Introduction to Cyrus Khambatta

Hello, everybody, and welcome to the Cancer Breakthroughs Summit. I'm very excited today to talk with my dear friends, Cyrus Khambatta, PhD in New York, bestselling author with his book Mastering Diabetes.

Cyrus really brings forth a unique background, and that's why I have so much respect for his work. He started his journey as a mechanical engineer in the Silicon Valley with brilliant scientific, analytical mind, and he then continued and got a Ph. D.

in biochemical nutrition from UC Berkeley, a very prestigious school of nutrition. So this combination allowed allowed him to really make a difference in the field of diabetes.

So through his book into his work was able to help people tackle and reverse insulin resistance. Over 10,000 people. And he himself has gone through a journey of type one diabetes and through his work has been able to reduce his insulin consumption by 40% by following his plant based diet and his lifestyle.

And I'm honored to have him today. Cyrus, welcome to our summit. Thank you, Isaac. So good to be with you. I appreciate the kind introduction. So tell us a little bit more about your journey because you really integrate a lot of knowhow and a lot of enthusiasm that comes from your heart and is well expressed.

And I know you, but also your own journey. So you have your own experience to validate your way. Yeah. So it's funny because I have a lot of people ask me how I decided to get interested in diabetes in the first place, and my answer most of the time is that it's a completely backwards route to get here because when I was growing up and as I, you know, all throughout my adolescence and all throughout college, I didn't I literally didn't even know what diabetes was.

I kid you not like I had heard the term. I maybe knew a couple of people that were diabetic, but I had made the Associated Association in my brain that diabetes was what happens to old people who eat cake.

Literally, that was all I knew about it. And so when I had gotten to college, I was 22 years old. I was going to Stanford University, I was a senior, and I was just trying to graduate and move on with my life.

Type 1 Diabetes Diagnosis and Autoimmune Conditions

And I started to feel very low energy, extremely dehydrated, and I was cramping significantly when I would go to sleep. So for about a 2 to 3 day long period, I just couldn't get anything done.

I was a very unproductive human being. I couldn't study properly. I was drinking upwards of a gallon to two gallons of water per day, and I was urinating very frequently every 30 minutes or so like clockwork when I went to the health center, I actually picked up the phone and I called my sister, who's a doctor of osteopathy and family practice medicine, and I explained my symptomology to her.

And she said she she stopped. She said, stop everything you're doing right now. Go straight to the health center. Check yourself in, because you are explaining the symptomology of type one diabetes.

And I remember talking to her at the time. I was like, David, we're talking about I'm a 22 year old guy. I'm an athlete. I'm normal weight. I eat a healthy diet.

I can't possibly be living with diabetes. And she's like, I don't have time to explain is different than the diabetes that you're thinking about. Just go to the health center.

So I walk over to the health center, I check myself in, a nurse greets me and she ends up taking me to a room, checks my blood glucose, comes back a few minutes later, I'm passed out.

I wake up, I don't even know where I am. I'm like, okay, I'm in a doctor's office. How did I get here? What am I doing here? She looks at me. She goes, How did you get here?

And I said, I walked from my dorm and she goes, I'm going to take you to the emergency room. Right now, your blood glucose is 660. It is six times higher than it's supposed to be.

And you're in an emergency state referred to as DKA, which is diabetic ketoacidosis. We've got to get you to the hospital ASAP. So long story short, it took me to a hospital there.

In the hospital, I got diagnosed with three autoimmune conditions, not just one, but three. The diagnosed with type one diabetes, which is basically beta cell failure, pancreatic beta cell failure, inability to make sufficient amount of insulin, which was causing my blood glucose to go extremely high.

And then number two, they also piece together a medical mystery that involved two other autoimmune conditions, one of them being Hashimoto's hypothyroidism, which was partially explaining why I was so low energy.

And then the third one was Alopecia Universalis, which is just code for hair loss. So I used to have hair, I used to have eyebrows, I used to have eyelashes, I used to have facial hair, but I lost all of my hair.

And all of that happened at the age of 22. And it was all very quick. So you can imagine at that time I walked away from the hospital and I was I was very afraid of what was going to happen to me because I didn't know what had caused these three autoimmune conditions in the first place.

I didn't know if I was at risk for developing more, and I didn't know what I was supposed to do about the ones that I already had. The doctors at that time said, Listen, the only thing that we can do for Hashimoto's hypothyroidism is give you levothyroxine or synthroid, and you can basically just take that and we'll find the right dose for you over the course of time and that should help you get more thyroid hormone in circulation and that should solve that problem.

But when it comes to eating, we can't do anything for alopecia, but we can teach you to eat a low carbohydrate diet because carbohydrates are not bad for you, right?

If you eat carbohydrate, your blood glucose will go up and your insulin use will go up. And then that's going to cause more difficulty. So instead, we're going to teach you how to eat a low carbohydrate diet, which will keep your blood glucose low and keep your insulin you slow.

And I said, great, sounds like a plan. So I tried to follow their recommendations eating turkey, burgers and fish and cheese and milk and eggs and yogurt and peanut butter and trying to avoid fruits and pastas and grains and cereals.

Again, the promises that are keep my glucose low in my insulin you slow. But the exact opposite happened. My glucose went up significantly and it was to the point where my blood glucose meter literally felt like it was a random number generator.

Any moment of any day I could check my blood glucose and I could be as low as a 50, which is hypoglycemic, I could be as high as a 400, and I just couldn't piece it together.

So I finally switched over to eating a plant based diet because I got opened to the idea of eating a plant based diet in the year 2003, which it wasn't.

It wasn't even talked about very much at that point. And I started eating a plant based diet that was truly low in fat dietary fat, not lowered dietary carbohydrate, because the gentleman who had introduced me to this concept, his

name is Doug Graham, and he had gone on to write a book called The 80 to 110 Diet.

He explained to me that there's a very strong connection between the total amount of fat that you consume in your diet and your insulin requirements. I didn't believe him at the time, but I followed his methodology and I said, Listen, I'll do whatever you say.

And so I switched over to eating a very low fat, plant based whole food diet. And in the process of doing so, my insulin use fell by 40%. My blood glucose very quickly, and I was able to return to playing a significant amount sports and feeling like a million bucks.

So long story short, fast forward now, you know, that was 2003. I then went to graduate school. I got a Ph. D. in nutritional biochemistry because I was so excited about what happened inside of me.

I wanted to be able to explain my own body and I wanted to be able to see if I could extrapolate it to other people.

Plant-Based Diet and Reversing Insulin Resistance

And what I learned in the process is that there's a large connection between the quality of the food that you consume and your insulin requirements. There's a large connection between the between eating a plant based diet in particular, and using that as a tool to significantly improve your blood glucose values and reverse not just manage, but reverse the underlying condition that causes blood glucose variability in type one and Type two diabetes and prediabetes.

So here we are, you know, 20 years later. And it's been an incredible journey. And I'm very thankful to be able to help as many people as we have it. It's very inspiring and it brings so many topics and I'll touch on them later.

But just as a hint for the audience, there is this concept that ketogenic diet is now a solution for life and including in cancer, and it's actually problematic and I'll touch on it again.

But really, I mean that and I want to hear more about the whole mechanism because you are very familiar as there is, it is having a period in biochemistry, nutrition and I love cellular and metabolism and how it translates specifically for cancer.

You know, one of the big secrets for plant based diet and you see the same thing with with restorative colitis and the same thing with Crohn's when you have a lot of fiber, naturally glucose absorption is low down a grade and when glucose absorption is slowed down, then insulin doesn't spike.

So very, very, very, very different. It's fundamentally different while while disrupted metabolism. And if you look at metabolic syndrome, the classical thing before anything is is elevated lipids, you know, it's what drives the condition.

So this misnomer about using fits all the time. I mean, ketogenic diet has a place in cancer, very specific. And I personally warned about it already in 2010 over using it.

But what I tell people, if it was our right diet, the body wouldn't make it. There's an alternate alternate emergency diet. The body's too smart not to use something, which is right all the time.

So with this in mind, there is so much connection between diabetes. You went through a dehydration process for people to understand in ketoacidosis, which is specifically for type one, not for type two.

Right? That there can be tons of glucose in the blood, but the cell is starving, starving. And because the osmolarity is, the density of the blood goes up, all of the fluids are moving into the extracellular space.

The cells get dry and shrink and you lose a lot of potassium in the process. So they tend electrolytes. I know from I remember from my residency managing this patient in family practice residency, it's an emergency through

emergency.

And it's remarkable where a person is 24 hours later when they get properly hydrated, it's like, wow, you back to life. Now, in your case, it's extremely unusual that you had three autoimmune conditions presenting in in in in one immediately.

You know, it's a multiple and multiple endocrine failure and it's worthwhile a discussion for us even after after the interview. But as you talked about, I mean, what you are hinting is about what insulin resistance does from the point of view of turning the fire on, of causing inflammation.

So maybe you can share with us a little bit the connection between insulin resistance, inflammation, and and then we can move on to how it actually drives cancer, which is such a fundamental concept.

Absolutely. Yeah. So it's actually really it's I love talking with you because you understand biochemistry, I think, at a much deeper level than I think a lot of people, which is great.

So, you know, we can have this conversations and we can kind of become super nerds about what's actually happening. And from a biological mechanism perspective.

And going back to what you were saying specifically about the consumption of fiber rich foods, I cannot emphasize this enough. The world of ketogenic diets and the world of low carbohydrate diets in general, they always equate anything that contains carbohydrate energy with sugar.

And it is a huge, huge misnomer for for a multitude of reasons. But the general rhetoric says anytime you eat anything that's carbohydrate rich, it doesn't matter if it's a fruit or a potato or Ebola chemo or Ebola black beans, which are all considered whole carbohydrates.

Right. That are either naturally occurring or minimally processed versus if you're eating cookies, crackers, chips, pastas, breads, sodas, sugar sweetened beverages, all these refined carbohydrates that had to go through a manufacturing process in order for you to become for it to become edible.

Okay. They take both classes, the whole and the refined carbohydrate rich material, and they lump them into this umbrella term called carbs. And then they say, regardless of how much of what type of carbs you're eating, you're going to eat those foods.

And it's going to cause a number one blood sugar spike and an insulin spike. And then that's going to cause your and then then that's going to convert the carbohydrate to fat and then you're going to become fatter as a result of that.

And then that's going to drive the diabetic process. And this there's so many things wrong with that in the first place. The first concept is that the this the differentiation between a whole carbohydrate rich food and a and a refined carbohydrates, food is essential.

It is absolutely important to understand that whole carbohydrate rich foods contain nine classes of nutrients carbohydrate, fat and protein. All three of them are present in all Whole Foods.

In addition to that, there's vitamins, minerals, fiber, water, antioxidants and phytochemicals nine classes of nutrients. So you have the three macronutrients, the carbohydrate, fat and protein, plus six other micronutrients, vitamins, minerals, fiber, water, antioxidants and phytochemicals. And all of them are present and they're wrapped up into a three dimensional matrix.

So when you're consuming the whole food, the whole food travels down yourself. It gets it get inside of your stomach. There's there's an acid bath inside of your stomach, a sort of linear rise of these molecules.

And that finally gets inside of your small intestine where there's enzymes, digestive enzymes secreted by your liver

and your pancreas and your small intestine to act upon these foods and start to break large molecules into smaller molecules, and then eventually monomeric units to absorb those through the walls of your blood and then to transport them to tissues.

The presence of fiber is critical for this process because fiber, like you said, it slows down the digestive process, which means that it slows down the glucose, the resultant of glucose excursion or the blood glucose concentration that happens after a meal, which then slows down the amount of insulin that has to be secreted by your pancreas in order to match the amount of glucose that's coming inside of your blood.

And it gives you a normal glycemic response and a normal insulin response, which it does not drive the diabetic process. But if you're already starting out from an insulin resistance state and an insulin resistance state like we were talking about earlier, is not characterized by the consumption of too many carbs.

It's actually characterized by the consumption of excess lipid. The lipid gets stored inside of your liver and inside of your muscle, in particular in excess.

And that causes a system wide defect inside of both of those tissues. That makes it so that insulin has a difficult time communicating with both of those tissues.

So if there's already insulin signaling defects that are present inside of the liver and inside of the muscle, then any time you eat a carbohydrate rich food, whether it's whole or whether it's refined.

You're going to react and. Triggers a high glucose and high insulin. I want to take my second. Yeah. Because you have the other side. They can understand your patient.

Yeah. You have presented multiple critical concepts for cancer patients that are getting lost, including integrative medicine, where it's so protocol driven and fancy treatment within.

And there's really a very basic movement to you. When you eat a high lipid diet, your insulin receptor density goes down in the cells, which means they think about is they all together?

And then they get spread by the fat, which means you are not going to absorb glucose in a normal way. And what happens in what uses glucose to produce energy in a very efficient way?

Through the mitochondria we get 36 ATP through its molecules of energy for one glucose. This when you block the insulin receptor, which is what you are describing a.k.

Insulin Resistance, Inflammation, and Cancer Risk

a adenosine monophosphate kinase gets blocked, correct in the cell, gets a signal that it cannot produce energy properly, which means it goes into starvation, it cannot take it deep, energetic breath.

This shift the cell you do in a poke to eight and it moves into aerobic glycolysis, it produces energy through glycolysis in the presence of oxygen. This is the driver of cancer.

So when we do a ketogenic diet, we are saying instead of fixing the metabolism, let's just bypass and give people other nutrients. Now, of course, every meat, every feed from the from the animal kingdom is very high in pesticides and even fed from the plant, if there are too many.

Also can be hind pesticides because most pesticides are fat soluble, you know, they are lipid solid. So the idea of the fiber is that it regulate. But there is another very important component.

Fiber is the oxygen of the microbiome. And that mobile home right here in the microbiome is our friend in our journey to heal from cancer. I cannot emphasize that enough.

Our relationship with the microbiome will determine our outcome. For example, if you take one of the most commonly used chemotherapy doxorubicin Adria macy and you give the patient antibiotic, it's the day of administration.

It will not work because we disrupted the microbiome. The microbiome is our friend is our partner will has the wisdom. It's mind blowing, you know. So to activate chemotherapy, to work better for us and without fiber, if you just give it fits, it's a lost case because the Fed will exchange with Phosphatidylcholine, which is part of the biofilm, and it will turn it will really turn into a mess.

So we have to recognize it. And for the for the cancer patients, you know, sometime when you go to the chemo room and you get chemotherapy, the nurse to pick up you energy will give you concentrated orange juice.

You know, it is zero fiber and pure sugars. It literally is canceling the effect of all of our AIDS based chemotherapy and reactive species, oxygen species, like like doxorubicin, because now we are shifting the metabolism.

And so it's science is talking about is differentiating the concept of carbohydrate which has been in nature for for millions of years and concept of refined sugars.

It has been in use for about a little bit over 100 years. And the all the dietary Diet Cokes and diets of drinks that have been came came aboard a little bit later.

And that is damaging from the point of view to observe mechanism. So thank you for clarifying. And perhaps you can talk a little bit more about about about the role of inflammation in all of this.

Yeah, for sure. For sure. So so what I think is essential to understand here when it comes to inflammation, driving the driving the progression of cancer is that insulin resistance is a very influential player in this process.

And there's a strong body of research that demonstrates that there's a very clear connection between insulin resistance and cancers of many types, including but not limited to liver cancer, endometrial cancer, pancreatic cancer, kidney cancer, bladder cancer, colon rectal cancer, esophageal cancer, breast cancer.

And the list goes on. Okay. So many of the biological mechanisms have been explored, but researchers to this point, admittedly, do not have the full picture on exactly what is the connection between insulin resistance and cancer risk.

But they have measured many things in the laboratory and they do know exactly what happens in a clinical setting and as a result of that, there's active research going on to elucidate what is this biological mechanism in more detail, because all of it centers around inflammation.

Right. And what about early? But one of the interesting things that we check ago is in cancer patient is IGF one is a factor. And for the audience, for their doctors, you have to really evaluate it very, very wisely.

It's really for the healthy person. In some level, it's it's it's a measure or a measurement of our growth factors, of our ability to be resilient. And for people who have deep fatigue, where those adrenal hormones are low IGF can really go down.

But if you see a cancer patient and they'll know they are low energy, they're not feeling well. And let's say IGF is between 80 and 210 and the patient is 60 years old.

They are supposed to have IGF one, 100, normally 110, and they show up with 150, 160 and say, oh, it's really good. It's not good. There is a pathway driving them through glucose and then too much glucose is too much insulin resistance.

So IGF one is often a bridging between insulin resistance and cancer. For a good point of view, at least in my experience. Yes. And I'm glad you brought up IGF one, actually, because IGF one is synthesized in the liver and

there are two tissues which take the brunt of the of the damage when it comes to insulin resistance, and that is the liver and the muscle tissue.

So when I'm referring to your muscle tissue, I'm referring to skeletal muscle that exists inside of your arms, your shoulders, your chest, your abdomen, your your butt, your quadriceps, you name it, the largest tissue in your body.

So your liver and your muscle have the highest expression of insulin receptors of any tissues in your body. And as a result of that, they are the most glucose dependent tissues in your body.

Actually, there's three tissues. Number one, your brain, number two, your liver, number three, your muscle. And so these are the tissues that are biologically designed to absorb glucose from your blood when necessary, and to use that as a four for immediate oxidation and or to store as glycogen for later use.

Your brain is the only one that cannot stores glycogen, but your liver and muscles can. Now, when your liver and your muscle become insulin resistant, which usually happens simultaneously as a result of consuming a high fat diet, your liver in particular undergoes a whole collection of dysfunctional mechanisms downstream of that.

And one of the things that happens is that your insulin I'm sorry, your your liver actually increases IGF one production. So this is a huge problem because effectively what your liver is doing is your liver is becoming your liver is is having a difficult time communicating with insulin, which drives more insulin production by your pancreas.

So your pancreas increases the amount of insulin that's being produced. The insight that insulin increased concentrations in your blood continues to knock on the door of your liver and say, hey, there's glucose in the blood.

Do you want to take it up? Do you want to take it up? You want to take it up. And your liver is sort of partially blind to that insulin because as you alluded to before, the number of insulin receptors has decreased.

So your liver or liver cells, hepatocytes are effectively operating in a high glucose environment and a high insulin environment. And as a result of that, they're partially blind to both of those signals in the blood.

And one of the things that the liver cells do is they actually manufacture insulin, and it's this process called hepatic glucose production. So they manufacture insulin and they put it into the blood specifically so that your brain has an adequate supply of glucose at all times.

So when your liver is partially blind to the amount of glucose and insulin inside of the blood, your liver then starts to over secrete glucose into the blood and that contributes to an even higher blood glucose value.

Again, your liver is in a disregulated state and it can't really fully pay attention to what's happening inside of the blood because it's partially blind.

It can also over secrete IGF one. And when it begins to do that, then you have a very powerful growth signal that promotes cell replication and tumor progression that is now available in the blood to every single tissue.

So the combination of having high IGF one status plus high insulin, which is high HYPERINSULINEMIA, is a very dangerous game to play because insulin is the most potent anabolic hormone in your body, period. End of story.

It's more potent than IGF one. It's more potent than testosterone, than thyroid hormone, than growth hormone. Nothing else is more powerful than insulin and driving growth processes, which is cell replication and glucose uptake.

IGF-1, Hyperinsulinemia, and Tumor Growth

So when insulin levels are high and then IGF one levels are also elevated, the combination can be disastrous and can drive tumor progression. Yeah, so, so well said.

Thank you. It's it's a great discussion. Tell us, how can you reverse insulin resistance from your experience, from your knowledge, from, you know, you've done it with thousands and thousands of people.

It's it's dangerously simple. It's really dangerously simple. And a lot of people are skeptical when they start to learn it. Just how powerful this process can really be.

But we talked about the fact that insulin resistance, the primary driver of it, is excess lipid accumulation inside of your liver it muscle. Where does that lipid come from?

Well, it comes from your mouth. So when you're eating a diet that tends to be high in fat, whether it's a ketogenic diet, whether it's a low fat diet, whether it happens to be an animal food heavy diet, triglyceride that comes from your diet, ends up inside of your blood, ends up inside of your liver, gets repackaged by the post office that your liver is putting in a little protein particle, sticks it back in the blood, and then they're back in circulation to go to your liver and muscle or to go to all tissues.

So long story short, when your lipid intake and your fat intake is very high from your food, then that drives the insulin resistance process. So if you're trying to reverse insulin resistance, the most effective thing that you can do is do a number of things.

Number one, lower your total fat intake. So let's just say for the sake of argument, you're eating the quote unquote standard American diet. The standard American diet is usually somewhere on the order of about 40 to 40 to 16, 42% carbohydrate, 42% fat, 16% protein.

You can you can wiggle it a little bit. You can say it's 40, 40, 20, somewhere on that that that spectrum. So the 40% of your diet coming from fat is quite large and that's going to drive the insulin resistance process.

So what we recommend is taking that 40% of your diet and minimizing it so that it's closer to about 15% of your diet. Okay. Somewhere between ten and 15%, which if you want to talk in terms of grams, we're talking about somewhere between 25 and 30 grams per day.

Okay. So if you can take a large fat intake, call it 60, 70, 80 grams of fat per day, and you can reduce it to somewhere between 25 and 35, 30 grams per day.

That right there is going to have the single most powerful effect at effectively waking up the and some receptors that are living inside of your liver, inside of your muscle, that's going to get those insulin receptors that are basically handcuffed because of a high lipid environment to be coming in handcuffed and becoming more responsive to insulin.

When insulin does appear inside of your blood. In addition to that, eating a diet that contains a significant amount of plant material is very powerful.

Number one, because it contains a significant amount of fiber. Fiber slows the glucose absorption process in your small intestine. Fiber also is few, as is a fuel to 38 trillion bacteria inside of your large intestine.

As you would alluded to earlier, those those bacteria can manufacture cellulose. Cellulose is the one enzyme that human beings cannot manufacture. Cellulose cuts the cellulose into individual glucose units.

They absorb those glucose units, they proliferate and they manufacture these magical things called short chain fatty acids, short chain fatty acids or molecules that can signal to every single tissue in your body.

And they do magical things to many different tissues to reduce the inflammatory process in many tissues. So eating more plants a.k.a more fiber and lowering your fat intake is the most powerful thing that you can do from a dietary perspective.

In addition to that, we also recommend that people move their body for a minimum of 30 minutes per day because

movement is another way to mechanically stimulate your muscle tissue to to ask for more glucose from the blood, to open up the doors for glucose to enter tissues which drives what's called non insulin dependent glucose uptake allows glucose to get inside of tissues and it lowers your blood glucose concentration.

And then in addition to that, we also factor in a third puzzle piece, which is intermittent fasting and there are thousands of studies at this point that.

I was just going to ask you. So thank you for bringing it up, please. What is your position on intermittent fasting?

Reversing Insulin Resistance with Diet and Movement

From my perspective, they can be different different opinions on diets for cancer. But the one thing which is universal and this is intermittent fasting.

Yeah. Is please a lot with from a point of view of diabetes because it's misunderstood sometimes that oh if you need to get carbohydrate all the time and you can do no intermittent fasting.

So maybe you can elaborate on this and then you can share with me what is your your favorite way of doing it. Then I can share a few details for the audience, also specifically with the conventional treatments.

So if we take a trip back to the year 2007 to 2012, when I was getting my Ph. D. at UC Berkeley, I was studying in the laboratory of a gentleman named Dr.

Mark Hellerstein, who's one of the world's foremost experts on carbohydrate metabolism and one of the areas of study that was happening inside the laboratory at that time was was how does calorie restriction and various forms of intermittent fasting affect downstream conditions, including diabetes and including cancer?

And we were using stable isotope tracers in order to really understand the sort of pathogenic mechanisms in a very high level of detail. And one of the things we found over and over and over again is just like you're saying, no matter how you slice it, no matter what combination, no matter what the timing is, no matter what it is, when you perform intermittent fasting, cellular turnover, global cell turnover rates significantly decrease, which slows down the cancer progression rate.

And it can be a phenomenally powerful tool for slowing down the progression of cancer and for reducing cancer risk if it hasn't already formed. When it comes specifically to diabetes, intermittent fasting is a very powerful technique because the way that I think about intermittent fasting is that it's an opportunity for you to give your liver and muscle time to go internal.

When you when you limit the fuel supply that comes in from your mouth and you limit the amount of glucose and amino acids and fatty acids that come in from your mouth.

Effectively, what that does is it keeps the concentration of glucose and amino acids and fatty acids at a relatively low sort of like basal state inside of your blood for an extended period of time.

What that forces your liver and muscle to do is not rely as much on nutrients from the blood as they normally would. And instead of relying on those nutrients for uptake so they can use it for fuel instead, what they do is they go internal.

They say, Huh, do I have anything inside of the cellular environment that I can actually oxidize for energy? So if you're in your liver and you say, okay, what do I have here that I can oxidize for energy?

The answer is two things. Number one is glycogen, which is a stored form glucose and number two, triglyceride, which is a stored form of fat. So liver cells end up degrading glycogen molecule and using that as ATP burning it for ATP.

And they also do the same thing to triglyceride molecules and they turn it into fatty acids and then the fatty acids get sent to the mitochondrial network and that turns into ATP.

So over the course of a 16 to 24 hour intermittent fast, you see a significant reduction in glycogen concentration, a significant reduction in triglyceride concentration intracellular lee And that's a good thing because these cells are effectively able to reduce the amount of fuel that they have on board, which means that the next time you go eat, they're that much more receptive to being able to take up glucose from the blood and being able to take fatty acids from the blood.

And that relieves a lot of the sort of internal stress that they've been experiencing for a long time. When these specifically when the triglyceride molecule becomes too too large internal, your muscle tissue does the exact same thing as a very similar biology.

It relies on glycogen, it relies on triglyceride. And when you give your muscle 16 to 24 hours of fasting, then those two fuel sources can get smaller and smaller and smaller and your muscle tissue effectively becomes hungrier.

So what that means then is that when you perform an extended duration fast, which is somewhere greater than 6 hours, my preference is to do a daily 16 eight fast, which is 16 hours of fasting and 8 hours of eating.

If you do that on a daily basis, what you do is you effectively put your liver and muscle into a stage by which they are effectively nutrient deprived for a good portion of time.

They end up doing a lot of this housekeeping and keeping the glycogen content low, keeping the fatty acid content low. They become supercharged for nutrients when the nutrients do appear.

Intermittent Fasting, Autophagy, and Cancer Support

And then in that 8 hours when you actually are eating nutrients, they're able to take that fuel in, store it when necessary, burn it when necessary. And it keeps it.

It leads to a significantly improved efficiency of fuel oxidation. And that's a good thing because it keeps your chronic disease risk nice and low. It allows you to stay normal weight, allows you to actually lose weight if you're overweight.

And it keeps your lipid concentration inside of your blood at a low level as well. And all of that is a good thing because all of those are known to be associated with increasing longevity.

Yeah, it's a great description and I want a little bit to highlight it. For the cancer patients, specifically, cancer cells divide faster and divide all the time.

Normal cells divide in our active based on stimulation from the outside. So when you are doing intermittent fasting and you're going to autophagy, this is the state of inner reflection and inner cleansing.

You are slowing down the the division of cells. And what happens, for example, if you're getting radiation therapy, you're getting chemotherapy, you're getting natural protection to normal tissue.

And because the cancer is very is glucose dependent, the more aggressive, the more glucose dependent the cancer becomes, the much more starved. And that's why, especially if you're getting chemotherapy for the first two, have like the two times that the drug goes down by 50% and intermittent fasting is critical.

And one of the tricks to do and I may do a mini talking about it if I have time in the summit is you look at the half life of the chemo drugs. So if it's no if it's a drug, it is a long half life.

It lasts for a long time like carboplatin and we have more time. But if it's a drug like gemcitabine, it is a 45 minutes half life. You want to come into into the state of getting chemo in a deprived state and the one place where

ketogenic diet can have a role in is in these first 24, 48 hours was where you really was this really there is no glucose.

And then because the cells starved, it will take in very strongly the chemotherapy. But the most important thing is really the intermittent fasting. It allows your system to rest.

And the other data that I want to shine on what Cyrus says, when you have a high fiber diet and a very low refined sugars diet and less lipids, the amount of your glycogen storage is smaller, which means that you are going to depleted faster and you can get into this state where this cell has to start using different energies.

The cancer cells keeps thriving while the normal cells get more shut down. And you create this differentiation where treatment becomes more targeted and less side effects.

So this is really this is really remarkably important. It's simple, as you say. It's it's very simple. And it's sometimes hard to keep. And I think that another part, Cyrus, and I wonder what you say about it.

One thing that drives out to eat sugars and to get energy is that most people are chronically dehydrated. Oh Great point. When you are dehydrated, you consume calories.

And for cancer patients, when's whatever blood fluid is, what creates communication in the body? When we are dry, when we are dehydrated, our tissues becomes inflamed.

So really, there's a way to calculate how much water you need, but a habit of drinking two glasses of water before every meal. Two glasses of water when you wake up and twice a day more drinking, two glasses of water in and before bedtime will allow you to stay hydrated.

You will naturally your desire to eat, your imbalanced appetite will naturally go down. And this really supports the high fiber diet. It really it really gives in AIDS and makes it simple.

Hydration, Practical Tips, and Closing Remarks

And these are these are the thing that are free and available and these things that look simple can make the whole difference in the outcome of a sophisticated integrative cancer treatment with the most fancy new creative stuff or integrating complementary methods with conventional oncology.

This very principle that you covered plus hydration and zinc are critical. So I want to thank you for sharing your experience and in putting it in such a simple language while not skipping the biochemistry we love about talking to you.

And Cyrus is how can people find moreabout you and your exceptional work? Yeah. Thank you for asking. The easiest way to do it is to go to our website, which is masteringdiabetes.org and So if you go there, we have information in all shapes and sizes.

We have a blog with scientific information and case studies. We have a podcast, we have a YouTube channel, we have social media on Instagram, on Tik Tok, you name it.

It's all Mastering Diabetes, Mastering diabetes, Mastering diabetes. We also put out a book, it was published in 2020, become a New York Times bestseller.

And if you're interested in learning more about specifically insulin resistance and how you can get out of the insulin resistance trap, then I highly recommend picking up a copy of that book and and reading as much as you can.

And I second this recommendation and I want to thank you for sharing your wisdom and your experience and your amazing work in this in the summit. Thank you for coming.

Yeah, thank you for inviting me. I really appreciate being here and hopefully the information was helpful. So thank you. Thank you.