Ivor Cummins	00:34	I'm here today with Dr. Stephen Hussey and I noticed he did a tweet a couple of weeks back about heart disease and cancer and connections between the two. So we struck up a conversation and then we decided we'd have a chat about it here. And I think it'll be very interesting. Great to meet you Stephen on video.
Dr. Hussey	00:52	Yeah, good to meet you as well. Happy to be here.
Ivor	00:55	Great stuff. Well, you know, this one, heart disease and cancer, I've kind of an interest in cancer, but I'm overwhelmingly, because I work for Irish Heart Disease Awareness, interested in the calcification scan, atherosclerosis and mainly heart disease as a modern degenerative disease. But cancer I'm interested in, but I found whenever I discuss it online, I sometimes get attacked by the art skeptics, shall we say, who hate anyone talking about cancer and diet and sugar and how it might be caused by lifestyle and diet. So I kind of steer clear of it a little. But I I think what you raised there was a very interesting thing that the two may be connected. So maybe in kind of layman's terms somewhat, for the mass audience, discuss the whole ideas that you are raising there. That'd be great.
Dr. Hussey	01:47	First, I've done a lot more, I've had a lot more interest in heart attacks and heart disease, because of my own personal story and how… because I'm type 1 diabetic so I've been told my whole life I'm predisposed to that sort of thing. So I've really looked into what I can do to prevent heart disease. But I'm just interested in health in general. So I look at anything.
	02:10	You know, I came across Dr. Seyfried's work up in Massachusetts and now he's, you know, "Cancer as a Metabolic Disease." And then also, he really builds off the work of Otto Warburg, who I think back in the 1920s, or 30s, won the Nobel Prize for showing that cancer kind of has the shift in metabolism, which is now dubbed the Warburg effect. So basically what happens is, you're... I mean, kind of the way I see it and what I kind of wrote about in the blog is that, you know, when you're a zygote, you know, a sperm and egg come together and that implants on to the side of the uterus, but before that happens, the cell, our first cell doesn't have an oxygen supply. And so what it is is kind of this rapidly dividing, anaerobic (without oxygen) and undifferentiated cell, which is kind of what sounds like cancer, what cancer cells are. But then as soon as that cell gets an oxygen supply, as the diffusion happens from the mother's blood supply, then that cell becomes aerobic, it can use oxygen, it can differentiate the

different types of cells, so becomes a liver cell and a skin cell and those types of things, and it has more control division.

03:31 And so to me, it means that the ability of the cell to use oxygen is key for preventing cancer and what structures in ourselves allow us to use oxygen, our mitochondria, they're there so that we can use oxygen and then harvest the bonds from our food, the chemical bonds stored in food so that we can make ATP and make energy. But if those mitochondria become damaged, then the cell is kind of forced to (since you can't use oxygen) it's forced to revert back to what I think is kind of an older way of doing things, which is what it was, whenever, you know, it was that zygote before it implant down to the side of the uterus. And so it's kind of like the survival mechanism. The cell wants to survive, it doesn't want to die. So it does this term fix, it's become this rapidly dividing anaerobic without oxygen, undifferentiated cell. And that is cancer. And I think it all stems from the inability of our cell to use oxygen. So things we're doing in our lives can damage mitochondria to the extent that our cells forced to do this other thing.

04:36 So obviously, it's a survival mechanism. Short term, but not so great, long term. But it's just kind of how the cells programmed. So that's the cancer side of things. So since I've spent so much time looking at heart disease and the series of events that that I think causes a heart attack, I think it's very relevant, because I believe it's a shift in metabolism as well. It's a kind of a forced shift in metabolism that leads to a certain series of events that causes tissue death in heart tissue. And it's not as often as we think, caused by a severe stenosis or plaque formation.

Ivor 05:20 Right. And I think it's probably broadly acknowledged, well, I don't mean acknowledge, but broadly believe that 60, or 70% of heart attacks are plaque rupture related with a sudden blockage of an artery, and that causes lack of oxygen and flow to the muscle of the heart, and the heart attack. And then another 30, or 40% can be electrical or metabolic or something else. So we can probably argue over the percentages, but you believe that quite a large proportion are related more to a metabolic crisis in the heart and perhaps not so much a percentage related to plaque rupture. So maybe talk about that crisis in the heart that occurs and what's going on there.

Dr. Hussey 06:06 Yeah. Well, first, I'll talk about the work that I looked at, that kind of showed me why or put doubt in my mind that it was these blockages or plaques that was causing most of these. And that was the work of a guy named Giorgio Baraldi, who is an

Italian medical doctor who did research at University of Milan, I think it was. He spent his whole life doing autopsies on people who died on their hearts, doing autopsies on their hearts, whether they died of a heart attack or whatever, anything else. And he found really interesting things, he found that some people had complete stenosis of arteries, and they did not die of a heart attack, they died in like an accident or some other disease. And they had never complained of heart, they had no medical history of heart disease whatsoever. But they had complete stenosis of these arteries. He found things like the heart, the people that did die of a heart attack, their heart attack happened, say over here, an area of the heart where like the left circumflex artery supplies blood with the but the blockage you found was over in the anterior descending artery. So it didn't make sense. Or he found that there was a plaque formation but it was really old and the heart attack had just happened. So it was obvious that the plaque had been there a while, the clot formation had been there a while but the heart attack just happened. Or he find things like, there was a plaque formation or clot in the area where the heart attack happened but the death of the tissue in the area was way bigger than the the area that was restricted in blood flow.

07:40 So lots of things just weren't matching up. He did, you know, probably thousands of these autopsies. And what he did was he took plastic cast material and he injected it into the arteries of the heart. And then he, I think he did it and it hardened, that caused it to harden and they dissolved away the tissue on the outside, and he had this perfect cast of the arterial system of the heart. And so he would look at different things and studied different things doing that.

08:08 One thing that he found was that anywhere there was more than 70% stenosis of a coronary artery, the body had built a collateral system of arteries that totally bypassed on its own. So it wasn't sacrificing one spot. And he said, that was everywhere, like every single time that there was a 70% stenosis. But one of the studies that he did, he said that, in 50%, of the hearts that he studied, there was no clot, no stenosis, and these are people that died of heart attacks. No clot and no stenosis. And then in the other 50, he said that, in 93%, of those 50, there was evidence that the heart attack was not caused by the clot that was there. But the clot, that form was sometimes happened after the heart attack happened. Or it was one of those things like I described before, there was a clot, but it was in the wrong spot from where the heart attack happened and those types of things. But didn't he said there was a certain percentage of

cases that there was a clot and it matched up exactly was where the heart attack happened. And so that is a definite possibility.

09:18 But his work kind of threw all this doubt into this whole stenosis or clot theory of a heart attack, at least for the majority of them based on his work. And I've looked at other pathologists too, none of them are really definitive, “Yes, this causes the vast majority of heart attacks, this stenosis or clot formation.” And so I really got into looking what does cause these heart attacks. And I found that this stenosis, or this atherosclerosis is still very relevant. But it's relevant in a different way. And so, there's a series of events that I think leads up to the events that causes the heart attack, and they kind of have to happen when the stars align. That's why we don't see it happen in everybody at a time. But these three imbalances, I believe, are not being well fat adapted. Not saying you have to be in ketosis all the time, but you know, being adapted to be able to burn fat and go back and forth, like metabolic flexibility.

10:22 The second one is increased oxidative stress. So basically oxidative stress is when we have excess free radicals in our body. And free radicals are made just by when we make energy for fuel, just like a car makes an exhaust when it burns fuel as a waste product. And our waste product is a free radical. That's an unpaired electronic, it likes to be paired. And so it will do anything that it can to be paired, including stealing an electron from another tissue, which can damage that tissue. And so things that cause oxidative stress are like burning too many carbohydrates, can lead to more production of these free radicals. But also toxin exposure, you know, heavy metals, and plastics, and all these different things can act like free radicals, with high blood sugar will damage molecules in our body that can make them into free radicals. So there's all different kinds of things that can lead to oxidative stress.

11:13 And then the third one is an imbalance in your stress response. So basically, we have this autonomic nervous system that is perceiving our environment and telling your body whether it is in a safe or stressful environment, or safe or threatening environment. And if we don't develop properly, when we're younger, or we have traumatic events, or we live a high stress life, we can get an imbalance in the stress response. And it's the thing that, you know, if these other imbalances are in place, the stress response can... you know, if we have a stress response without the concurrent, non stress response, balancing it out, we can get what triggers the events that cause a heart attack.

	11:56	I can string all those together if you're ready, or if you have any questions about that we can talk about it first.
Ivor	12:04	We might pick a little on that, and it's hard for me to recall everything you said but I'll pick out some things. So just on the latter ones, the three I think they're they're very well formed, so the inability to build fat and metabolic flexibility speaks to the whole metabolic syndrome, diabetes, dysfunction. You know, the ultimate people who can't burn fat properly and their glucose is high. The oxidative stress then is absolutely a given hypoglycemia and everything around oxidative stress, including heavy metal and many other causes for someone who may not have a problem really with hypoglycemia or diabetes, yet they still have heart problems. You know, there's so many other causes of oxidative stress.
	12:46	And the last one, actually, the stress one, that's interesting, I know, Malcolm Kendrick, who has some very provocative blogs, he thinks very strongly of stress as a potential large cause. I not so much so. But I don't think you were talking really about just generic stress. So someone who gets really stressed in the job and is really aggressive and driving for result, and then they back off afterwards and they calm down and relax, that's probably pretty ancestral and okay. But you're talking about a chronic, steady underlying background stress that some people have that really re encodes them, and physiologically, and biochemically, not just mentally. So maybe we'll tease that one out a little.
Dr. Hussey	13:32	Yeah. So, our biologic stress response, and this is based on the work of Robert Sapolsky at Stanford. He's shown that our stress response is supposed to be like most of the mammals we see in the wild. It's pretty much a non stress response until their life is threatened. So something comes out of the bushes and tries to kill them. And then they have an appropriate stress response and that mobilizes all kinds of metabolic processes to help them get away or fight off that stress. And then he's shown that if they do get away, they happen to get away, their stress response goes away. It's almost like it didn't even happen. They're not thinking about it anymore. Whereas we humans have the ability to overthink things. Our higher level thinking got us a lot of places, but there's a bit of a mismatch right now. Because you know, something stressful could happen to us and we could think about it the rest of the day, or the rest of the week, and/or fear that it's going to happen again, or we could see something stressful happen to someone else and fear that's going to happen to us. And lots of times, we tend to have, you

know, physiologic life threatening responses to non life threatening things, because we're thinking our way into the stress response. And if we do that chronically and we don't have this healthy balance between stress and non stress state, we can get stuck. We can kind of downplay the activity of the parasympathetic nervous system, which is the rest and digest state and get an overstimulation of the sympathetic nervous system.

15:07 And as you know, I'm sure I'll talk about soon that I think, is the final kind of driving trigger that triggers the events that cause a heart attack, as long as those other imbalances are in place as well. And I think that it's evident when we see things like the majority are most heart attacks happen on Mondays. There was a study done somewhere in Europe, I think it was France, where they showed that heart attacks were more prevalent on stressful days of the year. So they found that the number one was, I think, Christmas Eve, which is unfortunate, and also what they call summer holiday. And then sporting events were a big trigger for heart attacks, apparently. And then they also found Mondays as well.

15:53 It's just an association studies. So you can't prove causation. But just that we see that association, I think it means that there's a pretty important aspect to the stress response, provided those other imbalances are in place as well.

Ivor 16:06 Yeah. And kind of the way I look at it is it's a contributory factor. There's many, many potential factors. So you might get those associations because it's certainly contributing acutely and chronically. But then you've got loads of people who are actually quite relaxed and don't have issues, they got a massive heart attack, because the other big factors have taken them down regardless of that one. So you know, it's going to be a proportion where that's important. That's fair enough.

16:33 Just circling back to the only other thing from your initial summary was the causes. Yeah. Dr. Joseph Kraft, who I think you're familiar with. Myself and Dr. Garber interviewed him back in '15. And he did 15,000 insulin essays. And he was a pathologist and the Chairman of the Pathology Department, basically a lifelong pathologist with enormous experience. But he actually himself tied many heart attacks to the tiny vessels in the IV (interventricular septum) septum of the heart, and that hyperinsulinemia and hyperglycemia would damage all these micro vessels, and then occlusion of those are vasculitis of these little vessels in the hearts rhythm center, the IV septum could

		trigger many heart attacks and sudden cardiac deaths. So I think the point is well taken that there's many different causes. But absolutely, it's probably time for you to get into your favorite one, around this metabolic problem that could cause many heart attacks.
Dr. Hussey	17:38	Oh, even that one that you're describing, they're like insulin resistance and insulin issues. That's a metabolic issue. That's a problem with our metabolism. If insulin is too high, we're feeling our body on the wrong things. But yeah, we'll look at these three imbalances and how I think they directly lead to one causes a heart attack. So let's say the person is relying on carbohydrates. The heart is, it really prefers to burn fat and ketones. And I have multiple studies that show that. And I think it has these mechanisms in place that allow it to be... it's almost like the body wants it to be the last thing to have to be forced to burn too much glucose. Because it's burn some glucose, but predominantly it burns fat and ketones.
	18:29	Like one being that a chylomicron is uptaken digestive system. Well it can't really be uptaken, so it's put into the lymphatic system. And that drains pretty much directly into the heart and has to go into the lungs first, but then it comes back and the first tissue that it goes to is the heart. So it's almost like the body's giving preference to those fatty acids in the chylomicron to the heart. And then also, I found the study recently that shows that the heart has the signaling mechanism that allows it to communicate directly with fat cells. So it's almost like if it gets to a point where it's having to burn too much glucose, that the signaling pathway happens, and mobilizes fats and fat cells, maybe to allow it to burn more fats. Because, as we'll see, I think if it's forced to burn predominantly glucose, bad things can happen. That's the first thing is, let's say someone is relying on carbohydrates, so I think that they're... you know, if this series of events happens, they're just more likely for the heart tissue to convert to predominantly burning glucose.
	19:31	Now, the second thing is the oxidative stress component of it. So oxidative stress is doing a few things. One, I believe it's damaging the lining of the arteries. It's one of the things that causes that damage and then body reacts by building up cholesterol and minerals and things to kind of patch up that damage. And we get this atherosclerosis. But the problem with that is that the endothelial, the lining of our arteries is what's responsible for making nitric oxide, [Inaudible 00:20:03] we get a lot of damage to these tissues that can't make nitric oxide at the amounts that they need. And also, nitric oxide can act like

an antioxidant, neutralizing these free radicals. So if we have high oxidative stress we're taking care, we're depleting our nitric oxide.

20:21 And nitric oxide is very important because it it dilates the blood vessels, which is one thing that it does, but also, it's necessary for that stress signal I was talking about. For the sympathetic signal to get into the cells, it doesn't need any kind of thing to help it relay the message to the cells. But for the parasympathetic, which is our rest and digest state and signal, it needs nitric oxide present to get into cells. And this is some of the work of Stephen Porges studying the stress response on the heart and in mammals in general. But, without that nitric oxide present, we don't get that parasympathetic signal. So usually what should happen is if we get a really stressful event and we're having a stress response, we get this surge of sympathetic activity to the cells. And here I was talking specifically about heart cells. And then we would always get a lesser signaling of the parasympathetic as well. They're always balancing each other out, they don't allow each other (the cell) to get too strong of a message from either one.

21:32 But if a nitric oxide is not present, then we can have a stressful event like I talked about in that study like Christmas Eve, or like a sporting event or something like that, that can trigger that stress response and we get a surge in the sympathetic activity in the heart cell and we don't get the parasympathetic. And so what happens then is just like when we get a stress response, like if something's threatening our life, your body does things to help us get away from that. And one of those things is converts to burning glucose because it's quicker to burn, give us faster energy. So ideally, we get away from that threat. We fight it off, or get away from it quicker or more efficiently.

22:12 That's the same kind of thing that happens in our muscles. Like when we go for a run, we start burning glycogen that's stored in our muscles, and we start burning glucose and we get a buildup of lactic acid and hydrogen ions, which causes muscle burn. We feel that when we go for a run. But luckily, when we go for a run, if it's too much, we can just stop, and the lactic acid in the hydrogen it's pumped out. But for the heart, if it gets that signal, and it starts burning predominantly glucose and we get this buildup of lactic acid and hydrogen ions, it can't just stop beating. And so that's a problem. So that burning that we feel in our chest (angina) I think is is the heart being forced to burn too many carbohydrates and getting that buildup of lactic acid. If it happens to an extent where it creates this huge surge of

burning glucose because of a stress event that happens and we're not well fat adapted, and we don't have that nitric oxide, then we can get this massive buildup of hydrogen ions and lactic acid. And that does one of one of two things. I'm not exactly sure what happens, because I've seen evidence for both of these. And it could be both, they could happen both. But the big thing is that the shift in metabolism is what does this. So one, the buildup of lactic acid and hydrogen ions causes of swelling in the heart tissue. And that swelling changes the pressure gradient. So usually the pressure is is higher coming from the arteries into the tissue. But now the pressure is higher in the tissue, and so the blood is not allowed to get in. And so that causes a tissue death.

23:56 But I've also seen that in some heart attacks where they were able to induce heart attacks, I think in mice, where they didn't change the oxygen at all. So they weren't depriving blood flow at all. So the other theory is that, and there's plenty of evidence that shows that when we mess with calcium to heart cells, we get arrhythmia, we get all kinds of issues. Because calcium srt of allows the muscles cells to contract. And if they can't contract, we get issues.

24:24 The other thing is that this lactic acid interferes with calcium's ability to bind to [Inaudible 00:24:32] and cause the muscle fibers to contract, or it interferes with calcium's ability to get into the cell for whatever reason. And so that can cause the inability of the cell to contract and we get tissue death as well. And then, one of the things that Baraldi found when he was looking at those autopsies is that sometimes there was evidence, like I said, that the clot happened after the heart attack happened. So it wasn't the cause, iIt was the result of the heart attack. And so he was saying that when we get that increase in pressure from the swelling, pro lactic acid buildup, that actually rupture some of the synoptic processes that have already taken place, and pieces fall off, and he finds plaques and it makes the situation worse.

25:20 But yeah, that's kind of the series of events that I think can lead to a large part of heart attacks. And you know, all these components of our lives, our stress response, our oxidative stress and toxin exposure, ur food, and what we're eating and fueling our bodies with can all play a role in the series of events that causes ischemia.

Ivor 25:43 Yeah. So many causes, but all of them are pretty much environmental. They're not really genetic. I always remind

people, the overwhelming number of cases of chronic disease leading to early death and disability, they're not genetic diseases, they're environmental diseases. And we see that in indigenous populations that are almost absent from these diseases and early deaths. And if you move those indigenous population people to our modern Western lifestyle with the metals, the toxins, the refined carbs, sugar, seed oils, within a generation or two, not only did they get all the disease, but often they get it even worse than say Western Caucasians do. So it's a point well made. This is not genetics, this is all environmental. And the question is, what can you do to optimize your environment, like an indigenous person, I guess.

26:36 Now, there's just one thing I pick up on there, when you mentioned calcium, you're talking about elemental calcium, and all of the reactions that partakes in, obviously in contrast to the coronary calcium CT scan that sees the calcium and the plaque, just for listeners. But another interesting thing is that - and we talked about this earlier - that the coronary calcium scan results showing the plaque burden has an incredible predictive power for heart attacks, but also for all cause mortality and other issues. So the coronary calcium scan result is the perfect test to predict your risk. But as you say, many heart attacks, maybe still due to the same causes. You still got there by doing things which drive up your calcium score, but not all of them by any means are due specifically to a plaque rupture. And yet, the key thing is that when you do the wrong things like getting oxidative stress, metal contamination, or not being able to burn fat, if you're doing any of the bad things, you're simultaneously going to tend to drive up your coronary calcium score, because you're going to drive a lot of plaque.

Dr. Hussey 27:46 I think that the calcium score is telling us, you know, how much damage we've done to the lining of an artery because the body's forced to patch that up with cholesterol and calcium and various other minerals and things. And that's because of the oxidative stress we have. So I think that that score is telling us how much oxidative stress we're exposing ourselves to, and we need to do things, change our lifestyle to minimize that oxidative stress.

28:12 And then also, I think that it's telling us that we're not eating enough good fats. And by good fats, I mean, like good source, animal fats are going to have really high vitamin K2 which is responsible for taking those minerals and shuttling them where they need to go, which is the bone. And if they can't do that, because we don't have the K2 because I think there's like a

		massive K2 deficiency in westernized cultures, then we're going to get even more deposits in our arteries because there's all these minerals [Inaudible 00:28:44] around that can't get where they need to go.
Ivor	28:46	And interestingly, I've been going into the kind of biomechanics of calcification processes in the past couple of weeks, because, well, to cut a long story short, we're seeing reverses of calcification, so I'm getting really interested in understanding the deeper message mechanisms of depositing and indeed egress or removing calcium from the arteries. But interestingly, I have some papers now that say that not only is the calcium potent to stabilize, it's recruited in with a full bait bone matrix formation process, a response to injury, if you will, which makes sense. But the calcium, ironically, the presence of calcium can cause a knock on inflammatory effect in the surrounding tissue. So like you said earlier, everything's in balance, but things can both be an attempted curing and also having non intended inflammatory consequences too, like our immune system is triggered for inflammation to fix the problem. But if it's chronic, it can kind of lead to furthering the problem.
	29:49	So everything, the arrow of cause kind of moves all directions really, doesn't it?
Dr. Hussey	29:52	Yeah, yeah, totally. And that's really interesting, and really fascinating to see what all you come up with in that work. But yeah. You also mentioned too, that what we can do to prevent these things and rebalance these imbalances.
	30:46	You were talking about how, you know, we don't see heart disease in these more traditional cultures. Weston Price found this when he traveled the world, and then more modern studying of these indigenous cultures show this as well. And so if you link it back to these three imbalances, lots of times, these cultures are fueling their bodies correctly. They're eating lots of high fat foods, and yes, they eat some carbohydrates too. But the evidence is even shown that, you know, in our evolution, human evolution, we were relying on fat, and that's what made us human. And so these modern cultures are not living in the environment that ancient humans were living in. And so they're having to rely I think on some carbohydrates and things like that. But still, they're able to fat adapt. They can go back and forth, because they're not scared of fat like our culture is. So that's one thing.

31:44 The other thing is that they're living out in nature much more natural environments than we are and they're not exposed to all these toxins that we're exposed to. They're not exposed to the heavy metals, and the plastics, and the artificial fragrances and all these different things, and so their oxidative stress is much lower. They're also relying more on fat for fuel, so they're not making [Inaudible 00:32:08] just by burning carbohydrates for fuel. And so these are things that we need to try and figure out how to do within our modern world, like, be very conscious of the toxins you expose yourself to, because you're never going to avoid them all living in the modern world. You just have to control the one you can control and not freak out about the ones that you can't. Because if you freak out about them, then you're driving your stress response, which can also be contributing to things. And so that brings me to the stress response, like how do we balance? How do we make sure it's healthy? And I think that it's really... I mean, the work of Stephen Porges has shown that when we're born, our autonomic nervous system is not fully developed and it's very reliant on signals during our first six, eight months of life, that train our nervous system what is a safe environment. And so, he makes the argument that it's contact with mom and dad, It's a loving gaze from mom and dad, and looking into their eyes. Because, you know, humans have this emotional connection to our hearts, where we say, "I love you with all my heart," and you gave me all your heart and all this kind of stuff. But that emotional state is conveyed through the muscles of our face, our emotions, so I can pick up on how you're feeling about something. And so to train an infant on how to learn how to be in a safe environment is really dependent on them getting safe cues, which is why we see young children who are exposed to traumas tend to have problems later in life. And I think it's because their default state of what safe was not what it was supposed to be. And so they can't get back to that balanced autonomic nervous system.

33:57 But fortunately, even if you did have trauma as a child or didn't have a properly developed autonomic nervous system, there's things you can do to make it better and to rebalance it. And so it's no surprise that, you know, contact with nature, like those indigenous tribes would have had a lot more of has been shown to rebalance the autonomic nervous system and stimulate the vagus nerve, as I said in Health Circles, because the vagus nerve is what's conveying that autonomic nervous system signal. Also gut healing has been shown to stimulate the vagus nerve and promote autonomic nervous system balance. And to me, that's because our gut is kind of one way that our body signals what

type of environment we're in - is it safer? Is it threatening? Are we starving for food? Are we not? Are we ingesting things that could be damaging? Like the processed foods, with the glutens and sugars and different things that damage the gut lining. If our gut is a hostile environment, our brains getting a signal that we're in a hostile environment, and it's chronically stimulating that sympathetic activity. So gut healing and just creating a less hostile environment has been shown to increase autonomic nervous system balance as well. So lots of different things we can do. We just kind of kind of take back control of your life and learn what it takes.

Ivor	35:27	Yeah, and actually, all of those things as well, that affect the vagus sort of sympathetic or parasympathetic, all the things you'll do to help with that through gut permeability. And through everything else, they'll all tie back to things you should be doing for your hormonal balance and for your general health as well. So you're going to be eating lower carb, non processed foods, no sugars, no seed oils, ideally, no gluten, and you'll be getting exercise, you'll be out in the fresh air and the sunlight. So it's kind of like, you can argue around the relative contribution of stress and contribution of direct oxidative stress, or hormonal effects and imbalances from eating the wrong things and living a bad life. But the kinds of solutions or root causes you'll fix in your life are always going to be the same cluster of kinds of things. Which is kind of makes it easy, you don't need to know exactly which driver is the bigger one. You just need to know, “Well, what are the cluster of things in my life I need to do to maximize my health and reduce all of these problematic factors?”
	36:32	But you know, I'm thinking now, my mind is going back to the heart and cancer. So you very well described their potential source of many heart attacks. And a big part of it is the heart being forced to switch towards a glucose burning metabolism away from the preferential fat burning. Because absolutely, I was amazed six, seven years ago, when I learned that the heart was an extremely fat fuel intensive organ and it preferred fat in all circumstances where possible. So this movement of the heart being forced to move towards glucose metabolism and build up of lactate hydrogen ions being pushed towards that because of bad things, how does that tie into the why we don't really have heart cancer and heart tissue question?
Dr. Hussey	37:22	Yeah. I think that heart cancers are very, very rare. They’re the rarest form of cancer. And I think that it's because when... like I was talking about before, the heart has these mechanisms in

place that makes sure that I think it's the last thing to be forced to burn glucose, and the brain is probably second, but the heart specifically. And so I think that when it is forced to burn glucose, the reason that it's trying so hard to prevent it from burning predominant glucose is because when it does, we get a heart attack. So obviously, that's more life threatening than initially starting the process of cancer, like cancer is not going to kill you right away. And so what I think is going on is that, you know, there's no chance for the heart to develop cancer, because when it's forced to burn glucose, a heart attack happens. There's no chance for that process to happen.

38:24 I've done some looking and a lot of cancers that do happen in the heart are like connective tissue cancers. They're happening like on the periphery of the heart, they're not really happening in the muscle cells, but some do happen in the muscle cells. I mean, that's the thing. But lots of them happening on the periphery. So I think that the metabolically active tissue of the heart, which has the highest levels of mitochondria, some of the highest levels in the entire body, because it's so metabolically active, never really get the chance. And those mitochondria don't necessarily get damaged to the extent where a cancer would develop because they're allowed to burn fat. They're preferably allowed to burn fat and the body make sure that happens. It never gets to the point where a mitochondria is damaged enough that they can't use oxygen and cancer develops.

Ivor 39:17 It's a really interesting concept and hypothesis. And when I saw that a couple of weeks ago, I was struck by it, because I knew all about the heart in terms of preferentially burning fat and I largely knew about the problem with its forced to burn glucose. But I never put it together like that. There's a controversy around cancer being a metabolic disease based on mitochondrial damage and dysfunction. You know, a lot of the world's cancer business likes to see it as a genetic disease with magical genetic treatments, though the last 30 years have been very disappointing in that regard. But I was struck once by, I don't know, was it Seyfried, I think it was Seyfried, and they did an experiment in the lab, and they got cancer cells. And they got the nucleus from malignant cells and put them into other cells. And cancer did not result in the other cells by swapping the nucleus on all the genetic material, with all of its supposed genetic issues causing cancer. And then they took the cytoplasm or the cell volume from the malignant cells which had all the mitochondria, and they put that in a healthy cell and left the healthy cell with its own nucleus, all its genetics, and they turn

		those cells, normal cells cancerous, or they died and self eliminated themselves. And they also did the other side, vice versa. And they pretty much elegantly showed that whatever about your beliefs on cancer, it's largely centered in the cytoplasm, the mitochondria and the cell contents and it's not actually really the genetics, but cancer damage to the mitochondria and damage to the cells can cause them to generate enormous radical oxygen species which will damage all the genetic material in the cell. So you're going to see a ton of genetic damage in cancers of all different types, even within the same tumor.
	41:13	So if you kind of take that and say, “Okay, it's primarily mitochondrial problem,” like you say that the mitochondria become dysfunctional, and that's kind of one of the big things in cancer, it's intriguing that yes, the heart by the mitochondria being given a much more fat burning preferential environment, because of the heart's needs, combined with if the mitochondria do become a problem, and the heart begins to burn more glucose when it doesn't want to, you're going to go towards having a heart attack. So you don't really get the chance to develop the cancer in the heart muscle. It's kind of very attractive intuitively if you know some of the biochemistry around it.
Dr. Hussey	41:56	Yeah. And I had never put it together either until somebody very recently asked me, “Why is heart cancer so rare?” And I immediately thought, “Oh, because it never has to burn glucose.” But I never asked myself the question either until that person asked me. But yeah, that's so interesting, what Seyfried did and what you described there, because, cancer, people say, “Oh, it's a genetic disease, it's a mutation.” It sort of is, but the mutation only happens because the environment triggers it to do so. Like I said, it's kind of a survival mechanism. It's an epigenetic signaling from this hostile environment in the cell that triggers these oncogenes to turn on so that the cell can survive short term. And my guess is that the cells hoping that the situation resolves itself before it has to kill off its host. It’s larger tissue that it's in and body that it's in. But yeah, it's really interesting thought process and I hope that we find more and more information about it.
Ivor	43:06	Yeah. And if you then were to summarize, Stephen, so in terms of dietary patterns, we know the indigenous peoples, you know, some of them were higher carbohydrate, but then they were eating from birth with a good environment, sun, social inclusion, and no contaminants and usually nutrient dense shellfish, or

fish or other foods and animal foods as well. They had a load of advantages, and exercise and being out there in the sun in the air. So I guess from birth, if you're living in an excellent environment like that conducive to health, then if you have to rely on quite a lot of own processed natural real food, carbohydrates from the earth, you may never develop a major problem. And these guys as well, even the higher carb [Inaudible 00:43:59] or [Inaudible 00:44:01] I think, that were high-ish in carb, their blood glucose remain dead low, their insulin was low, they'd zero metabolic syndrome. So they were managing to eat quite a lot of unprocessed real food, carbohydrates.

44:16 But if you take the modern population, let's be honest, the majority now of over 45s in America, from CDC [Inaudible 00:44:24] maybe 65% are essentially diabetic from glucose measures. So if the modern Western population, the people most at risk in their 40s and 50s are mostly diabetic, what diet would you prescribe for them to minimize the risk for chronic disease? This phenomenon in the heart, you describe, what kind of diet for those type of people who are at the most risk?

Dr. Hussey 44:49 Yeah, I really liked that line. I wrote a book called The Health Evolution. And it's basically explaining how there's this mismatch between ou Western environment in our evolved physiology, and those people living in that environment would have had all the benefits of their body developing in the proper environment. So you're right, they probably can rely on carbohydrates a little bit more. And I was reading a book by Jared Diamond, who spent a lot of time in New Guinea, looking at those tribes, and he said that lots of them eat yams, like a large portion of their diet is yams, and they're also eating animals and lots of animal fat, but they're eating that as well. And they're perfectly healthy. And so it becomes difficult when you're recommending, what I think everybody should eat, because it depends on where your ancestors came from, and if they developed those genes, because some people are more tolerant to carbs and others. But I think that if we're talking about a person in the Western society that is having trouble with their health, I could probably relate it back all to metabolic health. And the way we fixed metabolism, I believe is a higher fat ketogenic diet, at least making your body learn how to do that. And then once you do that... I mean, I like to stay in ketosis a lot. But like, once you do that, it's okay, if you go out of ketosis. And some people would say, it's even better if you have like [Inaudible 00:46:29] ketosis. But you always want to make sure that you get back into ketosis, so your body doesn't lose

		the ability to do it. You may go on vacation and squeeze out a bunch of carbs and take yourself out of ketosis. Just when you get back, make sure you train your body to go back to it and don't lose the ability to get in ketosis by intermittent fasting or total carbohydrate restriction. Make sure your body's always able to do that. I think that's incredibly important for preventing all kinds of chronic conditions. Like we've talked about all the diseases of metabolism, which I think there are many.
Ivor	47:08	Yeah, and I think yeah, for the modern majority metabolically diseased, even recent figures showed 88% in one study of adult Americans have at least one marker of metabolic dysfunction. So on some levels it's nearly nine out of 10 adults now have some degree of problem. So high, healthy, fast, intermittent fasting, going in and out of ketosis, staying metabolically flexible, it just seems to be a no brainer. I guess, though, you'd probably agree as well, a tendency towards I think you mentioned the phrase earlier, healthy fats. I mean, grass reared healthy meats, without antibiotics, or other toxins and hormones, fish, avocado, olives, all the healthy fats. So it's not a junk food, high fat diet, obviously.
Dr. Hussey	47:59	Yeah, we don't want it to be processed. Seed oils are terrible because that is not natural fat. I always tell people, "We have to do this chemical process to get an oil or a fat from from the seeds." And the same with things like almond milk. And that makes a very chemical process that doesn't naturally happen. We can't squeeze an almond with our fingers and fat come out. But you know, the fats that nature makes, whether it's lard, a beef tallow, or the butters, if you want to do dairy or ghee, or just the bone marrows, all these different animal source fats, we should not be scared of saturated fat and we should how our body loves it. And it often comes with fat soluble vitamins, the huge deficiency of those as well. But we just got to make sure that we're staying away from those processed fats, the ones made by factories, and going back to the ones that nature made and that come naturally.
Ivor	49:01	Naturally, on package, largely as they were in their original form, as well, like you say, too much extraction of liquefied pure fats, perhaps losing some of their nutrients, not a great idea. I'm not so sure but piling in extra oils into my coffee or anything, I'd rather get them from real food, ideally. I guess, the holy triad for me and I've often mentioned it is the triad of disease, sugars, refined carbs, and seed oils, vegetable oils. And those three are honored by inclusion, hugely in most modern ultra processed foods. That's where a lot of our dietary related

		problems are coming from, I guess. If you just eliminated those three and the ultra processed foods and ate real food, you might not be too worried about being hardcore, ultra low carb, that might be just enough for the majority.
Dr. Hussey	49:57	Yeah. So like, I work with people online. I don't do a ton of testing unless they really want it at first. Because I know that if I can eliminate these things, first, these problematic foods or help them maybe detox their environment a little bit and help them work with their stress response, I know that they're going to achieve a high level of health. And if at that point, we still have some issues, “Okay, now, let's do some testing and see what specifics are going on.” But the majority of people yeah, you take out those problematic foods, like you mentioned that the grains and sugars and the seed oils, then yeah, we're going to get a much higher level of health. And it's more about I think, that people are really obsessed with getting all, like enough of the good things and their whole day becomes about getting all the right foods and making sure they're getting all the nutrients they need and everything but it's like really just remove the ones that are not serving you. I think that's more important sometimes than making sure and stressing out about trying to get all the things you need. Because when you remove those, you end up a) absorbing a lot more of the things you need, because some of those foods actually interfere with absorption, and b) there’s just more room and you're eating more of the foods that are higher quality.
Ivor	51:14	I agree, Stephen, and you know, in terms of supplements, when people like constantly asked this question, there's a handful maybe that are really worth having and making sure your high end, maybe the foods are not so replete with the many more modern foods, but if you get vitamin D from UV and the sun ideally, if you get magnesium and vitamin K2, MK4, MK7, and maybe Selenium and a few others, and DHEPA, I guess cod liver oil was always a great boost if you don't really like the fish. But you don't have to become obsessed with every single vitamin and mineral. Just take kind of the big three or four and either really target foods that have them, or maybe supplement but it doesn't have to be rocket science, I’d agree.
Dr. Hussey	52:00	Yeah, I think that supplements, you know, people overdo them, and the supplement issues just as bad as the pharmaceutical industry, in some cases. And people make the argument that, you know, people living a long time ago, these indigenous cultures, they don't use supplements and they're perfectly healthy. And I would agree with that. However, they didn't have

		access to them. I think at a fundamental level, life is about struggle and any advantage you can get, especially when you're living in a modern world that is bombarding you with these toxins and unnatural stresses that sometimes we could use supplements,but we just have to be very picky and not rely on them. It should start with diet, start with food, and then we can kind of boost things a little bit because we live in the modern world and we have the ability to do that. We can selectively choose certain supplements that could help achieve that higher level of health.
Ivor	52:58	Yeah, choosing wildly or not wildly, choosing wisely. Of course. I didn't know I know our time has come up now to the end. And you also just released today a blog and I just saw it this morning on why we get atherosclerosis in arteries, not veins. And I really love that question and I have my thoughts but we'll return to that at the later podcast I think.
	53:24	Great stuff. So thanks a lot Stephen, Dr. Stephen Hussey, and we'll catch you next time.
Dr. Hussey	53:30	Alright, thanks for having me.

[End of Transcript]