Understand Cancer: A Disease Of Mitochondrial Metabolism Transcript

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Introduction and Background

Well, doctor Seyfried, it's such a pleasure to have you on this segment of cancer Breakthroughs. Thank you so much for joining me. Oh thank you, Michael.

It's a pleasure to be here for the audience. Thomas Seyfried is professor of biology at Boston College and received his PhD in genetics and biochemistry from the University of Illinois, Urbana in 1976, did his undergraduate work at University of New England, where he recently received the Distinguished Alumni Award.

He also holds a master's degree in genetics from Illinois State University, and Thomas Separate, served with distinction in the United States Army first Cavalry Division during the Vietnam War and received numerous medals and commendations.

He was a postdoctoral fellow in Department of Neurology at the Yale University School of Medicine, and served on the faculty as an assistant professor in.

Other awards and honors have come from such diverse organizations as American Chemical Society, National Institute of Health, American Society for Chemistry, and Ketogenic Diet Special Interest Group, or the American Epilepsy Society.

You've done a lot. Doctor Seyfried has over 200 peer reviewed publications and is the author of the book cancer as a Metabolic Disease on the origin, management, and Prevention of Cancer.

His book, also translated in Chinese, is describing his research on many podcasts and radio shows, and his work is central in the documentary film The Cancer Revolution.

Doctor Separates. The peer reviewed publications can be found on PubMed. You. You are someone that is frequently when when we talk about cancer and metabolic disease of cancer.

Your name is the central component of all those discussions. So in your mind, from all the research that you've done and what is cancer, how how do you describe that to people out there.

Well, I think thank you, Michael, for the introduction.

Cancer as a Metabolic Disease

I you know, it's described in the textbooks as a very simple statement. Cell division out of control. Cells lose their regulatory behavior and are no longer in a growth regulatory state.

So this dysregulated growth persists as long as these cells have access to the fuels that drive their energy metabolism. All other issues associated with dysregulated cell growth are secondary.

Without energy, no cell can grow. The difference between a cancer cell and a normal cell is that the cancer cell uses a ancient fermentation metabolism to grow, whereas normal cells, the quiescent cells, will use respiration.

And even in regenerating liver, which is a regulated cell growth, that is a respiratory, largely a respiratory regulated growth. So cancer cells are different from normal cells in the sense that they obtain their energy from fermentation.

The most important thing is that the organelle inside the cell, the mitochondrion, is the organelle that regulates cell growth and the differentiated state of cells.

So when that organelle becomes corrupted or damaged in some way in the cell, it controls the regulation of the quiescent state. So when that organelle becomes defective, the cell falls back on these ancient fermentation pathways, and the organelle is no longer capable of regulating the growth.

And these cells proliferate uncontrollably until their fuels are shut down. And if you shut down their fuels, they will die. Unfortunately, most of the treatments that we use today to manage cancer are devastating.

They'll kill anything that grows. And also, if you don't kill all of the cancer cells using these kinds of treatments, the ones that survive come back into vengeance, because the body now is more capable of providing fermentable, fermentable fuels to the surviving tumor cells.

And you often see that we have over 1600 people a day in the United States dying from cancer. And this is a relentless problem that needs to be controlled.

Yeah. And in regards to the mitochondria, you know, there's been a lot of focus obviously on like anchored genes and, and genetic dysfunction that that drives and then cancer.

And by addressing that you are then to solve this issue of cancer. But from what I'm hearing, it's more signaling that's taking place from the mitochondria towards the genetic towards the DNA.

That that is where the issue is. And obviously it's the health of the mitochondria that then determines the signaling. Yeah. Well, I think the mitochondria, when they become dysfunctional, they throw out reactive oxygen species. Ross and the Ros are carcinogenic and mutagenic.

So most of the mutations that we see in cancer cells are downstream effects of damage to the oxidative phosphorylation, the mitochondria. The oncogenes are facilitators of the fermentation metabolism.

So when the cell falls back on fermentation, which is a very inefficient energy way to generate energy, you have to have large amounts of resources in the environment to subscribe and energy through fermentation.

The genes turn on the transporters and the for both bringing in, bringing in the fuels and also throwing out the waste products of fermentation. In other words, the exhaust or the metabolic exhaust is driven.

So you have lactic acid and succinic acid as metabolic waste products of the two fermentable fuels, which is the sugar glucose and the amino acid glutamine.

So the oncogenes are facilitators of high throughput fermentation metabolism. If you put normal mitochondria back into a cancer cell, uncle genes turn off and the entire cell becomes growth regulated and reestablishes its energy normalcy.

So it's not as complicated as people want to make it make it out to be. It's actually a very dumb cell. It doesn't. It's lost its growth. Regular. It has all these mutations that prevent it from adaptation.

So they're very vulnerable to death if you target their energetic fuels. The problem is most therapies today are not targeting their fermentable fuels.

They're targeting downstream phenomena. The things that happen well after the damage to the mitochondria. And unfortunately, that accounts in large part for the over 1600 people a day dying from cancer.

Mitochondria, Fermentation, and Treatment Failure

So by the time we've treated them with toxic radiation and chemo and all this crazy stuff, the poor body can't rally. The body is so damaged from the treatments, the body can no longer rally to shut down the fuels that are actually driving the beast.

So it's really it's really a tragedy. When I when I look at the what we're doing to these poor cancer patients and the lack of knowledge or just just ignoring the the underlying mechanisms that drive this, it's just very it's very sad to see to see this situation that really does not need to happen.

And the issue like, like he pointed out with the chemo radiation, since the mitochondria plays such a pivotal role in this whole process, in addition to obviously devastating our immune system and our immune system to be able to control whatever cancer cells that are left, it is then also damaging the mitochondria in the cell.

So it puts more mitochondria in a place where you have that dysregulation to create more cancer cells. Yeah. A lot of these treatments that we give to patients create massive systemic inflammation in the body.

And inflammation is one of the provocateurs of damage respiration. So you impair the ability of the normal cell the respiratory capacity in the normal cells to rally.

Say, one of the things about metabolic therapy that we work on is we transition the whole body over to ketones, which enhances the health and vitality of the normal cells.

And we lower the blood sugar using various either calorie restriction, fasting, ketogenic diets. And when you do that, all the normal cells in the body actually upregulate transporters to get glucose.

And what you do then is the normal bodies will then outcompete the crippled cancer cells. So you need to know evolutionary biology. You need to know how how the body works.

You need to know how systems. The body is an entire machine. All these organs work together in unison together, and we play all these organs off of each other using the concepts of evolutionary biology.

So without that knowledge, you know, a lot of this stuff is mysterious to people. But as I said, you need to understand evolutionary biology. And once you understand that the solution to the cancer problem becomes quite clear.

So the fuel source you're talking about, glucose, obviously, is one of the main fuel sources. And for fermentation that is greatly needed. So if we then shut down the ability or we reduce the amount of glucose getting into the cancer cell, then we make the cancer cell very vulnerable to any kind of oxidative stress or any other type of therapies.

I would assume yes that's true. You can actually if you transition the body over to a nutritional ketosis, you actually can use some of the conventional chemotherapy.

The the issue is that you can use very, very low dosages of these where they will not create minimal toxicity while having much greater therapeutic benefit.

But even even then we would would prefer other approaches. But, you know, I don't want to throw out the entire industry of cancer treatments, but I certainly think that we're not know.

We don't know how to use the tools effectively that we have. The goal is to eradicate the tumor cell while enhancing the health and vitality of the normal cells.

You know, not damaging the body in such a way that now you create all kinds of new health issues, because you did not know how to use the tools that you were using to manage this.

And the other fermentable fuel, of course, is glutamine. And we've interrogated cancer cells and looked for every other fermentable fuel that they could possibly use.

And only glucose and glutamine are the ones a little, a little bit, but nothing can replace the glutamine. They don't need much glutamine because they balance it's the two fermentable fuels work together.

They really power these cancer cells. So you get the glucose on the one hand, the glutamine on the other hand. And if you target both of those fuels together while transitioning the body to nutritional ketosis, you you really have the upper hand on putting these cancer cells in a very managed state, allowing for greater progression, free survival and quality of life increase for the majority of people that that know how to do this and can do it.

So the question becomes glutamine is a very we have a lot of glutamine in our body. I mean, and we use it and just such a great extent. I mean, what are the the impacts health wise by limiting that source?

Well, we don't eliminate it, we just disrupt it. And that's why I developed my colleagues and I, we developed the press Pulse therapeutic strategy. You can press glucose down really, really low.

The body does not need glucose. The brain is the biggest consumer of glucose. And they're fine to all the neurons. I mean studies have pushed blood sugars down to 0.5 million nine milligrams per deciliter.

Deciliter. You you think person would be dead? Not if their brain is transitioned to ketones. So you can push blood sugars down really, really low. So we press that.

But then you're 100% correct about the value of importance of glutamine for the immune system, the gut, the Areia cycle. You can't go in and just push glutamine down without damaging your immune system, your gut, your urea cycle.

So that's why we pulse. So we hit. Once we have a stranglehold on the glucose, we then use small amounts of glutamine inhibitors and pulse it, putting it on and then taking it off.

Glucose, Glutamine, and Press-Pulse Therapy

When you take it off, you allow the immune system to come in and pick up the corpses from the dead tumor cells because you don't want to impair your immune system.

So this again, is understanding evolutionary biology, knowing how you play groups of cells off of each other because you understand what they evolve to do and what fuels they need.

And our immune system needs glutamine. So if we're too aggressive with glutamine, this is a saying you must know how to use the tools effectively. And that comes from an understanding of evolutionary biology.

I don't know other way to say it, but that's the way it works. And when you're talking about them inhibiting glutamine, obviously we want to limit that in our diet during that.

No no no no no no no. Can I eliminate glutamine in the diet? We we all make glutamine. Glutamine is everywhere. This is why you can't purge your body excessively of glutamine.

You might use fennel butyrate, which gets metabolized to phenyl acetate to reduce it in the blood. This was one drug that was used for little kids that had elevated glutamine levels.

But you cannot be too aggressive. You have to know how to let your normal cells worked while just slowly depriving or interrupting slowly that otherwise you create other problems.

And this is the strategy that we use. So we don't want to. There's no dietary way to limit glutamine. There's a dietary way to limit glucose. But you're going to need drugs, what we call repurposed drugs that we can use in a nontoxic way to pulse the glutamine levels.

And that needs to be further developed. And we know how to do it. It's just that we know the drugs that work well. The problem is they're not available.

We have access to them. And if I had cancer, I know exactly where I buy it. I know exactly what who would be

applying it to me. You know, I'd buy it from the chemical supply houses.

They say, oh, not for human use. Are you kidding me? Those drugs are more are more purified than the stuff they're giving to humans. So, yeah, you can get it.

People who have a few bucks can get it. The bottom line is, I know exactly what the drugs are. The pharmaceutical industry is also quite aware of what these glutamine drugs are, and they're trying to patent and make new ones.

And but they're basically very similar to Don 60 oxy nor leucine. You know, you just put a little tail on it and make it new and it's like something's going to be different.

They're all basically the same. The problem, the problem is, is that the pharmaceutical or others will go out and it'll, like you said, they'll blast glutamine without knowing evolutionary biology and they're going to get some therapeutic benefit.

But at the same time they're going to hurt the patients. You've got to shut down the glucose at the same. Are you what are you interested in? Are you interested in saving the life of the cancer patient, improving his quality of life and overall survival?

Or are you interested in making $1 billion on a drug that you don't know how to use? So this is the this is the whole problem here. So yeah, we know how to use these drugs.

We know the system. The problem is it's not part of conventional therapeutic strategies for managing cancer. And our job is to make that more known and more available.

And we're training individuals how to use these drugs, how to use the whole concept of press pulse because that's going to be the future. You know, it's just a matter of time because the current system is broken and it doesn't work for the majority of patients.

So once the word gets out that we know how to manage cancer. I'm not saying cure cancer. I'm just saying we can manage it better than what we have currently today.

And someone can live 30 or 40 years longer. That's great. But if they can live 5 or 7 years longer when they should be dead in a month, then that's also very helpful to.

Yeah. And talk to me a little bit about you mentioned Dawn and obviously glutamine fermentation to inhibit that through the press pulse. Yeah. One of the big ones that you that we're dealing with is things like that really does not have a great, you know, people don't survive very long with it.

So tell me how how this combine how the ketogenic diet producing ketones and regards to dawn and delivery to brain and so forth, how all of that works together.

Yeah. Well that's good. We haven't made any advance in 100 years. In 1926, Bailey and Cushing published that your GBM glioblastoma patients can live to 1818 to 14 months.

Today, they 8 to 14 months. Today they're living eight to 20 to 17 months or whatever. You know, we haven't made any advance. The problem with managing glioblastoma.

Glioblastoma is a very deadly aggressive brain cancer. It used to be called glioblastoma multiforme because it had so many different morphologies and this kind of thing.

Yes, it's a very bad tumor. And if you don't do anything, you're probably going to die in 9 to 10 months. However, the current standard of care. Yes, we need surgery.

But the question is, do you have a watchful waiting period before you debunk that tumor? A lot of times they go in

and they try to rip it out as quickly as possible.

And sometimes that's absolutely essential. I'm not I'm not challenging that. Surgery will become an essential part of the effective management of glioblastoma.

The issue is, is that when you do it, how you do it. The biggest problem with glioblastoma is the radiation of the brain. I have said over and over again, this is malpractice and immoral.

We have clearly shown that irradiating someone with a glioblastoma frees up massive amounts of glucose and glutamine in the tumor microenvironment, leading to the rapid recurrence of that tumor and the most likely the death of the patient within a two year period.

It is the treatment itself that's preventing these people from allowing them to to survive. I'm sorry I have to say this, but it is malpractice because I have been publishing paper, a paper and paper showing how these blastocyst cells suck down glucose and glutamine, and the very act of a radiating the brain and breaking apart the very, very carefully regulated glutamine glutamate cycle, which is our neurotransmitter system.

You break that apart, you create inflammation. Massive amounts of glutamine are in there driving the cells of this aggressive cancer. You will radiate the brain. You heat the brain.

This causes massive systemic inflammation. And then you give high dose steroids which raise the blood sugars. So the two fuels that you're that are absolutely essential to control are massively released in the microenvironment of this poor souls brain, leading to his rapid death.

And we have shown that the survival of of patients with glioblastoma is concurrent with every major medical center in the world. You can just see how beautifully that everybody's dead at approximately the same time.

And they've been doing it for 50 years, and nobody knows why this is happening. And I'm telling them why it's happening over and over again. I said, what do you want me to do this in crayon?

You know, how much more clear do I have to speak? Slower. Do I have to write the mechanism down in crayon? This is. It's just so disheartening to see.

And when I talk to people like this, I said, well, you know, and I tell the guys that are doing this, and they look at you like a deer in the headlights, it's almost like you're coming from a different planet.

They look at you like you're a different species. And I'm saying to myself, what's going on in the in the brains of these guys that are irradiating another member of our species, knowing that this is going to lead to their demise and the rapid recurrence of the tumor.

So disheartening. And you're trying to be nice about it. You try to explain it, but the bottom line is you're killing all these people. And I'm not saying the tumor is.

The tumor, of course, will kill you if you don't do anything. But man, we don't need to do that. We need to shrink the tumor, do bulk it, and then transition the patient over to metabolic therapy.

Will it cure them? I don't know, but we have guys living longer than five and seven years, and and they do a hell of a lot better with a higher quality of life.

Glioblastoma and the Harm of Standard Care

And I think we can make the mean survival rather than 15 months, five years. Now, what is wrong with that? Why is no one listening? Why? Why do they ignore what I'm saying?

It makes no sense, right? So you just say over and over again. Podcast after podcast. Publication. After

publication. Open access journals. So every guy in any bar room or restaurant or or medical center can read it.

And it's like, you know, let's irradiate this guy. I mean, it's like, what is going on here? Maybe someone can someone explain that to me? I'm still lost. I just don't understand how.

I mean, it's like talking to a plug socket. I mean, it's like, what is going on here? Don't you understand that the standard of care is killing your GBM patients?

And you know. And it's just terrible. I try to go through our institutional review boards and they said only we can do metabolic therapy after we irradiate the brain.

And I'm saying, what kind of nuts are you people sitting on these boards. And they all went to top medical schools to which is scary. You think these guys would know what they were doing, right?

They're sitting there with the beautiful white coats, talking like they know something. And there ended up killing their patients. And it's just like, give me a break.

So, you know, I look at it, I'm saying this is tragedy. It's a tragic, tragic, tragic situation. And only it's medieval. And only when they come to realize that cancer is driven by a fermentation metabolism.

Will they come to realize what the hell they have been doing? Yeah. And that's the thing, is that the glutamine provides and the structure for new cancer cells to develop.

I mean, it creates that carbon skeleton to the nitrogen. It's it's both. It's you've got two nitrogen on a glutamine molecule. You got an internal nitrogen.

You need nitrogen to build new DNA. You need nitrogen to build new amino acids. And then. And then you generate energy through what we call mitochondrial substrate level phosphorylation.

It's another form of energy metabolism. So and the other thing you have to realize is that many of these GBM cells are microglia. They are derived from the microglia which is part of our immune system.

And we know that the immune system cells are heavily glutamine dependent. So the very cells that will invade through the entire brain are heavily glutamine dependent.

And the very act of a radiating the brain freeze up massive amounts of glutamine in the microenvironment. And that's why very few people survived. It's always rare you find a guy who survives fire and you got to love the human body.

No matter what you do to it. There's always some guy that can survive and everybody says, oh, I want to be that one guy where 99% of them are all dead, but they all think they're going to be that one guy.

No, no, no. They're all going to be most of them are going to be dead. There's always a chance that somebody hits the billion dollar lottery, but that doesn't happen very often.

Let's put it that way. Yeah. And regards to yeah I love it. And I see that again. Again in my practice. You know once they start that journey. Yeah. Where they start to radiate, it's like playing your radiate one spot and then two other appears and then three others.

And then all of a sudden they just circle the drain and then they're gone. Yeah. So it's absolutely tragic. Absolutely tragic. So in regards to Dawn, one of the issues have been that the impact on the digestive and people feeling nauseous, and they haven't been able to handle the dosage so well.

How do you manage that? They didn't use it right. You got to get the body into therapeutic ketosis before you use Don. So or hyperbaric oxygen or any of these kinds of things you really need.

The first step is you have to clean up the body, the metabolism of the individual. You can you can look at a blood panels and you can tell whether a person is healthy or not.

Just by looking at all the blood biomarkers you got to get you got to get these people back into a metabolic homeostatic state. And once you do that, then you and then Don was used incorrectly.

It was used in too high of adults. Oh they said Don is toxic. What relative of radiation. And Tim is Olamide and these other crazy. It's nothing compared to these things.

But we showed that we can use very, very low doses. Have done. And as a matter of fact, when the body is in nutritional ketosis, we have published several papers that it facilitates the delivery through the blood brain barrier of small molecules.

We published papers with electrospray mass spectrometry showing how much we can get three times more drug on target when the drug is administered in under nutritional ketosis.

So that means the dosages can be significantly reduced, the toxicity is significantly reduced, and the therapeutic efficacy is massively enhanced. Now you heard what I just said, right?

Did you did you hear what I just said? Well, how come that falls on deaf ears in the field? I don't know how much more I can make. We published papers showing that when the body is in nutritional ketosis, small molecules can be delivered very effectively through the blood brain barrier onto target.

We have published that. We have shown that quantitatively. All right. So why does the industry keep saying oh we can't get through the blood brain barrier. Can.

Do they not know how to read the scientific literature. What again? What do I have to do to I think it's not that they're dumb. I think they're just locked into procedures and dogmatic ideology that prevents them from looking at anything other than what they have been doing.

Okay, so I always find it remarkable that they say, oh, it's so hard to get drugs on target in the brain because the blood brain barrier. I just told you how to breach the blood brain barrier.

We have published papers showing that clearly, quantitatively, and yet they don't do it. So what do you do? How do you. I mean, what are you supposed to stand on the top of the Empire State Building and wave of flag?

It's just even if I did that, I don't think they would look. They would look and say, what's that up there? It's like, who's. Who's that weirdo up there?

I hate to I hate to bash these guys, but, you know, doing this for ten years, telling everybody about. I published a paper in Lancet Oncology in 2010, blowing the whistle on this whole thing.

And and, you know, it's, you know, I don't know what to say. It's just like, I don't think these people are stupid. I just think they're just incapable of understanding evolutionary biology.

And they're locked into a I do this because I was trained to do this and everybody does this. Therefore it must be right. Even though I'm killing my patients doing it, it must be right.

I mean, you got to be a moron to think like that, right? Yeah. Even though I see the same result again and again, I think that the next one is going to be better.

Yeah. You know, and they don't seem to be bothered. I don't know how they sleep at night. I mean, I if I were doing that to somebody, I'd feel terrible.

You know, I'm killing my patients. I mean, I, I came into this profession to help people and I'm killing them. You

know, this is harsh. What am I telling you is very harsh, right? Okay.

Why don't you look at the survival curves throughout the world? On what? This. I published papers showing survival curves. It's unbelievable. You. You cannot design experiments so reproducible.

We have a problem in the cancer field. They can't reproduce these papers from one from one lab to the next. But what we can reproduce is how fast people die after the standard of care for glioblastoma.

That that is so reproducible. You know, it's unbelievable. I just don't know what to say about it. And you're absolutely right. I mean, I know you're absolutely right.

I mean, it's such a wild Russ of a system that, you know, each individual is locked into it and is self-regulated, meaning that one medical oncologist said, step out of line.

It's you have a group of other medical oncologist that will then make sure that he's put back into line. So they all do the same. Yeah. It's like it's like the Japanese used to say, if the nail sticks above the board, you got to smash it down.

Yeah. Everybody has to be in lockstep for whatever you're doing. But you know. But when it comes to people's lives. I think you might have to think of something different and do something different.

You know, and it's such a tragedy. I look at all these poor patients and and, you know, after you get diagnosed, the shock of saying that you have a glioblastoma means that you're almost looking at your death certificate right there, and you become numb, the family becomes numb, all the relatives become numb.

And then these poor folks never even heard of what a glioblastoma is. And then all of a sudden, you find out that somebody has it. You look in the literature and almost everybody that has it is dead.

John McCain is dead. Ted Kennedy is dead. President Biden's son Beau is dead. And they were supposed to have the best medical care and the best. And they looked at that.

They all got the same thing brain irradiation. It was like, it's just amazing. So these poor folks didn't know any better than the common guy on the street. So.

And you're so shocked. Oh, no. We have to debunk the tumor right away. And then we're going to give you a big dose of radiation and chemo, and then you're going to be dead, you know.

And we tried we tried one guy, Pablo Kelly. I published a big paper on this. Oh yes, a lot of people read it, but very few people cited where he chose no radiation in Okemah.

He said, I don't want any of this stuff. He got a glioblastoma. They said, oh, Pablo, you're going to be dead in nine months. He said, okay, I'll roll the dice and take my risk.

And he's still alive. Eight and a half years going on 9th August, there'll be nine years survival. No radiation, no chemo, just metabolic therapy. And then they say, oh, but Pablo is a fluke.

Pablo is just one of those guys. He's an end of one. Yeah. He is. You might get a lot more Pablo's. If you don't irradiate the guy's brain, you might find it.

He might be. He might be the rule rather than the exception. So. Oh, nobody wants to talk about that. You see, nobody wants to talk about the fact that.

So are you trying to go through an institutional review board and tell them you want metabolic therapy without the standard of care? And they say, we don't do that. You have to go somewhere else.

So it's a tragedy. I have to say it again, it's one of the great tragedies. And someday in the future, they will recognize this as one of the greatest tragedies in the history of medical science.

Ketosis, Drug Delivery, and Repurposed Therapies

What we do to these, in fact, not only glioblastoma patients, most of the cancer patients are doing these crazy stuff, and everything is based on the somatic mutations theory.

Cancer is a genetic disease. Therefore all these all these approaches are justified by the National Cancer Institute, which says cancer is a it's not a genetic disease, it's a mitochondrial metabolic disease.

And once people realize that we're going to stop doing this medieval stuff and people are going to survive a lot better, yeah. And then they follow the same suit since since the 50s, and they haven't changed the result in any way.

You would think that they would kind of shift their mindset and focus on other things instead. But it's still so very profitable. So yeah. Well, you know, that happened in 1984 when the federal government and National Cancer Institute invited the pharmaceutical companies into the medical schools to facilitate drug development for cancer.

That was put in the fox in the henhouse right there. 1984 look it up. National Cancer Institute brings in pharmaceutical. So therefore the mission became profit rather than outcome.

Health outcome. And and we're paying the price for it today. We're paying the price for it today. So people want to look back and say how did all this crazy stuff happen?

It's all written there. All you have to do is look at the history of the National Cancer Institute. You'll see it right there. Bold big letters, you know.

So I look at all this stuff and I say, this is the way it is. And then they say, well, you got the authorities and the big medical. So you get all these grants from the National Cancer Institute, all based on the gene theory of cancer.

It's all bullshit. You know, it's contributing to the problem. It's contributing to the problem and the unnecessary death and horrific events that are associated with these poor cancer patients.

And so, in your mind, just giving a few minutes feel people that are diagnosed with cancer, what should their strategy be? You talked about ketogenic diet blocking your push pull on the luteum mean, you know, with repurposed drugs.

You know, Dom being one of them. I don't know if there's any other ones that that are easily accessible that. Well yeah. The parasite drugs and been dissolved and been dissolved.

It turns out parasites and cancer cells use common energy pathways. So some of the parasite medications work really well. We have a paper that we're getting ready to submit now for pediatric brain cancer.

Little kids, brain cancer and children is the number one killer of kids. You know, we've been able to put together different drugs together with metabolic therapy in our pre-clinical.

We use very young mice. They're at the same general age as like a three, 3 or 4 year old child. And we find that the tumors in these pediatric mouse model behaves just like what you see in children.

That goes down the spinal cord. So we don't see as much spinal cord invasion for adult glioblastoma, but we see it in children and children. They have a lot of spinal involvement for their aggressive cancers.

And our pediatric models show spinal involvement. So so what we do is we use cocktails of repurposed drugs. We put the animals into a ketosis, and then we deliver the drugs in low doses in a strategic way, and we can really

knock the hell out of these tumor cells and really put, put a growth inhibitory state over the whole.

And we know because of the differences in basal metabolic rate between the mouse and the human, 50 million years of evolutionary difference between a mouse and a human, the mice has rates seven times faster than that of the human.

So when we do these tests in human, the human has body has so much more opportunity to take advantage of what we're doing. So humans do hell of a lot better than the mice when we put them into the clinics. And we try this.

The problem is they don't want to do it. That's the tragedy. We know what we need to do and how to do it, yet it is not allowed to be done. Now where is the outcry about that?

We know how to use the drugs. We know the strategy. We are writing treatment protocols to help millions of people suffering from cancer, whether you're a child or an adult.

And yet it's not being allowed to be done because they say there's no clinical trials. Well, who's going to who's going to pay for a clinical trial to show therapeutic efficacy on a treatment that doesn't generate massive amounts of revenue?

So so you put it all together and you have this problem. So how do you how you're I'm not going to change the mind of the guys that Dana-Farber, MD Anderson.

Those guys are locked into a mindset. We have to we have to create knowledge, scientific literacy on the part of the population. Once the population becomes scientifically literate, they're the consumers.

They're the ones that will make the change. They have to demand. They want metabolic therapy, and we're going to train people to do it. And once we train the physicians to do this, they'll be clinics opening that will give cancer patients metabolic therapy and treat their disease the right way, the way it should be treated.

So with and you have different you have the benefits. All you have men bend is all you have. All bend is all its are the all the same or fem bend is all.

Is it preferred? Yeah. We're starting to see some differences. Some of my physician colleagues are reporting that Mendoza might work better on brain cancer, where Fen Ben Diesel might work better on visceral organ cancers.

The issue is, is that they generally work a lot better once the patient is in therapeutic ketosis. So that becomes the key because then you can use much, much lower dosages of these drugs, almost eliminating completely any toxicity.

And then the therapeutic efficacy becomes better. But the the cutting edge in our lab right now is dosage timing and scheduling. What are the best drugs?

How do you dose them? Schedule and time them to work to work off what we know is happening. We do. We analyze the tissue histologically, just like you would do in a conventional clinic.

You know, you have to take we don't do biopsy, but we but we look at the progression of the disease and we look at the histology and we see how many cells are dead.

Are there any cells alive after some of these procedures. And, you know, we're not completely successful. We we bring these tumors into a state of management.

But we it's hard to completely eliminate them. But, you know, we're pushing we're pushing the boundaries further and further. You know, when the Wright brothers first got their plane to fly 50 yards, you know, we got jet jetliners now and going to the to the moon.

But we're going to push the boundaries on how to dosage, timing and scheduling repurpose drugs under the state of therapeutic ketosis. Yes, it will be successful.

We need guys that are in the lab in the clinics Max, you know, mixing and matching these things and doing this. And they will come out with a now this is not sexy science, but this is the stuff that gets the job done if you want to live.

This is the kind of stuff that we need to have done. But when you write a grant proposal, oh well, this is not sexy. What's your signaling can. We don't care about signaling cascades.

We're only a carrot about dead cancer cells. What do you need to study? A signaling cascade and a cell that's already dead. You know, so it's not a it's not a complicated thing.

It's called survival. How long can we keep a person or an animal alive? Far longer than they would have ever been imagined to do. That's not sexy science.

But that's what really works. I love it, I love it. Well, I so appreciate your work. I mean, because this is what we need, and I mean, we we can't sit and rely on, on these big monsters that, you know, they're required hundreds, hundreds of millions of dollars to get new drugs onto the market.

And none of this obviously repurposed drugs. It can't make any money on it, are there? In addition to what you just explains, are there other things that you are seeing that that has promised that you feel the public should know?

Well, I think we know the strategy of how to do this. Are there better drugs that could be there? I mean, I'm not against developing new, new drugs. The problem is, is you've got to know how that drug can be used to its maximum level of efficacy.

And what there seems to be is a tremendous resistance in using the drug with a particular diet. That seems to be something that a lot of the drug developers don't want to do.

They want to look at their drug and say, oh, it has clinical benefit. It keeps a guy alive an extra month or six weeks. I'm more interested in an extra five years or six years.

And the way you do that is you've got to know strategic. Now, why why don a six dioxin or leucine is so powerful is because it's a pan glutamine Ace inhibitor.

That means it hits multiple glutamine targets simultaneously. And a lot of drug companies don't like that. They like a very specific, targeted thing. But the problem is we have many different families of glutamine, many different glutamine transporters.

If you're going to hit one, they come through others. It's like whack a mole. If you hit one glutamine ace. They have other glutamine aces. But Don is great because it just shuts down the whole family.

So but you can't you can't make any money on it. And everybody ran out and said, oh, it's too toxic only because you didn't know how to use it. Yeah. And then we're finding we're actually finding some other drugs that were had very poor track record in the clinic.

But when you now work them with the ketogenic diet and calorie restriction, they actually work really, really well. So at a much lower dosages. So I think we, we have many, many drugs already available that are out there that could be repurposed and reunified in a new and a new setting.

And all of a sudden you're going to say, oh, that drug that that was a crap drug. All of a sudden it turns out to be a blockbuster, only because now you're the first time you know how to use it in the right context.

And so I, I'm hopeful about this. I don't think we need to develop any more drugs. We've got drugs that are already

out there that can work really, really well if you know how to use them.

So that's going to be another exciting frontier, dredging up some of these old drugs that thought you thought they didn't work while you put them back in the right context, and all of a sudden you got some blockbuster.

Future of Metabolic Cancer Management

So it's going to be exciting to see all this happen. It's going to happen. It's just a matter of time. So one of the challenges that are a lot of people are dealing with, you have on repurposed drug doxycycline as an example.

And we also know that it has a negative impact on on the mitochondria. And here we are trying to then protect the mitochondria. So I mean what what are your thoughts in regards to that.

I mean those those we don't we don't use those. Why would you want to use where would you have stuff that'll do the job. So why would we use anything that's going to harm the very organelle that we're trying to enhance?

Again, you've got to know the biology of the system you're working on. I mean, you have all these crazies out now. They're all saying we want to target oxidative phosphorylation in cancer cells are inhibitors.

Right. Well, the best inhibitor that I know is cyanide. You want you want to you want to inhibit oxidative phosphorylation, drink the Kool-Aid with the cyanide in it.

And the absurdity of these guys, they're out there doing so. You think these guys know what they're doing right there at the top medical schools, and you think they understand stuff, and yet they come out with saying, let's let's hammer oxidative phosphorylation to the cancer. So.

Oh yeah. You go and they think cancer cells use which we and others have clearly shown they don't. And they're going to harm the rest of the body. I'm telling you, man, it's just scary when you see people that are supposed to have knowledge and they don't know Jack, and they're out there doing this to these people and causing more harm than than you would have expected.

No, you don't want to harm oxidative phosphorylation in any person, ever. Period. People should know that I love it. And do you mind just saying some? Yeah.

Mentioning the name of some of the drugs that you feel hold the best promise, you know, for people out there? Well, I think I think we have to go back and revisit the parasite drugs.

And this is unfortunately so many people on the podcast comments think cancer is a parasite. Wrong. Cancer is not a parasite. Parasite is a completely different organism.

However, parasites and cancers use common common energy pathways. So parasite drugs can kill cancer cells not because cancer is a parasite, mainly because they use common pathways.

Again, you have to have some knowledge of evolutionary biology. If you're going to understand cancer and you know, you get all these crazies that come in with different crackpots suggestions.

But, you know, most people are appreciative of what we're saying, basically, because we kind of understand the overall picture of what's going on. Yeah, there probably could be some additional drugs.

We're always finding something new. People always ask me, can you test this? Can you test that? What about seed oils? What about this or what about that?

The idea is, all I know is that let's get rid of the cancer first. Keep the patient healthy. Then if we want to go back and revisit a seed oil or some other, some other thing that somebody said, okay, but we've got a crisis on our hands.

We've got over 1600 people a day are dying from cancer. Why don't we? Why don't we take care of that problem first, and then go back and worry about signaling cascades and what gene might have been turned on or turned off about this kind of stuff.

Let's let's solve the problem first and then go back and look at this extraneous stuff, you know, does that make sense to you? Absolutely. Yeah, I love it, I love it.

Well, any kind of last words that you want to say before wrap up? Because, I mean, this is such a I mean, what you have given to this field is tremendous.

And, I mean, I have a lot of dear friends, including myself, that are following suit with this in order to be able to tackle this, this huge problem that we're dealing with.

So any other kind of last words of wisdom that I can say, we're working on a very comprehensive treatment protocol in order to manage cancer. It's not only having the knowledge that I have and my colleagues have, it's also training people to know that you have to train, retrain large numbers of physicians that are actually going to apply this to patients.

You have to have a place where they can go and receive this kind of treatment in a logical and a logical way. So we're writing up a very comprehensive protocol now how how to do it and what to do and training people.

And once that happens, then you're going to see a real shift in how and how we do this. So again, we're at the very early stages of this. I don't want people to say, well, let's go, because the frustrating part is they run down to their oncologist, tell them what I just told you, and the guy has no clue what you're talking about, you know?

And that's scary and sad because these guys should understand this. And they have been unfortunately, we have to have retraining and these guys can be retrained.

It's just that, you know, we have to and it takes time. And this revenue issues with challenging an entire paradigm here. You know. And that never happens like overnight.

So it's going to be a gradual change in the way we do this. So people just have to hang on and just understand it's coming. I'd like to get it as fast as I could because I feel so bad.

I get hundreds of emails from all these poor cancer patients. It's a horrific tragedy every day in my life. I see this and I wish I could, you know, help them, but we will help them in the future.

We could do it faster if people understood. But you go out and you ask the guys at the top, medical schools the top, and what I just said, and you're going to get you're going to see the response that you get very, very different from what I just said.

Yeah. Well, doctor separate or professor separate, that is such an honor and pleasure. And I really appreciate everything that you do. And to tackle this horrendous pandemic that we're dealing with as just getting worse. So thank you so much.

Well thank you, Michael. It was a pleasure being here.