

Curable: How an Unlikely Group of Radical Innovators Is Trying to Transform Our Health Care System: A Special Interview With Travis Christofferson

By Dr. Joseph Mercola

JM: Dr. Joseph Mercola

TC: Travis Christofferson

JM: Welcome, everyone. This is Dr. Mercola, helping you take control of your health. Today we are joined by a repeat guest, Travis Christofferson, who wrote the fantastic book that catapulted my interest in final appreciation of the important influence of diet in cancer. He wrote the book, “Tripping Over the Truth: The Metabolic Theory of Cancer.” It’s a fabulous book. If you haven’t read it, you probably should put it on your to-read list.

But he’s written another book called, “Curable: How an Unlikely Group of Radical Innovators Is Trying to Transform Our Health Care System,” which addresses the issue of “What has happened to American health care? What are the foundational disruptions or corruptions in the system that has flooded to a point where it’s really a travesty?” That would be a light term. The book again is “Curable.” We’re just delighted to have Travis. Welcome and thank you for joining us today, Travis.

TC: Thanks for having me. I’m glad to be here.

JM: Your book, in some ways, was based on the theory that was promoted in “Moneyball,” which is a book and a movie, I believe. It really describes how you can use statistics to really massively improve a flawed system, or at least based on strategies that have been used for long periods of time and generally believed to be accurate but then found that, with further analysis, it wasn’t. Why don’t you start there and maybe the motivation for the book?

TC: Yeah. The motivation, I was lucky to kind of have an epiphany moment. After “Tripping Over the Truth,” I think the next year, I’d been invited to speak at a small charity event in London. One of the speakers, the speaker who went right after me was Dr. Ndabezinhle Mazibuko. He was at this startup clinic called Care Oncology in the U.K. The idea behind this clinic was there are drugs that have gone off patent that have a whole other life to them, but they’re unrealized. They’re undervalued in the system.

One of these drugs, for example, is metformin in the use of cancer. There’s just this vast body of data to suggest it can improve cancer outcomes, but there’s no good mechanism for the system to get this on the prescription pads of doctors. It just doesn’t happen. There’s a flaw in the system. To address this flaw or this underappreciated argument, they opened this clinic and then prescribed a combination of four drugs that showed they had synergy, very few side effects and the best chance to help outcomes in cancer. The cost of the drugs is phenomenal. It’s about 60 dollars.

JM: Per month.

TC: Per month. Yeah. Per month. I was really enthusiastic about what they were doing. We started collaborating. I agreed to open up a clinic in the U.S. to help them start in the U.S. I opened it up in my small town, Rapid City, a physical clinic. We started doing telemedicine as well to address the rest of the country. But I arranged the time to come speak at our local hospital, local cancer center to present what we were doing to the local oncologists. My hope was that they would see the value in it and refer patients to us, especially patients with dire cancers, like glioblastoma, where there are few good treatment options. This is such a low-risk intervention that it had a good potential to help.

I went in there and I presented these data the same day that the doctors in the U.K. looked at it to determine that this was a valuable treatment. Immediately when I was done, there were probably 15 oncologists in the room, nurses, head pharmacists and the medical director. One of the oncologists just lit into me. What stuck in my mind is he accused us of taking advantage of desperate patients. Then he brought up, “Why would you prescribe a medication for Type 2 diabetes for cancer?” Another oncologist in the room in the corner said, “Well, I do that.”

What struck me in that moment is you can have these medical doctors in the same room that have a profound disagreement on data that we have just gone through. If this is the case, what are the inefficiencies in the health care system? That drove me to – That was the original spark for the book.

When you look at all these institutions across the country that we deal with in our lives, the arenas, say sports or financial things in health care. Michael Lewis had written this wonderful book, “Moneyball,” that showed how within a simple game of baseball, you can have these massive inefficiencies. By taking away the human biases and just applying statistics to find what is undervalued in that market, you can catapult a team – the Oakland A’s, which had this tiny budget, it was three times less than the New York Yankees – up towards the top in performance.

He tells a great story. Michael Lewis, when he was deciding to write the book – he was doing the research – he happened to walk into the A’s locker room. He walked in there right when the Oakland A’s were taking a shower. He saw these guys naked. He said he was just, “These don’t look like professional athletes.” They were overweight, kind of misshapen. But that was the reason why the talent scouts were misvaluing these players.

So in health care, we have such a massive disparity, again, in valuation, how we value treatments. As I said, metformin has got massive repositories a day to suggest you can ward off not only cancer but a plethora of chronic disease, but it’s the price of a nickel a pill and very rarely gets prescribed. That was kind of what the book really dove into. It’s finding – It’s just an examination of these huge disparities in health care and why it’s gotten so out of control in the U.S.

JM: Yeah. It’s interesting that the physician who made you attend accused you of trying to make money from this, when obviously there’s not much margin in selling generic drugs at pretty close to cost, when every oncologist, for the most part, is legal to sell them the very expensive chemo agents that can frequently net the provider tens of thousands of dollars of net revenue. It is really somewhat ironic that he would have the audacity to state that.

TC: Yeah. It gets hidden in the veil of the system, right? I mean, we sort of enshrine this cloak, this title of “expert.” We want to believe in the experts who we are deferred to. I think that allows within the realm of human bio, et cetera, allows that behavior to just go on unchecked, where, yeah, you can prescribe a treatment that costs a couple of hundred thousand dollars and may not extend lives very meaningfully at all. They just sort of get away with it in that arena.

JM: You know, the topic you chose is, I think, a really important one. Because our current system is radically flawed and needs some incredible revisions soon. I actually interviewed Dr. Marty Makary, who’s a professor and surgeon at Johns Hopkins. He wrote a similar book to yours. It’s being published about the same time. It’s called “The Price We Pay.” I actually listened to Dr. Peter Attia’s interview with him recently also. He pointed out something I didn’t realize. It’s that the health care system is the largest industry in the United States. It’s 3 trillion dollars. It’s bigger than any industry at all. It’s not hard to understand that there are incredible financial motivations to capitalize on this. They exist. They’re really a large part of the problem. That’s sort of a basis. I’m wondering if you could briefly differentiate the approach you took to addressing this issue versus the one Makary took.

TC: I think, like you said in that interview, you could probably write 100 books in this topic and still not even encompass the entire thing. I believe this book, judging from the interview, focused most on the price aspect of how they get away with this sort of gouging behavior and what to do about it. Yeah. Three trillion dollars insured, and then most of that financial toxicity lands. The stat that really struck home with me in that interview was I think 1 in 5 Americans have medical debt.

JM: Yes. It’s extraordinary.

TC: It’s shocking. The system is so broken. It’s such a massive part of our GDP. It’s just sucking away from everything. You do have these sort of disruptors that are looking at how to make this market more efficient and what can you do to make it more efficient. You look at – There are some sort of buckets that I kind of put in my book. You look at the variation in treatment and the overtreatment, which is a huge part of it. There are numbers that go up as high when you include the fraud, the middle management and just the overtreatment from physicians in general. It’s 50% of all health care.

And then the other bucket that I looked at, again, these undervalued treatments, the treatments that you focus on a lot, Dr. Mercola: diet, vitamin D. What are the things that are very low-cost that if we incorporated would have a big difference in outcome? Because if we can prevent disease, then we can prevent this massive cost escalation. So I try to find examples of people doing this in the book.

[-----10:00-----]

One of the good ones that was interesting – He talked about this in the interview. If you go to a single pair, you kind of lose out on this creative marketplace, this dynamic, creative innovation that we have in the marketplace that we’re seeing now. Geisinger Health is a health system in Pennsylvania. For Type 2 diabetes, what they decided to do is they introduced this thing called the Fresh Food Farmacy. They give patients with prediabetes or Type 2 diabetes a prescription to this.

Basically it's just a grocery store with fresh, good food. They allowed them two meals a day for free, and then they give the recipes, and then really intensive care. They wouldn't let them fall through the cracks. If they've got any questions, there are hours support for them.

The outcome of that – just fast-forward to the outcome – there was an 80% drop in per-year outlays and cost for Type 2 diabetics, which we know is a huge – there's huge ancillary cost to that disease. A1C dropped I think two percentage points, a huge reduction. It only cost them 2,600 dollars a year. This is a drugless treatment that has this incredible outcome that's cheap.

What interests me about that is they didn't leave out the human component. They made sure that the patients – They let their families be engaged. They gave free food to the families so they can all cook together. Pretty soon, when people have this level of engagement and feel like they're part of a system, we start asking questions. “What else can I do? Can I exercise? How do I stop smoking?” Not only is it changing their health status, but it's changing the way their families view health and what they do about it. To me, there are these wonderful examples of places, these pockets that are doing extraordinarily good work.

The other one I focused on is Intermountain Health care, which shockingly, if you extrapolate it, it's a health chain of hospitals in Utah and Idaho. If you extrapolated their system to the rest of the U.S., we would see a 40% reduction in health care costs immediately. There are places that are doing the right thing, doing this very well.

JM: Yeah. This is in stark contrast to certain not-for-profit hospitals that Makary describes in his book that essentially constitutes the majority. Ninety-five percent of the legal cases in their local town are in the courthouse. They are essentially practicing predatory billing on these very poor people and essentially bankrupting them and using the court system as their collection agency. It's such a travesty when you have these huge financial incentives that certain individuals just get corrupted and push the system in the wrong direction.

I wanted you to talk about this aspect. Because another fundamental issue that really needs to be addressed is the physicians. As a medical student, almost every medical student is very altruistic and wants to pursue medicine for the right reasons. And then they get brainwashed. They're never given the proper education and the tools to address the fundamental reasons why people are sick, and understand their lifestyle. But rather, they're focused on pretty much a medical-pharmaceutical approach and certainly a surgical one when appropriate.

So the result of that is it's a model that the physician, after they finish their training, typically are a few hundred thousand dollars in debt, real debt. I mean they don't have any net worth. They have to pay bills. They're introduced into a system where they're given 15 minutes to spend with a patient, 15 minutes. What can you do? You can't do a darn thing in 15 minutes. You just say hello and “How are you doing?” This system is – It's just designed to fail. Clearly, what's required are physician extenders, people – like 10 to 15 to 1 – where they can invest the time and effort and energy to spend with the patient to address these fundamental issues. I think any system that doesn't integrate that into the total process is going to be designed for failure.

TC: Yeah. I couldn't agree more. As I wrote this book and research, what I kept coming back to was the overwhelming power of incentives, like you mentioned. Our system is so flawed with regard to incentives. The biggest offender of that, by far, is the fee-for-service system, where we demand our doctors get paid for every test, procedure that they do. This creates a terrible incentive for them so that they have to think like businessmen in which procedures produce money, which gain money. If there was a marginal procedure and you have a financial incentive to do it, perhaps you're going to do it. This leads to overtreatment.

There's a brilliant example of that in the book. This was actually done by Atul Gawande. He wrote about this in *The New Yorker*, where McAllen, Texas had two times the Medicare utilization compared to the national averages. There were 15,000 per person. And it wasn't specific to that demographic region, because if you went to El Paso, up the border, it's the same demographics, but it was half the cost there. We flew down there to ask why, "What has gone wrong here?" What had happened was the doctors have just developed this entrepreneurial culture where they almost competed with each other financially.

You looked at their kind of balance sheets at the doctors, and they owned strip malls and real estate. They're engaged in all these other activities. Really, their focus was on money. And so that, just putting a pen to paper and writing that article, you know, it had a sterilizing effect. Suddenly, the regulators came in. They looked at all the fraud that was going on. There was, I think, 20 million fines levied. The overutilization started to drop. I think 3,000 a year over the next few years. Under that incentive structure, it's not surprising that you see that at all.

When you look at the high-quality providers, like Mayo Clinic, Cleveland Clinic, they put their physicians on a salary. The marketplace will reward that behavior because now you can see the data. You can see that if somebody you're insuring, say, for example – Walmart does this now. If they have an employee with lower back pain, they won't let him go to the local hospital. They fly him to the Mayo Clinic. Because there, if they don't need a surgery, they won't get one. The doctor has no incentive, financial incentive to operate. The incentive structure is entirely backwards.

Be creative. How do you incentivize doctors to, as you said, be proactive to prevent? To shift their mindset to preventative health? I just learned that in that interview as well. There are wonderful ideas where you pay clinics a lump sum of a number of patients, and then they spend money to take care of their patients throughout the year. It comes out of that lump sum, so they keep the profit in the end. Now, their entire incentive alignment is towards preventative medicine. They want to keep these people healthy so that they can keep more of that pot of money. I think that's a brilliant way to address this problem. That's kind of the underlying theme of this book. We really have to take a look at human incentives and what drives human beings, how they make mistakes. We can design systems around that to do better.

JM: Do you have any other examples of systems that may address this? This fundamental flaw in the system that allows this human tendency towards reaping financial gains to overcome their initial motivations to enter into the field.

TC: Yeah. Intermountain Health does a wonderful job. Dr. Brent James is kind of their north star. He's the one who implemented all this. Back when electronic medical record systems were first

kind of getting incorporated, he realized the potential within that – I think it was the ‘80s – what you could do with this. With Intermountain, what they do, again, they put their doctors on salary. And then the next thing they do, they give them bonuses if they have better outcomes. If their patients do better, they get a bonus.

What they do is they look at the variation in treatment. This shows up in medical records. You can find it very easily. For example, inducing pregnancies. They found out that there was a huge – There were doctors who were inducing too many pregnancies early on. This can result in babies being born with respiratory problems. He saw that the variation of the doctors, too many overall. He set guidelines in the electric medical record (EMR) to induce at a certain time. Suddenly, those complication rates dropped precipitously. I remember from 3.5% to like 1.5%.

At Intermountain, that’s what they do. They notice the variation in health care, which by, in and of itself, is shocking when you look at the numbers. In Elyria, Ohio, which is 50 miles away from Cleveland, you’re three times more likely to get a stent put in there than in Cleveland. At certain counties in Washington State, there’s a 15-fold variation in back surgeries. It just goes on and on. There are certain doctors that order double the amount of magnetic resonance imaging (MRIs) compared to other doctors in the same clinic.

[----20:00----]

When you notice this variation in EMR, Brent James, they start to narrow it down to the best protocol. They’ve done this on so many different things. For example, surgical timing of antibiotics. They always give patients, preoperatively, antibiotics to prevent an infection. It was never established what’s the optimal time to do that. They just looked at the medical records and found the optimal time was an hour before. They then dropped their surgical infection rate by half.

What it takes is there’s always a conflict between – We don’t want to detract between a physician’s intuition, but at the same time, we want to narrow the data down to where there are guidelines and what is the optimal protocol. This is kind of the push-pull of medicine right now. It’s doctors are complaining because they feel like a noose is tightening around their neck. They call it straitjacket medicine or cookbook medicine. At the same time, good systems, like Intermountain, are saying, “Well, the data clearly shows that this is the best way to practice medicine. But we still want your best part of what it is to be human too in a doctor and keep your intuition intact.” That’s kind of where the front argument of medicine is at the moment.

JM: You give another example in the book of Charlie Munger, who is Warren Buffet’s partner. Charlie gave a lecture at Harvard, I believe, this “Ecology of Human Misjudgment,” where he discusses Richard Feynman’s, who’s a physicist, the first principles, “That you must not fool yourself and you are the easiest person to fool.” I’m wondering how that fits into the practice of medicine and how that can help improve the health care system.

TC: Yeah. There are these wonderful examples in other arenas about how sort of disruptive people have figured out the inefficiencies in the market and ways to exploit that. The Oakland A’s, “Moneyball,” Michael Lewis’ book is a wonderful example. Berkshire Hathaway was the other one that I found that is a beautiful example. These guys were doing these back in the ‘60s, before “Moneyball” was a word.

They just simply noticed a rational human behavior in the financial market, particularly in the stock market. What they noticed was there was just irrational waves of euphoria, followed by irrational waves of gloom and doom. They would simply install the system to just kind of do the opposite of the herd. It's remarkably simple, but very hard to do in practice. Year after year, all of the economists at all the Ivy League schools said it was impossible to do this. The financial markets are 100% efficient. The guy, the one who came up with the Efficient Market Hypothesis (EMH) won the Nobel Prize.

But yeah, Berkshire Hathaway, year after year, would just beat the market. If you invested 10,000 with them, I think, in 1964, or put 10,000 in the S&P 500, you'd have 240 million in Berkshire Hathaway today, and you'd have only 1.5 in the S&P. It wasn't by a small amount. These guys learned how to find these efficiencies in the market and exploit them very early on. That's the example that I tried to use of what we need to apply to health care.

It just was a fortuitous sort of narrative arc that Warren Buffet, Charlie Munger and Jeff Bezos and J.P. Morgan have consolidated this health care consortium called "Haven Now," with Atul Gawande. He's the chief executive officer (CEO). The idea is to recognize this human misjudgment, the bias in thought, and design systems to correct for that. There's so much room for creativity in health care because the market is so inefficient. But this is a really exciting. We can watch this endeavor from the outside and see how they're doing. Hopefully the government can take notes and apply it to the system.

JM: Thanks for illustrating that. Another topic you talked about in the book is the controlled scientific study or experiment that we based most of modern medicine on. Many of us don't realize that this wasn't always the way. In fact, you allude to a groundbreaking book written in 1865 that was an introduction to the study of experimental medicine and gained wide acclaim, and clinicians started applying the principles. The journal started using this. But prior to that, it was pretty much a clinician's experience that guided things.

I think you even went into the book in describing Dr. William Halsted, who was a Johns Hopkins surgeon, who came up with the radical mastectomy, but really had no support for it if you carefully analyzed his cases. It was just his opinion. Yet, at that age of medicine, he had enough influence to spread that wide adoption of that technique, which was a miserable failure, and horribly disfigured all these women for no benefit and probably contributed to their premature mortality. I wonder if you could describe that a bit more.

TC: Yeah, yeah. I love the history. You learn so much by just looking back and seeing what the path that we've taken. I was surprised to find a quote by Hippocrates. He said that a physician's judgment matters more than any external measurement. This really guided medicine in the beginning, in the 1700 or 1800s. It consisted of bloodletting, of these crazy concoctions of herbs and things like that.

JM: Maybe it's a kind of different bloodletting.

TC: Right. Now we know. Right. Back then they had no clue. But it was always a guess. This was even compounded by the fact that the physical sciences were exploding – physics, chemistry – carefully designed experiments. We were learning so much. Medicine was really held back so much by this belief in vitalism that the human body was not connected to the physical world. It was infused with some force that we were not able to understand. Medicine is really best left to the kind of mystiques and people’s intuition. This really hamstrung medicine for a long time.

I was shocked to learn that the first well-conducted trial was in the ‘40s, obstructed myosin in the U.K. It’s the first randomly controlled trial. That’s how far it lagged behind. And then all of a sudden, what’s interesting is, then it kind of exploded because they shifted the patent structure to where – pharmaceutical companies – over-the-counter drugs were separated from patented drugs.

This launched pharmaceutical companies into the score-profit venture. They took over sort of outsourced the randomized control trials to them, which exploded them. Then we have randomized control trials. That was the gold standard to determine if a therapy was good, if it was going to be approved by the regulatory bodies in the world.

Now when you looked at it today, it’s become almost – The pendulum was almost swung too far to where that guiding match, where you have to have this randomized control trial and Food and Drug Administration (FDA) approval for a therapy to be good. Now we miss out on these drugs, like metformin that has lost patent protection. But it’s been in the patient population now for decades. You could look at the data. You could very clearly see the beneficial effect.

The amazing study, following 70,000 diabetics versus 90,000 non-diabetic control group. The diabetics on metformin lived 15% longer. There’s clearly something to this drug. But it gets – Again, all this data gets sort of shoved to the side and not looked at because it’s not a randomized control trial and it doesn’t have FDA approval. Because the pendulum’s swung too far, we miss out on so much.

I can’t remember if somebody – A physician told me. I think it’s one of the U.K. guys. It’s equivalent of like a doctor skydiving. He’s about to jump out. He looks back and says, “Well. How do I know this parachute’s going to work? It’s not been randomized controlled trial.” It’s swung too far to where there’s reliance on this kind of dogmatic assumption that you have to have this gold standard trial and you miss out on so much observational and retrospective data that’s meaningful.

JM: So, I can appreciate the fact that metformin may have some benefit. I happen to be prejudiced and really don’t prescribe to taking any medications, even ones that have been out of decades and appear to have minimal side effects. I think – It’s my belief system that they don’t really address the fundamental issue of why you’re treating that disease and these more basic issues or strategies that could more effectively address the fundamental cause. It is a big part of your book and your belief system. I think you may even be taking it.

We had this dialogue by email in the past. You had mentioned some of the reasons that justified that. When I responded to that – I showed you some studies that showed it was a mitochondrial poison and it increases adenosine triphosphate (ATP) production. But you’ve got a pretty good

counter for that. I'd just like your perspective on it. Because I respect your wisdom in this. You've really – You're a careful judge of the literature. I think your opinion is worthwhile.

[----30:00----]

TC: Yeah. You know, there are certain people I really respect the opinion of too. That's kind of led me to the tipping point with taking metformin in low doses. I think what you first said is worth looking at, staying away from interventions, embracing simple health care first, which is just typically stuff your grandma said, "Go outside and exercise. Go in the sun. Eat good food." I try to kind of show this in the book through Charlie Munger. He's got this kind of – He adopted this inverse rule of problem solving.

Say you want to help India, now you shouldn't say, "How do I help India?" You say, "What's doing India the most damage?" and trying to address that. I think that general rule for health care is a great idea. "What are the most simple things I can either take away or do that will keep me healthy?" Intervening usually always comes with risk, unintended side effects. I completely agree with that sort of general strategy.

With metformin, what sort of swayed me is, "We just have to accept the fact that we're aging and we're going to die." This process, it's natural. But it also can be categorized as a disease process. And certain things happen as we age. We just lose the ability to process food well. Most people, regardless, even if you do a great lifestyle, some people will just develop to where they can't process carbohydrates well. This just happens over time. In fact, the numbers in America, it's over half. I think it's 52% of the U.S. adult population is either Type 2 diabetic or has prediabetes.

JM: It's actually worse than that. Because if you look at insulin resistance, as defined by Joseph Kraft in his book on diabetes, it's upwards of 90% of the U.S. population has insulin resistance, which really should be the definition of prediabetes. It's almost everyone.

TC: Yeah. It's a modern-day plague. It's almost going to hit everybody over time, unless you have great genetics, a perfect lifestyle. To me, it's kind of a mitigation of that process, which is sort of inevitable. The data – I would not ever look at something like metformin from a – I think people make huge mistakes by looking at mechanisms to try to extrapolate outward. You have to look at the population data.

The thing that really put me over the tipping point was a study I just cited you that it's taking a less healthy population, the Type 2 diabetics, in conferring enough protection that they're actually living longer than the healthy population. We've known these general principles for a long time, that if you stress a body, mild stress, we get this hormetic response, which is a beneficial response. The way I take it is not continuously. I kind of cycle it and give the body a chance to kind of adjust, things like that. But I think there's a lot of benefit, especially when you look at the context of everybody. With those numbers you just spoke of, I think metformin could make a real difference for the population. It's just very misvalued. It just doesn't get prescribed a lot.

JM: I can accept that. But for the 90% of people who are insulin-resistant – you and I are not in that population. That's why I'm still surprised and confused why you would perceive there are

some benefits when you likely do not have insulin resistance and wouldn't seem to receive some of the benefits that people who do have.

TC: Yeah. It's a judgment call. I think, until you look at a big population of healthy people, like people who have no insulin resistance, who have taken metformin, you really won't know. The way I take it, I take it at night, not even close to when I exercise. I just think that the data is clear enough that the risk is extraordinarily low. There could be a potential benefit down the road. You look at – It's the same thing. If I was doing intermittent fasting regularly, we're all just trying to tap into this caloric restriction pathway that gets talked about so much – mammalian target of rapamycin (mTOR), AMP-activated protein kinase (AMPK). That's all metformin is doing. Again, I don't fast. It's maybe just a replacement for something that I could do that is non-drug related.

JM: Do you do intermittent fasting or time-restricted eating?

TC: I try to occasionally. I found that if I do too much fasting, I find that I get gastrointestinal (GI) issues. I've actually switched it to where – I think I found the antidote to that. Simply, I need to eat more fiber during those times. I think it kind of somehow was messing with my gut microbiome. But if you have fiber during that time – Actually, the last time I've done it with fiber, I feel better. There's kind of all these tricks, hacks. Each individual has to do it the right way. But that was the one that seemed to work for me. Now I'm going to probably start doing more intermittent fasting.

JM: Interesting. You may be interested in exploring a carnivore diet. Paul Saladino seems to be one of the thought leaders in that space. He's a recently graduated physician, who's carefully analyzed the literature and has very strong, compelling reasons, especially with people of GI issues. It seems to be relatively low risk for most people. There may be some benefits. Maybe not the lack of fiber, but fiber that's causing the problem.

TC: Yeah. It could be. That's undiscovered country to me, as the gut biome and all these, the right amount of fiber, the right types of fiber, and the right bugs in there. Again, the health care context, there are some interesting things going on with that. People with Type 2 diabetes, carbohydrate intolerance – You wrote about this in "Fat for Fuel." You can induce this form of metabolism called ketosis, which bypasses that pathology. Carbohydrate intolerance, when you eat carbohydrates, you have to – There's a series of steps involved where your body releases insulin. A pore comes and lets glucose through the bloodstream and into the cell where it gets processed. That process just wears out.

With ketosis, you drop insulin. You drop, obviously, blood sugar. You introduce this new fuel that enters the cell through a different pore – MCT, monocarboxylic acid transport protein. It's a completely separate sort of fuel mechanism that bypasses all that pathology. It's in all of us. I would venture a guess that the vast majority of Americans never enter that state. But it's right there for us.

There are clever clinicians and scientists who have started this company called Virta Health. I think they had 40 million in startup money. It's a drugless intervention, purely dietary for Type 2 diabetes, all done remotely, very good patient access. Their numbers on their first year are

incredible. They have huge reductions in A1C, insulin use. It's all based on this ketogenic metabolism.

JM: Yes, indeed. It's interesting. One of the side effects of the carnivore diet is there's zero carbohydrate, so within a short amount of time, you're literally highly ketogenic. I mean, typically, ketones in the 2.0 or higher level. It's an interesting strategy. But there's another fuel that also utilizes the monocarboxylic transporter, or MCT transporter, and that is lactate, which is previously thought to be a waste product, a metabolic waste product and have no beneficial use. But now, the trend is to consider it as a pseudo-hormone. If you can generate high levels of lactate with specific types of exercises and release that lactate into the blood, your brain can actually survive on 60% of its fuel as lactate. It's another fuel, other than glucose, that your brain can utilize, besides from ketones.

TC: Yeah. That's new to me. That's another – We keep discovering these unknown things about metabolism and learning. That's unreal.

JM: Yeah. That's one of my new passions now. It's a form of training called blood flow restriction, which addresses probably more effectively any other intervention known, the massive rise in sarcopenia. We have about 25% of the people, once they reach 60, are not having enough muscle mass. That rises to 60% by the time you're 80. It's an epidemic.

Really, muscle is such a valuable resource. It's not just for function and to avoid frailty, but it also is a metabolic endocrine organ. It releases cytokines and myokines. It's also 50% of your body tissue and really the major reservoir of glucose. When you eat a meal that has sugar, where is it going to go first? Ideally, it's going into your muscles. If you don't have a lot of muscle tissue, you're going to be highly – at much higher risk of insulin resistance. It's a big issue.

[-----40:00-----]

Anyway, that's an aside. I just thought – It's just one of my new passions. But one of my other passions – It's a new passion because it's a subset of a broader one, which we both share. I was very intrigued when we –

I think the last time we met, it was at Best Answers for Cancer in Orlando, a few years ago. You were in the process of an early draft of your book. When you first described it, it was nothing like what you sent for me to review, because you had shared with me something I've never heard of before, but since I've learned, perhaps the biggest bet we have to actually crossing that bridge to getting over 120, which is cellular reprogramming, as Dr. David Sinclair refers to it, or the use of what's known as the Yamanaka transcription factors to actually reedit your genome to reset the epigenetic clock and the DNA methylation. I'm wondering if you could comment on that and how your book morphed from that concept into "Curable."

TC: Yeah. I think I misrepresented it the first time.

JM: Because I was just so jazzed after that conversation. You sent me some of the articles and I was just voraciously interested in that material.

TC: Not that that topic's not deserving of its own book. I'm completely fascinated by it. It's really – I think it's not known as widely as it could be. It's hard to explain. I always tell people about it. It's kind of lost.

JM: Yeah. I missed it the first time, and then I started reading the papers, then I finally got it. It clicked.

TC: Yeah. Right. Longevity science is focused on caloric restriction. That's the reliable way to extend mammalian lifespans, all the way down from various simple metazoan creatures to, we think, primates and us. But it's a little less known fact that the longer lived the species, the less likely caloric restriction is going to work. But nevertheless, we can focus on health span. All of these caloric restriction pathways are really well mapped out now. We know about mTOR, AMP kinase and sirtuins. Nicotinamide adenine dinucleotide (NAD) is the biggest sort of next block, Western intervention, because it kind of triggers those pathways.

This is outside of that. What we call this is epigenetic rejuvenation. I think that's kind of the term that's been settled on. When you think about humans, about our species, about all life for that matter, we are essentially immortal in the fact that we take our aged germ line cells and we recombine them through the process of fertilization to create a new life. That life is biological age zero when it comes into being.

How does that happen? The way that happens is it takes our 23 chromosomes from the mom, 23 from the dad. There's a process in the egg that wipes off the processing of the software. The software in the genome is the epigenome. There's molecular tags on our DNA that are wiped clean and the new ones are put on. This kicks off the process of embryo genesis.

In the process, it resets the aging clock. Now, we're starting to learn that you can do this, you can take a cell off you or me, Joe, and put it in a Petri dish, add these factors – they discovered there are four factors that are involved in this process – and you will reset the epigenome back to age zero. Now, you know, you can take a 9-year-old's skin cells and do this. And then potentially, now it's a therapy. You can inject this back into them. You can come up with tissue regenerative strategies.

Dr. David Sinclair and others recognize the potential of this. They're doing it in-vitro – sorry – in-vivo. So you can express these similar factors within our bodies, our aged bodies, and rejuvenate them from the inside-out. You're sort of co-opting nature's intellectual property that it uses to reset the aging clock during fertilization to our aged bodies today. I know it sounds like science fiction, but it is the next frontier in aging biology. It's just a matter of time before there are viable therapies that actually start to – not slow down aging in people, but to reset it, to wind their clock backwards. I hope that's a good explanation.

JM: That was great. I appreciate that. I actually interviewed Dr. David Sinclair for his new book on longevity, which should air before this video airs. Yes, indeed. He has done in-vivo work. But that wasn't in humans. It was in animals. I believe it was in mice or rats. He described in our interview some fascinating pre-publication results that he's accomplished, basically turning blind

and giving blind animals their sight back. I forget how the loss of vision was initially achieved, but pretty remarkable results.

I do think – We need these bridge therapies to get beyond 120, because all the caloric restriction, all the metformin, all the rapamycin, all the little biohack tricks that we know – sleeping perfectly, having perfect insulin balance – is only going to get us to 120. That's it. I mean, 125, but the record is 122, so no one's going beyond that without some reprogramming of the genome. It was a very elegant and succinct definition of the exciting potential that these therapies have. And really, in my mind, a profound motivation to live healthy. Because it's not just living to 120, bedridden and frail. We're talking living and essentially, hopefully, having all the functions and abilities that you did as a 50-year-old.

TC: Yeah. The science leads us there. We have much more control over our destiny, I think, than we previously realized. We grew up in the era of where genetics really was the centerpiece of everything. We thought genes controlled most of our destiny. For example, around 2000, when the first rough draft of the human genome was done, Francis Collins, who is the director of National Institutes of Health (NIH), predicted there would be about 12 genes involved in Type 2 diabetes. We'd know what those were, and then we'd know how to design interventions. There turned out to be hundreds. It turns out that the genetic variation between us as individuals is much lower than presupposed back then.

The question then comes. Less of our sort of destiny and the propensity for disease and longevity is determined by, really, a fixed process of our inherited genetics. What's the other process? It turns out the split is about 20 to 80. Twenty percent of our destiny is determined by our inherited genes, and 80% is determined by nurture – by the variables, the toxins we're exposed to, love and relation. All of these things we experience day to day have an impact. Now we know the impact is our epigenome. It changes the way genes are expressed. This has a massive impact on our health.

We know this because of twin studies when you have two perfect clones in identical twins. When you track them over time, what you see is their destinies are very different. They very rarely die of the same diseases. This nurture aspect, this 80% I talked about, that's the part where we can, like you mentioned, have control over, how we can live our lives and change these variables.

I looked at that in the book. What are sort of misconceptions that we have under these kind of medical biases? What are our misconceptions as individuals about our own health? The biggest factor – I was surprised to learn this – When you look at, epidemiologically, “What are the most important factors to stay healthy and live a long life?” We always think of diet, exercise and genetics. Again, genetics is a minority. The biggest factor is your social life and how engaged you are in the world – the number of close friends you have, the number of social integration. How many people have you talked to throughout the day? Did you say hi to the mailman? Did you talk or chat with people at the gym? That's got a massive influence on our immune system.

When you're lonely, you have this sort of corrosive inflammatory response. But when you're not lonely, your immune system has a more targeted response. Inflammation, as we know, is the root cause of so many cardiovascular disease, cancer and so many chronic diseases. That's kind of why these blue zones get so much attention. That's the constant variable. It's that there are very dense

architecture. People are connected and they're surrounded by each other all the time. That's where you have – Sardinia is one of them, where you have 10 times the number of centenarians than you do in North America.

It's kind of – In writing the book, it was beautiful to find that sort of what a good life is, being engaged in the world, exercising and all, those things do matter, of course. But being social, now you lose the realm of data and you enter this sort of “How do you live an artistic kind of caged life?” I thought it was a neat place where the science has taken us.

JM: Yeah. Let me just tie up some of the loose ends here and connect the dots of the excellent information you just stated in that this epigenetic programming that we have due to our environmental factors. It would far outweigh the influence of our genetics, but it does in a very specific way.

[-----50:00-----]

It's usually through this transcription factors that either methylate the DNA, put these small one-carbon molecules on the DNA, which essentially silence that specific genome, or they acetylate it, which activates those genes. So depending on the combination of shutting off and turning on the genes, you get the expression of the genome, so it's not what you've inherited, but your expression of the genome that's so important, which is really how these lifestyle factors influence our genes. And then as we talked about earlier or you described so elegantly, is that, yes, the environment can do it, but we can actually get in there with gene editing and make some changes too.

TC: Precisely. Yeah. That, again – CRISPR, not just at its DNA, the code, but now you can actually edit those methyl groups with CRISPR as well. We're finding ways to directly influence the epigenome. And ketone bodies, beta hydroxybutyrate, is an epigenetic – It's a histone deacetylase (HDAC) inhibitor.

JM: It's an HDAC inhibitor. Yeah.

TC: Yeah. When I was in school, we were told that we have twenty – Well, the guess was we had how many genes? 30,000?, 100,000?. We end up – We have 22,000 genes. Our genomes – That's 2% of our genome. The other 98% was considered junk. But now we know what that 98% is. It's just epigenetic mosh pit of non-coding RNA (ncRNA). All of these things going on. You could never – Scientists couldn't relay the complexity of the organism through its DNA, because there were lesser organisms, like, say, pufferfish, for example, that have a larger quantity of DNA than us. But we're clearly more complex creatures. The answer turned out to be the richness of the epigenome. There is so much going on.

You could think of our 22,000 genes as a piano. The pufferfish has got the same piano, but it's playing Mary Had a Little Lamb, where our genome was playing Mozart. This relates to everything, this change in gene expression. For example, the breast cancer gene (BRCA) mutation, we're used to hearing a sort of Angelina Jolie version, which is inherited germ line mutation and confers a higher risk of cancer. However, unlucky people, for whatever reason – exposure to toxins – they can be born with a BRCA that is hypermethylated, so it's turned off.

Think about that, it's the same function. If you inherit a mutated version, you've lost the functional BRCA protein. If you inherit or you have a hypermethylated version, it's turned down. It's the same thing as loss of function. These people have a way higher propensity for childhood leukemia and thyroid cancer. So yeah, the good news about the epigenome is it's able to be manipulated. We can change it, from lifestyle factors all the way to these Yamanaka factors that kind of reset it back to a younger age.

JM: Yeah. The other part of the equation is what was previously called junk DNA, we now know was mostly non-coding RNA, these very small RNA molecules that actually don't transcribe proteins off the DNA but have other important regulatory functions.

TC: Yeah. Scientists, I think there are some at the Massachusetts Institute of Technology (MIT), they're starting to use these as drugs. Now they've learned to stabilize them. We can start to then directly manipulate gene expression. You know, in my personal view of cancer, I view cancer as a primarily sort of metabolic epigenetic disease. Now, this group at MIT is looking at direct non-coding RNA to change the genetic expression of cancer cells with tremendous outcomes so far in mice. That's one of the reasons we see intermittent fasting, metformin, all of these things that change gene expression, are these viable sort of adjunctive cancer therapies that are being developed.

JM: Yeah. So all in all, powerful information to motivate you and your family, hopefully to apply these interventions. Because not only will it radically decrease your risk for all sorts of diseases that almost everyone seems to be experiencing that you know, and you could avoid the central challenge with the American health care system, which is probably one of the worst in the world, and certainly not designed to help protect you against disease. You want to stay out of this system as much as possible.

In fact, I've done interviews with Dr. Saul and others to give you specific recommendations. I mean, if you happen to go to a hospital, you almost have to have someone stay in your room all night long if you want a good hope of staying alive, because there's a good chance you could die at a hospital, just by a simple mistake. That's just the nature of the business system. But let alone the predatory billing practices that almost the entire system is designed to. Really, as we referenced earlier, 1 in 5 families in this country had a medical debt. It's the largest contributor to bankruptcy.

These are all powerful motivations to do the simple things that are usually inexpensive. It's not necessarily a shopping bag full of supplements. It's the simple basics: sleeping well, choosing the right foods, choosing when not to eat, time-restriction eating, exercising and getting plenty of sunshine. These are simple basics that pretty much everyone could apply to radically improve their health and avoid the medical care system, so you don't have to buy Travis' excellent book, "Curable," because you're not going to be involved in the system.

Now, actually, you do. Because it is a good book. It's a great book. Travis is one of my favorite authors. I really enjoy the way he tells the story and makes it a very readable book. If you're interested in this topic, I highly recommend it, "Curable." It's out. Probably you can get it on Amazon now.

TC: Yeah. One month, one month. You couldn't have ended on a more elegant note, if you can stay out of it. The numbers are scary. I think it's 200,000 die every year from medical error. I learned one that 7,000 people die from sloppy physician handwriting. If you're in the hospital for four weeks, you have about a coin-flip chance of developing C. diff, which is a horrible, horrible intestinal infection. Yeah. Anytime you can stay out of that system, not just the financial but the real health risks.

We didn't even touch on the overtreatment and cancer that is so rampant that you could just go on and on. But yeah. I think you're right. The focus – Things you've been saying for such a long time, Joe, to the masses, is your best kind of – My editor said something to me while I was writing the book that I thought was beautiful. You can be your own culture of one when it comes to health just these very simple things. And then the implementation and the support and just being with other people. That, in and of itself, is health care.

JM: I couldn't agree more. But it's even worse than that, Travis. I created a meme in 2000, literally 20 years ago now. On July of 2000, I read The Journal of the American Medical Association (JAMA) study that talked about physician errors. I concluded that physicians were the third leading cause of death. If you look at the numbers in that study, it was true. Ironically, the study was published by Dr. Barbara Starfield who was an M.D., Ph.D. out of Stanford. Ironic because literally 11 years later, she died from a medical side effect. She took Plavix and had some type of complication from it. Even the author of this study was killed.

Interestingly, they don't discriminate. This video is, I believe, airing in September. In July of this year, we celebrated the 50th Anniversary of the Apollo Moon Landing. The first man in the moon, as I'm sure everyone watching this knows, was Neil Armstrong. He died from a medical mistake. You may not know that, but it was linked to the New York Times on the anniversary. They don't discriminate. They kill even America's greatest heroes. It doesn't matter. You're at risk.

Really, my meme was doctors are the third leading cause of death. But the reality is that the American medical system is by far unquestionably the leading cause of death in the United States and the world. Why? Not because they're killing people by mistake or indirectly – or they are killing people indirectly because they're failing to understand what the primary foundational cause of disease is. By failing to address that at the fundamental level, they are causing premature death and needless pain and suffering in virtually the majority of the population.

TC: Yeah. I learned something. There's a stat that's really burned in my mind. We've had such a focus on early detection for cancer. We've gotten much better on it – thyroid cancer, breast cancer, prostate. However, that hasn't changed the death rates at all. But it's led to an incredible amount of overtreatment, unnecessary treatment, because most of these tumors are not dangerous at that point. If you are diagnosed with cancer from a prostate-specific antigen (PSA) test, prostate cancer, you're 47 times more likely to receive damaging treatment – chemotherapy, surgery or radiation – than you are to have your life extended.

The problem with this now is the way you frame it. When the doctor says the word cancer, the patient almost demands treatment. Let me tell you the power of human incentives and the way we talk. In the '80s, there were two treatments for lung cancer. There were surgery and radiation.

Surgery gave you a better chance of survival, but it also came with a 10% risk of death. If the doctor said you have a 90% chance of surviving the surgery – patients went for surgery 84% of the time – if the doctor said you have a 10% chance of death from the surgery, they only went for surgery 50% of the time.

Our minds are wired. You can show this now. We know it very clearly. We're wired to have a bias for law subversion. That's why you see that. What should be a raw assessment of that data to make that decision is twisted by a human bias. That spins back to all of the silver treatment and how do we address that. I think we just have to acknowledge the fact that one dangerous tumor you might miss, but the other 100 that you over-treat is more of a burden on the system than the one you might miss. It's a reframing of how we think of – you're right – of how we're performing medicine.

JM: Yeah. You could extend that argument to vaccines too, “For the greater good,” supposedly. They're ignoring all the people they're injuring, which far outnumber, thousands of times, typically, to one, for the one person who may be benefiting from it. It's a flawed system. That's why you need to pick up the book, “Curable: How an Unlikely Group of Radical Innovators Is Trying to Transform Our Health Care System.” Read it so you'll be even more motivated to follow these healthy strategies. I really appreciate you, Travis, for writing the book and providing such a great resource.

TC: Thank you. We had a fun conversation. Thank you.

[END]