Heart Association was ... Remember, heart disease was rare, so there was no real such thing as a cardiologist until like the 1920s and 30s. And they were this sleepy little professional society with no budget, barely an office, and then in 1948, Procter & Gamble made them the designee of something called the walking man contest. It was this radio contest with Jack Benny. Overnight, according to the AHA's own official history, they got millions of dollars floated into their coffers. Overnight, they were transformed into this national powerhouse opening chapters up all over across the country and becoming ... They're now the single biggest non-profit in the entire US, and it all began because they were launched by Procter &...

Dr. Hyman: The American Heart Association?

Nina: American Heart Association, launched by Procter & Gamble in 1948. Shortly thereafter, they were recommending vegetable oils to replace saturated fats in our food supply, and we are still living with that legacy today, and Procter & Gamble is still a big donor of the American Heart Association. In fact, I almost had my article...

Dr. Hyman: It's pretty corrupt, right?

Nina: It is, and they're a huge advertiser in media as well. One of the reasons it's hard for me to get my message out or to be covered in media is that there have actually been cases where Procter & Gamble was going to threaten to pull their advertising from a magazine where my story was being published.

Dr. Hyman: Absolutely. It's fascinating. In fact, when you look at the amount of power they have, it's phenomenal. You go the grocery store, and you see the American Heart Association stamp approval. Well, they get paid hundreds of thousands of dollars for saying that cereal is a health food. It's a low-fat health food. You look at the label on the things that they say are good, and they're like six different kinds of sugar. They're like five teaspoons of sugar. It's not breakfast. It's dessert, and yet that's considered healthy or low-fat yogurt, which has more sugar than a can of Coke, and they go, "That's a health food."

I think this whole thing is just a mess for consumers, and I see it. I go out and I sit with people at restaurants, and they're ordering low-fat this and egg-white omelets. I'm at a coffee shop, and a guy's putting skim milk in his coffee instead of the cream. I'm like, "Why are you doing that?" He's like, "Well, I think it's better for me." People just don't know. Even people who are highly educated are afraid.

Nina: They don't know.

Dr. Hyman: I had a woman come into my office at Cleveland Clinic, and she was like struggling with weight and feeling bad, and inflammation, and just like low-fat, low-fat. I'm like, "Listen, eat an avocado, have olive oil. Get rid of the sugar," and she was terrified. It's just 10 days. Just do it for 10 days, and then we can talk. She comes back, and she's like, "You know what? It was psychologically like the hardest thing I ever did, but I lost six pounds in the first week, and I feel great, and my joints don't hurt, and my skin's better." It's unbelievable what happens when people switch their diets.

Nina: We have, especially women, and myself included, this idea that the fat you eat is going to be the fat you get, what I call the tragic homonym of the fat in that bacon's going to become the fat on me.

It's just not the case, but for women especially, it is so hard. Women, and when I talk to scientists, they say, "We can get women to cut back on sugar," and they get that flour's bad. They get that. But you try to get women to eat more fat, it's so hard.

Dr. Hyman: It's very hard.

Nina: Because we all grew up not with salads without salad dressing. It's so hard to change those eating habits, and it's going to be a generation of re-education.

Dr. Hyman: It's like the world is flat, you know, don't try to tell me otherwise, right? So what are the biggest challenges left in what we need to know about fat and this? What are the challenges, I think the unanswered questions going forward that we really need to get, because we don't have all answers, right?

Nina: No.

Dr. Hyman: In your review of all of this, what are the things...?

Nina: To me, our biggest challenge now really has to do with policy and trying getting the advice being right from the top down. It has to be that Americans are getting good advice from the authorities so that they don't have their doctors ... You tell them one thing. They're confused, because their official guidelines are something different. Their kids are getting something else from their school lunches.

I basically, think our biggest challenge is just acting on the science that we know already and just getting the policy changed. There is a really good body of science out there saying low fat doesn't work. Saturated fats, maybe not bad for health, or really, I believe the science really shows that they're not bad for health. We really just need the policy that reflects that.

Dr. Hyman: How do we change that, because it's so tough? It's so tough to get policy change. I recently got a petition from a food company that makes products with lots of nuts. They petitioned the FDA to change their guidelines so that it doesn't say that their food's unhealthy because it's got a lot of almonds in it, which have fats in it and have saturated fats and has monounsaturated fats. The FDA still is adhering for these old concepts. He asked me and he asked Cleveland Clinic to actually come out and support this. What was fascinating to me was people don't want to get involved.

The CEO of Cleveland Clinic said, "Hey, what do you think about this?" I'm like, "Well, I think that as a healthcare system, as doctors, as health professionals, if food is the biggest driver of chronic disease and it's the cure for chronic disease, we need to come out and make the government stand up and make science into policy. That's our job." But the government relations person was like, "No, we shouldn't get involved, and it's not our fight." I'm like, "What do you mean it's not our fight?" We're here about creating health to America. That's what we stand for, that's what's important.

It's amazing to see that. I'm doing a public television show which I think is this independent news organization. I called out the fact that Coca-Cola and other food companies are supporting the Academy of Nutrition and Dietetics, which is the mouthpiece of the nutritionists in this country, and they're like, "Well, no, no, you can't say their name." I'm like, "What do you mean? It's public television." Like, no, no. You can't say my name, like, say "a soda company." I'm like, "Really?" People are just trembling under the weight of this, and it's pretty frightening. It's pretty frightening.

Nina, what was your experience, just in the last couple of minutes, what was your experience as you started to change your diet, because you hinted at it, and how did it all shift for you, and what happened?

Nina: Well, like you, I was a vegetarian for like 20 years, and when I started off my book research I was as well. It was a kind of a slow ... I didn't have a big aha moment, but I just had this slow transformation, like, "Oh, I won't buy low-fat yogurt anymore. I'll buy whole fat, and I'll get some butter next time I go to supermarket." I just started slowly to change the way I ate.

The moment that sticks out in my mind was the first that I bought a piece of red meat, which I hadn't eaten in like 25 years. I had no idea how to cook it, and I felt guilty about it, because you just think red meat is bad for you, bad for everything. Then it turned out, oh, that was really delicious. Also, so much easier to make a piece of meat than to spend hours cooking, slicing, dicing, poaching, sautéing vegetables, which I still love vegetables, but meat is really an incredibly good, nutritious food. Really an efficient way to eat. I've really changed the way I eat and...

Dr. Hyman: And how has your body changed as a result?

Nina: Well, I have to say I never have any chance to exercise at all. I just sit at my desk and I'm hunched over at my desk all day long, but it's just effortless for me to ... I don't think about calories, I don't gain weight. I'm 50.

Dr. Hyman: Not hungry?

Nina: I'm 50 years old, and I'm not hungry. I don't think about it. I don't worry about it at all. My cholesterol markers, which I posted on my website, are all fantastic, and much better than they were when I was a young woman on a vegetarian diet, so, yeah, everything looks better.

Dr. Hyman: Well, we talk in medicine of something called the N of 1, which means a study of one person. We say, "Well, that's not really relevant," but it actually is relevant. The only thing that's relevant is what works for you, and so I encourage everybody to try it on. See what it feels like. See what works for them. See how their body responds. See how their numbers respond. That's the evidence you need, because it's extraordinary what happens when you see people shift from eating tons of sugar and carbs to eating more fat, and it's not that we should be eating 70% fat, but we shouldn't worry about it, and we shouldn't be so concerned about it.

I think that's really the gift of your work, and I encourage everybody to go check out Nina's book. It's "The Big Fat Surprise." It is surprising what you'll find in there. It's the whole story of this. It is like a science nutrition thriller. I certainly felt like that. It's so well-written, and it's just a delight to read, and it's also very smart in its ability to dissect what happened, how we got here, and tell the whole story. I really thank you, Nina, for doing that book. I know it was a lot of work, but it's pretty awesome.

Nina: Thank you. Well, thanks for putting me on too.

Dr. Hyman: Sure.

Nina: It's great to be here.

Dr. Hyman: Thank you. It's a great story. Thank you so much, Nina.