Ivor:	00:00:00	And we're on. Hello there. Tucker Goodrich. Pleased to meet you again.
Tucker Goodrich:	00:00:05	Good to see you. How are you?
Ivor:	00:00:07	Not too bad. I'm kept busy for sure. Just getting this new podcast going and a lot of other things in the background, so you're doing well yourself, I guess. You look great there.
Tucker Goodrich:	00:00:18	Thank you, sir. Yes, I am. I'm doing well. Looking forward to a little bit of a blizzard. They're promising us. We'll see what actually happens.
Ivor:	00:00:25	All right. None of that over in Ireland. Just rain. That's all we get. Well, you know what I'm going to do, I'm going to start off with a little bit of your backstory because a lot of us technical people who got into the health arena and research and metabolic health and biochemistry came because in middle age we had health issues that we had to address. We didn't get great satisfaction maybe from our doctors. So you have a backstory where you had a few significant issues and you had to research them yourself, so maybe run us through a little of that.
Tucker Goodrich:	00:00:56	Yeah, so that in hindsight, I had had a long series of things that I might have realized were caused by diet, but didn't put it together until later. What triggered me to realize something was going drastically wrong was when I seem to have a stroke when I was 38 years old and spent four days in a stroke ward in a local hospital. The final diagnosis after I did some work with the doctor, um, was a Migraine, but it was a migraine that left me with a tiny bit of brain damage and a resulting speech impediment, which luckily only I really noticed, but he was able to test for it and confirm that it existed. It's since cleared up, but you know, it's rather shocking to have that happen when you're 38 years old and you're standing there surrounded by a professor of, uh, neurology and all of his med students and they're telling you, you're fascinating. We never get anybody your age here in the stroke ward. Right. That's exactly what I want to hear guys. Thank you. Two years later was a acute diverticulitis, which is basically a perforated colon. That was after a couple of previous attacks that weren't diagnosed, I don't want to say correctly, they were diagnosed as other things, but I had passed out at home while sitting on the toilet and that resulted in a trip to an emergency room up in Vermont. And you know, that was pretty sufficient at that point to get my attention that something was drastically wrong. All of my grandparents died in their eighties and nineties so, and I ate a quote unquote healthy diet. I pretty much tried to follow the

Food Pyramid and the recommendations are referred to myself as Mr Wholewheat.

Tucker Goodrich: 00:02:55 So I figured I was all set and then all of a sudden the next thing know I've got a surgeon cutting out pieces of me for the acute diverticulitis. And I was like, you know, I've only got so much colon. If he keeps having to cut it out every couple of years, I'm going to have a real problem. I'm not going to make it to 80 or 90 so all of a sudden the plan was out the window and I had to start trying to figure out what was going on and hopefully take action. So my initial reaction was to start running because when I was doing research on diverticulitis, the only thing that correlated with it negatively was running. So I took up running and I used to joke to people that I was running from a man with a knife, the surgeon and that didn't work. Unfortunately, I still wound up having to have the surgery, but I, you know, still a runner 10 years later and it was definitely a good thing for me. Now in hindsight, I had a whole bunch of other issues that I have since been able to link up to my diet derived health issues, the Migraine, the diverticulitis. At that same time, I was probably borderline osteopenic. I broken six bones over the course of two years. I had autoimmune diseases, you know, allergies and asthma. Going back to when I was a child and it runs in the family. My father had it, my grandfather had it my daughter had it. There were a lot of things that were going on that in hindsight realized we're all related and has since resolved.

Ivor: 00:04:40 Yeah. and, I mean you essentially in your late thirties you have an Elvis moment on the toilet essentially, which is a big deal for someone so young. If you get on then you, you didn't really get a whole lot of root causing from i don't know your advisers or consultants, whatever. Did you begin quite quickly then when you realize this should not be happening? There must be an answer. There must be. It's not just that I'm a genetic, you know, unusual person because all of my family history is very good up to the eighties and nineties so there's something wrong. How quickly did you get to diet and what was your path?

Tucker Goodrich: 00:05:18 Well, unfortunately I wasn't quite as smart as you were about it. Right. I looked at the literature and the medical literature and mostly what you find when you do that is standard of care. Right? Which is almost like being in an echo chamber because that's what the doctors look at. So what I saw online basically reaffirmed what the doctors were saying. I wasn't able with my conditions to go, um, you know, I, I did the research that got the doctor to change my diagnosis from a stroke to a Migraine. Um, his comment, and this is a professor of neurology with a

specialty in stroke, his comment was, I've never changed a diagnosis because of research that a patient has found. So I said, okay, well then I must be, you know, I must, I must, I'm obviously not making a fool out of myself here. Right. I got into this, this was a case of better lucky than smart. I had somebody send me a link to Stephan Guyenet's blog where he was discussing the causes of dental problems. I had countless cavities when I was a kid. I had four teeth pulled and he explained how it was all diet, the result of malnutrition and there was virtually no genetic component to it. And that was what opened my mind to it. I was like, wait a minute, you're telling me that all of the pain and suffering I went through as a kid was optional? Basically it was because, not because I had bad genes. Like I thought my mom had bad teeth and her mom had bad teeth. Right? It was easy to call it genetic. And then I read this series of posts of Stephan's going through the research and I was like, oh my God, this is, you know, so I owe him a huge debt.

Tucker Goodrich: 00:07:10 Because he opened my mind to the possibility that diet could be a major impact on this stuff. And then I started reading his blog, reading all of his research and he never really posted anything that connected my conditions to what he was proposing. It was more just a general well eating this stuff should be a bad idea. Maybe I should try it out myself. Um, you know, in addition to my health issues, I was also 20 odd pounds overweight, 40 years pound a year after 20. Right. Standard story for people getting obese over the years. So one day I said, um - I got to the end of the salad bar at the cafeteria at work. And I looked at the salad dressing squeeze bottles, and I said to myself, okay, this has gotta be the worst, cheapest oils in these squeeze bottles that it's possible to acquire.

Tucker Goodrich: 00:08:14 So what happens if I just stopped eating them today? Right? So I put some vinegar on my salad and skipped the salad dressing. And at that point as, um, in addition to the diverticulitis, I had irritable bowel syndrome, which is the most vague disease, probably known to man. It's basically your colon is unhappy and they have absolutely no idea what causes it and we'll blame all sorts of crazy things. But at that point, I had had chronic diarrhea for 16 years. Right? I realized that I had had an attack, an acute diverticulitis attack in my twenties, which is when that problem started because I had all the same symptoms that I was later hospitalized for. So, okay, so stop eating the seed oils. Two days later, my chronic diet, my chronic diarrhea stopped and I had a normal poop for the first time in 16 years.

Ivor: 00:09:18 Wow. That is something to celebrate about and no doubt.

Tucker Goodrich:	00:09:22	Oh yeah. And I've gone back and I've read, you know, Stefan was fabulous in speaking to me offline and I've gone back and I've read the email that I sent to him and I was absolutely incredulous. I was like, I cannot believe that this has made this big of a difference this fast for me because I'm a very active person. You know, I like to hike. I like to go on travel, I like to go skiing. I had to carry a roll of toilet paper everywhere. It was just part of my life. When I would pack, I would pack a roll of toilet paper and all of a sudden that problem, my biggest day to day negative in my life from a health perspective is fixed.
Ivor:	00:10:07	That's amazing. And that's a knife edge. I mean, of course it's an association. That change was associated with a dramatic improvement in your health. It's theoretically possible that something else could have happened literally in those days. Massively unlikely, but theoretically possible. So then what would an engineer do in that circumstance? Well, I always say in problem solving, you switch the problem off which your factor, okay. Then you'll switch it back on again. Then you switch it off again, and then you reached the, the security of of being confident...
Tucker Goodrich:	00:10:46	Right. Which is what you do in if you can't do an RCT because there aren't multiple needs that I can do a parallel trial and you have to add and remove what you think is the factor. So I wound up doing a lot of experimentation like that. And now the interesting thing to me, as I said, I was, you know, about 20 pounds overweight. I tried various different dieting approaches. I tried calorie restriction, I exercised in enormous amount, never lost a pound through exercise. I had tried going low-carb at one point and couldn't get over the carbohydrate cravings. So what was really interesting to me was that after I stopped eating seed oils, I forgot to eat any carbohydrates for a week. Just didn't occur to me. It didn't have an appetite for them until the following Friday when I went back down to the cafeteria and I got myself a roast beef sandwich with whole wheat bread of course, because I was Mr. Wholewheat, it's healthy, don't you know,
Ivor:	00:11:44	Healthy whole grains - don't miss 'em!
Tucker Goodrich:	00:11:46	And I had a horrible reaction to the bread. Right. So to your point, okay, just one bad reaction to one sandwich doesn't necessarily mean anything. So this time I intentionally didn't eat any wheat for the following week and on the following Friday had a couple of slices of pizza, which made me think I was having a heart attack and my reaction to them was so violent. My heart was racing, my head was pounding, I had to lie down

on the Sofa at work to recover for about a half an hour. Right. So what I discovered by adding things and removing things, I still distinctly remember the last bottle of beer I had at that point because it turns out, you know, and this gets back to the open mindedness when I was reading stuff on his blog, he said wheat was one of the worst health problems in the modern world and I thought that was crazy because I was Mr. Wholewheat, right? And I was healthy allegedly. Yeah. Well, so here I am discovering I'm one of the most seriously gluten intolerant people I've ever heard of. The, it turns out my two major health problems at that point were, you know, the quote unquote stroke and the acute diverticulitis. Both of them occurred on a Monday morning after a ski weekend. What would I eat when I was skiing? I would eat pizza, I would eat Chinese food, I would drink beer. I would eat crappy food that they sold on the mountain, which was often deep fried and included lots of French fries, all of which I can't eat anymore. I was inducing these things by going out and eating crappy food on the weekends and then having this reaction on Monday morning.

Ivor: 00:13:41 Quite an extreme reaction too, I mean some people can handle lots of these problematic foods and then some people have enormous reactions. Now what you're describing there is, because today we're going to be talking predominantly about the seed oils, the vegetable oils, the Omega six fats. But in there in your discussion, you've also got a lot of the older problem foods like wheats, refined carbohydrates, you know,

Tucker Goodrich: 00:14:07 And that the point about the lack of carbohydrate craving is a crucial one, which is why I include it. Because while it did uncover my gluten intolerance, which was the cause of the stroke, and by stroke I'm not exaggerating, I went partially blind and was unable to speak. So I started looking at this, you know, a little bit about my background. I've been on Wall Street for almost 30 years. I got sucked into the technology business. I am not a trained technologist, but kind of self taught. We would have problems at work and I would figure out how to solve them. And it usually involves some degree of technology. And it got to the point where I was the chief technology officer for a major hedge fund with a team of computer science graduates working for me with my, you know, partial history of degrees, fairly funny situation and I was the ultimate problem solver. I designed a lot of the systems and when other people couldn't figure out what was going on, why we're having problems, they would come to me and I would sit down with them and help figure things out. So I have this, you know, tried and true problem solving mindset, practical engineering.

Ivor:	00:15:22	That's where nature beats nurture, where natural talent and aptitude can blow away academic training often - once someone has a talent for something, the lack of a specific academic accolade is not really relevant. Once they have the capability and the talent to dig into the science, sorry, this is just a personal bugbear of mine. When people refer to "but you don't have x or you don't have y".... it's, it's so naive to say that. Yeah.
Tucker Goodrich:	00:15:51	Yep, and that's a whole other topic. The problems I had with various Computer Science people who worked for me over the years versus the guys who, you know, had a love for it and taught themselves. But anyway, so once I started, once my mind was opened and I mentioned, I mentioned the open mind part because I often hear people saying, well, you know, you won't consider the alternative hypothesis to the position that I now hold. I started there and gave it up because I was forced to right? Through an extremely unpleasant series of incidents. I was forced to say, okay, diet is causing this stuff for me. Right? It doesn't matter what anybody else tells you when it happens to you, when you're in a stroke ward, four days with a bunch of med students staring at you like you're a fascinating butterfly. You really start thinking hard. What is going on here? Um, so I started, I was curious about why had all this happened to me when I was doing everything right, right. I was doing what everybody told you to do. I was eating reasonably low fat. I discovered, um, when I stopped eating seed oils, I again, because I didn't know what I was doing, I'm one of the only people you'll ever talk to who actually induced rabbit starvation in himself because it turns out the only source of fat I had Seed Oils, and I went without any fat for two weeks and got to discover what rabbit starvation was. It's miserable.
Ivor:	00:17:25	Now. That's an interesting, I, we don't want to divert too much, but yeah. So just for anyone listening rabbit starvation is when people only have access to very lean meat, low-fat meat, like the explorers who had rabbits that, in the winter they had very little fat. And they had a lot of lean meat and very little else and, and they actually have this dreadful condition develop. So you were essentially eating a low-fat diet of which the fat in that diet was largely made up of, of "healthy polyunsaturated vegetable oils".
Tucker Goodrich:	00:17:57	Yes, yes. Oh. Without realizing it. Right. That's what I was eating. And when I stopped eating the vegetable oils, what I was left eating was basically protein and vegetables. As I said, my carb cravings went away and I was doing that experiment and I wasn't really getting any fat because it hadn't occurred to me

that you had to eat fat at that point. So when the rabbit starvation hit, I was like, oh my God, I have to, you know, I started craving fat, like an insane craving for fat to the point where I drove to the supermarket on the way home because at that point I'd read enough about quote unquote healthy fats that I bought a jar of coconut oil and went home and ate it with a tablespoon. Oh Wow. And it felt great. And then I induced rabbit starvation in myself again because I didn't realize you have to eat fat every day, not just every two or three weeks. Um, you know, so that was the second time was a cooked up a pound of Bacon and ate the whole thing for the fat and oh my God, it was the most fabulous experience in my life. You know, being in rabbit starvation and eating fat, you cannot imagine how good it tastes. It is just mind-boggling how good that felt.

Ivor: 00:19:19 Yeah, there are mechanisms that the instinct kicks in and it does push you towards certain foods, whether it's cattle licking "salt licks", you know, or chewing up dirt to get minerals, this occurs? Instinct kicks in. Actually my own son, it turns out as a double ApoE4 (homozygous) - when he was very young, he used to, when he could barely crawl - he would find his way to the butter dish and he would eat butter and he wasn't interested in anything else. He would go and eat butter, and we found it very amusing. Of course, back then, I didn't know any of this, but it turned out he was profoundly vitamin D deficient. We were feeding them a healthy, low-fat kind of diet in our ignorance and his instinct was triggering, when he got hold of butter, he would just eat it by the chunk and we couldn't stop him. It just goes to show you. Yeah. Evolution works. It's a funny thing and and it's also a good point that you need to listen to your cravings - to a point. Yeah. I mean not the false cravings of the modern high-carb population craving pizzas and coke. No, but in, in the proper context. Yeah. Proper context.

Tucker Goodrich: 00:20:29 Yes. The cravings are very important. Um, and we can, we can get into all of that. So based, so, you know, I started looking at this as an intellectual problem. Why was I doing everything right? And I got so sick and I was basically by dumb luck ever able to figure out what was calling causing all of health problems. And I mean, I thought my problems were probably from wheat because my own reaction to it was so severe. Um, so I did a lot of reading on that and went through all the literature and came to a very good understanding of what is and isn't caused by wheat. I looked into seed oils for years and wasn't really able to get anywhere until Ninas book "Big Fat Surprise" came out. And in her chapter nine, she discusses vegetable oils briefly and mentions what vegetable oils turn into when they are cooked. And having kind of run into a dead end

on the seed oil research on my own, one day I said to myself "hmmnn - they turn into this poison. I wonder if it does that inside the body?" And I started doing some reading and lo and behold, it does - Eureka, right? So again, back to the engineering mindset. These chronic diseases including obesity, but we've got obesity, heart disease, diabetes, cancer, autoimmune diseases, all of them have a couple of traits in common, right? They all tend to occur in the same people. One - right? So if you're obese, obviously you're more likely to be diabetic and you're more likely to get heart disease and you're more likely to get cancer and you're more likely to have an autoimmune disease. So they're all sort of clustering together. They're all new in human history. Now, while lots of these diseases existed, you know, have existed for all of human history, they weren't pandemic the way they were the way they are today. I mean, the obesity rate in the United States used to be 1% now it's what, 30% obesity in the United States, whatever it used to be, now it's like 60% overweight, right? The number of people in the United States who are considered quote-unquote "metabolically healthy" is now, like 12%

Ivor: 00:22:49 yeah, I saw that recent paper, 88% failed metabolic health criteria. So it's insane...

Tucker Goodrich: 00:22:57 Right? So heart disease, people, you know, there's a long history of heart attack, heart disease, it only became a common disease in the 20th century in England, in America. Right? And there are studies, if you go back and you look at that, where they compare populations like the, they look, there's one fascinating study that looked at the Koreans, the Japanese and Africans, and compared their or heart attack rate in their native environments and then looked at similar genetic people in the United States. The heart attack rate for African Americans was similar to White Americans. The heart attack rate for Nigerians in Nigeria was zero - confirmed by autopsy. So that doesn't mean if you die of a heart attack -rather they were looking at every single heart because some people will have a heart attack that doesn't kill them, but it does damage to the heart.

Tucker Goodrich: 00:23:56 So when an autopsy you can say, Oh, this guy had a heart attack at some point, even though it wasn't what killed him. So we're talking a heart attack, effective heart attack rate of zero in a big population. Thousands of autopsies, right?

Ivor: 00:24:11 Yup. And I know over there they can have viral infections that damage the heart and they kind of older phenomenon or phenomena with the heart. But as you say, not the coronary vascular disease. The atherosclerotic plague of the West...

Tucker Goodrich:	00:24:25	Right - the MODERN plague of the West. So if you're looking at this from an engineering perspective, you've got a bunch of criteria that you can use to narrow down what are the possible candidates. First off, that study eliminated the possibility that it's genetic because they looked at people of similar genetic backgrounds and saw a huge divergence in disease, right. People's genes don't.... you know, if you're Japanese, your genes don't change just because you move to Los Angeles.
Ivor:	00:24:57	Yeah. It's 15,000 to 20,000 years for a significant genetic kind of change. This is 30, 40 years. Yeah.
Tucker Goodrich:	00:25:06	Right, right. It doesn't happen in a single generation. Obesity - same thing. Japanese people moved from Japan to America. They'd start getting American style obesity in Japan. Currently the obesity rate in Japan is 3.5%, it's the lowest of any industrial country. Right. But if you're Japanese and you moved to America, or if you stay over there, you start getting fat - it's clearly not genetic. We ruled out genetics. So the next time your doctor tells you: "Oh, you just have bad genes" - it's baloney. Okay. So we've now determined that it's clearly an environmental cause. Right? One of the things that's been proposed is, is there an obesity virus? There are Adeno viruses that will cause obesity in animals. That's an interesting hypothesis. And one of the things about viruses is they tend to be very species-specific. So people generally, you know, viruses can jump from species to species, but it's pretty rare. Generally people get people-diseases, monkeys get monkey-diseases, pigs get pig-diseases. Every animal that eats a human diet, right? Dogs, cats, rats, pigeons. Laboratory animals are all having an obesity epidemic, right? Wild animals are not so wild. Rats, they're usually skinny and lean? But rats in New York city eating human garbage - they've got an obesity epidemic.
Ivor:	00:26:35	That they've actually, I saw a recent reports, rats in the city are becoming diabetic. at a high rate.
Tucker Goodrich:	00:26:42	Yeah. Literally can't make this stuff up. So, okay. So we can narrow it down to from environmental. It's not - it's the food. It's got to be the food because it's affecting all these different species.
Ivor:	00:26:56	Exactly, and the exercise doesn't make sense because of all of the counterpoints to that argument that we've just talked about. And as Robert Lustig says, there's an epidemic of obesity in six-month-olds. They're not skipping the gym, that's for sure.

Tucker Goodrich:	00:27:16	Right. And the rats in New York City, they're not kicking back and watching Netflix and they're, I mean - they're still rats. They've still got to do rat-things to get their food - right? And I mean the exercise, we won't get into that. That's a big topic that's been pretty clearly debunked as a problem of all, as a cause of all of this. There's no question that exercise is not causing all of these epidemics. Exercise is a wonderful way to be healthy. Let's be clear about that. And it's a great way to relatively lower your risk of all diseases, right? So huge fan of exercise - but lack of exercise isn't what's causing all of this. Then we have what's probably the most contentious point, which is, for instance, if you talk to a cardiologist about heart disease, he will tell you, oh, it's LDL is the cause. What he's saying therefore is that genetics is the cause - because we have LDL because our of our genes, right? That's how we're programmed. Somewhere we have a gene that tells your body to make LDL for whatever reasons, right? And yet we know that a hundred years ago, 150 years ago, nobody was getting heart disease. It wasn't because we didn't have LDL, right? LDL isn't a recent "infection" that's afflicted the human race, right? We know that for a fact. But if you understand the history of these diseases, a claim like LDL causes heart disease fails immediately because then you say, well, why didn't anybody get heart disease a hundred years ago? Why are Americans not getting heart disease a hundred years ago? Why were the English not getting heart disease a hundred years ago? Right? Something was added since we've already established it's dietary, something was added to the human diet. Over the last hundred years because, you know, we didn't have obesity a hundred years ago. We had very low rates of diabetes, very low rates from heart disease. Cancer is a recent disease.
Ivor:	00:29:22	Yeah. And that is contested. But I have a paper that goes through the data. The Polynesian women had five to six times lower rate of breast cancer than American women...
Tucker Goodrich:	00:29:36	ALL Asian women - all...
Ivor:	00:29:38	...It happened to be a paper on Polynesian. I'm just being really, really purist here.
Tucker Goodrich:	00:29:44	Yeah there's another paper that shows it for all Asian women.
Ivor:	00:29:47	All right. Okay. Yes. But when they moved to America, the paper observed within a couple of generations, they largely catch up with the American women in rates of cancer. So I need to acknowledge by other experts that it's overwhelmingly not a genetic disease really, that it is only around 10% of cancers that

		are truly genetic (people with very strong disposition). Broadly speaking, it's an environmental disease. And I always say to people like, look at the chimney sweeps in the 18th century, the boys had Scrotal Cancer rates that were enormous. It was almost unheard of in others - but they [chimney sweep boys] have rates that were 20x or much more compared to anyone who wasn't a chimney sweep. Yeah. And Lung Cancer, we know the same [from smoking]. But just take those and extend them to, to most cancer generally - is environmental. You can argue whether it's diet, you can argue whetehr it's pesticides, you can argue WHAT in the environment is causing the cancer - but you cannot really argue it's not an environmental disease mostly.
Tucker Goodrich:	00:30:44	Right, right. And there are viral causes of cancer also, like Epstein Barr causes couple of different kinds of cancers. Um, but to your point, that's part of the environment.
Ivor:	00:30:54	Yes, absolutely.
Tucker Goodrich:	00:30:57	And yes, that's one of the key points about genetic diseases is that there are genetic diseases, there are genetic diseases that predispose you to heart disease and obesity and probably diabetes - although that's a whole other question looking at like type one diabetes. But the thing that actual genetic diseases, severe genetic diseases have in common is they're all rare because they're bad for you. They tend to kill people, therefore they don't reproduce, therefore they can't be too common in the population or people die. Right? I mean, there are populations that have higher rates of genetic diseases and it's kind of a big deal. You know, they, they're well aware of it and it's been going on for thousands of years. It's not something that started up in the last hundred years. Right. So
Ivor:	00:31:47	And the genetic, the genetic makeups that make you susceptible to these modern diseases? Again, it's the environment overwhelmingly that's the cause. But for instance the genetic trait to be so susceptible to your LDL getting oxidized and damaged, or for you to be susceptible to building up liver fat? All of these things went through evolution and survived and remained because there wasn't the offensive agents in the environment to, to make that susceptibility be a big problem. But then came the 20th century and - boom!
Tucker Goodrich:	00:32:20	Right which gets, you know, there's a concept in toxicology called a lethal dose 50 which is the dose of a poison that will kill 50% of the population that it's given to. Now what kills one half, and lets the other half live - is their genes. Right. But whats causing it is the poison, not their genetics.

Ivor:	00:32:43	That's, that's a great analogy. Now, I haven't used that one before. LD50 I, I remember it. That's true. Yeah, absolutely.
Tucker Goodrich:	00:32:51	Well, yeah, LD 50 is an important concept and it's a real key to understanding the onset of chronic diseases that there are genetic factors that can predispose you to susceptibility, but those aren't the causes, right? And too much of medicine spins their wheels looking at genetic causes for clearly environmental diseases and it's an enormous waste of resources in my view.
Ivor:	00:33:16	Yeah, I agreed.
Tucker Goodrich:	00:33:19	So we've got a bunch of, you know, through a little bit of analysis, we've got a bunch of things that point us to what could be the possible cause, right? It's new, it's dietary. It is something that travels around with what I'll call "the American diet" - because we have books and loads of epidemiology showing that as soon as any population starts eating the classic American suite of foods, they get all these diseases within a generation. Right? And the most interesting point is there is, you know, scientists know how to cause all of these diseases in laboratory animals. You can call up a company called "research diets" and order research Diet D14292 and feed it to your pet, and it will become obese and diabetic, right? So by process of elimination, whatever's the cause has to meet all of those criteria and be in the research diet that is the standard in science to cause these diseases, right?
Ivor:	00:34:32	Yeah. and those diets, overwhelmingly they call them high-fat diets because of political beliefs and ideology, but they are really fat plus loads of sugar and carbohydrates...
Tucker Goodrich:	00:34:48	Because rats, rats like carbohydrates, right? So there was a fascinating series of studies that were done recently. The lead scientist, the first name the lead scientist was this woman Alvheim, right? So what her team did, and it was led by a scientist named Christopher Ramsdon from the NIH and what they basically did is they looked at the fatty acid composition of a high fat diet. Now, there was a drug that came out in I think 2006 it was approved called Rimonabant. Rimonabant cures obesity in rodents and in humans. It reduces insulin resistance. All these, it improves this whole suite of diseases that rodents and people get. You can give it to a rat, it will cure its obesity. You can give it to a monkey it will clear it's obesity. You can give it to a human, it will cure his obesity. Problem is it had an rather unfortunate side effect that it made people want to commit suicide. So they promptly pulled it off the market, right? Oops. Why it worked? So what Alvheim's study was doing was looking

at what was the mechanism of Rimonabant? Exactly. Why did it have this effect? And they did this by varying the fats in the Diet. So it turns out Rimonabant worked because Rimonabant blocks your endocannabinoid receptors from receiving an endogenously created chemical called 2AG - 2-Arachidinaoil glycerol that's made from arachidonic acid, which is an Omega six fat. Most of the Arachidonic fat in your body is made from linoleic oil. LINOLEIC oil. The primary source in the Diet is seed oils. But what generally people call vegetable oils. But "seed oils" I like to say because olive oil isn't a seed, it's a vegetable and olive oil is quite healthy. But soybean oil, corn oil, you know, rapeseed oil, canola oil, all those are seed oils...

Ivor: 00:37:13 Safflower, all of the classic so called vegetable oils have nothing to do with vegetables - they are from seeds...

Tucker Goodrich: 00:37:21 Right? So basically any seed oil other than coconut oil, which is the little outlier - coconut oil is not, should not be considered a harmful seed oil, just to be perfectly clear. So what they did is they varied the amount of seed oils in the diet. And what they discovered is that this factor controlled how much obesity they got. Now what do we know about seed oils? It's, let's go back to our criteria. are seed oils new - Yes, they are a modern invention. They're part of the industrial diet. They were originally created in scale back in the 1900's from...yes, everybody - they were created from industrial waste. Cotton seed oil originally, which was toxic until they figured out how to detoxify it. And then I think it was sunflower oil in Europe, mostly

Ivor: 00:38:13 They were used as machine lubricants. Those leftover oils crushed from those seeds where the cotton was made, and the leftover oil - lubricant for light machinery until smart-arse Crrisco said we can feed it to humans...

Tucker Goodrich: 00:38:28 Right. And they were also used as Lamp oils because most people don't remember there was a huge market for lamp oil prior to the invention of electricity. So vegetable oils made a great lamp oil, right? Um, actually vegetable oils are still the basis of biodiesel, which is kind of interesting. Most biodiesel is leftover cooking oil. So anyway, so it's new, it's part of the American Diet, right? Production of cotton seed oil start in the United States, and we spread it to the rest of the world. At one point, the adulteration rate of lard sold in the United States with cottonseed oil was 30%, so the entire national output of so-called "Lard", well 30% of it was actually cottonseed oil back in the late 1800's - which is coincidentally when diabetes, heart disease, cancer, all became problems. And what's really key

here is for our criteria, it's one of the key parts of D14292 - the research diet's diet, which is made from Lard - and which they recently discovered the lard that they're using is 30% linoleic acid because pigs eat, they're fed soybean oil and corn in the United States and they concentrate the fats just like humans do.

Tucker Goodrich: 00:39:56 So because we are feeding pigs a lot of seeds and seed oils to fatten them up, they concentrate these fats in their tissues. Right. So Lard has gone from being a healthy fat to an unhealthy fat to the fat, in fact, that they use to induce all these diseases in laboratory animals. Yeah. Lard used to be a lot of monounsaturated and a little Polyunsaturated in the traditional boar or a pig. Yeah. And if you go back and you read old agricultural feeding studies they observed a hundred years ago, like for instance, Rice Bran oil - you can't feed rice oil to animals because it concentrates too much the Omega Six fats in their tissues and the fat becomes undesirable. This was a hundred years ago. So what did they do? They feed, they use de-fatted Rice Bran. What are they taking out of the Rice Bran? The seed oil. So basically they've known for a hundred years in animals that these things are problematic, but not until Alvheim, did their study, her study, I think it was 2012 did they start to connect the dots and say, Hey, this is why Rimonabant works. And there are other researchers who've since done studies confirming Alvheim's work, right? Rimonabant was pulled from the market for humans, but you can still use it in animals and it's now the most promising. What they're trying to do is block this action in this stomach because that's where it starts. So now we've got a pretty good candidate, right? It meets all of our criteria. We know that it causes obesity in humans. Because that's the mechanism of this drug Rimonabant which blocks obesity in humans. We know that it works in animals because they've done the intervention experiments, right? We know that it fits all the criteria for our candidate, for the root cause of all this stuff, right? So let's just discuss a little bit why, why is it a problem?

Tucker Goodrich: 00:42:02 Right back to Nina Teicholz's book, different fats are, I hate macronutrients, right? Carbohydrates, protein and fats. The reason I hate those three criteria is because there are good proteins and bad proteins, right? Gluten that causes me so many problems is a protein. Obviously it's very bad for me. There are good carbohydrates, like fiber arguably is a good carbohydrate and there were bad carbohydrates like you know, the whole sugar that we all know, children shouldn't eat because it'll rot their teeth out. There are also good and bad fats, right? So if you're looking at, go back and look at the research, there's evidence that some fats are harmless and

some fats are toxic, right? Omega six fats are the most toxic fat. They turn into a variety of different harmful chemicals. The most harmful chemical that they turn into is something called 4-HNE 4-Hydroxynonenal - this is a lovely chemical. It is a mutagen. It causes genetic damage, It is what they call cytotoxic. It causes cell death. And it seems to promote cancer and it promotes cancer by preferentially modifying the p53 gene, which is your body's defense gene against cancer. Now that is interestingly enough the gene that is most commonly found in cancers. Wait a minute. So we have a chemical that we are feeding to people - that modifies a gene that allows cancer to happen - and it's the most common cancer mutation that we find when we look at cancer mutations in all of the cancers, lung disease, breast cancer, liver cancer, all of the cancers that have gone up in association with the modern diet. So we're looking at a clear mechanistic pathway from what you're putting in your mouth to genetic damage right, think about this. This chemical was introduced into the human diet, right? You have to assert that it's safe firstly. Stuff that's been around for a long time, and this is going to be the core of my argument - stuff that's been around for a long time can be considered to be "generally regarded as safe" [GRAS]. Right? How do they determine if a chemical is dangerous? They feed it to animals, right? So what do we know about seed oils and animal experiments? We know that it's required to induce cancer. Right? We know that the rate of cancer increases along with the percentage of Omega six fats in the Diet, we know that it induces diabetes in animals. Rats have a slightly different version of diabetes in humans, but they get insulin resistant, they get Leptin resistant, they get obese. If you feed it to rodents or to humans, it makes cholesterol susceptible to oxidation. Right? Which is one of Ivor's favorite topics. Right? But again, since we know heart disease is a recent disease - it's rather interesting that we have a long series of experiments going back to the 1980's showing that what causes LDL to initiate atherosclerosis...are Seed oils.

Ivor: 00:45:50 And that would be hotly debated because, just to interject - the Orthodox suggestion is that native undamaged, non-oxidized healthy LDLs go into the endothelium, and into your artery wall. And thereupon they get trapped some of them and they become oxidized n their trapped state. The alternative view is that the LDLs do become mildly oxidized, or desialylated in an earlier step (in the blood stream) driven by environmental factors. And those slightly oxidized, slightly damaged LDL's are then brought into the endothelium through receptors and brought in and become part of the atherosclerotic process. So they're two very different views, but you would subscribe more

to the LDL being damaged as a primary step - and then becoming part of the atherosclerotic process?

Tucker Goodrich: 00:46:50 From my point of view, neither one of those distinction matters, right? What makes an oxidized LDL susceptible to oxidisation? It is the presence of Omega six polyunsaturated fats in the LDL.

Ivor: 00:47:15 ...and in the same way that humans, it's been clearly demonstrated if we eat more polyunsaturated omega six oils, we sequester them in our body fat - the omega 6 has gone way up in human body fat over the last 60 years. Also women's breast milk becomes much higher in Omega 6 and the babies are thus fed with high poly. So at every step, this stuff doesn't just go in and get burned for energy and then discarded as carbon dioxide. This becomes incorporated into all of our cellular membranes, including LDL particles. Lipoproteins....

Tucker Goodrich: 00:47:51 Exactly. Exactly. So where it gets oxidized in the body is an interesting question, but it's really beside the point. The interesting thing, from an engineering standpoint - we know it's environmental. What's the environmental trigger? Right? Well, we know that what causes, we know this in human experiments, we know that what makes LDL's susceptible to oxidation and just you know, for the audience, to be perfectly clear here, the two fellows who discovered the LDL recepto who got a Nobel prize for it, were two doctors named Brown and Goldstein. Okay. So first they discovered the LDL receptor, which explains how LDL gets taken up into cells. Okay. The next thing they tried to do was take LDL - and the first step of Atherosclerosis is what they call the formation of foam cells, right? Well, foam cell is a white blood cell that has hoovered up a lot of LDL and all the fats that are in the LDL to the point where it becomes this bloated, obese little cell that on a microscope looks like foam, hence foam cell, right? So Brown and Goldstein say "aha! - we've discovered how LDL gets into the cell. Let's take a bunch of macrophages, put them in a vial full of LDL, and they will all become foam cells. And then we've shown that this is what causes heart disease." Brilliant. But it didn't work. So then a couple other doctors, Steinberg and Witsdom, they said, you know that Brown and Goldstein concluded only modified LDL was to blame, but we don't know what modified means. So Steinberg and Witsdom through, you know, a bunch of experiments and some serendipity, which is always a key part of science. They discovered, well, what's happening to the LDL is that the polyunsaturated fats in the LDL are getting oxidized. That's what's modifying them. And then they did some experiments in rabbits and humans where they said, let's feed them different amounts of seed oils and what

		happens to their LDL if we take it out and try and oxidize it? Oh my goodness, it's more susceptible to oxidization now that we fed them a lot of seed oils. Well that's pretty straight forward. So if you want oxidized LDL's, you eat more seed oils. Simple.
Ivor:	00:50:31	Incorporate more "less stable" polyunsaturates into the membrane, and leave more exposure to modification/oxidation. Yet the belief system that the polys could help with heart disease, smashed all of that discussion like a hammer, I'm guessing.
Tucker Goodrich:	00:50:51	Well it wasn't even that really it was Steinberg and Witsdom. Steinberg was also the doctor who convinced Merck to produce the first statin and I mean they already had it, but he convinced them to take it to market. And I don't know this, he wrote a very interesting book that I have not read yet, but what I suspect happened is that after they did the experiments demonstrating that the problem in heart disease was the food supply, they probably said to themselves, okay, well we can't change the food supply. Right? Is there anything else that we can do? And there's an argument and there's some experimental evidence that, I mean, we don't know why statins do what they do, but they do do something. They reduce heart disease by a little bit, especially if you already have heart disease and they also lower LDL and they also, you know, anyway. Statins is a whole long other topic. But what I suspect he thought is "we can't fix the food supply, but we can give people this drug and we think it will make it better by reducing the amount of LDL, which we think will reduce the susceptibility of LDL to oxidation" - which statins do do....
Ivor:	00:52:11	Which is fair. Absolutely. And, uh, I always say for existing heart disease or very reputable dependable blood markers or a calcium score that's high or real evidence of the atherosclerosis problem going on. There's no doubt, but statin's mitigate the problem. They don't fix the problem per se - the heart attack you would have say in 10 years time, well you may have it in six years or seven years time without the statin. And they don't change the world. But they mitigate the problem. They reduce the number of particles, the reduce the number of oxidized damage particles, they mitigate...
Tucker Goodrich:	00:52:48	Yeah, they mitigate the problem. That's clear and that's what the research is very clear. But the research is also very clear about what's causing the problem, which from my perspective, you know, if you're a doctor and you have a patient and you can reduce his risk of heart disease by 20% that's a win, right? Because most doctors assume that patients won't follow diet

advice, which is partly because the diet advice they give is bad and counter-productive so the patients don't follow it. Okay, 20% reduction is nice. But what I'm curious about is why were we at zero a hundred years ago, or near zero? Why were Nigerians not getting any heart disease? Why would the Japanese who lived in an advanced industrial society, very similar to America in a lot of ways - why did they have a near zero heart disease rate until they made the mistake of eating American food?

Ivor: 00:53:51 But you are talking Root Cause, and Root Cause resolution - rather than mitigation. And the medical system is pure mitigation -well except for surgeries and certain things that fully cure, like antibiotics will cure certain conditions or diseases. But the medical system is overwhelmingly mitigation and Root Cause has no place in it because the Root Cause is nutritional and dietary. And that's just not really part of medicine to, to change those factors really. Except to read from the standard sheet. But the standard sheet says take more polyunsaturates and that does include vegetable oils.

Tucker Goodrich: 00:54:34 Okay. And why, why did they say that? Okay, that's an interesting question.

Ivor: 00:54:38 Well they believed it.

Tucker Goodrich: 00:54:40 They still do believe it - and they still do recommend it. Okay. So one of the things that seed oils do beyond a shadow of a doubt is they lower LDL. So back in the 1950's through I think it was the 1970's they did a bunch of different experiments where they fed people more seed oils and looked at what happened. And what happens is that people's LDL went down. Right. And since, you know, Steinberg and Witsdom didn't do their experiments until the late 1980's showing what causes LDL to become atherogenic. these guys just said, look, LDL goes down. That's gotta be a good thing, right? Because we know LDL causes heart disease, right? And they said, "Oh!" and they published their papers. And they said "look, vegetable oils, causes LDL to go down, we know that LDL causes heart disease. That's gotta be a good thing. Right?" Okay. So fast forward, back to around 2000, it was recent. I can't remember. I mentioned before Alzheim that she worked under a doctor named Ramsdon. Well, Ramsdon went back and looked at all these polyunsaturated heart disease studies because he asked the same question that you just asked. Wait a minute. We just showed that it's harmful. Why are they seeing benefit? So he went back and talked to the original scientists and found the original data from some of these studies. What they looked at

was the change in LDL, but they had a population of people who were getting heart attacks. What they didn't publish was what happened to the people - not just to their LDL. Right. And what the studies show is that the people fed more seed oils had lower LDL and higher rates of heart disease and higher mortality.

Ivor: 00:56:38 It was significant. 30% and this is the one, I think it was 2015 BMJ, Ramsdon - the Sydney Heart Trial - where they got the records...

Tucker Goodrich: 00:56:50 Rght. The original data, they had never published the mortality data. But now they had it. The original team didn't even apparently look at it or include it in their analysis. It makes you want to smack your head.

Ivor: 00:57:02 It's crazy. And if we look now, I was in Dublin a couple of years ago and there was an Irish Heart Foundation review of the evidence for saturated fat versus vegetable oil. And Professor Hooper was there who did the big Cochrane Collabortaion 2015 Meta-analysis of all the RCT's and we, yeah, we discussed this. What they found, well there was a small percentage of apparent reduction in heart disease "rates" - but there was no beneficial effect on all cause mortality, heart disease, mortality, blah blah, blah. But the thing about it is that the devil was in the detail. The one trial that seemed to show lower mortality for cardiovascular disease specifically was the Veteran's Administration one. And that was the only one where there was no cholesterol reduction seen from the intervention - which was a bit bizarre that it should see a benefit in that scenario. And what they didn't know was a year later there was a follow-up publication from that team, verifying and the cardiovascular mortality had indeed reduced slightly. But the all-cause mortality had not reduced at all? And a year later they quietly published that the all-cause had not changed because the cancer mortality had simultaneously gone up significantly. But that never made the media or the meta-analysis. So we've got the Sydney Heart, we've got the Helsinki Businessmen's Trial, we've got the Veteran's Administration trial, we've got a few more that showed the opposite of what we've been told - but they were all subdued and pushed aside.

Tucker Goodrich: 00:58:38 Well, what's interesting to note, though Hooper published three different papers looking at polyunsaturated fats, Omega six fats and Omega three fats. And I will confess, I have not read them all because in total there are about 850 pages. But what they do show is that there's no significant mortality benefit for heart disease from polyunsaturated fats and getting, getting back to,

you know, the LD50 concept in epidemiology, which is the study of disease in populations, you have a real problem if every member of a population has the same disease causative factor, because you can't figure out what it is, right? It's like if you're trying to figure out what causes smoking and you're only looking at smokers, or what causes lung cancer, and you're only looking at smokers - you're not going to see the difference between a smoker and a nonsmoker because you're only looking at smokers. Right. And a lot of these epidemiological studies going all the way back to Ancel Keys. They're confounded by the fact that they're only looking at industrial countries because that's where the researchers happen to be focusing. So if you were Ancel Keys, you can call your buddy in Italy and say, hey, we want to do a study, and your buddy will say, sure, that sounds fun. Let's do a study. And you wind up with a bunch of industrial countries that all look the same because they're all eating similar diets. Right. Um, and that's, sorry, go ahead.

Ivor: 01:00:12 There may be a threshold effect. I've a few, several papers on animal studies and Seed Oils and cancer, linoleic acid back from the eighties and nineties and then these experiments suddenly tapered off. I think they got unpopular because the whole official policy was to tell people to eat Seed Oils. They were a massive economic and food industry component. So I think these studies showing cancer problems or potential carcinogenic issues. They weren't very popular, but one of them was interesting. One looked at mammary cancer in rats and they found that when you were eating a very low percentage of Omega six, there was a lower rate. But when you got to around 4% of the linoleic acid in the diet, you are now at a higher rate of mammary tumors in the rats. But after that, when you kept putting in more up to 10% total and more - it didn't get much worse. So they said, they actually said in the paper, they said, well, look, it appears that more Linoleic acid means more tumorigenesis, larger tumors, more problems. However, after 4% in the diet, there's a plateau in the increase. And they actually noted that today's population, the lowest linoleic acid consumers are around 4% or more. So they made your very point, it's going to be very hard to see an effect of linoleic and cancer - because nearly everyone's above the threshold.

Tucker Goodrich: 01:01:43 Exactly. Right. That's a fascinating paper. That's exactly the point. But there are populations that aren't eating much in the way of seed oils still. Right. There are the Tsiman Indians down in, I think they are in Bolivia, in the Amazon jungle. They are still basically living a horticulturalists lifestyle right there, hunter gatherers. And then they, I think they farm yams, something

that they plant themselves, and they don't buy much outside food. Now what's interesting is a correlation there between Tsimani health and motorboat ownership, right? So if you're somebody and you own a motor boat, you have worse health. And part of the reason seems to be that then you can get to town and buy modern foods...! Right. And then the Kitavans in Nepal, in Polynesia who, same thing, they make their own food. They don't have any of these diseases, right? They smoke and they don't get cardiovascular disease. That's another long topic. But this gets to a key point of the epidemiology is that a lot of it is looking at populations that already have the problematic factor set at a high level. So you can't distinguish - if you go between the healthy population and the unhealthy population. However if you find healthy populations: There's a famous study from India in the 1960's, I think at the time it was, it may still be the biggest epidemiological study ever done.

Ivor: 01:03:22 The railway workers? (Malhotra).

Tucker Goodrich: 01:03:23 yes so this was done by the chief medical officer of the Indian railway system. And he had I think 1.1 million employees and their families who were all right part of his, um, medical system, right? They've got all their medical care through this guy. And when he heard he was doing all of these fascinating studies looking at, you know, diet and various disease states in his employees. And one of the things that he looked at was heart disease because he said, okay, this was just when the Diet heart hypothesis was becoming fashionable. That saturated fat causes heart disease, right? This was like the fifties and sixties. So he looked at his population and it turns out that in India, in the north, in the north and the south, you have very different diets. In the north people, mostly dairy fat and the wheat, um, and a bit of meat, right? And in the south they tend to be more vegetarian and they tend to eat a lot of rice, a lot of starch, and they tend to eat a lot more seed oils and less dairy.

Tucker Goodrich: 01:04:29 So they're basically eating, you know, if you look at this EAT-Lancet study that just came out, the recommended diet is what southern Indians have been eating for a long time. Right. Okay. So what did this fellow, Malhotra was his name - what did Doctor Malhotra find. He found that the southern Indians eating the EAT-Lancet recommended diet of lots of starch, lots of vegetables, a little meat and lots of polyunsaturated fats had seven to 15 times the heart disease rate of the northern Indians who are eating a high saturated fat high animal product diet.

Ivor:	01:05:10	I remember that. That was a stunning study and it was well-executed epidemiology. I've my memory seven or eight times, somewhere up towards 10x higher and...
Tucker Goodrich:	01:05:22	exactly how he sliced, how he sliced the different, that was the range. 7 to 15 times...
Ivor:	01:05:28	Yeah, it was quite stunning. But yes 7x is a huge difference. It's exactly, and that's the point I was gonna make that we've got studies now where the The World Health Organization say "meat might cause cancer". They got a 1.08x or 1.1x times risk. But we're talking 7x here. I mean people just need to think for a moment. The other, EAT-Lancet reports coming out, are mere epidemiology, that low-carb may be bad for you. They muster up a 1.2x so-called risk approximately in a confounded epidemiological study. But here as you say, 7x times now that's a massive hazard ratio that would suggest screaming causal.
Tucker Goodrich:	01:06:17	And if you look at, you know, the older study, um, the geographic spread of Ischaemic Heart Disease paper, which is the one that looked at the Japanese, the Koreans and the Africans versus Americans - what's the multiplier in risk, if your divisor is zero, well, it's infinite.
Ivor:	01:06:43	I would, yeah, effectively zero I guess is is what they're saying. So maybe it's a tiny number...
Tucker Goodrich:	01:06:50	Well if you are comparing African Americans to Africans who have a zero heart disease rate? You're looking at an infinite risk increase basically. I mean, I'm being kind of cute. True.
Ivor:	01:07:00	I'm just Tucker...I'm just nitpicking on, I'm sure the Native Africans had an extremely low rate, like a close to zero. I'm just guessing
Tucker Goodrich:	01:07:10	It was in fact zero. Okay. It's over 4,000 autopsies.
Ivor:	01:07:18	All right. So it could, it could be less than 1 in 4,000
Tucker Goodrich:	01:07:23	So yes that's fair. It's not actually zero but it's so close to it that the risk increase to coming over here is enormous. Enormous
Ivor:	01:07:33	And the reverse is true as well. I've papers on these people from Polynesia in Africa, they come over, it's not genetics, it's environmental. Their rates go right through the roof. And also they have evidence that when they go back, they begin to reverse the metabolic distress naturally in their native

environment. So it goes, it goes both directions. Directionality. I mean it's...

Tucker Goodrich: 01:07:58 Right. And then the final, you know, just to get away from the whole epidemiology topic because it's kind of tedious and we have the mechanisms anyway. Um, there's the Okinawans, right? Everybody's favorite population. Okinawa, because at one point, they were the longest lived people in the world. And these guys who are associated with this Blue Zones company wrote a couple of papers saying, Okinawans have such a long lifespan because they're eating a near-Vegan diet and blah, blah, blah. That's why they're so healthy. Okay, so let's go actually, let's discuss the Okinawans briefly just to put that one in the grave. So okay. Now as a southern island of Japan, Okinawa is, there are a number of Japanese studies looking at Okinawa and health and they come to a very different conclusion from what the Vegans did, right? The Okinawans had the highest meat consumption in Japan because they didn't have the same Buddhist tradition that largely drove most of Japan to not want to eat meat. Meat was actually outlawed for hundreds of years in Japan, even though people ate it anyway - back to EAT-Lancet...

Tucker Goodrich: 01:09:18 We've tried that experiment already in Japan and it by the Japanese. The Japanese conclusion was it did not work all that well. So what happened to the Okinawans? So after World War Two ended, they had the longest life expectancy in all of Japan. And then a bunch of Americans moved in. Americans took over the island of Okinawa and use it as their base for the reconstruction of Japan. After World War II, Americans decided they didn't particularly care for local Okinawan cuisine. So they started importing American fast food. The first fast food restaurant in Japan was in Okinawa - six years, nine years before we opened in Tokyo. So what happened to the Okinawans is they got fat, they got diabetes, they got heart disease, they got cancer in one generation. Okinawa went from the longest life expectancy in Japan to the shortest life expectancy in Japan.

Tucker Goodrich: 01:10:34 Partly that was because in mainland Japan's meat consumption went up, longevity went up and partly because they cut sodium intake, which was epic-ally high over there. But what caused these diseases in Okinawa was American junk food. And there's a great paper by a doctor written in 1996 looking at the excess Linoleic Acid syndrome, excess seed oils. He put the finger way back then squarely on the fact that they reading too much seed oils, that it was never a part of the traditional Japanese Diet. And if you read some health stuff in Japan, which is kind of challenging because I don't read Japanese, I can only read it in

translation. I've read conclusions that say well Japanese aren't as as they should be - because they eat too many oils,

Ivor: 01:11:16 ...which some people might construe as too much fat but, but we're talking specific oils and the Linoleic Omega Six oils. Well if we get out of the epidemiology, though I believe it's both fascinating and also tiresome at this stage - at once. But, but it makes points, it makes these huge points. People are using epidemiology to make absolutely false points with really low hazard ratios and, and bad confounding - but you can use it when the hazard ratios are very large to make fundamental simple points like you're doing. But if you go to the mechanisms now, because we'll have to move on and actually I've a paper here open on my desk. I got from Dr. Cate Shanahan and it was the guy Gerhard Spiteller who...

Tucker Goodrich: 01:12:06 Wait, tell me about the paper. I'm lousy at names.

Ivor: 01:12:08 I'll tell you the title of the paper: "The Action of Peroxyl Radicals, Powerful Deleterious Reagents, Explains Why Neither Cholesterol Nor Saturated Fatty Acids Cause Atherogenesis and Age-Related Diseases." But it's essentially all around what you're now going to talk about is the Polyunsaturates.

Tucker Goodrich: 01:12:28 Right, right, right. So back to those peroxyl radicals. The primary one and the most studied one is that chemical I mentioned 4-HNE, which is solely made from Omega six fats either oleic acid, arachidonic acid, which are the two main omega six fats in our diet. Mostly linoleic acid. Okay. So I'm going to try and stay away from too much chemistry. But let's just quickly go over what seems to be the pathway here. So if you, as we discussed before, eat a lot of vegetable oils. It alters the amount of vegetable oils in your tissues, right? There is a great paper by Stephan Guyenet showing that Omega six fats in adipose tissue has gone up as it's increased in the Diet. There are a lot of animal papers showing that within weeks the amount in tissue changes, right? Based on what you're feeding the animals both directions. So you can make it, you know, Omega six fat in tissues go up if you feed them more, and go down if you feed them less. There are Steinberg and Witsdon's papers showing that and there's a couple others. , showing that LDL oxidizeability is controlled by Omega six fats in the Diet, right? So what happens here, what seems to be the pathway is one of these tissues that changes its composition based on your fatty acid diet is - the Mitochondria are the powerhouses of the cell, right? Mitochondria are, as we're learning more and more key to health. One of the more perplexing aspects of all of these different diseases that we're discussing, obesity, Alzheimer's, all

the neurologically degenerative diseases, cancer, diabetes, atherosclerosis is something called mitochondrial dysfunction, right? Which is the Mitochondria are not working correctly. They can't produce as much power as they need to and this causes all sorts of problems. They think that this is one of the reasons why people get insulin resistance, right? So there's a fascinating little study that I think this one was also in 1996 where they took some rats and they put them on a standard rat diet, mostly carbohydrates. And they added seed oils to the Diet first.

Tucker Goodrich: 01:15:13 So they wound up with two wings, one with regular rat diet, the other with rat plus seed oils. What happened to rat plus seed oils?They got obese, they got diabetes, they got insulin resistant, they got Leptin resistant, and they got mitochondrial dysfunction. So the shape of their mitochondria actually changed as the function changed, right? The next thing they do, rats don't get human diabetes in that they don't get hyperglycemia. So they have to give them a toxin called streptozotocin to induce hypoglycemia. And when they did that, the rats got, another disease that is becoming epidemic in the west, which is heart failure. Why did they get heart failure? They got heart failure because their mitochondria collapsed. Extreme mitochondrial dysfunction. What does that cause? It causes necrosis. Necrosis is tissue death. Uncontrolled tissue death, which is seen in heart failure. It's seen in advanced liver disease, right? So we have a clear pathway here. We, if the rat seed oils make them hyperglycemic, then they get heart failure - in four days! Right? So, okay, what's what's happening here? Feeding them more seed oils changes the composition of the Mitochondria. As we were discussing before, there are good fats and bad fats. Polyunsaturated fats are a bad fat because they are susceptible to breaking down and when they break down, they break and break down into poisons.

Tucker Goodrich: 01:16:54 The Mitochondria hoover up linolenic acid and use it in this molecule called Cardiolipin, which we won't get into, but cardiolipin when it's made of Omega six fats is susceptible to oxidative breakdown and it breaks down into that toxin called 4-HNE, which then goes on to - this is a process that's called oxidative stress - this is why smoking is bad for you. Smoking is bad for you because smoking induces oxidative stress, which breaks down your polyunsaturated fats into toxins in your body, right? That's what causes the cancer. Because again, lung cancer, you know the genetic, the primary genetic defect is a defect that's induced by Omega six fats, the p53 mutation. So what else? So then let's discuss a little bit what else 4-HNE does, okay. There's a great study I found that looked at the molecular

composition of an LDL. The definition of an oxidized LDL is that it has oxidized Omega six fats in it. That's the definition of it, right? The definition of oxidative stress is oxidized Omega six fats. Basically 4-HNE goes off. And what has it been shown to do so far? It causes LDL to become oxidized. It causes the macrophages to take up oxidized LDL and turn into foam cells, right? It causes the necrosis that if you look at atherosclerotic lesion, the middle of the lesion is necrotic tissue and it's full of oxidized Omega six fats - always. That's one of the signature features is lots of 4-HNE oxidized and oxidized Omega six fats in the middle of the cyst. Another odd little feature of both cancer and Atherosclerosis is what they call neovascularization, which is when your capillaries grew, 4-HNE induces neovascularization in cancer, in heart disease and in the leading cause of blindness - age related macular degeneration. Right. Which is another disease that is clearly demonstrated to be caused by Omega six fats. 4-HNE is found in Alzheimer's lesions. There's the research that's been done into Alzheimer's for the last 30 years revolves around Amyloid plaques, Beta Amyloid plaque. Okay. So that's been what they've been claiming as the cause of Alzheimer's for 30 years. Research has failed completely. If you want to cause Beta Amyloid plaques, you induce this Omega six chemical 4-HNE into the brain. Bingo. You get it. The same process. The amyloid plaques are also found in age related macular degeneration, which is, I think I said is the leading cause of blindness. Now another funny little thing is advanced diabetes, typically your Beta cells die. Even if you start out as a type two diabetic, as it progresses, your Beta cells die. Oxidized LDL is one of the things that kills Beta cells, right? It also induces the same Beta Amyloid production that we see in the brain of the Alzheimer's patient. So you basically got multiple places around the body where this one chemical is inducing the disease process.

Ivor: 01:20:37 Yeah. And it's not, sometimes the arrow of cause can be confusing and sometimes it'll be moving both ways. But here it is the 4-HNE, the result of excessive Omega six oils and their breakdown is the causal agent connected to many of these things, essentially.

Tucker Goodrich: 01:20:57 Right? So then the next thing you want to do is try and turn the causal arrow back the other way. Right. So what happens if we put people on a lower seed oil diet? Ramsden has done a couple of studies on this, but the most interesting one that I have found, uh, the two most interesting ones I found. One was from India and one was from Poland and in the Indian one they took people who I think eating safflower oil and had them switch to either canola oil or olive oil. And the difference between those

three oils is safflower has the most Omega six can all of the next most and olive oil the least.

Ivor: 01:21:41 This was not the High Omega three canola - it was the standard Canola which is lower in Omega six?

Tucker Goodrich: 01:21:48 Right? Right, right - and what they saw was that their insulin resistance ended and their obesity started going down. The Polish study did the same thing, except they actually tracked the chemicals that Omega six fats break down into. Not unfortunately 4-HNE, but some of the associated ones. They took a bunch of people who had nonalcoholic fatty liver disease, which is another one of these diseases that has become epidemic. I mean, it becomes tiresome at this point to produce a list of all of them because there are so many. But non alcoholic fatty liver disease (NAFLD) progresses to liver cancer and liver failure. That's why people need liver transplants. That's the problem with alcohol, which is another topic we can get into. So they put these people on a low Omega six diet, 3.3% I think and around 75% carbohydrates and their cure rate was 100% - in six months. So standard medicine will tell you NAFLD - non alcoholic fatty liver disease - is incurable except by weight loss and they don't know how to make you lose weight. So it's basically incurable. And here we have this little pilot study where they get a hundred percent cure rate, a hundred percent cure rate and an incurable disease. It's mind boggling.

Ivor: 01:23:08 It is. That is quite, and I remember you raised us study quite some time back. That was a fascinating study and the thing was it was uniquely removing seed oils. Now what remained was probably a reasonably healthy diet. It wasn't full of other problematic "fats and sugar" Combo. It was probably one of these high carb, relatively very low fat, which can be a healthy diet for some in the short term. We know that, but it was the removal off the seed oils. You there went through reversing the problem by removal. But when you go back to creating the problem, there's all of the alcohol experiments with rats as well, in the nineties I think - where they discovered that even infusing ethanol 24 hours a day in the rats fed with a high concentration of beef tallow with no Polys - or very low maybe 1% they almost could not cause liver damage in those rats. There was a grade one at most, it was so low that you have to do histology on it to see it. And then they put in the lard with extra Linoleic acid and you had significant grade two or three - and then you had grade four with the sunflower oil. And they basically titled the paper "Linoleic acid is required for liver damage from alcohol. That's exactly right. I mean, and we know that the nonalcoholic fatty liver is just, the insult is more sugar rather than ethanol". But

		the idea that these polyunsaturates are, are actually requisite, are required to get liver damage from alcohol. A huge statement - "REQUIRED".
Tucker Goodrich:	01:24:50	And so we have that statement for two different diseases now, non alcoholic fatty liver disease, which is a modern disease. We should note - post World War II. They literally used to think that patients who came in with nonalcoholic fatty liver disease were liars, because up until recently they didn't know that it could happen without alcohol. So they would get these little old ladies coming in with fatty liver and they're like, hey, granny's really, you know, knocking back the gin and not telling us about it. But Lo and behold, we now know, we know this so clearly. I mean, you use soybean oil for what they call total parenteral nutrition, right? So if you have such a serious intestinal and stomach problem that you can't digest food, right, they give you this TNP intravenously. Right? And they've been doing this in humans since the 60's in humans. Right. What reliably happens to these people when they are injected with soybean oil? They get liver failure.
Ivor:	01:26:02	Yeah. I there was a juvenile or a, yeah, there was a pediatric paper. You may have shared this or in a year or two ago as well. Just run through that one.
Tucker Goodrich:	01:26:13	Yeah. So okay, so you take a human baby, right? No rats. Let's go, let's jump directly to the money here. Right? Human infant short gut syndrome. You inject them with seed oils, soybean oil and they will get liver failure - if you stop that and inject them with a fish oil substitute their liver failure cures. Human babies.
Ivor:	01:26:41	And I think there was a lady, professor maybe on this study, I can't remember her name, but they never do the parenteral solution with, with other fats because they're seen to be non heart-healthy. So there is that, that will be true.
Tucker Goodrich:	01:26:57	The FDA just this year approved the Omega three substitute for use in humans in the United States. Wow. This is after decades of poisoning people with seed oils.
Ivor:	01:27:12	Yeah, it is quite shocking. So if you look at the, the overall evidence, epidemiological/experimental, you know, mechanistic beautiful papers like the one I mentioned, all the ones you were mentioning, the overwhelming evidence is, why would you ever eat these industrially extracted with temperature and pressure oand solvents oils anyway? But when the actual inherent Omega six type of fat in it, even independent of the industrial

production of them, can cause all of these issues. It's almost like a no-brainer not to eat vegetable oils?

Tucker Goodrich: 01:27:56 Right. Well let's, you know, just to finish, to finish up the point. So you know, your mitochondria take up seed oils, you give yourself hypoglycemia, the seed oils, the Linoleic acid in the mitochondria gets oxidized, your Mitochondria stop working, right? Um,

Speaker 7: 01:28:16 okay.

Tucker Goodrich: 01:28:17 That is clearly demonstrated. They've actually gone in and taken Mitochondria and replaced the Linoleic acid with Oleic acid, which is the fat in olive oil - and it makes them impervious to this oxidative damage. So they'd gone down, you know, same study they've done in humans with LDL, switch out seed oil for olive oil. LDL then isn't susceptible to oxidation. Same thing happens in the Mitochondria, right? This, you know, mitochondrial dysfunction, you read a lot of papers about it and they will all say, well, that seems to be: "we think this is one of the core aspects of what's going wrong with all of these diseases because you see it everywhere". It's what's happening in Alzheimer's. It's what happens in your fat cells. It's what happens in the linings of your blood vessels, right? Those cells have mitochondria that aren't very well able to handle high levels of polysaturated fats.

Tucker Goodrich: 01:29:15 And yeah, maybe the LDL is getting oxidized in there, or maybe it's starting out in the bloodstream. It's kind of a moot point, right? Because we know what the endogenous cause is - and now, so think about this from a toxicology perspective, right? If you have, say, a drug or a food. The safety of it isn't clear, then typically what they will do is they will go and they will feed animals, whatever it is you're trying to sell to see what happens to them. Right. And you have to prove, I mean there's some caveats, but as a general thing, you have to prove that it's safe, right? Like Rimonabant was a great obesity treatment that caused some people to commit suicide or to want to commit suicide. So they pulled it from the market. So let's say, let's say I'm introducing seed oils as a food additive today.

Ivor: 01:30:07 Yeah. If they were discovered today?

Tucker Goodrich: 01:30:10 Yes if it was discovered today, let's look at what it does. It causes obesity in animals - clearly. So you wouldn't even get to human studies there. It causes genetic damage clearly - in animals. So leading cause of genetic damage or rather, let me

		say that the leading genetic damage in cancer is the one that's caused by Omega six fats. Right?
Ivor:	01:30:38	when they're converted to 4-HNE ultimately when they are oxidized...
Tucker Goodrich:	01:30:43	Exactly. It causes liver failure. Right. Clear. In babies. You know, I mean, do you think the FDA has thrown me out of their offices yet???
Ivor:	01:30:58	it is. It's absurd. It is quite absurd. But, not only has this "food" been around for so long, but it's been sold by all the authorities as heart-healthy and good for you specifically - for decades now.
Tucker Goodrich:	01:31:24	Based on bad Science.
Ivor:	01:31:26	True. But that will make you ignore an enormous amount of science, the likes of which you're referring to. Because it's inconceivable to begin to acknowledge what you said, all of that science - if you've been pushing this stuff as healthy for decades.
Tucker Goodrich:	01:31:45	So let me come to their defense a little bit. Right? Back in the early 1900's there was an economic debate, which if anybody's ever taken economics in school, you will have heard about "guns versus butter", right? This came up during World War One. Basically, you've got huge demands to produce stuff. You've got to feed people, right? It's "do you use all your research to make your resources to make guns or to make butter?" Well, the answer to the guns versus butter problem in economics was....seed oils.
Tucker Goodrich:	01:32:22	That's literally, they couldn't make butter to feed everybody. So they started feeding them seed oils. They thought that they were doing something good, right? They'd figured out how to detoxify cotton seed oil, and then they figured out how to detoxify rapeseed oil to make canola oil. 4-HNE wasn't discovered until 1960, and it wasn't identified that it was made from seed oils until, I think it was the 1980's right? The pathway that I'm describing through the Mitochondria wasn't first described until 2011 so... Now there were certainly red flags like the fact that feeding soybean oil to babies gives them liver failure - that should've been a clue. Right? But even that only started in the 1960's so there's an argument to be made that this was a good faith mistake, right? There's a legitimate argument to be made that this was a good faith mistake.

Ivor:	01:33:19	I'd agree with that. And I think a few decades ago it was being realized quietly that there was a problem - because they were trying to switch to high-oleic sunflower, and canola was being designed to be low omega six. So they were, they must have themselves realized quite a bit of what you're saying in the 2000's. Because they were making moves on, and have made moves to de-omega six these oils.
Tucker Goodrich:	01:33:51	Yes. They industry is well aware of the problems. Although there's my favorite seed oil study was summarized in the industry press as "Plenish causes less obesity than regular soybean oil."! So there was a scientist who did a study comparing soybean oil to coconut oil and showing that soybean oil induced obesity. Right. Okay. In rats or mice, whatever. So Plenish is a GMO soybean oil that is made to have less omega six fats in it. Right? Genetically Modified. They hired this scientist to compare their GMO soybean oil to coconut oil and two regular soybean oils. And that was the headline - "causes less obesity". Yay.
Ivor:	01:34:45	Happy days.
Tucker Goodrich:	01:34:47	These are the MANUFACTURERS! This is what they're saying!
Ivor:	01:34:52	It is insane. I dunno. Is that guy the same author as that paper out a couple of years ago, not that specific compare I think - that was a manufacturer rather than a published paper maybe. But there's a paper "Soybean oil is more obesogenic and diabetigenic than than coconut oil and fructose." (and also that it causes liver inflammatory issues). So it made a compare of soybean oil against not just coconut oil - to say that soybean oil is more obesogenic, diabetigenic everything, but it even had it compared to combos of coconut oil and fructose, which we would not considered to be healthy. I mean, that's a bad combo. And the soybean was worse than that combo of soconut oil plus fructose. It's an amazing paper.
Tucker Goodrich:	01:35:42	Yeah. The soybean oil, there's, between the experience in human children, the animal experiments. I think it's pretty clear that that is a key part of what causes obesity. It's also the biggest change we've seen in the human diet around the world over the last hundred years. The percentage of soybean oil is increased by about a hundred fold over the last hundred years in the human diet in the United States. And it corresponds with all of the rest of the negative changes that we've seen happen to human health. And we went over those earlier. But obesity, diabetes, heart disease, cancer incidence, neurological diseases,

		the rise of auto immunity, all the things that we can see here are intimately tied to excess omega six in the diet
Ivor:	01:36:37	And macular degeneration. And other...
Tucker Goodrich:	01:36:40	yes, it's a long list. I keep leaving things off. But, and you know, the increase in sunburn and you know, everything else that we can look at causation and say, okay, this is probably all related. We know that they're all related statistically, they're all correlated to each other. So it shouldn't be, you know, from an engineering standpoint, if you look at a system from people to our pets and lab animals, the system, and you see similar changes across all aspects of the system, it's unlikely that you're going to have a bunch of different things that are all changing in the same direction at the same time. Right? It's back to Occam's Razor, the simplest explanation, which is what led them to look for a virus. The simplest explanation is that one thing has changed in the system and that's what's causing all of these similar changes. And...
Ivor:	01:37:43	Could we perhaps say "one primary thing" because there's other...
Tucker Goodrich:	01:37:46	Yes - aand there's many, there are clearly a bunch of, as we discussed, you know, seed oils has a bunch co-factors. There's alcohol, there's smoking, there's carbohydrates, but as we also saw with alcohol and fatty liver disease, and apparently maybe with mammary cancer, they don't happen if you don't have seed oils. So that seems to be the critical path of disease. Right? The one thing that' seems to be required for a lot of these diseases to happen is excess linoleic acid in the diet.
Ivor:	01:38:24	Yeah. Now you Tucker, I remember we, we argued a thing a while back on Twitter and elsewhere. And it's, it's a great thing too. I know, I love people who devil's advocate my beliefs, because it gets closer to the truth, when you reveal all of the different evidence, it's great. But one thing you pointed out I didn't quite realize was Weston Price clearly in the 1900's saw the modern degeneration of the human species, and he linked it intimately to wheat flour and sugar in the African nations. However you pulled out a piece from his book and I had missed it, he essentially said "wheat flour, sugar and vegetable fats". So I must say that was amusing for me because I was thinking of Weston Price's work as a conflicting piece of data, where if all of the degeneration (or a lot of it) can happen with just wheat flour and sugar, it shows an independent deleterious effect, a capability of refined carbohydrate and sugar all on its lonesome

- to cause a lot of this disease. But trickily, sneakily, he included vegetable fats in there as well. Yeah...

Tucker Goodrich: 01:39:34 Yes. And there was, um, in my edition of his book at the end there's a letter to his nieces and nephews telling them what they should do about their diet and his advice. As I recall, the primary part of his advice was to eat pastured butter and make sure that you got it at when it was produced in the summer at the height of it's nutritive quality, but also as the flip side of that to avoid eating vegetable oils. And that was one of the reasons, you know, Dr. Cate Shanahan, Chris Master John and others have actually done a lot of great work on this. There are a lot of people who said for quite some time that vegetable oils are harmful, but they never got into explaining exactly how they were harmful. And that was really the question that I was curious about because I personally saw such a great and immediate change in myself. You know, why, why did it have such a big effect? I couldn't get an answer to that. And that's really what's motivated me to do the reading I've done and try and understand the process.

Ivor: 01:40:42 And let's just recap again on this, this critical toxic agent, if you will, that results from excessive vegetable oils - the 4-HNE. So maybe we'll recap as well before we wrap up, on just rolling through that mechanism again.

Tucker Goodrich: 01:40:57 Right. So you have, um, an increase in of Omega six fats via seed oils in the diet, right? That's one of the key elements of the modern industrial food diet. Processed food is, or ultra processed food as people like to say. That increase causes a change in the tissue composition in human and animal bodies, right as the fat builds up. That causes an increase of issues in the mitochondria that makes the mitochondria susceptible to oxidative damage, producing oxidative stress. And the primary agent in oxidative stress is this chemical 4-HNE, which is produced exclusively from linoleic acid and seed oils and arachidonic acid, which is also produced from seed oils in your body. And that toxin goes on to induce a lot of the changes that we see in all of these chronic diseases. It causes neovascularization in age related macular degeneration, in cancer, most likely, in Atherogenesis, it causes the DNA damage, which affects function all through the body.

Tucker Goodrich: 01:42:13 It causes the DNA damage that, you know, when I first came across, this was a bit of a mystery to me, right? Why is DNA damage associated with atherosclerosis? If you read the cardiological models, nothing that they discuss can address why is DNA damage happening in atherosclerosis? Well, if you look

at it from the perspective of Omega six fats starting the process while they break down to something that causes that DNA damage, it makes perfect sense. It explains why 4-HNE and the related chemicals are always found in atherosclerotic lesions in animals and in humans, right? It's causing it. It's not the only thing that's causing it - but it seems to be a critical element. And the populations that we see that don't eat industrial seed oils don't get heart disease. Period.

Ivor: 01:43:05 With no notable exception. Actually in fairness, it doesn't prove it, but there's no notable exception. Now, one other thing I'll throw in there is I love the concept of imbalance and "the dose defines the poison." And I love the way that some of those animal studies where Linoleic acid showed an increase up from the very low levels we would have had evolutionarily, up to a few percent in the diet - there's this increase - and then there's a tapering off in risk. But could it be said, and I know from some papers including the Gerhard Spiteller paper I believe and some others I've been through, I've been through many of them. There's an element that there's a natural requirement for 4-HNE and many other oxides and superoxides and many other components that can be used to attack foreign agents in the body, and the inflammatory process can be used to a beneficial effect. However, what we're really talking about here is a genuine case of excess above the machine tolerance, above what the user manual would dictate. And that's, that's leading to an overdrive of this free radical type damage at that's hitting all over the body rather than just being targeted in a specific fashion - in a manageable fashion towards pathogens or genuine uses. Would that be a fair concept?

Tucker Goodrich: 01:44:29 That is a fabulous summary, in fact, and you've hit on a really 4-HNE is a natural part of our body's processes. It's so fundamental that the Mitochondria actually use it as a signaling mechanism to say, Whoa, slow down. Something's going wrong inside. We got to, you know, throttle off, lift up on the throttle and let the engine cycle a little bit, right? Freewheel a little bit. Some of the key antioxidants, glutathione people may hear is an important antioxidant in the body. Glutathione is major job is to detoxify 4-HNE and it's such a fundamental process that if you have a creature that's genetically unable to produce glutathione, it won't be born. It'll die as a fetus. So there's also the secondary detoxification pathway for 4-HNE is Aldehyde Dehydrogenase, which is part of what is involved in detoxifying alcohol.

Tucker Goodrich: 01:45:35 And it turns out that in Asia... Now, one of the things that biologists like to find when they're talking about disease

processes and the genetic interactions, are animal knockout models, right? So the PCSK9 inhibitors, right? PCSK9 is a protein that removes LDL from the circulation. Right? And if that's not working correctly, then your body removes it too quickly. So one of the things that cardiologists are now hot on, is this idea of inhibiting that process, which therefore removes a lot, lots more LDL, and they claim this is an indicator that LDL is a fundamental part of the disease process. Well, it turns out that with seed oils, there's a human knockout model also. It's the most common genetic mutation in humans. And what it does is reduce the ability of your body to detoxify alcohol and 4-HNE. Right? So if you've ever heard of something called the Asian Flush where Japanese people or Chinese people when they drink alcohol, they get red-faced and they have very poor alcohol tolerance. They have this genetic mutation. And if you then go look at, you know, their susceptibility to all of the chronic diseases, they have a higher susceptibility to all of the chronic diseases. Similarly, selenium deficiency. Selenium is used to make glutathione - people who have a selenium deficiency also have a higher susceptibility to the chronic diseases.

Ivor: 01:47:16 And actually there's a personal note there. My own father had a very strong version of Asian Flush. He never really drank much alcohol. But again, he had his first heart attack at 66 and he died at 72 with vascular dementia and terrible run-out...

Tucker Goodrich: 01:47:32 That's fascinating because it's very rare outside of Asia.

Ivor: 01:47:35 Yeah, exactly. It is very rare. But he would one glass of wine and he would begin to flush so there's a little bit of genetics. I came from the other side of the family it looks like. And you know, there's another personal note there -Glutathione itself. I got into this whole research around metabolic disease back in 2012, and one of the primary reasons I got into it was because I had a very high high GGT, the liver enzyme, Gamma glutamyl transferase. And of course that's associated with a depletion of glutathione, the body's natural endogenous antioxidant. And that's one of the reasons a high GGT is a really, really bad sign, with incredible links to early mortality and chronic disease and diabetes. So GGT is a grossly underused biomarker that's hardly measured often. It's unfortunate...

Tucker Goodrich: 01:48:33 Yes and impaired glutathione status is a classic sign of excess oxidative stress because basically what that means is your body is producing more 4-HNE than your body can clear - and that's where the toxicity comes from. So you see that all through the literature... there were a couple of papers that I found that say,

oh, well, you know, higher linoleic acid in the serum for instance, is associated with lower disease process. And what it turns out is happening is it's because it's not being broken down. When it starts being broken down, when the Omega six fats are being broken down actively, that's when you see lower levels and that's when you see 4-HNE go up and glutathione go down. That's the late stage disease process.

Ivor: 01:49:21 Yeah. So that, I've seen that one. It's highly misleading, and it's like most things in metabolic science are kind of counter-intuitive unless you know what's going on. So all these associational studies can basically sow and propagate more and more misinformation because they give simplistic relationships that are simplistic and often untrue - but they appear logical. So in the war to misinform the masses, they are pretty big weapons, the associational junk. But anyway, that's another day's worry. So I think that's a good summary there. We've got this huge amount of science - mechanistic and experimental, particularly in animal models, and we've got the associational epidemiological fact that soybean oil has gone up by a factor of hundreds and all the vegetable oils too - If you look at the graphs, it's insane in the past 80 or 90 years, and everything ties together. One of the beauties is though, that rather than arguing about refined carbs and sugars, which everyone kind of knows are bad - or arguing about meat causing diseases, which is kind of absurd. The good thing about this particular problem is - it's really simple to fix. So you eliminate all vegetable oils. The complicated bit is you'll have to eliminate a lot of processed foods, because most of those are stuffed with vegetable oil - but it's not too complex. If people only reduced or eliminated vegetable oils and ate real food and items which brought in a reasonable amount of linoleic acid, an ancestral amount - that would be one step that would probably make a huge difference in population health. One step.

Tucker Goodrich: 01:51:06 Yes. And let's just discuss the relationship that brings up the relationship to low carb, because people aren't going to miss eating seed oils, right? There's an economic argument that we eat them because they're cheaper, but nobody eats them because they prefer them, that I've ever heard of. Right. People would rather eat butter and olive oil generally they're just a little more expensive to produce. But it also gets into, you know, cultures or countries like India where they have an enormous population and they just don't have enough food If they cut out industrial seed oils etc. They can't really go on a low-carb diet because they can't produce enough non-carbohydrate foods. My view is it's clear that carbohydrates don't seem to cause much disease if you are absent seed oils.

Right. You can look at India prior to the modern era, Japan prior to the modern era, the Tsimane and the Kitavans both eat high carb diets and don't have all of our diseases.

Tucker Goodrich: 01:52:08 But once you have the diseases, it seems that the fastest way to clean your body up is to go on a low-carb ketogenic diet. I mean, if you just look at the effect on fatty liver, you can start to clear up fast. I mean the study that I mentioned, the Polish study where they put their subjects on a high carb, low linoleic acid diet, it took them six months to resolve their fatty liver, whereas the ketogenic diet studies, they're getting major benefit within weeks. So it's definitely the best way to, it's definitely the best way to cure it. A low-carb ketogenic diet is super, in my opinion. Everybody who talks about how the most important attribute of human diet is nutrient density. Well, if you want to reduce the nutrient density of the human diet, you add carbohydrates to it, right? That's it!

Ivor: 01:53:11 Or, or of course you add, I mean the perfect example, seed oils - zero nutrients, and and lots of energy. That's obviously crazy,

Tucker Goodrich: 01:53:23 Right. But so in my view, a higher carbohydrate diet is plan B for human nutrition. It's not the worst thing in the world, but it's certainly not the best thing in the world. And it gives us, you know, from a holistic perspective, it gives us a simpler target to shoot at rather than trying to get say India off a high-carb diet, which is not going to happen anytime in the near future.

Ivor: 01:53:48 Now India interestingly Dr. Ron Rosedale has spent many years there in essentially charity work, but they call him "the Egg Diet man". So his solution to Indians getting more healthy fats and a bit lower carbohydrate, (and he'd certainly agree with us on Seed Oils as well). And if people are vegetarian, you know, just eat more eggs is a very good single step for obese or diabetic people to reduce some of the carb and to improve their health. But I think currently if 64% of adult American adults over 45 are now actually by CDC data prediabetic or diabetic, which is all diabetic. And if you measured them using insulin metrics and more refined metrics, maybe 70% plus are essentially diabetic. I agree with you. The no-brainer for the majority of the modern Western population is to go lower carbohydrate, and start fixing your liver, your fatty liver, your diabetes. But it's pretty crucial that they also ensure that they remove the seed oils, which, which are part of the causal chain. So...

Tucker Goodrich: 01:54:57 Yeah, indeed. Absolutely. And I mean, I've talked to people who are on a low-carb diet. There was a fellow from South Africa who, unsolicited sent me a Twitter message one day and said,

you know, I'm a runner. I go out, I used to get all these sunburns on my long runs. I've been low-carb, I've been following Professor Noakes' advice. But I was eating safflower oil as my fat. And he said, now I've, after listening to you, I've cut back on that. And I don't get sunburned to the same extent. There's some associational data looking at melanoma and seed oils that indicates that there's a relationship there. So even if you're, yeah, it's, you know, it's a benefit even if you're on a low carb diet. I think it's the, the two pieces, low carbohydrate and low Omega six go hand in hand for getting closer to an optimal human diet.

Ivor: 01:55:57 Yeah. And I think arguably we (myself and doctor Gerber) in our book "Eat Rich Live Long". I mean they are the first, they're the base of our pyramid off rules - eliminate refined carb, sugars and seed oils - just eliminate these as much as possible. And then you go onto the low-carb and the fasting and Keto - and a lot of those strategies are repairative. They help fix your metabolism after decades of eating the bad things. But, but they really are the base of our pyramid, which makes it rather ironic that the EAT-Lancet has a worldwide campaign right now - telling us to eat 15% or 16% energy from seed oils. And remove meat, eggs and these nutrient-dense healthy fat foods and basically rack up our carbohydrate also. So that's almost like a recipe to continue the problems we've had...?

Tucker Goodrich: 01:56:51 Well yeah, if you go read the WHO malnutrition documentation, because part of the World Health Organization is trying to address the huge worldwide epidemic of malnutrition and we're talking like 2 billion people here. It's not a small problem. And they're quite clear that if you want to cure malnutrition in a human, you feed them meat. And all of the nutritional deficiencies that are part of malnutrition are from lack of meat, iron, anemia, zinc, you know, like low zinc B 12 etc. Yeah, B12, of course. So the EAT-Lancet diet is basically, it's as if they took a look at the WHO malnutrition pages and said, oh, let's use this as a program for the entire human race. Great. I'm not a fan of a project that based on the science we already have is going to result in human malnutrition - it just seems crazy. A last point that we should probably mention just to give folks something else to look up. When I started looking into this, as I'm sure you've been through this too - you think you've come up with some bright, original idea and you start poking around a little bit more in the literature and you discover that it's not your original idea that somebody else has been at it for years.

Tucker Goodrich: 01:58:15 But that, that can be great because it's a wonderful validation. And one of the interesting things that I discovered when I came

to the conclusion and back in 2016 kind of, you know, put a marker up on my blog and said: "excess linolenic acid in your mitochondria is the cause of metabolic syndrome and chronic diseases." And I walked through the mechanism Cardiolipin composition being altered and that causing the breakdown in Mitochondria that we see. And then after that I discovered that there are actually three - not one, but three different drugs designed to protect linoleic acid in Cardiolipin from oxidative damage, and thereby protect protecting the mitochondria from breakdown. Um, one of them is called Mito Queue, which is actually over the counter in New Zealand and I think in the United States. The second one is called SKQ, one which comes out of Russia and is kind of a second draft of Mito-Q. And the third is a drug called SS31. Which is a wonderful proof of concept because the animal data on these drugs is amazing. In Russia they had an animal model of blindness and giving the animals this drug cured blindness, like at an 80% rate. One of the things, my pinned tweet on Twitter, is a study where they induced heart failure in rats by giving them seed oils and then making them hyperglycemic. And in a dog model of heart failure, if they give dogs this SS31 chemical, it repairs the damage to the heart, right? And improves heart function. So you know, we've got, you know, trying to be objective about this - and because there's always a danger of falling in love with your whole hypothesis. I think this has got all the parts right. It's got the fact that there were actually three different drugs that seem to show benefits and two or three of them are all in phase two trials with the FDA - phase two or phase three trials with the FDA. There's, you know - it's a real story. It's a real story. It goes all the way through from start to finish. It makes a lot of sense and there's a lot of good evidence for it.

Ivor: 02:00:48 And an easy solution as well. And the foods you eliminate with this crap in them, you're going to be eliminating a lot of other bad things too - in one fell swoop. So it's a no-brainer. Just, you mentioned drugs and I know we're winding up now, but the NSAID's, the is nonsteroidal anti-inflammatory drugs that are so common. I think they act on similar pathways - as would be exacerbated by linoleic acid metabolism - which is another kind of proof point indirectly or you'd probably, I remember this from many years ago, but you probably have the latest?

Tucker Goodrich: 02:01:20 Well that's, that's old data actually. You're right. William Lands who was one of the leading researchers in human fat metabolism and Omega six and Omega three fats, he pointed out that all the Cox Two inhibitors, Cox One, Cox Two inhibitors, aspirin, they all work on this exact pathway. They are interfering with the body's conversion of Omega six fats into the bioactive

components, eicosanoids, prostoglandins and the other chemicals. That's not the whole story, which is why for instance, in osteoporosis, which is another disease where Omega six fats play a clear role, inhibiting the Cox Two pathway helps pain but it doesn't reduce disease progression. And it's probably, I expect because disease progression is going through the Cardiolipin pathway, which is outside of Cox Two and is another way in which these harmful chemicals can be produced. Um, but yeah, that's, that's an awesome point. And you know, there was an, uh, there's an amazing old study I found. I love old studies. Sometimes they're really mind blowing. Aspirin blocks this pathway. Right? It turns out that aspirin also helps cure insulin resistance. Think about that. Okay.

Ivor: 02:02:39 Well, it assists!

Ivor: 02:02:45 Yeah. And that, and I'm going to have to attach, by the way these studies afterwards, when I put together some notes, we'll attach some of the papers we've referred to so people can go off and enjoy reading these studies themselves. But yeah, so, so many, so many congruent pieces of data all coming together to make a strong case because the modern world of nutrition and disease has become almost farcical, with all of the claims and counterclaims. And it's lovely to find something that's so unanimously lines up on all the different drug data, you know, mechanistic, experimental Blah Blah Blah. So it's fantastic. One other little point of contention, and it's only a single data point because I know you are challenging people to find cases where excesses of carbohydrate and sugars could be problematic without the Linoleic factor. And there was one monkey study, but unfortunately it didn't have a control group. They got 32 Rhesus monkeys and they gave them a pint of Koolaid a day. So quite a chunk of fructose along with their normal carby chow, and biscuit chow kind of thing. And they did get a huge amount of disease - all got metabolic syndrome and four got full-blown diabetes in a year. And it does appear they were only around 1% of Omega six in their diet, you know, so maybe it...

Tucker Goodrich: 02:04:09 Yeah, so from a mitochondrial perspective, if you're on a low fat diet, the Mitochondria preferentially aggregate Omega six fats. So I found a couple of papers looking at Mitochondria specifically where they comment that a low fat diet has similar effects on the Mitochondria to a high Omega six diet - A. And B, fructose kicks off oxidative stress in the liver. So there's a human pediatric study study where they give kids fructose and it causes an increase in their oxidized LDL. So it seems through a pathway I don't entirely understand, up-regulate the metabolic activity in the liver, which causes increased oxidation of Omega

six. Even if there's less there. There was another human study in adults that shows that a low fat diet causes increased oxLDL. And then there's another study I looked at in rhesus monkeys where they also fed them Koolaid - which is just, who comes up with these ideas really - feeding monkeys KoolAid and they get sick. Are you shocked? I mean, come on! Anyway they fed the monkeys Koolaid and then they used an antibiotic to remove the oxidized Omega six from their LDL. This was an attempt to treat atherosclerosis. They were using the wrong type of antibody in my opinion. But what is really fascinating is that, removing the oxidized Omega six fats from their LDL cured their insulin resistance.

Ivor: 02:06:00 And this has come up before Tucker - when we're talking about the oxidized lipoproteins essentially causes downstream issues, immune reaction, and can lead to an increase in insulin resistance. So insulin resistance by getting into that stage and hyperinsulinemia can be causal through many pathways. And it can also be a "gauge" to indicate that there's another causal problem under the hold. So...

Tucker Goodrich: 02:06:25 Well I'll leave you with one little chestnut, right? Here's the pathway. Oxidized linoleic acid in the LDL is indistinguishable to the body from bacterial infection, right? The antibody that I mentioned is actually a natural antibody that naturally occurs in the body. The body's reaction to infection is to get insulin resistant. That's what happens in infection. It's what happens in viral infections. It's what happens in Sepsis, right? So, and we've seen that if you clear that out by an antibody, you reduce insulin resistance. So it's a typical, you know, it's a real pathway that exists. And essentially what you're doing is creating what I've seen called sterile inflammation, where you're putting these damage indicators, these oxidized linoleic fats into the body, making the body think there's an infection going on. And that's why it's having this reaction, what it thinks is a reaction to an infection, and what we're calling type two diabetes.

Ivor: 02:07:38 Yeah. And in fairness, if you stop smoking, again, an old study, so you'd probably like it - 1960's I think - with athletes and when they stop smoking, within a week or two, their insulin levels were tumbling down...

Tucker Goodrich: 02:07:56 Same pathway yes - smoking causes oxidative stress - it causes the linolenic acid acid to get oxidized. Smokers are far more likely to become diabetic. I had never seen the other way around. That's a huge point, that it works both ways. That's really remarkable. But yeah, we've, you know, they are clear pathways and the amazing thing to me... There's an old, there's

an old engineering acronym RTFM, which basically means read the flippin' manual, right? Which is the old engineers instruction to the young engineer when he's trying to figure out some problem, read the flippin' manual. The manuals, the scientific literature and most of this stuff is out there. The answer's out there, it's not that we need to do research. We need to read the papers.

Ivor: 02:08:42 Yeah. But the reality is, and without any tinfoil hats, people now more and more are realizing that research for the last 30 or 40 years was on the surface looking for answers. But really mostly they were answers which will help attract more funding and attract, you know, research success...

Tucker Goodrich: 02:09:01 So the answer is "can we make a drug out of this and get rich?" That's the answer they're looking for. They're not necessarily looking for what's going to improve human health.

Ivor: 02:09:08 Yeah. And in fairness, that is just the way the modern world works and I see even fantastic teams doing amazing research, highly complex detailed papers and metabolic pathways, which I loved. And they almost always add on at the end: "there may be a drug for this" - and you can actually tell some teams - they actually really are interested in getting the answer, but they know that they must say that phrase, or they're just going to be out in the boonies. So all the good guys have to do it too. I mean, the universities and the government departments, everyone's looking for commercial success Blah, blah, blah. But here on that, on that sobering note, and a slightly negative note...

Tucker Goodrich: 02:09:49 But the happy note there is that, you know, there was this one paper I saw that talked about the benefits of a ketogenic diet and then they said, well, maybe we can, you know, figure out some drug that'll replicate this. From your perspective and my perspective and everybody listening to this, you don't have to wait for a drug. You can do all of this stuff tomorrow.

Ivor: 02:10:09 Yeah, I would agree and to be honest, if you did all of the things that have good data behind them, that they are highly deleterious - from the seed oils, refined carbs, sugars, and all the other problems in the modern world, and you eliminate all of those together. Basically that's a superdrug. That's a drug that would be an utter blockbuster, like nothing the world has seen. But such a thing is also indirectly a competitive threat to the existing, more ineffective drugs. So that creates the tension we live in. But here, the democratization of science, the ability on the Internet to get thousands of papers. I think I have 3000

		in my hard disk now. We can reach out now like never before. Get the science, analyze it, share and debate it. And that's gonna make things hugely better in the next 10 years. I have no doubt.
Tucker Goodrich:	02:11:04	And you see a lot of the scientists appreciate this. Ben Bikman who was on Sean Baker and Zach Bitter's podcast, he came flat out and he said "look, a lot of the stuff that I was taught in the textbooks I've since learned just isn't true, and was not true at the time that textbook was written." Right. And he said "I don't believe anything unless I can find some good papers that see it just because some peer or some textbook says it." So there's, you know, the open minded scientists who are really interested in advancing science. They recognize that there's a lot of value to this and they, you and I interact with these guys online and they're open to learning and they recognize that, you know, guys like you were an I and a lot of the anecdotes that are coming out have real value.
Ivor:	02:11:53	Yeah. As I used to say (for actually decades at this point) to engineers when I was leading problem solving teams, "show me the data". You know, opinion - even from a really good person? If things are serious and you must get the answers and there's some ambiguity, you have to see the data yourself, the raw data, the papers, you cannot trust the abstracts or the belief system that's grown because because of the way the world works, you just can't. So on that note, yeah, exactly. Absolutely. Well, here, listen, we're going to be back again chatting in another while, but we've certainly covered quite a lot here, focused on seed oils. We've peripherally touched on some other bad actors. But for today, seed oils are the ultimate evil and hopefully all the listeners, well make sure that first and foremost, get those out of your diet. Yeah, thanks a lot.
Tucker Goodrich:	02:12:49	This was a great conversation.
Ivor:	02:12:51	Oh yeah. We'll have some more goodbye now!
Tucker Goodrich:	02:12:53	. Excellent. You're welcome. Cheers.