Introduction and Ari Whittenu2019s Background

Hi everyone. Welcome to this episode of The Reversing Type 2 Diabetes Summit 2.0. I'm your host, Dr. Beverly Yates, ND. It's my distinct honor and privilege to interview one of our wonderful sponsors, Ari Whitten.

Ari has a wonderful, extremely deep background when it comes to research and caring about how the body processes energy, where does it come from, you know, mitochondrial function or dysfunction along with insulin resistance, things like that.

And we know when people struggle with glycemic regulation, with diabetes, with blood sugar issues, that underneath that there is sometimes a particularly stubborn kind of fatigue, an exhaustion, a lack of a ability for the body to really tap into its energy, despite ironically, often stores of energy.

But they're not functional energy. So we're going to talk to Ari about that, because the clothing, that link often is what unlocks the ability to really heal and reverse type 2 diabetes.

So, Ari, welcome to the Summit. Thank you so much for having me. Dr. Yates. It's a pleasure to be here. I'm delighted to interview you. Thank you for your time, your effort and your consistent expertise around this, because I know you've been doing this for quite a while.

With that in mind, would you please give us a thumbnail overview of your background? Yeah, I mean, I could give a very long story here, but the very short version of it is Health Science has been my passion, my obsession since I was 13 years old.

So we're going on about three decades now. When I was young, my interest was more, I would say, typical teenage boy interests. I wanted biceps and abs.

And so I was very, very deep into exercise, science and nutrition, exercise, physiology, biomechanics. I was also an athlete. I was a high level martial artist and a soccer player.

So I was interested in the performance enhancement side of things as well. And I later went on to do a bachelor's degree in exercise science and certifications in exercise Science and as a performance enhancement specialist as a corrective exercise specialist certifications in nutrition.

And I was a personal trainer for many year, both to high level athletes and to just sort of average Joes and Janes. My background further, you know, I spent some time in graduate school, I was actually in medical school for two years, decided this is not for me.

I'm not really into the pathology focus. I'm really into health science, not disease science. And I went on to do a master's degree. I actually went on to a Ph. D.

program in clinical psychology. I did all three years of coursework of that, decided I didn't really want to do the internship phase of it, but fascinating education in clinical psychology as well.

So I'm well versed in sort of the mental, psychological, emotional side of health as well. And and I've also done a master's degree in human nutrition and functional medicine.

My interest more broadly is looking at human health through the lens of evolution, through the lens of evolutionary biology, and looking at how we can cultivate more health by providing the lifestyle for which we have designed so for which we've evolved, I should say.

So right now in the modern world, over 80% of the chronic disease burden are diseases of lifestyle, what are called sometimes in the literature, diseases of civilization.

And this is this means that these diseases are a result of the mismatch of the modern environment and lifestyle with what human biology has evolved to require for health.

And to the extent that you have a mismatch between what your your biology needs to be healthy and the way that you are living in the environment you're in, you will tend to be predisposed towards disease.

And indeed the vast majority of the chronic disease burden are diseases that are directly the result of this. And in my view, we cannot understand human health properly without this evolutionary lens.

This is sort of an essential ingredient to truly understanding what's actually happening. And that issue actually understanding things the right way paradigm is the first foundational ingredient that we need to end up approaching solutions.

How to fix the problem in the right way. If we're not understanding it correctly, then it's pretty much all but a guarantee that we will not derive solutions that are intelligent, effective solutions.

And I would say like as an example, looking if we don't look at disease through an evolutionary lens and I would argue like conventional allopathic medicine generally does not, then we might end up in a paradigm where we are trying to solve diseases of lifestyle and environment through synthetic chemicals by going into a chemistry laboratory and synthesizing new molecules, that we can have somebody take in the form of pharmaceuticals, prescription drugs that we're trying to solve diseases with.

And it doesn't work very well. Less than 3% of all the drugs that are developed that have been developed over the last century are curative drugs. And most of the ones that are curative are anti-microbial antibiotic type of of drugs.

So this model simply doesn't work for chronic diseases. So if we want to solve them effectively, these diseases effectively, we have to address them on the level of actual causation, which is lifestyle and environment.

So that's my focus. And I would say last thing I'll add is my my background, my educational experience, the way I think about health and solving health problems is different from most people in the sense that my background is really health science rather than pathology science.

So this is about science of how do we build more health rather than combating disease. And my my background is also more of an experiential background.

What Mitochondria Do and Why They Matter

I've been a biohacker since long before there was such a term as biohacker people who are bodybuilders and high level athletes were the original biohackers doing self experimentation with their own physiology to figure things out.

And that's really what I've been doing since I was 13 years old. So for me, health science isn't just a set of things I learned in the classroom, in biochemistry class, in anatomy, class and physiology class and pathology class, though I took all those courses as well in graduate school, this is something that's very experiential for me.

This is years and decades of actually experimenting with human physiology. My own and thousands of people that I've worked with. All right, great. Thank you for setting that lens for us.

You know, much of this speaks to what I care about in my own professional career, both as 30 plus years clinical experience, the licensed doctor, natural perfect medicine, along with being an MIT electrical engineer, systems engineer, and, you know, looking at the lens and realizing that so much of what goes on, certainly news is about disease management.

It is not about caring for health, promoting health. And that's where the wheels just come right off the cart when it comes to chronic illnesses and the ones that are so sensitive lifestyle.

I've always thought of type 2 diabetes as being the most sensitive to lifestyle. It's the good news. And frankly, it's the challenge because of the way in which we've got ourselves set up and we have to be smart about what we do.

So when we're talking about energy systems and mitochondria, insulin resistance, let's start at the beginning or a place where I think people who are listening can engage here because we have both the general public as our audience and we have fellow health professionals who are part of this summit.

One of the things that was super exciting to me, this was shortly after the birth of my second child was when the human genome was unlocked. They had figured out what was where and what it meant.

We were about to have this whole new wave of, we thought, insights and understanding. One of them that got me really jazzed was some of the insights around mitochondria, whether it was specific nutrients like ubiquitin or whatever.

I was like, Wow, I think this is going to be a transformative moment because there were plenty of people that used to come to my clinic who had like congestive heart failure, things like that, who in the nineties, you know, they come in with buckets of supplements.

They weren't well, you know, what they seem to be taking might be helpful kind of. Now I knew what was missing because now I could tell wasn't just coenzyme Q10 as one example it was ubiquity all right etc.

and ubiquity loans and things like that. So for what we can get accomplished here within the timeframe that we have to share together, would you please give people a thumbnail overview?

What does a mitochondria do for them? Why they should care about its function and how that can relate? Because you do have such depth with exercise physiology.

I know a lot of people with diabetes struggle with consistency around their energy, feelings of fatigue and exhaustion and being able to stick to exercise because they're just tired.

Ari So please talk to us. Yeah, well, there's a lot there. Let's see how to break that down, where to start here And responding to that. First of all, let's start by saying, you know, mitochondria are something that we all learned about in high school and college biology courses.

As you know, everybody remembers this is the powerhouse of the cell. So that's that's sort of the one thing people know about mitochondria. Remember, on the test, you know, if I'm asked which which organelle of the cell is, that is the powerhouse of the cell, Is it the Golgi apparatus, is it the Lysosomes, is it the nucleus or is it the mitochondria.

Oh, I checked the mitochondria. Right. But beyond that, where most people have been taught, including, you know, most people who go to graduate school and take grad level courses in physiology are taught about mitochondria, a sort of just one of many organelles.

And yeah, they're important, but you know, so are lots of other organelles and lots of other parts of physiology. But if we imagine a car, like a car has lots of different parts that are necessary for that car to function, if you take the wheels off, it's not going to work very well.

If you take the tires off, it won't work very well. If you take the spark plugs out, it won't work very well. There's lots of parts that are necessary for that car to function, but some parts might you might see as more important than others.

Right. Like, for example, what kind of engine it has. The mitochondria is like the engine in our body, the engine in our cells. And it is what provides over 90% of the energy to all of the trillions, virtually all of the trillions of cells of

your body from your your brain to your heart to your muscles and so on, to your skin cells, to your eyeballs to just about everything. And what cells do and different cells in different parts of your body, body do different things.

Right? The the brain is doing a different thing than the lungs, than the heart, than the muscles, than the thyroid gland and so on. But in order to do whatever their function is, they require an abundant supply of energy.

And to the extent that they don't have an abundant supply of energy, those cells tend to do their job very poorly and tend to start dysfunction. And if you understand that basic principle cells require abundant energy to function well, now we can understand why mitochondria might not just be, you know, sort of just another organelle, but might really be of central importance in human physiology.

And indeed, we now have, especially in the last decade, really an explosion of tens of thousands of studies on how mitochondrial health or mitochondrial dysfunction.

And something else that we'll talk about, that's an important distinction most people don't talk about, which is mitochondrial size. And the size of your mitochondrial.

The robustness of your mitochondrial network is a major determinant of dozens and dozens of diseases and even the rate of aging itself. And, of course, you know, as we might logically intuit from these being are cellular energy generators that are providing most of the energy to the trillions of cells of our body.

They're also pretty important to our energy levels, right? If if you it's hard to feel as a whole organism energized, full of energy, if at the cellular level, your cells are struggling to produce energy.

Right. That the connection here is very logical and obvious. We don't have to invoke sort of complicated, convoluted physiological explanation. Oceans of, you know, well, the adrenal glands are really important in energy because they produce this this hormone called cortisol, which impacts on blood sugar regulation and the blood sugar therefore controls your energy, because this isn't no, if you don't produce a lot of energy at the cellular level, you are basically a collection of trillions of cells.

If you don't have lots of energy at the cellular level, you will not feel subjectively much energy. So this is really important again, for energy. But broader than that, it is a major determinant of your risk of many diseases and is a determinant of the rate of aging itself.

The reason why, if I can try to explain this very briefly, has to do with a concept, a little known concept called the homo dynamic space and the homo dynamics space is essentially your body's capacity to deal with stress stressors of various kinds, whether they be chemical, psychological or any other type of stressor, from a poor diet, from toxic relationships, whatever it is, poor sleep and so on.

Whenever our bodies are under any kind of stress, there is an increased energetic demand on that system. To the extent that our bodies are capable of meeting that energetic demand and it is below our bodies capacity to deal with that, we can handle it.

We can maintain health and homeostasis to the extent that stressors are in excess of or are overwhelming our bodies capacity to deal with that bio energetic demand on the system, our system will incur damage.

And in addition, what will tend to happen and that that damage occurs as physical cellular damage, as oxidative damage and the physical structure of ourselves and the physical structure of or mitochondria can degrade over time, hence predisposing to many different diseases.

And that is essentially what aging is. It's the accumulation of cellular damage. So to the extent that that is occurring at a rapid rate, we are aging at a faster rate.

So the capacity of the mitochondria in the cells of our body is a direct determinant of the rate of aging. And the rate of aging is itself the major risk factor for most of the chronic diseases of aging, which are most of the diseases that

kill us.

So the age itself is the biggest risk factor for those things. You don't see people dying in general of things like dementia and Alzheimer's or complications of diabetes or heart disease or stroke and things like that in their twenties and thirties.

It happens at older ages and it is precisely for this reason that biological aging itself is the biggest risk factor for getting these diseases. Now, with that said, we can understand that mitochondria sort of have this central importance in human physiology.

Now, one really critical layer that I want to add to this is most people, including like in in functional medicine circles, natural health circles, the understanding, you know, when I started talking about mitochondria ten years ago, nobody was talking about mitochondria.

This was sort of everybody was talking about adrenal fatigue, for example. Now mitochondria are much more in vogue. Many more people are talking about them.

And mitochondrial dysfunction is sort of a buzzword. But what most people still don't really understand is, is they conceptualize mitochondria as sort of these static entities in our cells and we sort of have these mitochondria and they're there and they can either be producing lots of energy or be dysfunctional.

And the truth is quite a bit different than that. The truth is that we have many lines of evidence showing that we on average lose about 10% of our mitochondrial capacity with each decade of life.

Maybe it doesn't sound like that much, but consider this The average 70 year old has lost 75% of their mitochondrial capacity. And the reason why this occurs is largely a result of atrophy from lack of stress, lack of challenge to the mitochondria.

So if I as an analogy, if I present to you the very common logical idea that if I challenge my muscles by lifting heavy objects regularly, they will adapt by growing stronger.

Conversely, if I break a bone and I put my muscles in a cast and I immobilized those muscles for eight weeks, when I get that cast sawed off at the doctor eight weeks later, that those muscles will be half the size as they were two months ago.

And this is a fundamental principle of how human physiology is designed. Use it or lose it. The body is a dynamic, malleable, adaptive machine that is intelligently trying to adapt to its environment always.

So it has certain challenges on it. It says, Well, I better adapt to these challenges in order to survive this environment better. If you remove those challenges, it says, Well, I guess I don't need all that muscle mass on that leg anymore.

We're not we're clearly not using it. So now it's just a survival liability. Let's get rid of it. There's no sense in preserving all of this energetically costly tissue.

That same principle applies at the sub cellular level. At the mitochondrial level, it's just less outwardly visible. We can see it like the way we see muscles, but it's exactly the same thing.

And to the extent that you don't challenge your mitochondria regularly, they shrivel up, they shrink, they atrophy, and they literally die off to the point where the average 70 year old has gone from what they used to have, let's say in their twenties was a Ferrari V8 engine and now it's age 70.

They have a moped engine in their cells. Now, given what I explained earlier about mitochondria being central in our stress buffering capacity and our ability to prevent damage from exposures to stress and prevent cellular aging and prevent disease, and of course to support our energy levels.

Perhaps it's now clear why going from a Ferrari V8 engine in your cells to a moped engine is a really, really, really big deal in terms of your health, your energy levels, your risk of disease and your rate of aging.

Yeah, definitely. Right.

Aging, Healthspan, and Longevity Myths

So along that journey, you want to optimize your health as many ways you can and if you can turn back the hands of time, so to speak, with aging and just buy yourself time so that ideally your health span equals your lifespan, to me, that's like the magic mix because there's a lot of people now who are living longer, they're not living better as they age.

I cannot tell you, Ari, over the last decade, decade and a half, how many people have said to me, if I'd known I was going to live this long, I would have taken better care of myself when I was younger.

But none of us know what expiration date is, right? So. Well, I'll add a few layers of of knowledge to that without going too deep. There is a broad misconception that humans used to live much less long than they do now.

This is largely a misconception that's built around statistics more than anything else, because we measure a term called life expectancy at birth, which is basically an average age of death, and the rat, as opposed to a maximal age of a particular population.

And the problem with that is it's hugely affected by infant and child mortality. So we have these data data from 100 or 200 years ago in North America and Europe, in from hunter gatherer societies where it says, hey, you know, these people used to die at age 40 or 50 and and now we're living so much longer than we ever did before.

And this is mostly a difference not of actually living to older ages than we used to, but mostly a difference in a massive reduction of infant and child mortality and death by accidents and death by infectious diseases.

At very young ages and by by massively reducing the number of people who are dying at age zero or one or five or 12. It used to be the case in North America and Europe 150 years ago that 50% of kids didn't make it past the age of 12 or 15.

So there was a huge, huge level of child and infant mortality, and those massively skew the averages down. And based on that, we have this idea that people used to live only to age 40 or 50, and now we're living so much longer.

We know this is not true for a number of reasons. One is, for example, we can look into ancient history, for example, the ancient Greeks and look at famous people like Aristotle and Socrates and Hippocrates and Democritus.

And many of these ancient Greeks 2000 years ago were living into their eighties, nineties and even past 100. The average lifespan life expectancy at birth of people in the US right now is 73 and 79 for men and women respectively.

And so as another data point, we can look at modern hunter gatherers, for example, there's a tribe in Bolivia called the symphony and the Mozart ten tribes.

And there's been recent studies just in the last year or two where they take adults who are in their nineties in these tribes who have zero access to pharmaceuticals and zero access to modern medicine.

These are hunter gatherers living in the jungle, no medical care. So the idea that us modern humans are living so much longer than we used to is not really true at all.

We certainly have way less child mortality than we used to, but we're not living any longer than humans did. A couple thousand years ago or 20,000 years ago in terms of maximal lifespans.

Yeah, I think that there's so much more isolation and unnecessary misery and other things that go on now. And this is why people have this idea in their head that, Oh, I'm not going to live that long.

So let me for some people, not everyone, but then they don't do the things that would be basic around their own health care, whether it's, you know, regularly walks doing things that require use of muscles, use of your mind, etc..

Right. But there's a certain level of neglect. Some people have baked into their lifestyle because they actually don't think they're going to live a long time.

That's right. The first thing it's very, very odd that. That's right. And the one thing I want to add to that in line with what you were just saying is you said earlier about wanting our health span to match up with our life span.

And the thing about these hunter gatherer tribes, for example, the Timoney who have been studied in just the last few years, if people want to look this up, they have the lowest cardiovascular disease of any population ever studied and the lowest incidence of dementia and Alzheimer's of any human population ever studied.

Their health span matches up with their life span as opposed to us modern humans where we have at least a decade, if not much more. And some of this has to do with semantics and how we're defining health span, which is a whole other issue. But we have many, many years where we are chronically disease and physically and cognitively disabled to one degree or another, whereas populations like the hunter gatherer populations, their health span actually does match up with their life span.

They live with very good physical and cognitive functionality well into older ages, much more so than us modern humans. Some of these studies have shown that adults in their sixties and seventies in these tribes have the cardiovascular function that is equivalent to U. S., North American and European adults in their twenties and thirties, and that their brains the rate of brain aging to the point of what I was talking about earlier with mitochondrial health, the rate of Brady Age brain aging is 70% slower than for us North Americans and Europeans.

So that gives a sense of the power of nutrition in lifestyle and I think busts a lot of illusions that we have about how modern medicine and taking these drugs, you know, we have 19,000 drugs that have been created in the last 100 years.

How much that has actually boosted, how much how long we're living or how healthfully we're living. Yeah, I do think that, you know, the Band-Aid approach is just not it's not effective.

And I think there's a way in which people have a false sense of security and aren't really being armed with the information that they need is why I appreciate, you know, people like yourself, others who are experts here on the summit to gather together and to help people be able to really get their arms around this and to understand how this can work for them.

So with this in mind and knowing just how functional it is around aging, around optimizing, aging, around having mitochondrial function, about feeling well, feeling energized, feeling like carpe diem, when you wake up, seize the day, and being able to actually do the things you have in mind throughout the day.

What is the tie in here with insulin resistance? Because again, with type two diabetes, there is this irony of how much potential energy, if you will, not to take this into a science and engineering discussion, but there's a lot of pent up energy in that body.

It's just not being tapped effectively.

Insulin Resistance, Body Composition, and Energy

And that's a large part of what's going on in the resistance. So can you help us understand what it is that people might have some myths about and then bust those myths?

Because I want people to go away from this talk with some clear action steps. You know, understand this is what the issue is. Here's my role in it. Here's what I do.

Yeah. So, man, there's so there's so much to be said here. I'm trying to think how I can condense this into a few minute answer. So, you know, what I talk about a lot is energy and how to have more physical energy.

If we go back to mitochondria and we think about, you know, sort of what mitochondria do from the way we're taught about them in biology and physiology courses, they take in carbs and fats and they pump out energy in the form of ATP, adenosine triphosphate.

Now if you if you sort of on a on a basic level, logically, if you have that bit of information, one might say, well, if I have low energy, maybe I just need to add more carbs and fats to the system.

Right. Provide more fuel to those mitochondria. Maybe it's a deficit in fuel. So if I provide more fuel, then mitochondria pump out more energy boom. Wouldn't it be great if the fatigue epidemic could be solved that easily just by telling people to eat more carbs and fats?

You know. Maybe winning, we'd all be like, you know, gold, silver and bronze on the Olympic Stadium. Exactly. And so that's how we know that that's not true.

We can easily disprove this this basic sort of what seems to be logical this this hypothesis, because we can find lots and lots of people, the majority of the population that is chronically eating fuel in excess of their needs and simultaneously somehow struggling from a low energy levels.

So you have an excess of energy in excess of fuel and yet a deficiency of energy right. So what's going on with the cellular engine that is causing this?

Well, there's a lot of layers to this story, but if I can simplify, one really important layer to this story is body composition and excess body fat in particular, but also low levels of muscle mass.

This story also ties into hunter gatherers, by the way, because it turns out these exceptionally healthy hunter gatherers generally have exceptionally good body composition relative to us modern humans.

In the US right now, 30% of adults are over fat, 30% are obese. And if we look at measures where they combine blood markers of of metabolic health with these body composition metrics, it's over 90% of the US population that has excess body fat.

You know, that excess body fat itself is a really big problem. So we have these models of insulin resistance and diabetes that are very biochemistry centric models that are about different molecules floating around in our blood and different molecular and cellular mechanisms and biochemical cascades happening that, you know, this inflammatory cytokine does this and it results in this, this and this.

And this then alters the glut for receptors which impairs the entry of glucose into the cell. And when you look at things through that kind of paradigm, it when you look at things through a biochemistry centric paradigm, it wires your brain to look for biochemistry centric solutions to those problems.

If only I could have a molecule like a drug or maybe a natural molecule, maybe it's metformin, maybe it's berberine, maybe it's alpha lipoic acid or something like that that goes in and it alters that mechanism so the cell can pull in more glucose.

And that would fix the problem because, you know, I read in the biochemistry of this problem that all these cascades really are important and central to this whole story.

But in fact, you know, going back to what I said earlier about the importance of paradigm, if we want to solve problems effectively, we have to make sure we're looking at them in the right way.

And what I want to encourage people to do is look at insulin resistance and type two diabetes and mitochondrial issues, which are very overlapping because obesity and insulin resistance or being overweight, excess body fat and insulin resistance will actually drive damage to mitochondria.

So hence they're they're connected. And why someone can have an excess of energy in the form of fuel and yet have a deficit of energy in terms of the energy produced by them, by their cells.

Right. If you have a physiological environment that's driving suppression of mitochondrial energy production and damage to your mitochondria and atrophy and degeneration of your mitochondria, well now you can pump all the fuel you want in the system.

If I have a dysfunctional engine in my car, will adding more gasoline to the fuel tank solve that problem? No, I have to fix the engine if I want it to burn that fuel properly and make my car go fast.

So it's the same principle in the human body. Now, I want to encourage people to think about what's going on here. Less from a biochemistry frame like like I would say the majority, certainly within allopathic conventional medicine, think through this frame less through a biochemistry centric frame and more through the frame of structure structure dictates function.

So going back, I'll use my car analogy, I guess I'm fixated on that in the moment. So if I have let's use a bicycle, I'm going to switch things up. If I have a triangle or a hexagon or a trapezoid or a square shaped wheel on my bicycle, will my bicycle function the same as if it's a round shape?

We'll probably not. I'd say it's going to function pretty poorly. Structure dictates function. And this is a key principle of human physiology that is either massively unknown or under emphasized by most people.

We do not. We are so fixated on the biochemistry of health problems that we do not understand. Structure is the physical structure of our physical body is a huge, huge determinant of the problems that we have.

There's lots of layers to that story I could talk about, but let's just talk about the insulin resistance part of the story. If I have a deficit of muscle mass, if I have low muscle mass, and if that muscle mass is not being utilized frequently, but let's just say I have low muscle mass, that muscle mass is a glycogen sink for carbohydrates entering the system.

If I have a low, you could think of it as a sort of fuel tank, if you will. And that's a place for fuel to go. That's a healthy place for fuel to go as opposed to overflowing than when where it gets stored as fat.

Now, if I have a really small fuel tank, that fuel is much more likely to start overflowing and causing dysfunction and can be stored as fat. Okay. So having an abundance of muscle mass, especially highly active muscle mass, where there is a large amount of energy coming in and going out of it frequently is a critically important piece of the story.

So the physical structure of your muscle mass is an important piece of the story with with regards to insulin resistance. Even more important is the excess body fat itself, which is another another type of physical structure.

So we have you know, fat is an evolutionary mechanism. Body fat is an evolutionary mechanism to pull excess energy out of the bloodstream because excess energy that's floating around in our bloodstream, excess fuel, carbohydrates, lipids, it is itself directly toxic to our cells.

We have to keep that in a narrow range, what's in our blood, so that we're not chronically pushing too much energy into the cells and causing damage to our cells.

So fat is this mechanism by which body fat is this mechanism by which we can pull excess fuel out of the bloodstream and store it in in our tissues, number one, to minimize the cytotoxicity of it, but also for for cases where, this matters a lot more in the ancestral context.

Cases where we don't have a lot of food and now we have fuel that's stored on our body that we can pull that fuel out of and and use for energy. And we can go for not only hours but days and potentially even weeks without consuming any food, just based on the the the fuel supply that's stored in our body fat.

Now, the problem is those are cells. This is the body fat are our physical cells, and we have a certain number of them. We don't have an unlimited supply for the most part.

There's some nuance to this, but we don't have an unlimited supply, an unlimited number of these cells. And each cell doesn't have an unlimited capacity to expand, to take in more lipids. So What happens is if you think of like a balloon, basically each individual adipocyte fat cell takes in more lipids, more more of these these this excess fuel and expanding spans and expands.

But it gets to a point where it can't expand anymore, it can't grow any larger. It maxes out. And once that happens, the fat cell itself becomes and your fat cells more broadly become dysfunctional.

They become leaky. They don't hold in the excess energy as well. And they and this starts an inflammatory cascade. So but the inflammatory cascade that also predisposes to insulin resistance is secondary to the structural problem of the physical adipocytes.

Fat cells in your body have have grown and expanded to their maximum capacity. This is also called in the literature your personal fat threshold. And once you keep pouring fuel into the system, you you keep you have a physical structural problem that is driving the biochemical problem and a way of simplifying this.

Everything that I've just said is if you have good body composition, if you are lean, if your body fat percentage is lower rather than higher, and that doesn't mean I'm you have to be ripped with six pack abs or something like that.

But I'm saying as as a as a matter of degrees, if you're moving in the direction of leanness as opposed to being overweight and you have more as opposed to less muscle mass and hopefully more active muscle mass, if you have good body composition in those two things, if your physical structure is healthy, you're pretty much not going to have type two diabetes.

You're not going to have insulin resistance. It is almost an impossibility to have good physical structure in terms of body composition and those two things and also have large amounts of insulin resistance.

You can find rare exceptions. You could point to some skinny fat person. I would still say they have low body, low body muscle and maybe they're eating a horrific diet and maybe they're doing night shift work or smoking cigarets or they're an alcohol or something like that.

You could find some rare person who is not outwardly really overweight and under muscled who seems to have a lot of insulin resistance. But this is a rare exception.

Basically, what I'm trying to say is if you think about it less as a biochemistry problem and more as a physical structural problem, it reframes what you think is the solution to go, Oh, well, maybe instead of trying to add molecules and drugs to my body to alter receptors and mechanisms and biochemicals, what I need to do is alter the physical structure of my body by altering my body composition, my body fat level and my muscle level.

And if I do that well such that I actually have good body composition, I don't want to I don't want to guarantee it because I can't you know, I can't make a 100% guarantee, but it's pretty close to 100% guarantee that you're not going to have insulin resistance if you have good body composition.

Yeah, it certainly tips the odds in your favor for sure. With outside of the exceptions where someone has, say, type 2 diabetes as a viral infection result other and yes, they can occur.

But in general body composition is the thing in my opinion to to really focus on and how you get there for your age and stage, you know, your gender, your stress levels.

I love the fact you touched upon the realities of shift work, especially people who work all night or, God forbid, rotating shifts because it is a disaster for metabolic health disaster.

All the research on just lived experience, you know, you watch people's health just unravel if they're on shift work. It's really terrible. On the other hand, somebody got to be at the hospital in the middle of the night because sometimes people that's when they need help, right? For sure.

Oh, yeah, It ain't easy.

Closing Remarks and Where to Find Ari

All right, Ari, thank you so much for such a wonderful session. You're a great episode. Friends, please link arms with us. I am sincere in my effort to help 3 million or more people reverse type 2 diabetes.

I see this as a pivotal moment in human history. We have got to work together to make this different. Right now we've got young children not even in the double digits, age eight and nine, showing up with type 2 diabetes.

This can't continue. And we have people showing up, interestingly, for other reasons with type one as adults in their forties and fifties, something has fundamentally changed.

I think we all know what it is. We each can do our part. Kindly share these episodes with others that you know and care about so we can give people good quality, factual information.

Ari, thank you so much for this where. Can people find out more about you and your work? Yeah, my website is theenergyblueprint.com and my newest project that I'm starting now is humanoptimization.com.

Love it. All right, friends, make sure you go check out those websites and find out what Ari is doing and follow him because, you know, he's a person, puts forward the effort and the sincerity around looking at the facts and how they apply so that they're useful, not just a bunch of anecdotes or things that sound good, but have no basis in fact.

Thank you so much. Thank you for having me.