

Ari Whitten

## Carbs and fat — are they good or bad for you?

There is a lot of hype online from diet gurus on carbs and fats. In recent years, the focus has been on low carb, ketogenic diets as the ones that are the best for weight loss. And certain ideas about both carbs and fats that have no basis in science have become accepted by the general public as fact. So what's the truth? Do carbs make you fat?

Today, I am talking to Dr. Alan Christianson — a Naturopathic endocrinologist, NY times best-selling author. and a personal friend of mine — who like me is a huge science geek. One of the things that we are both particularly passionate about is the science around carbs and fats. This is a particularly controversial area because there's a really big gap between what the science actually says about this topic and the common ideas floating around on the internet and in books by diet gurus — 99% of whom have not actually studied the science to a significant degree.

In today's podcast, Dr. Christianson and I will shed light on the actual science on diets and macronutrients. Some of it will likely surprise you.

- How “cherry picking” of the science by diet gurus has created a situation where everyone claims their diet is the one “right way” to eat, and how to avoid getting duped by a diet guru
- What kind of diets (in terms of carbs and fats) do the healthiest and longest living populations in the world live on?
- The shocking findings of studies that compare equal calorie low-fat diets vs. low carb diets.
- Why the last few decades of diet wars of carbs vs. fats have been a waste, and what we *really* need to focus on.
- Why low-carb or keto diets can cause gut health problems in some people
- Did people really get fatter during the “low-fat era” or has the narrative been twisting the facts?
- The factor that matters far more than the carb to fat ratio of your diet when it comes to health and leanness
- The REAL causes of insulin resistance (hint: it's not what you think)
- Does insulin really control how fat you get like some people say?
- What are the best diets to reverse insulin resistance? (you might be shocked to learn about some of the diets shown to reverse insulin resistance)

(WARNING: It is possible that things said during this podcast may offend you if you are someone who believes that only one diet is the “right way” to eat, or if you believe that entire food groups or macronutrients (i.e. carbs/fats/proteins) are universally bad. Various diets, are often like cults, they get taken so seriously that they become like religions, where you have certain dogmas, these are the belief systems of your dietary

cult and then anyone who says anything other than that becomes someone to hang or burn at the stake or something. So if you're one of those people, and we say something that goes against your current belief system, this will likely make you mad (and likely be convinced that WE don't know what we are talking about), so again, we are aware that certain people listening to this that have certain preconceived notions that prevent their minds from opening to new ideas. If you have some specific diet that you believe in and it has some rigid dietary dogmas, we hope to maybe expose you to some ideas to help you be more flexible in your understanding of what the science actually says. So please try to be open before going into listening to this podcast. I want to also mention, that neither Dr. Christianson nor I take diet that seriously where we have specific dogmas that we need you to believe in. We're just interested in what science says, not trying to sell you on any particular diet or particular carb-fat ratio of the diet. Many different types of diets can work, so our point here is not to sell you on any particular diet, but simply to talk about what the science really says — past the hype — about carbs and fats.)

**Ari Whitten:** Hey guys, this is Ari and welcome back to another episode of the Energy BluePrint Podcast. I am super excited about today's episode. I have my good friend Allan Christianson, Dr. Christianson with me today, who is like me very much a science geek. We geek out all the time together on the phone and on some of the trips that we've taken together.

One of the things that we are both particularly passionate about is the science around carbs and fats. This is a particularly troublesome controversial area because there's a really big gap between what the science actually says about this topic and what are the common ideas floating around on the internet and in books about this subject.

We've really gotten to a kind of critical mass here where certain things, certain ideas, which are not rooted in science, are so commonly believed that saying the truth, what the science actually says gets you labeled as someone who doesn't know what they're talking about, as a liar and a scammer and all sorts of, you're labeled as a whack job by just saying here's what the scientific evidence actually says.

So, what I want to do in this episode is, I want to talk about the science around carbs and fats and debunk a lot of myths here. I also want to answer the question Do carbs make you fat?

I also want to mention a couple of warnings or a couple of notes to be aware of.

One is that, because diets, various diets, are often like cults, they get taken so seriously that they become like religions, where you have certain dogmas, these are the belief systems of your dietary cult and then anyone who says anything other than that becomes someone to hang or burn at the stake or something.

I want to also mention that neither Dr. Christianson nor I take diet that seriously, where we have specific dogmas that we need you to believe in. We're just interested in what science says.

So having said that, this will piss some of you off and just prepare for that. If you have some specific diet that you believe in and it has some rigid dietary dogmas, we hope to maybe expose you to some ideas to help you be more flexible in your understanding of what the science actually says.

Then finally, just to let you guys know, neither of us have any vested interest in promoting any particular macro-nutrient ratio of the diet. We have no specific carb:fat ratio of the diet we're trying to sell you on. But we want to clear up the question, do carbs make you fat?

Having said that, I would like to hand it over to Dr. C. If you have any kind of thoughts, intro thoughts to kind of open things up on this topic and maybe open peoples minds to exploring some new ideas.

**Dr. Alan Christianson:** Awesome stuff. I grew with all of it, also really jazzed to be with you. It's going to be a lot of fun we'll see how long we keep on going before biological necessities slow us down. Well, we could talk a long time on these things.

**Ari Whitten:** Yeah, most definitely.

Do Carbs make you fat?: How research data is not created equally

**Dr. Alan Christianson:** On the trail, it's easy to keep on going, it's trying to decide real quick or hydrate. Anyway, so some other prefix concepts. Like you said, there's a big gap between what is known and what is thought. What is thought becomes more anchored by repetition regardless of if it's truth or not. Then also, it's important.

These are really important weighty questions and some things you can see how they affect you over the short term, some things you cannot. These things can affect long term outcomes in mortality and disease risks and it's not apparent. So, this is hugely critical.

One thing I wanted to prepuce the whole discussion with, which I think will orient a lot of things is that, not all data is created equally. By that, I don't mean that my data and Ari's data is better, I mean that there's ways you can categorize information.

In almost all cases, once you look at information as being in a hierarchy, almost all conflicts just vanish. You can think about it as like two big groups as like really ideas and evidence. Evidence often is thought of as being such because someone of authority said it. But a big part of the renaissance in science was that, hey, it's not about authorities. It's about things you can test and prove.

So, you can have concepts that can make sense, that can go viral, that can seem very inherently consistent and that can look like evidence but it's really not. That's really an idea or a concept or the word theory is used in different ways in scientific circles versus in the public. When the public talk about it, they mean just theorizing like without a lot of

weight behind it, speculating concepts. That's what a lot of that modeling is. To whereas, evidence is really what happened, what actually happened from studies.

So, the difficulty is that this ideation is just so much more apt to go viral by its very nature. Its simple concepts, it's click lines, it's yeah, carbs make you fat, insulin does this, all the foods we eat after 8,000 BC are bad. It's these simple concepts. But, the problem is that, that's not how evidence works. We have to talk about just actual outcomes in actual studies. It's not as easy to package in all cases.

Quick generalization about this hierarchy, the lower portion, which I would lump together into ideas, would be first off just concepts. Things like the foods that we've eaten more recently than 8,000 BC are bad. That's a concept. You can take steps up in terms of concepts based upon if there's consensus, if experts put them together, but that's still the bottom of the rung no matter how many big experts you have in full agreement, we're at the very bottom of the rung here.

The next step up would be what we call more so in vitro data or data from test tubes. You can see chemical analysis about things, where cells lacked in a certain way and a ton of anything mixed on to a cell will cause cancer for it. Then we think above that about animal data.

Everything down here is not worth is jettisoning. That's not what I'm saying. This is all good stuff and this is all things that if we see dangers or warnings from ideas, test tube studies, animal studies or if something looks really exciting, maybe that's the basis for good research, maybe we should inspire evidence about that. So this is good stuff but this is not really actionable.

The odds of something coming from down here and coming up into a clear action step from good documentation, it's usually less than one in a million, no kidding things as they filter up. So above that, we think about more so actual outcome studies, the lower levels being epidemiologic, just tracking lots of people and the higher levels being interventional where you actually do something and watch group differences. I see a lot of times in which epidemiologic studies take flack, like, oh they're not valid for many reasons. It's really true.

There's a lot of shortcomings in all kinds of data but the point to in my mind is that, the shortcomings are even greater further down, further down in the level of ideation. So we have big picture concepts, we're going to really stick to more so the top part of this hierarchy and that clarifies so many things that are otherwise controversial.

Do Carbs make you fat?: How cherry picking is taking up a lot of space in the online health and nutrition space and why that is bad

**Ari Whitten:** Yeah, absolutely. Just to elaborate on that, at the top level of this hierarchy of scientific evidence, we get into really well designed, randomized controlled studies where they're controlling for all the different variables. Then on top of that, the systematic literature reviews and meta analysis of all of the studies. That's a key point because, by doing that, we're avoiding what's called cherry picking.

Cherry picking is, for those that are not familiar with this term, is something that is rampant in the health and nutrition space online.

Basically, it's where one particular health or nutrition guru says, this is the right way to do things and then here's the three studies that say that this is scientifically proven. Just to kind of follow up and make sense of what you were saying Alan, that there is this difference between opinions and facts and opinions and evidence.

Basically, it's possible to take any particular dietary view and find at least one, two or 10 studies that support that view. It's also possible simultaneously to take the completely polar opposite view and find five or 10 studies that support that view. So, we have all these competing ideologies that are all cherry picking the data to find the specific studies that support their views while leaving out all of the ones that don't. It confuses the hell out of people because we have all these average people who are not science geeks, who don't have time to spend to go through thousands of studies, who are hearing from one person, this is scientifically proven and then from someone else the polar opposite and then from someone else something completely different and someone else completely different.

So, what we really want to get across to everyone listening is, there's a hierarchy of evidence and what we're looking for, is something where at every step of this hierarchy, by the way, if you want to google image search the hierarchy of scientific evidence, I'd recommend that so you can get a visual on what we're talking about here. What we're looking for is, where all the all full body of scientific evidence really starts to align and point in a particular direction and when that full body of evidence that is non-cherry picked starts to point in a particular direction, that's when we go, "Okay, now we have a sense of what is "truth" or the most strongest evidence that the science has."

**Dr. Alan Christianson:** Can I expand on the cherry picking just a little tiny bit?

**Ari Whitten:** Please yes.

**Dr. Alan Christianson:** I think that's so important and think about baseball. So, I'm not a sports expert so if I come up like an idiot, don't be surprised. So a batter, imagine that batters, they could not count nine times out of 10 that they go to bout. So you wouldn't know who's good and who's not. They could pick. They could say, "Yeah, that one last week we hit that home run, that's how I bout."

**Ari Whitten:** I hit a home run 100% of the time.

**Dr. Alan Christianson:** That's right, 100% of the time, I hit home runs. Someone else could say, "Yeah but that one time the week before, you struck out. So 100% of the time there, you failed." Like no, we put all of it together into a batting average and that could be the composite score. That's what Ari was talking about with the higher reviews and meta-analysis to where it's a completion of the data, not just one or two studies. They even go further too.

So often, they will pick out one or two odd studies that are not even human studies or not even living things studies. Also about how you can find studies supporting anything, if you go a step further down and talk about this modeling of biochemistry, you could make up anything at all, no problem and make it sound good, make it sound possible.

**Ari Whitten:** Oh yeah the arm chair theorizing when people go down to the biochemical mechanisms and if so and so molecule increases with so and so thing, therefore, do this.

**Dr. Alan Christianson:** We had a biochemical map on the wall in med school in one of our classrooms. One professor would do that. He would start here and take all these steps, pull in a new triangle of botanical, pull out of the Z's process. At first, I was mesmerized. I'm like, "Wait a minute, you can make up anything you want," and it may or may not be meaningful.

**Ari Whitten:** Yeah absolutely. On that note, there's a scientist who I really like, an antiaging specialist named Vince Juliano, really, really smart guy in the realm of aging science. There's a talk, actually a free talk online that he gave really fascinating on the science of longevity. At the beginning of his talk, he talks about all those biochemistry maps. If you guys haven't seen this, picture like one molecule in the center and then like 500 arrows going off in various directions to 500 other molecules, some arrows pointing this way and that way and going both ways simultaneously, this inhibits that and this activate this. One of the things he actually chose like 20 different biochemical maps in the beginning of his presentation and he says, "These maps don't even match up with one another. They can't even agree on what is doing what let alone extrapolate out to the level of behavioral interventions."

**Dr. Alan Christianson:** I had a physiology professor who would make fun of that whole world. He'd say, "Oh, those are mechanisms. Sure, if you want mechanisms, you can have those but they change whenever new studies come out. This is our best explanation for what the study showed us, but it is just the study outcomes that matter."

Do Carbs make you fat?: The truth about the causes of fat gain

**Ari Whitten:** So hopefully guys get all this concept of the hierarchy of evidence, cherry picking and the warning of not to be offended by anything we say. With all of that said, let's get into some of the meat of this conversation. I think a good entry point in this conversation is, what causes fat gain? Do carbs make you fat? Now, in the context of we have lots of ideas floating around now, fat doesn't make you fat, carbs make you fat or sugar makes you fat. Insulin is a fat storing hormone and therefore things, which boost insulin, that's the cause of fat gain.

Really, there's this whole thing called the carbohydrate and insulin theory of obesity, which has primarily been popularized by Gary Taubes. That basically says, it's not really calories that are making us fat. It's insulin and insulin is produced by carbohydrates, therefore carbohydrates are really the things that are driving obesity. Now, there's a lot of layers to dissect here as far as different levels of evidence that we can use to assess the validity of this argument but do you have any kind of intro thoughts to get us into this?

**Dr. Alan Christianson:** In intro thought, I would talk about a big generalizing concept is about how, think about these macronutrients and think about their contribution to fuel. The main ones we're going to talk about are going to be carbs and fats but also relevant would be alcohols including ketones and then also protein. So ultimately, your body converts fuel down to one common thing.

This was I think more common in my generation but the joke was that, kids would get concerned about their food mixing up and mom said, "Well, it all goes in the same place. Don't worry if you've got mashed potatoes in your green beans because it all gets mixed together in your stomach."

So when it comes to fuel in the body, that same place would be just energy metabolism or the Krebs Cycle. All those different macros, they convert down into acetyl CoA they make. They all burn down to the exact same stuff.

Either they get brought into the cell, they're kept outside the cell, they go into the mitochondria, they're kept out of the mitochondria and they're going to be burned or they're going to be converted to a storage compound most commonly glycogen and then eventually triglyceride. So no matter what it is, that's what it comes down to.

The difference is that whether you have, you need more fuel, because you've not consumed enough, or you're burning more because of your basal metabolic rate, your activity levels, thermogenesis, or how well you can burn fuel in terms of the endoplasmic reticulum, mitochondria, how well your body is capable of handling that fuel. So if those three variables determine whether you've got too little fuel or too much and if there's too much, you'd rather reject it and store it and that gums things up.

**Ari Whitten:** Yeah, beautiful. So, carbs versus fat, what can we draw from the science, to assess whether it's true that carbs are uniquely making us fat, are uniquely fattening or insulin specifically is the primary mechanism that is driving the epidemic of obesity?

**Dr. Alan Christianson:** Well, in terms of carbs specifically, there's been several good studies that have looked at how different ratios of diets have played out over long periods of time. Like how the rubber meets the road. Kind of interesting, the groups on high carb, low carb, high fat, low fat or more moderate take diets, they end up doing about the same over longer periods of time. Curiously, when you look within the groups, you pull out individual scores on every one of those diets, there's some people that do quite well in terms of weight loss goals and then others that do not do as well. They actually have weight gain.

I think another important thing that we should mention too is the distinction between weight changes and then composition changes. Because, the science is so strong that weight is not an important predictor. Just your simple waist circumference, your waist to height is probably one of the biggest ones as far as predicting your health span and mortality risk. The overall ratios from the largest studies, by themselves don't seem to be big differentiators. If it were solely a matter of carbohydrate being a culprit, what you would expect to see is that, the lower someone went on carbs, the more weight loss they would see and the higher they were on carbs, the less weight loss they would see. It should rank up in a fashion like that. That's just not been the case.

Do Carbs make you fat?: How most traditional diets are carb rich and don't promote obesity

**Ari Whitten:** Yeah absolutely. I'll add a few specific kind of layers of evidence on this point. One is to go into, in the context of the hierarchy of evidence, I'll kind of go into a few layers here. One is epidemiological research. We could look at different populations around the world. One of the simple predictions that would come out of a simple theory like this is well, if we look at populations that have 60% or 70% of their diet is carbohydrates and other populations are eating 20% or 35% of their diet is carbohydrates, the ones eating more carbs should be fatter right? So, this is, now this is epidemiological evidence. By itself, it doesn't tell you the whole story but it's an important layer of evidence. What we find when we look into those studies is that there's basically no correlation at all.

We find lots and lots of populations all over the world that have carb-based diets where, as long as they're eating their traditional diets and they're eating whole foods and relatively unprocessed stuff, they are lean and pretty much disease free.

There is no, certainly no obesity epidemic and usually, in most populations, there's zero obesity at all or very close to zero. There's no significant difference in these populations between higher carb versus lower carb populations.

We have lots of examples of research, really good research that's been done in the last few decades on this topic where certain researchers have gone out and studied hunter-gatherer tribes in various parts of the world, in Africa and South America, in the south Pacific and so on and basically analyzed their diet exactly what their eating, the macro-nutrient ratios, carbs:fats and all of that and then found out, they went and saw, what's the rate of obesity, what's the rate of diabetes, what's the rate of cardiovascular disease and so on.

A lot of these tribes are eating 70% and in some cases 80 or even 94% in some cases, carbohydrate in their diet. Some of these populations like the Tukesenda in Papua New Guinea are eating 94% carbohydrates in their diet, basically all sweet potatoes. The [inaudible] in the south Pacific have a 69% ratio of carbohydrate, the Tarahumara Indians have I think 75%.

**Dr. Alan Christianson:** [inaudible] were way up there, they were like 69, 70%.

**Ari Whitten:** Yeah, the Hadza in Africa, they're on and on and on. A lot of these tribes are eating carb based diets and yet have no obesity. That's kind of one layer that we could explore that really show's whether this theory has validity or not. So I'd say, that first layer really points to no real indication that carbs are causing obesity.

**Dr. Alan Christianson:** Well, and we can think about obesity, I don't want to juxtapose too many topics. You did talk also about just heart disease and other diseases. I think you can consider longevity as like one of the biggest factors that whatever else happened, if you died, it wasn't good.

**Ari Whitten:** Right.

Do Carbs make you fat?: How the blue zone lifestyle promotes a greater chance to live to be 100

**Dr. Alan Christianson:** The opposite, we've got Dan Buettner's data on the Blue Zones, about the populations they tracked that had disproportionately higher rates of centenarians. It's not that everyone lived to be some crazy old age, but within large numbers of people, the rate of living to 100 might be one in 2,000 or 3,000 rather than one in 20,000 or 30,000. So, it was a big deal. All of those four areas were starch based diets, they were consuming high starch diets.

The one group that had the highest rate of centenarians amongst males, which was unusual, in most cases, it was higher amongst females, that would have been in Italy, off of Gavi on the Island.

**Ari Whitten:** Sardinia.

**Dr. Alan Christianson:** Yeah, yeah thank you so much. It's Sardinia. These were all pastoral groups and their diet was roughly 60% bread, 64% bread and they had the greatest rates.

**Ari Whitten:** Again, that population level, epidemiological studies, the blue zones, the healthiest populations in the world are eating carb based diets. In most cases, with a couple of examples of the Mediterranean diet, where it's more moderate carb, moderate fat but none of the populations, none of the populations in the world that are known for being the healthiest and longest lived are on low carb diets.

Do Carbs make you fat?: How the inuit diet is not ketogenic

**Dr. Alan Christianson:** Further along those lines, there has been a lot of talk about how the Inuit or the Masai had higher fat diets and great health. When you look a little more deeply at their health histories, that claim doesn't stand up. There's a large review from 2003 that was looking at the claim about the Inuits having, the Eskimos having these low rates of heart disease and there's not really evidence for that. Amongst native Americans in general, they've often had high rates of chronic disease and the Inuits, even going back as long as we had good records, their rates were consistent with other groups of native Americans but even a little bit worse than other groups were.

**Ari Whitten:** Yeah and just to go a little deeper into that one specifically, we also have this narrative of the Inuit diet being kind of this ideal diet. Part of it's based on the idea that they were supremely healthy, there was also these kind of myths around how they were able to achieve these amazing feats of performance and so on.

Therefore, and this is kind of invoked as evidence for the benefits of low carb or ketogenic eating. I think it's worthwhile to note that there was actually research done on the Inuit eating their traditional diet, to assess whether their diet was actually ketogenic. They found that it wasn't. They found that actually, the Inuit people, despite eating

basically blabber and like almost an all animal food and super high fat diet since plants don't grow where it's all ice, they found that even in that condition, they were still getting enough carbohydrates and protein in their diet to keep them out of ketogenesis.

So there's literally no population group on earth that eats a ketogenic diet as their standard diet, which I think is an interesting point considering that we hear so many people kind of advocating for low carb ketogenic eating as this sort of state of our ancestors or what traditional man ate. There's just no indication that that is true. So do carbs make you fat? Well, not when you look at the traditional lifestyles.

**Dr. Alan Christianson:** You talked about it being almost like a religion or a cult. What happens in a group when they have beliefs about here's what we do, here's the dance we do to make it rain. So if it doesn't rain, we weren't dancing hard enough or maybe Joe stayed behind in his tent and didn't show up that day. We need to share shortcoming. The cycle is that, when low carb didn't yield the benefits we expected, we weren't low carb enough so we'd better go keto.

**Ari Whitten:** Yeah and that's where the low carb movement went all the way into keto. I've even seen, more recently, I've seen people go, there's a new movement called Zero Carb.

**Dr. Alan Christianson:** Oh, it's actually a movement. I've seen a website of the zero carb diet but now it's a movement?

**Ari Whitten:** Yeah.

**Dr. Alan Christianson:** Okay, I guess that's ...

Do Carbs make you fat?: How insulin levels are a signal from the body notifying you if everything is in balance

**Ari Whitten:** So now people have established that keto isn't quite extreme enough so that we need to get even a few grams of carbohydrates that are in the diet all the way out to get into the real magic zone. So anyway, we kind of went on a little digression there but back to this carbohydrate theory of obesity. One more layer of evidence that I think is useful to go into here, a couple of layers actually.

One is just animal studies where they've done direct manipulating of insulin levels through various drugs like Clonidine and stuff like that. So you put mice or, excuse me, rats or dogs on a fattening diet that makes them obese. Then you give them a drug like clonidine that manipulates their insulin levels, so that artificially lowers their insulin levels and you see if that affects the rate of fat gain.

There has also been studies where they've genetically manipulated insulin levels in rats and so on. Over and over what they find in those animal models is that, manipulating insulin signaling or insulin levels in that way doesn't actually affect the rate of fat gain. Then the final most important layer of evidence that I think is worthwhile getting into is

the metabolic ward studies and the overfeeding studies. I know that you paid attention to the recent ones that came out funded by Gary Taubes' institute.

**Dr. Alan Christianson:** Yeah, I'd love to talk with a lot ... Right back after the animal studies you mentioned, one great thing about humans and sometimes what's ideation or what's almost like the thought type studies, sometimes they're just not done thoroughly. So the idea about insulin causing weight gain, the basic idea there is that insulin is an energy signaling molecule and it does have roles to play in how cells take in energy. So the thought process is that, high levels of insulin make the body resistant to insulin and may create this state of insulin resistance, which in turn causes you to make more insulin. So, it's thought that then this vicious cycle ensues, which causes your body to like have everything get vacuumed up into the fat cells.

One shortcoming about that from human studies, just working as an endocrinologist and managing many who are diabetic, we'll see type 1, type 2 diabetics. Type 2 diabetics, their bodies do produce insulin and generally, they've got very high levels of insulin. If you take someone like that who's not responsive to medication, they're at a critical state and you give them, we call that exogenous or from outside of the body, you give them exogenous insulin, if this theory was true, things should get worse. That extra insulin should worsen that resistance and should make everything just cycle further. But it doesn't. We give them some extra insulin, now their blood sugar comes down, it can improve their metabolic rate, they can lose weight easier and those things can become positive. So insulin is not the driver of all of this. It's really just a molecule that's signaling somethings going on.

Do Carbs make you fat?: How metabolic ward studies are conducted, and what recent studies show

**Ari Whitten:** Yeah, absolutely and thank you for adding that. I guess the most direct means in humans, the highest levels of evidence that we can look at as far as individual studies, are these metabolic ward studies. To give you all a little insight, a little explanation into what these are, basically, they are studies where they take people and they put them in a chamber and then they precisely control calories. So, it's not in a real world setting where people are allowed to do whatever they want and eat whatever they want.

**Dr. Alan Christianson:** Here's what I ate last week.

**Ari Whitten:** Yes exactly. They're not recording based on memory what they ate. Scientists are literally controlling every morsel of food that these people are eating and they're controlling, they're measuring how many calories they're burning. So every last calorie is controlled for. Now, there's been several studies, metabolic ward studies, going back a few decades now.

But actually, the biggest most well controlled ones just came out in the last year and a half, two years. Interestingly enough, were actually funded by Gary Taubes' institute called NuSI, which again if you guys don't know, Gary Taubes is the guy again who has, the primary guy who's popularized the low carb movement. Now, he's funded this institute and got a lot of millionaires to invest in it, to fund this research, with basically

the explicit goal of proving that low carb is the best way to lose fat and that insulin is the primary cause of obesity or fat gain.

This NuSI, this institute, has now funded a couple of these metabolic ward studies. These really well designed tightly controlled studies. They've basically put these people in a chamber, to give you guys the basic gist of this, basically, they take one group of people and they put them on a diet that's lets say 70 or 75% carbohydrate. They take another group of people and they put them on a diet that is the exact same number of calories but is lets say 5% or 10% carbohydrate instead of 70 or 75%. Then, they do this for several weeks or several days, several weeks. Then afterwards, they simply assess, well has this big change in carbohydrates and insulin actually affected fat loss. Do you want to talk a little about the results on that one?

**Dr. Alan Christianson:** Yeah. The most recent one is pretty fascinating. They were looking at the effects of the ketogenic diet. I should briefly define ketogenic versus ketosis.

So I talked about how all those types of macronutrients become acetyl CoA. If you have oxaloacetate from carbs or protein, you can burn that for fuel in the liver, in the mitochondria, elsewhere in the body. But if you don't have enough carbs or protein, then you can't get those in the liver properly. So you make those in the ketone bodies, which then circulate. They can't be burned by our liver but they're burned elsewhere. They're either burned or they're converted to fat. So any time you're running low fuel and low calorie of any combination, vegan, high carb, low carb, [inaudible], whatever it is, if you're low fuel, when you run out of glycogen, your liver and your muscles will start making ketones. That's metabolic ketosis, which is not enough fuel.

Most of us are mildly in that stage just from overnight fast when we wake up in the morning. But then, ketogenic is to where there's not a fuel deficit but there's so little carbohydrate and protein that all you can do is turn that stuff into ketones. So, this study was looking at a ketogenic diet, which funny thing, they weren't expecting there to be weight-loss. They wanted to look at changes in metabolism and how the body was burning fats and carbs and insulin output. They put this group of people on about 2,700 calories. They did end up losing weight, which is pretty fascinating and telling about metabolic wards. Most would think that they would not lose weight on 2,700 calories but in the real world, in an actual scientific setting where you honestly are getting that much, that ended up being less than they thought in terms of how it's affecting people.

Do Carbs make you fat?: How a high fat diet affects fat loss

There was weigh-loss that occurred. Funny thing too is that there was more fat burned in those who were in the ketogenic group. We've got to distinguish fat burned from the diet and fat burned from the body. So they...

**Ari Whitten:** I'm glad you brought that up yeah.

**Dr. Alan Christianson:** ... they burned more fat in total but they actually burned less fat from their bodies. If you pour kerosene in your car, your car's burning kerosene. You didn't have to change your car such that, that's all it's got to run on. So, if all you're eating is fat, you'll burn fat but you're not burning your fat.

**Ari Whitten:** Yeah and I want to dig into that a little deeper. This was one of the points that I really wanted to dig into on this podcast with you because there are so many misconceptions on this that I think it's worth really emphasizing this more. We often hear this narrative of you don't want to be a carb burner or a sugar burner, you want to be a fat burner. In order to be a fat burner, you have to eat fat. You have to eat fat to burn fat. People think, if they're a fat burner, if they're a fat burning machine, that they will all of a sudden lose lots of fat and therefore by eating fat and becoming a fat burner, it will result in all of these amazing fat loss benefits.

**Dr. Alan Christianson:** It will trigger some kind of a chain reaction that gets out of control and burns up all their fat mysteriously too.

**Ari Whitten:** Exactly. There's a real semantic issue that kind of I think disrupts our thinking process here. We talk about dietary fat and body fat using the same word fat. So, there's a confusion and a blurring of the lines that I think for the human brain, it's hard to grasp that these are distinct things. I think to make this more clear cut, let's just say as an example, you put two people on a calorie restricted diet. Both are eating let's say 1,300 calories a day. One person is getting 1,300 calories a day from bread and the other person's getting it from butter. One of those people, the butter eater, is going to be a fat burning machine but as we know from these metabolic ward studies, when we control precisely for the amount of calories, it doesn't actually matter at the end of the day whether you're eating 1,300 calories from a carb dominant diet or 1,300 calories from a fat dominant diet.

**Dr. Alan Christianson:** As far as body fat lost, yeah.

**Ari Whitten:** Body fat loss is the same. So yes you're a fat burner but you have to burn through 1,300 calories of butter before you burn off your body fat.

**Dr. Alan Christianson:** That's where I was talking really about how all the fats the carbs, they become acetyl CoA. They all come down to ultimately the same thing before they go into to the furnace and it's just how much of that have you got.

**Ari Whitten:** Yeah absolutely. So to tie this up, basically these overfeeding studies, even the ones conducted by Gary Taubes' institute have all been extremely consistent that when matched for calories, it doesn't matter whether your diet at 75% carbs or 5% carbs, the fat loss, the body fat loss is the same.

**Dr. Alan Christianson:** Well, the NuSI, the NuSI did a more recent one, was looking at a national ketogenic diet. They were in a state of ketosis, it was calorie controlled. The opposing diet was honestly a straw man, it was set up to fail. It was 25% sugar amongst all those calories. When you got down in the details, the sugar diet lost a little more fat than the ketogenic diet did.

**Ari Whitten:** A little more body fat.

**Dr. Alan Christianson:** A little more body fat, thank you. It wasn't enough to be a huge difference but overall there was definitely not an advantage by going low carb.

**Ari Whitten:** Yeah. I like to be generous when I explain this study to people and say that they lost the same amount of fat.

**Dr. Alan Christianson:** They didn't.

**Ari Whitten:** Because it's so hard for people, I feel people will be [crosstalk]

**Dr. Alan Christianson:** That's hard to know.

**Ari Whitten:** ... me and think that I'm telling them some lie if I tell them that the carb base group is actually less likely more body fat. To be honest, it was small enough that it's pretty close to the same. It's not that statistically significant but I just leave that part out because I feel it makes people less skeptical of the information.

**Dr. Alan Christianson:** I'm just throwing the salt in.

**Ari Whitten:** Yes. Well, we're having the podcast. That's why we're here. The last point I want to add on this is that interestingly enough, there's also been I believe three or four overfeeding metabolic ward studies. In contrast to the studies we were just referring to, where they're putting people on a calorie restricted diet and matching for calories, in this context, they're actually putting people on a calories surplus diet. They're basically forcibly overfeeding them with the intention to get them fatter.

They put them on two different diets, basically the same idea, one a very high carb low fat diet and the other one a very high fat low carb diet. What they find in these studies is basically the same. That when overfed a certain number of calories, you will gain the exact same amount of fat regardless of whether you are on the high carb or high fat study. Again, here's there's a little bit of salt, which is, if anything, there was actually a slightly greater fat gain in the high fat groups in at least some of those studies I'd like to say overall, it's basically the same.

Do Carbs make you fat?: How protein consumption is controlling muscle growth

**Dr. Alan Christianson:** I don't know if this is the best point to throw this one in the mix but protein's relevant too. I've seen some overfeeding studies in which they tracked different levels of protein. You can make a strong generalization like we have, that fats and carbs, not a big difference as far as scale weight goes for change. But protein does seem to be distinct and that's why I left it out of that fuel definition because I've seen overfeeding studies where they gave people intentionally about an extra 1,000 calories per day. Three groups, one group was on what would be a lower protein, it could be a vegetarian, vegan diet like 7-10% calories and protein. One was on the typical American diet, like 12-15% protein and then one was a dedicated higher protein diet, 30-35% calories. What this overfeeding studies showed was that, the weight gain differences were not huge but

there was the most weight gain just total to scale weight on the lowest amount of protein.

Now, the lowest amount of protein, I'm not exactly correct but I'm close, I'm going to make up the numbers, there was about 11 pounds of weight gain but there was actually 13 pounds of fat gain. So, as people were gaining weight, they were losing muscle tissue. Your body requires somewhere at least about like 10-12% calories in protein just to function. Less than that, you've got to make up that difference from your muscle tissue.

So the moderate group, they gained more equal amounts of fat and muscle. Actually not equal but a little more, some muscle and then some fat. Then the high protein group, mostly gained muscle. They did gain some fat. I thought about that like, so the calories pretty much rule the scale but the protein might have ruled the mirror because these people might not have looked worse afterwards. These folks definitely looked worse.

**Ari Whitten:** Yes absolutely and thank you for adding that. On that note, there's one other important layer of evidence that I think will be re-missed for not mentioning here, which is the non-metabolic ward studies. This is where we have a mixed bag of some confusing research. This is where the low carb advocates like to cite evidence from. So, this is where they take for example a high protein, high fat, low carb diet and compare it to a low protein, high carb, low fat diet.

What I'm saying by that, what I'm saying there for those that didn't quite catch it is, protein is not controlled for. Calories are not controlled for. You're allowing people to eat whatever they want in a real world setting without controlling their calorie intake, without controlling their protein intake. In some of those studies, low carb diets actually turn out to be superior, and at least in the short-term and for a couple of reasons as to why this happens. When we look at it in the longterm six months, out 12 months, in general, the differences are very, very minor between low carb and low fat diets, even when not controlling for calories or protein.

But in the short-term, when you don't control for calories, you don't control for protein, what happens on a lot of these low carb diets is, people end up eating more protein. They drop a lot of the processed foods and they are, as a result of eating more protein, we have the effect that you just talked about, which is, they retain or build muscle mass and so more of the fat loss comes from fat, more of the weight loss comes from fat and less from muscle tissue. Protein has a couple of other effects. One, it increases dietary thermogenesis or post-meal thermogenesis, which is the number of calories burned after the meal. Then probably the most significant is that it decreases appetite. Of all of the three macronutrients, it decreases your desire to eat more food more strongly than either carbs or fats.

Quick note there, there's a lot of kind of popular ideas around fat is really satiating. Actually the research doesn't really support the idea that fat and carbs are much different in terms of satiation but protein is uniquely satiating. So a higher protein diet will cause overall less calorie consumption and that will be more effective in driving fat loss.

**Dr. Alan Christianson:** The term that some researchers use is caloric offset. So, if you take a meal and you add in 100 calories from chicken for example, what is that person going

to have the rest of the day? You track them and let them eat what they want, you see how many calories they eat. Just to make that point, if they add in 100 more calories from lean poultry for example, they're probably going to offset about 150 calories spontaneously. Now, the opposite extreme of that would be, the most automatic could be sodas. To where there's probably no caloric offset if any. When you add in a couple of hundred calories from a soda, and that person is still going to take in just as many calories as they would have otherwise. So that's one of the few examples that liquid calories like sodas especially to where there's no real caloric offset.

Do Carbs make you fat?: The satiety study – how fats are the least satiating foods

Foods that almost always have some caloric offset even junk foods, but protein seems to have the most caloric offset unit per unit. Do you know the satiety, the satiety study, that one particular one that was done?

**Ari Whitten:** I'm not sure which one you're referring to.

**Dr. Alan Christianson:** There was one, I think it was called the Satiety Study. They gave people access to controlled amounts of certain foods, large numbers of different foods in different intervals and then they tracked them for how soon they consumed the next meal and how much they ate at the next meal. They ranked about 50 somewhat foods on a satiety scale. It was pretty fascinating. It really bordered out what you were saying in that fats were some of the least satiating. The winner by a long shot was potatoes.

**Ari Whitten:** Yeah, I do remember coming across that. Yeah fascinating.

**Dr. Alan Christianson:** Potatoes were a huge, huge outlier. There was this whole rank of foods about like this but potatoes were like all by themselves way out there.

**Ari Whitten:** Yeah fascinating. I want to just dig in a little bit more to fat loss and low carb diets and the mechanisms behind it. If it's, what we just kind of went through was that, insulin and the carb insulin thing really isn't, clearly isn't the mechanism because we have lots of evidence, many lines of evidence clearly showing that it's not true. So what is the mechanism when someone goes on a low carb diet, a low carb paleo-diet and then they lose weight spontaneously, even while eating to fullness, they start to lose weight. What's going on there? We know that that person, if they just read a paleo low carb diet book or just a low carb Atkins, whatever, that they're inclined to think, "Wow, it's from removing the carbs and lowering my insulin levels. That's why I'm losing fat." What are the real mechanisms behind that?

Do Carbs make you fat?: Why cutting out carbs can be counter productive

**Dr. Alan Christianson:** One brief thing I would love to throw out as just devil's advocate so to speak for communities is that, everything you talk about that can happen for paleo testimonials, you can find those same things for vegan testimonials. For those that have gone vegan or raw food or high starch low fat diets, you find all the same cures and benefits and diabetes and weight. So yeah, what's really happening? Ultimately, they're

consuming, they've probably shifted their fuel to nutrient ratio and they're consuming less overall fuel.

Most human spontaneous diets are about half carbohydrate and most of that comes from starch. We get carbs from starch or from simple carbohydrates. The starch is primarily grains, legumes, tubers and the others are primarily fruits or processed foods. When you cut out this whole big category of foods, your fuel intake, your caloric intake has plummeted because that's usually at, at least about 3/4 of that half of the diet. We're talking like almost 40% of the caloric intake is just off the board.

The cycle that happens whenever you cut a food category is that, at first, you're staying true to eating more or less as much as the other foods as you did before. Then overtime, there's some drift. The drift is that you start finding the cheats, the workarounds, the processed low carb foods or you start changing your quantity of the foods you have that are still left over. That's where it quits working and even reverses to some extent. That's true of all diets when you cut out a category of foods.

**Ari Whitten:** Yeah and just to phrase that in other words so that people really get this, the vast majority of the typical western diet is from processed carb rich foods. So, when you go on a diet that immediately eliminates all of those foods that were maybe 40, 50, 60% of your overall calorie intake, you're eliminating half or a majority of the calories that you were normally getting in your diet. Just by that alone, you will spontaneously reduce the overall amount of calories that you're consuming pretty dramatically in some cases and cause fat loss.

But as you also mentioned, we see these same things occurring when you eliminate processed foods on vegan diets, on the Mediterranean diet, on the zone diet, on whatever carb to fat macro-nutrient ratio of the diet, you can get these same amazing weight loss testimonials. It largely comes down to removal of different food groups and they may even be contradictory food groups between different diets and especially removal of processed foods.

Do Carbs make you fat?: Why carbs are crucial for a healthy gut microbiome

**Dr. Alan Christianson:** One thing to talk about too in terms of longterm successful weight loss, there's been an unholy convergence of two incompatible ideas over these last several years, one of which has been that carbs are bad. The other idea has been that your microflora is important. We need these healthy bugs. There's more data saying that these can be bigger predictors of weight than anything else can be. Ratios of certain types could be relevant. It's almost like saying gardening is a good idea but don't use water. Ultimately, the flora is fed off of carbohydrate and carbohydrate remnants solely. Fats and proteins do not serve the types of flora that we're interested in preserving and amplifying.

**Ari Whitten:** Yeah absolutely and I think that's a good point to add in. We hear a lot of people talking about the importance of microbiome but very few people mentioning that and mentioning also that we actually have quite a bit of data showing high fat diets actually disturb the gut microbiome.

**Dr. Alan Christianson:** Even a little further along those lines, fiber's talked about as if it is an entity and it's really a category. You can think about at least 16 different main categories in dietary fiber. Once you drop out starches, tubers, legumes, impactful grains, you've now lost about a dozen of those categories of fiber. So you lose a diversity of your whole flora.

Do Carbs make you fat?: What really caused people to become obese during the 80s and 90s "low fat era"

**Ari Whitten:** Yeah, yeah fascinating stuff. So, a couple other points on this, this whole carbohydrate theory of insulin that I, carbohydrate theory of fat gain that I want to add that I think are worth mentioning. One is that we have this narrative of the low fat era. We commonly hear this idea of, "Oh, we all went, we had the low fat movement in the '80s and '90s."-

**Dr. Alan Christianson:** And it didn't work.

**Ari Whitten:** ... "and it didn't work and we all went low fat and we just got sicker and fatter as a result of going low fat." The real secret now that we've tried that experiment and we know that didn't work, the real reason is because it turns out that fat really isn't bad and really carbs were the thing that was problematic. So, it sounds like you know where I'm going with this. Do you want to elaborate on that?

**Dr. Alan Christianson:** For sure. That's totally the narrative. You can look at what the population's intake was in two different ways. You can look at our percentage of calories or our absolute amounts of those macro-nutrients. In terms of our percent calories, we went a tad lower fat. I don't think I'm off by much, I think it was like 37:35%, 37:34% calories from fat over that time, something about like that.

**Ari Whitten:** Yeah, that's about right.

**Dr. Alan Christianson:** Okay. So we went down slightly by percent calories from fat and like you said, the obesity trends kept on going and kept on getting worse as we went lower fat. The problem is, that was a percentage of calories and it didn't take into account our total caloric intake. So the short version of what happened was that, everyone had their diet for what it was and they heard the low fat message and they said, "Oh, these fat free foods are good." So, they added processed fat free foods on top of their diet. They never changed their diet, they never ate less of anything else. They just added more processed carbs on top of their diet.

So, their total fat intake never went down. It didn't change at all. But they added more on top, so the percent went down by a smudge. So, we never really had a low fat experiment.

**Ari Whitten:** Yes, yeah, thank you and this, I have to say, this is so fun that I can provide a little intro like that and you know exactly-

**Dr. Alan Christianson:** Throw in a softball.

**Ari Whitten:** Exactly. You know exactly the research that I'm referring to so that's awesome. Just to re-emphasize that. There's a difference between absolute grams of fat consumption versus relative. So, what actually happened during these years of the so called low fat era is we actually slightly increased our overall fat intake but the relative amounts, since the overall calories we were consuming went up dramatically, the relative amount, the percentage of that total calories that was from fat decreased very slightly. Basically, people twist the data to create this narrative in support of low carb diet saying, we all went on this low fat diets and they didn't work, they just made us fatter and therefore really you need to go low carb.

**Dr. Alan Christianson:** There's a way to maybe even make it even clearer is that, my son, I'm going to make up some numbers, he's got like 40 kids in his class and half of them are girls. There are 20 girls and 20 boys. So, if he had 20 more boys come into his class, also the percentage of girls went down but there are just as many girls there.

**Ari Whitten:** Yeah exactly. So basically, people are twisting this data to make it seem like we did something that we didn't. There was no low fat era where millions of people adopted low fat diets and got fatter as a result. This did not happen. It is totally just a false narrative that has no basis in the actual science.

**Dr. Alan Christianson:** The funny thing is that, along those lines, I remember being such a health nut during that time and I remember seeing the responses and just the pervasiveness of that dogma. It's such an obvious parallel where we are today. I remember a couple of [inaudible] after a race one time, there was, everyone had the bagels out, just totally normal, they were passing around the bagels, we did a running event. Some person was pretty heretical. They had mixed cream cheese and brown sugar and put in the bagels. Like wow! Yeah but this is so good. After a race, just have a little bit. This one girl, she was just being fed and she had her big stack of bagels and she had one little smudge of this stuff. She was, "Okay, that's my fat grams for the day."

**Ari Whitten:** Yeah that's great. Just as another point to add on this, we also have actual studies, where people have been put on low fat diets. Oftentimes, these low fat diets are vegan diets. When they're put on low food, low fat diets, we actually do have solid research showing that these people do lose weight, they do improve their health biomarkers and so again just to re-emphasize that a lot of this narrative that's been built around the villainization of low fat and of carbs specifically, really is not well grounded in science. It's really, they're doing a lot of twisting of data to make a case in this direction and ignoring a lot of the data there. They're cherry picking as we mentioned earlier.

**Dr. Alan Christianson:** This is somewhat along those lines. Fats never were the enemy. I think the whole idea about good and bad or ideas we want to really jettison and get rid of because all these food categories we need, there are valid questions on how much of which we need all these things. Now, I think we've gone so far, we're thinking that fats have these disproportionate tonic magical properties. We need fat, we need linoleic, linolenic acid, we get sick without them. So many of these fats you have talked about as being good fats are not essential fats. So, we hear about how saturated fat, we need it

for our cell membranes, we need it for our brain, we do and that's why we make it. We make it all day long.

What is in our brain in terms of saturated fat is what we made. It's not what we ate. So there's this concept that somehow if we need this stuff, the more we eat, the more we have. It's just not true. There are fats that lacking them, things cannot work. But there are so many other fats where we can make them on our own when we need them. Ultimately, they end up just becoming just an empty source of calories because of that.

Do Carbs make you fat?: Why it is more important to look at the type of food you eat vs. the macro content

**Ari Whitten:** Yeah, yeah absolutely. On that point, I think it's worth mentioning that we really need to stop this conversation around carbs and fats and that fats are good or fats are bad and carbs are good or carbs are bad. We really need to start talking about foods because there's a big difference between blueberries and sweet potatoes versus donuts, soda, and potato chips. They're both carb dominant foods or they're all carb dominant foods but these have radically different health effects on our body. Effects in terms of whether they promote fat gain or fat loss, whether they drive disease or health. These are radically different things. The same is true in the realm of fats. There's a difference between almonds and avocados and olives versus butter and margarine and whatever else, whatever other kinds of refined processed stuff that is generally associated with negative health outcomes.

We need to be really careful with our words because there's been so much hubbub and just fuss around carbs and fats for 40 years now. I think to tell a bottom line message of some of the stuff we've talked about, what we're really saying is, carbs and fats really don't matter that much. The carb to fat ratio of the diet is not that critical.

**Dr. Alan Christianson:** For body weight yeah.

**Ari Whitten:** Yeah but foods matter a lot. Do you have any thoughts on that?

**Dr. Alan Christianson:** I couldn't agree more. Along those lines, even the terms low fat, high fat whatever, those can be so confusing because they're not really defined. Actually, they are defined in research but they're defined and used very different in popular press.

So we have the pure study that, the urban, rural, epidemiologic, large paper that came out about three-four weeks ago, a month or so, a couple of months ago, the headlines were low fat diets were deadly and then high carb diets were deadly. I remember a lot of people who were big low carb advocates were like, "Oh, this is the holy grail."

**Ari Whitten:** See, we told you all along, carbs are bad and fats good.

**Dr. Alan Christianson:** Of course the study and the detail is, what they were defining as a high carb diet was ridiculous, it was basically a rice diet. It was like 75% or more carbohydrate from processed food.

**Ari Whitten:** Yeah the big confounding variable was that they didn't control for socio-economic variables there. You basically had poor people being compared to affluent people. Poor people eating basically a diet of nothing but white rice versus affluent people who have much more variety in their diet and vegetables and proteins and things like that. Then you're trying to, from that data with all these confounding variables, then make conclusions about carbs versus fats.

**Dr. Alan Christianson:** Well, and it was populations that were primarily Asian and also Pacific Island, no primarily Asian, a rural Asian, that's right. But they were then compared to American diets. So what was high and low in that continuum, they were all over here and they were comparing that to American diets, which were somewhat completely different.

Do Carbs make you fat?: The right diet composition for a healthy body

I think as you were saying, in terms of body weight, that's just not the most important metric. So protein seems to matter and having more protein can cut down on just random food cravings, total caloric intake, help metabolic rate, help body composition. That's a relevant variable. But whether or not you're choosing to fuel from fat or carb, it's pretty straight forward that your body can do better on some of both.

You need good fibers, you need some good fats, you need a lot of vitamins and minerals and the less processed, the better, or else, you're better off with nuts and seeds, avocados and healthy animal fats, fish especially and carbs, same thing. Those that come in intact, whole packages that have not been broken up, are going to give you the best thing for the book.

Do Carbs make you fat?: How insulin resistance really works

**Ari Whitten:** Absolutely, couldn't agree more. Let's get into a little bit around insulin resistance now and talk about some of the causes there because this is another area, it's very much related to some of the stuff that we have talked about so far, as far as mess around carbs and fats but let's talk about the causes of insulin resistance and compare what the science says about the causes versus common beliefs about the causes of insulin resistance.

**Dr. Alan Christianson:** Well, the common belief is pretty straight forward that carbs create insulin resistance or that insulin creates insulin resistance. The common narrative is that carbs make insulin, at some point, insulin, your body gets numb to it just stops listening to it because there's too much of it and then quits working. So, that's kind of the common narrative.

**Ari Whitten:** If you drink soda, you eat lots of sugar, you do the things that produce insulin, you will eventually cause insulin resistance diabetes.

**Dr. Alan Christianson:** I think it's important to understand what insulin is really doing in the body. It's a signal and it's really controlling how your body burns different types of fuel. It's one of several signals that controls whether or not energy moves into the cell.

It's not really governing what happens within the cell, where the fuel's really burned or partitioned, but it does have some bearing on whether fuel comes into this cell or not.

**Ari Whitten:** Yeah and on that point, I want to add, the difference between a part that is necessary for a certain function versus a part that regulates a certain function. This idea that insulin regulates our body fat levels, basically is not true. Insulin is not actually in any kind of regulating of whether we gain or lose fat. It is one of the necessary components that we need to store fat or if you have certain levels of insulin that allows you to burn fat but it doesn't control how much fat we store or burn. To give an analogy here, you need an engine in a car to be able to drive somewhere. But if you don't get in the car and start the engine and press on the accelerator pedal, that car doesn't go anywhere just because it has an engine. So, let's talk about some of these causes of insulin resistance. We have the common idea of what most people believe and is that true or not?

**Dr. Alan Christianson:** Well, to anthropomorphize a little bit, again the common idea is that there's a mistake, there's a glitch, something is broken. That there's so much insulin it quits working. Still in this vain of anthropomorphizing, what's really going on is that insulin resistance is not a mistake, it's a strategy. It's your body's way of rejecting the fuel when there's too much fuel in the cells already. When there's too much fuel coming in, your body cannot process it. Your liver takes what it can and it makes glycogen first off, when that's filled up, it makes triglyceride. But there's a point at where, it's just run out of room. It's a large part of governing that whole body response and insulin's one of the tools. Insulin resistance is one of the tools to reject energy and keep it out in the bloodstream when there's too much. That's why glucose gets higher and triglycerides and eventually ketones get higher. Your body is rejecting and not burning that energy.

**Ari Whitten:** What's causing that situation?

**Dr. Alan Christianson:** Well, there's three scenarios. There's just too much fuel coming in, there's not enough fuel being burned or there's not enough capacity to burn fuel. We can go deep in all of those.

**Ari Whitten:** Yes, let's do it. Too much fuel coming in, very simply, what does that mean?

**Dr. Alan Christianson:** That's all these fuels. That's the carbs, the fats, also the alcohols including the ketones, they still work like fuel. They've got to be processed. I say that chemically, ketones come under the category of alcohol but also alcohol itself is still caloric. So to really round out all the fuel services, that's all of them. It's all coming down to acetyl CoA, the cells have to burn it or store it and if there's more than they can burn in that moment, they have to reject that. It's just dangerous for them not to. The thing that wears us out is, just like your car, driving the car, the more fuel you run through your body, the quicker you wear things out and the quicker you age. It creates metabolic stress, it creates free radical damage, because we need these free radicals to generate energy.

So, by being in a state of excess fuel, our only safety mechanism is rejecting that fuel. And it's hard on us to have that fuel in the bloodstream, all that glucose, triglyceride, that gunk's up our heart, our kidney, our blood vessels to our retinal tissues, it hurts

everything. It creates disease states. So it's at a cost but it's at a lesser cost than fuel overload within the cell is.

**Ari Whitten:** Yeah and to add one thing there, we have these nutrients that you're saying the cell has to block them, it has to keep them out. Just to say why, these things actually become toxic inside of the cell. If too many glucose molecules, too many fatty acid molecules are getting into the cell, it will actually become toxic to the cell. This is an important point because the cell is basically intentionally blocking the entry of these excess nutrients into the cell. As a result, we get this situation where now we have excess nutrients floating around the blood, which is also toxic but I guess less toxic than it is if they're inside the cell.

**Dr. Alan Christianson:** Just to close out that last loophole, the same stuff applies to ketones as well. When someone's on a ketogenic diet that's not a low fuel diet and they've got these ridiculously high levels of ketones, they think, "Oh wow! My body is burning all these ketones, it's got to be amazing." Like no, you're not burning them, that's why you're peeing them out and that's why they're peeling up in your bloodstream. So, your body makes ketone resistance the same way that it make resistance to carbs and fats when there's just too much fuel there.

**Ari Whitten:** Okay, so main cause is basically fuel excess.

**Dr. Alan Christianson:** The first part of that is fuel excess. Second part of that is not burning enough fuel. That can be a function of the basal metabolic rate, thyroid hormones, debt of sleep, micronutrients status, circadian cortisol cycles can all tie into that, overall body composition. This is a wild thing Ari. I read recently about the newer blanket term overfat. So you've got body weight gives us obese and overweight per BMI but then we've got this whole thing of toffee or skinny fat, thin outside fat inside. You put that all together as overfat.

There are stats now on this being over 90% of American males and a little above 80% of American females. What we see is that, so many people that develop the complications that often go with weight gain, often times they're not heavy. So the solution is always, then they're overfat. You've got two little lean mass. So a lot of our lean mass or muscle tissue contains receptors like GLUT 4 receptors, which just suck up fuel. If we have less muscle tissue or if it's less stimulated, then we cannot tolerate a load of fuel that might otherwise be appropriate.

**Ari Whitten:** Fascinating. Are there any other causes here of insulin resistance that you want to-?

**Dr. Alan Christianson:** Well, the third part about this whole, because this is going to work in any combination. The third part about that is how well we can burn fuel at any given moment. That comes down to endoplasmic reticulum, mitochondrial function, the big thing you've gone real deep into. So, even if we've got appropriate amounts of fuel and capacity for it, if at that cellular level we can't function with it right and there's problems and you know lots of reasons why that can happen.

**Ari Whitten:** Yeah absolutely. The way I kind of tend to list out the causes, I will say number one is, being overweight itself and that goes along with fuel excess and those two states obviously are very much intertwined.

**Dr. Alan Christianson:** Can I expand on that just ever so slightly?

**Ari Whitten:** Please, yeah.

**Dr. Alan Christianson:** So fat cells are dynamic, they're not like this thing you stuck in there like Scrooge McDuck and his ball, this is all stuck away and its not doing anything. There's stuff always going into and out of fat cells. Fat cells are always leaking fuel, they're always pouring out triglyceride in the blood stream. So one of the other mechanisms of insulin resistance is to try to put a lid on that, try to not have it coming out. Like you're saying, the excess body fat all by itself is creating more of a fuel demand upon the mitochondria, more of that toxic fuel overload.

**Ari Whitten:** Yeah, absolutely. As fat cells grow, as fat cells become bigger, they become less effective at trapping that fuel, those triglycerides inside of the fat cells. So more leak out and then we have insulin as you were saying, kind of responding to that. The body is trying to produce more insulin to not have this toxicity of too many triglycerides floating around in the bloodstream.

**Dr. Alan Christianson:** You were talking about the causes of mitochondrial dysfunction.

**Ari Whitten:** Yes, yeah absolutely. One of the other big ones as far as insulin resistance is sitting, which goes along with not burning enough fuel but interestingly enough, there's actually research showing that literally within a few hours of being stationary and just sitting down, you can actually see measurable increases in insulin resistance in the body. Just from sitting. We normally talk about insulin resistance diabetes as this really big, longterm dynamic process of over the course of years and years and years of eating a certain way and having a certain lifestyle, you eventually become insulin resistant. Well, what's interesting is, you can create insulin resistance in a matter of hours by simply not moving your body.

When that happens, basically, the mitochondria don't work as efficiently when they're stationary. They will intentionally kind of basically create this situation where they're keeping fuel out of the cell, like we were talking about earlier.

**Dr. Alan Christianson:** The ultimate set up for that is, think about traveling. Your sleep is goofed up, your sleep is a big part of that too. You can create insulin by skipping a lot of the night sleep. So you're not sleeping right and now you're holding still for like all day long.

**Ari Whitten:** Yeah, absolutely. Then there's all these other, there's research showing that alcohol consumption can contribute to insulin resistance, sleep deprivation, circadian rhythm disruption, psychological stress, tobacco smoking can cause insulin resistance. So basically what I want to get across here to everyone listening is that, this is not, insulin

resistance is not simply a matter of that you had too many candies and soda and carbs. There's a lot of research indicating that there are many factors that lead into this.

I will also add that there's actually research that if I wanted to cherry-pick, I could go find you 50 studies saying saturated fat causes insulin resistance. **There's actually research showing that higher fat consumption can contribute to insulin resistance just as there's research showing that refined sugar consumption can create insulin resistance.** Now, my point there is not to say it's really fat that's doing it. I do not think that fat is the primary, dietary fat is a primary driver of insulin resistance, nor do I think it's carbs.

**Do Carbs make you fat?: How scientists induce resistance or obesity in animals**

**Dr. Alan Christianson:** I'm going to goad you on a little bit. So what do they do with animals when they want to induce insulin resistance or induce obesity? What kind of a program do they put them on?

**Ari Whitten:** They put them on a high fat diet.

**Dr. Alan Christianson:** Every time.

**Ari Whitten:** Yeah, this is a remarkable thing when you start to look at the animal research is that when they want to create obesity, when they want to create insulin resistance, they almost always use a high fat diet to induce those effects. Yet simultaneously, we have this world of online health, where all these people are teaching, these nutrition gurus are teaching you need to go high fat in order to have amazing health. So again, I think that emphasizes that there's really a gap here between what the science is saying and what popular ideas are.

**Dr. Alan Christianson:** **So having some insulin on board tells your liver basically to utilize carbs or fuel if you've got carbs. That insulin resistance, again, its blocking fuel and it'll also block fats. So fats and triglyceride overload can still create insulin resistance even though a dietary fat has less of an impact on insulin secretion.** One more thing along these lines too, insulin's been vilified, it's this bad thing you've got to get rid of or reject and sadly, it's so critical for many functions. **Overall, if we're insulin deficient, we become infertile in our output of gonadal hormones from the testicles from guys to ovaries for women, that all shuts down.**

In the context of evolution, low, low levels of insulin only occurs if there's no fuel, if there's like not enough food available, so it makes sense why reproduction would be impaired. Also thyroid hormone just shuts off. I've got a friend who's one of the nutritionists behind the Barrow's Neurologic Center that's done most of the research on ketogenic diets and kids with epilepsy. They know just predictably that even within like a few weeks into it, these kids develop thyroid disease, they become hyperthyroid. They often preemptively start thyroid treatment because they know this is going to show up. So also just gluten-thyroid production, making antioxidants, muscle growth, lots of important things you need insulin for.

**Do Carbs make you fat?: How most foods stimulate insulin production**

**Ari Whitten:** Yeah absolutely. You just reminded me of something that I meant to say much earlier but I'm going to say it now because I think it's really important. We have this idea that's very popular that carbs are uniquely insulin stimulating and insulin is only stimulated by carbs. I'm going to tell everyone who's listening right now something that is so shocking that you will probably think that I'm crazy and that I'm completely wrong. So, I will encourage you all to actually look up the research for yourself.

Basically, there's research showing that protein containing foods can be as insulinogenic as stimulating to insulin as many carb containing foods. So beef, fish, cheese, which most people would think these are low carb food, these are not stimulating any insulin, they actually stimulate as much insulin per calorie as believe it or not something like pasta or porridge, grain based foods. Whey protein, which is a protein powder that's commonly used in the fitness industry, commonly used by many, many extremely fit people who are very lean and who have no problem with being overweight, is as stimulating to insulin as white bread is. So, hopefully, probably a lot of people listening just had their minds blown, probably you don't believe me. Again, look at the research for yourself.

**Dr. Alan Christianson:** Go google insulin index, insulin index, you can find this online and it's straight forward.

**Ari Whitten:** Yeah. So protein stimulates insulin. There's basically no way to avoid insulin unless you want to eat only, I was going to say only butter but butter is actually slightly insulinogenic too.

**Dr. Alan Christianson:** There's what causes you to secrete insulin and there's what causes insulin resistance. If you've got any kind of a fuel overload, you have reached the stage of insulin resistance. So if you do a low fuel diet, and it's a high fat diet or it's a non high fat diet, if you do low fuel, you can reverse insulin resistance. If you do zero carb, you can decrease insulin secretion to a point. But at some point, it's actually counter-productive and really, you need to be on more ketogenic to see it drop that low to get those types of problems to show up.

**Ari Whitten:** Yeah, thank you for mentioning that. That was the point that I meant to go into. Let me ask you directly, do you need to go low carb to reverse insulin resistance? How do you reverse it?

**Dr. Alan Christianson:** No definitely not. So, it's just low fuel. Your body is creating insulin resistance to fight off extra fuel. If lower the total intake of fuel below that magic threshold and we talked about a lot of ways by which your body may not burn fuel well, but there's still some threshold. There's still some point right now to where, if you've got less than what your needs are, your body will start accepting fuel. There's a little bit of a shift that happens in that, this is some stuff in the coming book, I'll even share more of this with you too in person but, the liver is storing glycogen and triglyceride. What seems to happen is that, the endoplasmic reticulum become damaged and fuel goes into and out of glycogen, into and out of triglyceride. The damage and the pathology is that fuel coming out of triglyceride, that's stuck. This becomes a one way street.

So extra fuel, at some point, glycogen is filled and you don't have room for all that much glycogen. It's not a very efficient dense source of fuel converting to triglyceride. So that

overflow goes to triglyceride but somewhere along the way, you can't tap out of your hepatic triglycerides as well as you can tap in. Then, they actually crowd out glycogen. They physically occupy so much space in the cells, you don't have much room for glycogen. Then you're losing a lot of your ability to fine tune your blood sugar throughout the day because you don't have that glycogen to draw from moment by moment.

### **Do Carbs make you fat?: How to reverse insulin resistance**

**Ari Whitten:** Fascinating, I didn't know that. So low fuel will reverse insulin resistance.

**Dr. Alan Christianson:** I say fuel for two reasons, one of which is because, we need to clean our ears about the word calorie. We've been so brainwashed like just plug our ears when we hear the word calorie and run away screaming. So, that's one reason.

**Ari Whitten:** Oh, you said calories, you must not know what you're talking about because calories have already been debunked and really it's been shown to be all about insulin right?

**Dr. Alan Christianson:** Exactly.

**Ari Whitten:** To clarify, I'm not speaking as me, I'm speaking as someone who has been listening to too much of the online health people.

**Dr. Alan Christianson:** So that's one reason. The other one is because protein is a caloric source but it does have a distinct effect. So, even in some of these pathways in the liver, it does work differently. So carbs, fats, ketones, alcohol compounds, collectively, I think of those as fuel and it's really high fuel low fuel. Proteins are a little different. We've got to like get past the calories stuff so that's why I've been using that term more and more.

**Ari Whitten:** Just to add a little bit on that point, there is research showing that basically any low fuel diet, whether it is low carb high fat or it's Mediterranean, moderate carb moderate fat or a vegan high carb low fat diet, if it's low fuel, if it's low calorie, it can reverse insulin resistance and we have actually studies showing that these diets can reverse diabetes, they can reverse insulin resistance. It does not have to be low carb high fat in order to do this.

### **Do Carbs make you fat?: The "rice diet" study**

**Dr. Alan Christianson:** Do you want to blow people away a lot and talk about the rice diet?

**Ari Whitten:** Oh yeah, we talked about this a couple of months ago when we were sitting at that table for lunch at Mindshare and people were like, "No you guys, you guys ..."

**Dr. Alan Christianson:** You're making this up.

**Ari Whitten:** Yeah, go ahead.

**Dr. Alan Christianson:** What was his name the researcher? It was at Duke University?

**Ari Whitten:** Yeah Duke University, William Kempner I believe.

**Dr. Alan Christianson:** Awesome you're right, Kempner, Kempner. So he first went into this trying to treat hypertension, high blood pressure. His speculation was that it was all about sodium. So how do you get, not even just like no salt on the table but how do you get like only the foods that are the lowest in salt? That was his original intent. He pretty much built a diet that was white rice, fruit juice, sugar, that's about it. The intent was to get adequate calories but crazy low in sodium. It was all about blood pressure at first. But over the years, he saw so many reversals of late stage congestive heart failure, diabetes, huge amounts of weight loss amongst [inaudible] obese, again a lot of diabetes reversal on this diet that was just all processed carbohydrates. That's all that it was.

**Ari Whitten:** Yeah. Let me emphasize that for people. This is a diet of white rice, orange juice and refined sugar I believe, actually like table sugar. They were showing, it was calorie restricted and they were showing, on that diet, which nobody today would consider that a healthy balanced nutritious diet by any stretch of the imagination. You would think, most people would think that this is a diet that is destined to cause fat gain and diabetes.

**Dr. Alan Christianson:** It should be deadly for diabetics.

**Ari Whitten:** Yeah. Instead, they actually were documenting cases of obesity reversal, diabetes reversal on that diet. That's mind-blowing and this is all documented, if you guys want to look up the rice diet you can read up more on that. I'll put some links on the show notes page for this episode as well.

**Dr. Alan Christianson:** Do you know the only reason that Duke stopped researching the rice diet?

**Ari Whitten:** I don't.

**Dr. Alan Christianson:** Because of the sex scandals.

**Ari Whitten:** Oh really? I didn't know anything about that.

**Dr. Alan Christianson:** The guy, he had a full-on cult. He had a full-on cult and a harem and [inaudible].

**Ari Whitten:** Nice, why be in a position of power if you're not going to abuse it?

**Dr. Alan Christianson:** That's totally what he did. It was bizarre but that's why it all went sideways. It had nothing to do with the effectiveness.

**Ari Whitten:** Wow! That's funny. I didn't know that. So, I'm trying to think where else we can go with this. Let's talk about nonalcoholic fatty liver disease. What's going on there as far as the causes of that and how does it relate to carbs and fats in the diet?

**Dr. Alan Christianson:** Well, that's a big one. We might have to give a couple of sections on this. We could talk about chronic disease in general, including that, we can talk about a lot of other variables on this.

**Ari Whitten:** You know what, maybe, I think we've gone almost an hour and a half now. Maybe we'll save this for a part two. We still have a bunch of things that I think would be useful to cover. If that one's a deeper one that requires some time to really explore, let's save that.

**Dr. Alan Christianson:** Yeah. Can I throw a teaser out about that topic?

**Ari Whitten:** By all means, yeah.

Do Carbs make you fat?: How a healthy liver is crucial for a healthy metabolism

**Dr. Alan Christianson:** This is something that has been thought about as a rather obscure version of liver disease for some time in the medical world. That whole thing about overfat that I talked about, this is how it starts. When your liver's working great, you've got room to take on this extra fuel, store it, put it out and burn it. Most of us had at least one point where when we were kids, we didn't watch what we ate or how much we did and it was all fine. We never got the exact right amount of food. We never were spot on for our day's caloric needs or fuel needs that we were going to use. We were never spot on.

So when we got healthy liver function, I call that metabolic flexibility. Any fuel overage, you've got a place to hold on to that harmlessly. On the other hand, the days where maybe you don't get as much and you played around the block more than usual, any fuel deficit, you can compensate for that. You've got this little buffer you have of throwing in the extra fuel, pull out the extra fuel, your energy stays steady, you don't crash when you have a bit less food and you don't have your weight go crazy when you've got a little bit more food.

So, that not working right is the overfat and for various reasons, some people have more fat in this area than under the skin and elsewhere. Then also, that same complication creates so much fat that you get about more than 5% of the liver's volume displaced as fat and now it can't work as well. You go into fatty liver disease, nonalcoholic steatohepatitis, full-on cirrhosis, there's just this whole continuum. The actual disease state, not just a little bit too much and the overfat, the actual disease state, by best evidence, that's at least 40% of American adults. That [inaudible].

**Ari Whitten:** Wow, fascinating. I can't wait to dig into that a little deeper with you.

**Dr. Alan Christianson:** Yeah, that'll be a blast.

**Ari Whitten:** This has been so much fun. I have to say, this is probably the most fun podcast I have ever done. So thank you so much and I'm super excited to get into part two with you. I'll email you and we'll schedule a part two for this.

**Dr. Alan Christianson:** Likewise, it's been a lot of fun.

**Ari Whitten:** We may have to do a part seven series on carbs and fat myth debunking. An episode only three and a half hours long. All right Dr. C, thank you so much. It's been an absolute pleasure. I can't wait till the next time.

**Dr. Alan Christianson:** Likewise, bye, bye.

**Ari Whitten:** All right, bye.

## **Do Carbs Make You Fat? Separating Science From Pseudoscience On Carbs And Fats – Show Notes**

How research data is not created equally (3:23)

How cherry picking is taking up a lot of space in the online health and nutrition space and why that is bad (7:52)

The truth about the causes of fat gain (13:34)

How most traditional diets are carb rich and doesn't promote obesity (18:18)

How the blue zone lifestyle promotes a greater chance to live to be 100 (21:31)

How the Inuit diet is not ketogenic (22:52)

How insulin levels are a signal from the body notifying you if everything is in balance (25:49)

How metabolic ward studies are conducted, and what recent studies show (28:55)

How a high fat diet affects fat loss (33:24)

How protein consumption is controlling muscle growth (38:58)

The satiety study – how fats are the least satiating foods (44:13)

Why cutting out carbs can be counterproductive (46:08)

Why carbs are crucial for a healthy gut microbiome (49:03)

What really caused people to become obese during the 80s and 90s "low fat era" (50:32)

Why it is more important to look at the type of food you eat vs. the macro content (57:08)

The right diet composition for a healthy body (1:00:35)

How insulin resistance really works (1:01:15)

How scientists induce resistance or obesity in animals (1:13:26)

How most foods stimulate insulin production (1:15:29)

How to reverse insulin resistance (1:17:15)

The "rice diet" study (1:20:45)

How a healthy liver is crucial for a healthy metabolism (1:24:10)