DANNY LENNON: Gil, welcome to the podcast. Thank you so much for joining me.

GIL CARVAHLO: Thanks for having me.

DANNY LENNON: There's a lot that I want to get through with you on various different topics, but I think one of the things that you've done most effectively from a broad science communication standpoint is really focus on how do we get people less confused about one of the most confusing topics often nutrition science. So before we get into anything else, can you maybe give people a small bit about your background, then also what attracted you to the science communication aspect of your work?

GIL CARVAHLO: Absolutely. So I went to medical school in my native Portugal, and after graduating medical school, I wanted to get more background and more understanding of research. And so, I got a PhD, moved to the US, I got my PhD in biology at Caltech. We worked on a number of topics, but aging, so gerontology, the biology of aging, what factors extend lifespan and shorten lifespan. And because nutrition and nutrients and nutrient sensing is so intricately linked with the aging field, we ended up doing a lot of work on nutrients and physiological effect of

nutrients, effect of nutrients on lifespan, and then how genetics ties in, all that good stuff. And after that, I've done different stints in neurobiology, I've worked in different fields, molecular biology. And lately, the last couple of years, I've been really passionate and interested and focused on science communication. And I chose nutrition for several reasons, one, it's a topic that I find particularly interesting; two, it's a topic where there seems to be rampant confusion, and where I think there is a wide gap between the available evidence and public perception.

So I thought there was a really good opportunity to provide value. In other topics maybe, bridging the gap wouldn't be as productive. I like to focus on actionable tips, things that people can take the science and go to the kitchen and get the results as quickly as they can, nothing against talking about hypotheticals or mechanistic models or anything like that, I think all those things that are interesting. But at the end of the day, I think most people are interested in science because of the results, at least, certainly nutrition, because of the direct effect it can have on their health. And so, also, not just the value that we offer is predominantly focused on that actionable side of things, but also on my side as a scientist, although pursuing these theoretical questions and doing experiments in the lab can be really intellectually fascinating, and really it's a great career, I was missing a little bit the application side of things. Because, as a scientist, you know this, we spend, sometimes years and decades inside a lab, doing experiments night and day, and the application to people's real lives isn't always obvious or direct.

So I was missing a little bit that side of the what's the point of all of this. Right? I know it may have an application 50 years down the line, but can we help people right now? And because there was so much information available that people aren't necessarily aware

of, this was something that really appealed to me.

DANNY LENNON: Yeah. So I think this idea of the gap between public perception of certain topics and what the actual evidence base says is very intriguing, because there's almost different layers or different categories to it. Right? There's some things that people just have a complete misconception about that they've picked up from some random place that has no evidence at all, but then there's more, I would think, interesting areas to look at, and there are hopefully, some I want to explore a few, in that there are people who actually do try and dive into the research or do have some degree of a background, but still maybe disagree on some of the evidence that is there. And I think there are some of the really interesting areas that get debated within nutrition science. Unfortunately, it's when most people in the population see such debates, then they're left even more confused. So I think to start, one of the areas that I'd mentioned, I would like to talk to you about is dairy and human health, because this is one of those areas where there is this difference of opinion, depending on who you talk to on this question. And correct me if I'm wrong, but I think from seeing some of the stuff you've posted before, if we take something like the newly published Dietary Guidelines for Americans that was the 2020 to 2025 edition, they obviously have a certain overview of evidence around dairy and human health and its promotion in the diet; but I've heard at least you talk about how maybe you feel, whilst some of it is accurate, it might be over emphasized to some degree – can you maybe just clarify if I'm picking it up correctly, and what you see as your kind of position on that at the moment?

GIL CARVAHLO: The problem with dairy is it's so heterogeneous. Right? You have different types of dairy. You have many moving pieces, and that's typically where you'll see the confusion, because of all these different factors working together. So we have different types. Obviously,

butter is a very different universe from milk and cheese and yogurt. We have dose, so exposure, very different amounts in different populations and different individuals. We have the replacement aspect, what are you replacing the dairy with. We have the, what else is present in the dietary pattern aspect, which can influence also the effect of dairy. And then we have the individual variation, the who. Right? And so, when you put all these moving pieces together, obviously, you're going to see some context dependence. So right off the bat, it's easy to see that extreme positions like dairy is poison, and no matter how much you're having, no matter who you are, no matter what else you're eating, you're damaging your health by including any dairy into your diet is very hard to take seriously; and so is there's nothing wrong ever with any type of dairy in any amount, no matter who you are.

So those are easier to put aside, although those are also the stickier messages. The simpler, most simplified or oversimplified messages are usually the stickier ones. Food X is poison or food X heals are the messages that are going to propagate the fastest like wildfire, because it's just easy to remember. You don't need to remember in any nuance, you don't need to remember any context, any considerations about how the experimental design – and it also ties really well with different ideologies and different preconceived notions that people have around different foods, so – and dairy would be one of those foods that are prone to that type of confusion. So there's definitely some nuance there, and we can talk in more detail, but my position specifically with the USDA guidelines is that they still propose dairy as a necessary, as a fundamental dietary group. I forget exactly what the term is, let me call it essential, an essential group, but it's essentially put forward in their plate as something that the implication is it must be in your diet. And if you remove dairy, then necessarily, you're going to run into problems. And I'm not saying that that isn't the possibility; yeah, it's possible

to remove dairy and run into problems. It depends if you have the same nutrients being provided by some other foods in your dietary pattern, and what else you're replacing the dairy with. If you're in certain populations where dairy is a fundamental source of protein and calcium and you don't have alternatives, then absolutely, the dairy can provide – can play an important role.

But what I think is a little misleading is to suggest that for a western population that has all this choice, that there is a necessity, that we need to have in our diets. It's just as misleading as saying that you have to eliminate all dairy, otherwise you're damaging your health. Both positions are a big stretch of the science, and are not really serving people if you're not forgiving them a very warped image.

DANNY LENNON: I think you bring up a number of really interesting points that might be worth explaining in a bit more detail. For example, you talk about, we can think of the context of who we're talking about. So maybe this could be differences in dairy tolerance. We can then maybe look at some of the dose response, I think, definitely to touch on some of the substitution effects. But maybe if we go with that first one of the context for individuals and certain demographics within the population, when it comes to the idea of dairy tolerance, and who it may be more or less likely to be problematic for, how would you tend to try and communicate that to an audience around what we should think about dairy tolerance as a general idea?

GIL CARVAHLO: I think most people have a pretty good idea of whether they tolerate dairy or not. And if they don't, it's a fairly straightforward thing to test unlike other problems with diet that are more complicated to do the direct experiment. The dairy thing, people can try, remove the dairy, see if you feel any difference. And again, provided that you're replacing it with something that is nutritionally equivalent, and

overall health outcomes are equivalent or superior, I don't see a problem having some dairy or not. With tolerance, we know there's an ethnical difference. Northern Europeans seem to be more tolerant. And then among African Americans, I could probably – this is an international audience – I probably shouldn't say African Americans, but people with African ancestors, we all have African ancestors, but people who have more recent African ancestors – so a black population versus a northern European population, there certainly seems to be a larger prevalence of dairy intolerance among blacks than among whites. But whites are not immune from it. There's certainly dairy intolerance there as well. And then, with the replacement issue, for example, there is some really interesting work, when we look at the observational analyses, depending what you're replacing the dairy with, you can find that there's benefit in introducing dairy.

And then when you look at some of these substitution analyses that were done by the Harvard School of Public Health, among others, they've done a pretty detailed analysis of the different substitution possibilities. And what you typically see, both for cardiovascular disease and all-cause mortality, is that if you're replacing the dairy with other animal sources of protein and fat, you can see actually an increase in rates of cardiovascular disease, about 6% in one of the large studies, if I remember the numbers correctly, but then if you look at other substitutions, for example, with some forms of seafood or with plant protein, you tend to see a reduction of disease risk. So this is another thing that's really important to keep in mind when we talk about food, and people expect a simple message like is this food good or bad, just give me the bottom line, spare me all the P values and all the nerdy graphs. But it's really difficult to give a sound bite, because you're not really helping by doing that, even though it may be the

information people want, but it's not the information they need.

So that's one thing that's really difficult, but also really interesting and rewarding about what we try to do with the videos, is we try to hit that middle ground between going over simplified, where it ends up being a misleading message, and also providing too much unnecessary detail where, sure, if you're talking to nutrition nerds, they're going to be all over it. But for a wide population, for a general population, not only are you going to miss most people, you are not going to connect. But also, it's not really memorable, they're not going to remember what you said. At the end of the day, people take the gist of what you said, and they tend to forget a lot of the detail. So I think the bottom line for dairy would be, and we're strictly talking nutrition and health – I know this gets very thorny, and every time I make a video about dairy or red meat or eggs, if I talk about the nutrition aspect, and I try to be very objective, somebody will pop up in the comments and say we're disregarding animal suffering or what about the environment. Those are all valid considerations, but I think it's okay to discuss things separately and to be clear about what we're talking about. And then, of course, once it's done to make your personal decision, you're going to incorporate all the factors that matter to you. But the nutrition angle, I think, if people have some dairy in their diet and their overall dietary pattern is a health promoting one, I don't have a problem with that, I don't see an issue. By the time, you know, I would make a difference, I would definitely differentiate between having some milk in your diet versus having everything covered in butter, it is not the same thing.

When it comes to cardiovascular risk, another thing that I would point out is that the benefit there is we have a control panel at our disposal, right? With other diseases, it’s less easy to do that; but with cardiovascular disease, we have lipids and lipoproteins that we can look at, and

they give us a pretty decent gauge of where we are. It's not perfect, it's not the only risk factor, but they give us an idea of where we're heading. So for somebody who's hypercholesterolemic or has elevated Apo B I would certainly recommend more moderation, especially with butter, with concentrated sources of saturated fat. But if you're generally healthy, if your lipids are good, if your overall dietary pattern is well designed and health promoting, if you have some dairy in there, I don't have a problem with that, then yes, environmental and ethical considerations would be separate and would be something to bear in mind for sure. But health wise, I don't think those things, those caveats, provided those caveats are in place, I don't think it's a big health concern to include some dairy in your diet.

DANNY LENNON: Yeah, and I think the cardiovascular disease is actually a really good example that actually ties in a number of those factors that you talked about, in that, if we look at dairy as this broad food group, we might see that, in general, it may have a neutral effect, but with all those caveats that you mentioned of, okay, well, what is the source of that, if you have a really high butter intake, that's probably going to lead to higher levels of LDL cholesterol or Apo B and increase your risk. But then we also need to factor in, okay, if you're taking some of that out or adding it in, what is it replacing it with. And we can see this on a nutrient level of, if you are decreasing that saturated fat intake, but just replacing it with refined sugar, that's not the same thing as replacing it with polyunsaturated fats and so on. So I think that's a really useful example, and that kind of summary you gave is something that could be used, and actually applied across many other topics in nutritional science.

GIL CARVAHLO: That reminds me, so another thing that's probably very relevant, what I always try to remind myself of, is people, when they make their choice at the grocery store, or at home, they're not thinking nutrients, and they're not

even thinking foods per se. They're thinking overall dietary pattern, right? And so, for a lot of people, what dairy means is not necessarily a glass of milk, it could be for some people, but for others it could be these heavily sugar sweetened milk options or drinks, right? It could be yogurt that's heavily sugared, where the sugar and the refined carbohydrate ends up being the biggest source of calories in some options, especially if they're low fat. It could be a frozen pizza, right? So dairy means completely different things to different people. So that's a crucial difference, and that's why it's really hard if you tell somebody, oh, dairy is totally fine. Well, if you're having a glass of milk, it's a completely different universe from having a frozen pizza, and a block of butter in your coffee. It's not even – it's crazy to even include the two things under the same title.

But yeah, I know where you're saying, the overarching principles can be applicable to many other topics as well. It's not to say specific to dairy, and this is one thing that we see, as we start to make more and more content and get more feedback from our viewers is that the foundation and the explanation that we end up providing for why things are the way they are, ends up being very transferable. So the logic and certain concepts of hierarchy of evidence, for example, and totality of evidence, and context dependence, which we try to communicate to our viewers, end up being transferable across all these different questions and all these different sources of confusion, whether it's dairy or eggs or red meat or refined carbohydrates or low fat, low carb, weight loss, seed oils, all, no matter what the source of confusion we find, tend to be common. And once we address that root cause, the heuristics, if you will, and once people get that idea, it's actually really rewarding, we start to see our viewers now just apply the principles themselves. And when we talk about a new topic, they go, oh, so it's that thing where you got to look at all the evidence, and you got to look at whether the interventional evidence

and the observational evidence align. Right? And, I mean, this is really incredible to see people who have no scientific training, start to – the light bulb starts to go on, and they start to apply these ideas to a new question, without us necessarily needing to come in and tell them prescriptively here's the truth, and here's what you should do, and that's really my goal, it's not a good business model, because my goal is to give people the tools, so that then I can then back off of the picture, and they don't even matter anymore.

DANNY LENNON: But I mean, the idea of rather than hype being hyper focused on a specific nutrient or specific food being good or bad, just the idea of pulling that back to an overall dietary pattern is what we really care about. That one piece of understanding, if someone gets that, that completely transforms every piece of nutrition content they're going to come across in the future, and be able to, much be able to decipher that – actually, I don't need to worry about this thing or that thing necessarily, or I do – but that one framing is a huge thing once people learn it. To get to another topic, and this is one that I've seen, again, much heated debates about, but particularly in the plant based community, where you see on most vocally, those who are strong advocates of a whole food plant based diet, will say that you shouldn't have plant based refined sources of oil. So like olive oil, which we typically think of as a, quote-unquote, healthy food, is something that actually people shouldn't be having in their diet, or, at the very least, they would benefit from taking out and replacing with something else. And that's a very simplistic way of explaining that the position with the underlying mechanism tended to be focused around endothelial function, and the effect potentially of having olive oil in the diet. What do you tend to see when you see some of those debates popping up, what would your kind of best representation of either side of that currently be?

GIL CARVAHLO: Yeah, from my experience, that position that oil is detrimental and causes – you'll even hear people saying, oil causes heart disease, whether it's olive oil, they'll say all oil is the same, and it's all detrimental, and it's all disease causing. From what I've seen, it's based on mainly two pillars of evidence or two observations. One is the fact that some of these diets that have been shown to improve some aspects of cardiovascular disease, some embodiments of those diets have been very low fat, and specifically the Esselstyn report, it's not structured as a randomized control trial, but it's basically a case report or a number of case reports gathered in one paper. And he happened to use a very low fat diet, and the Ornish Diet is also on the low fat end of the spectrum, and those diets have shown some benefit in the context of atherosclerosis. And so, I think what's going on is people are looking at a beneficial effect of, like you were saying, a whole dietary pattern, and they're making this leap to one of the components, and they're assuming causality. So because the diet is low fat, it must be the lack of fat, and the lack of oil specifically that is responsible for the possible benefits that are observed. But of course, we're forgetting that there's all kinds of changes that have been made when those – there's all kinds of factors going on, there's many moving pieces with those diets. Right? They're low in saturated fat, they're low in cholesterol, they're high in fiber, they're high in vitamins, they're high in – even leaving aside the nutrients, they're high in unprocessed plants. They're low in processed, refined, artificial foods. So how can we specifically pin the blame on oil?

So that's one pillar that I see people leaning on. The other one is the one you mentioned, the endothelial function, and it tends to be this assay, the flow mediated dilation, which is, in fact, increased acutely after a diet that's abundant in oil, or even a high fat diet, we tend to see an acute increase in full media dilation. The problem is jumping from this acute marker to the presumption of an outcome. And so, one

video we may try to explore this idea of oils. We looked at a number of examples of situations where FMD, flow mediated dilation, is also impaired. So the assay for people who are listening who may not be familiar, it's basically looking at the elasticity or the responsivity of an artery after a meal. And ideally, you want that responsivity to be high, and if the artery is not responding, it's not dilating properly, you say that the flow mediated dilation is impaired.

So we looked at a number of contexts where you also see this acutely. Some types of exercise, impair flow mediated dilation acutely. In sleep, during certain phases of sleep, and right after sleep, it's been shown that for flow mediated dilation is reduced. So when you look at that, it becomes a bit more clear that you can't jump from one isolated physiological change in a vacuum and ignore all the constellation or the context around it of everything else that's going on and assume that this change is necessarily going to equate to a bad outcome. And then when we look the real litmus test is to then look at outcomes, of course, looking at both observational and interventional evidence, where oil is used, where we look at the effect of oil, and specifically with olive oil, but even the other many of these non-tropical vegetable oils like canola oil and other types, you overwhelmingly see positive outcomes, both in the interventional and the observational literature, whether it's populations that tend to eat more, that tend to eat oil, having better outcomes, lower risks of cardiovascular disease, certainly, compared to more saturated forms like butter or other replacements.

And then even in the interventional literature, that’s always a bit harder, but we have studies like PREDIMED, for example, which has some caveats. People don't like PREDIMED, that's fine. But it's one example where you can directly compare a diet that was rich in olive oil versus a diet that was rich in nuts. Right? The two groups – and they didn't see any

significant benefit of replacing the olive oil with nuts. And then even some, there are some meta-analyses of interventional trials, giving people olive oil in the form of a pill containing olive oil and giving them that daily. And again, the outcomes were in terms of blood markers, lipid markers. The outcomes were predominantly positive. The worst thing we could say about those oils is that they have a neutral effect, that they maybe don't provide benefit depending what you're substituting them with.

And then other another question would be the type of oil, again, back to the type of food that we touched on with dairy. The extra virgin olive oil appears to be a bit more beneficial, and those polyphenols that are rich, especially in extra virgin olive oil may have an effect there as well. There are some data showing that if you extract the polyphenols, and if you refine the oil, you change some of the outcomes. So when you put all this together, what's the bottom line? Similar to dairy kind of, I don't see a problem with people having some oil in their diet. If it's replacing a food that is associated to worse outcomes, oil may actually be beneficial. It's not unnecessary food, if people prefer to eat no oil, that's fine too. Just make sure you replace the calories with something health promoting.

And then some other concerns that are associated with oil, and reasonably so, is that it's a very calorically concentrated food. So if you are going to opt to have some oil in your diet, bear that in mind, it's very easy to go overboard and to go hypercaloric when you're drenching everything in oil. Yeah, that would be my gist around vegetable oil.

DANNY LENNON: Awesome. Yeah, I think in particular, there's, again, two really useful conclusions that are broad principles for people to bear in mind that you've just discussed. One is remembering not to necessarily focus too much just on an acute effect, particularly if something is happening,

say postprandially, but also we need to ask, well, if that happens, does that also consistently occur chronically. And then second, to again ask that question, what do we see across multiple lines of evidence, rather than just one, and then do these things converging and corroborate one another versus pinning our hopes on one particular study. So I think that's really useful example to walk through again.

GIL CARVAHLO: If they align, everybody's happy, but when they don't align, that's when you typically have these controversies on social media, that a lot of times hinge on hierarchy of evidence. And it's incredibly common to see this misunderstood, and people arguing. Lately it seems to be this controversy around seed oils, very similar to the olive oil thing. I used to see this with olive oil in the subset of the vegan camp, where they insisted olive oil was diseased causing, and now it seems that people who are on the opposite camp, maybe people who like to eat a lot of meat or who thinks there's nothing wrong with saturated fat, they seem to have this notion that polyunsaturated fat rich oils like canola or flaxseed oil or sunflower seed oil, are disease causing, and it's also based on mechanisms and animal model work. But again, it's neglecting all the other types of evidence. And this is typically how a lot of these misconceptions arise is people look at a pocket of evidence, and totality of evidence is kind of forgotten. But the story with seed oils is very similar. When you look at human outcomes, whether it's observational or interventional, overwhelmingly, you see benefit, particularly, if you're comparing it to source of concentrated saturated fat. And so, it's very difficult when you look at all of the available evidence, it's very difficult to justify pinning disease on a food that for human outcomes is predominantly either positive – or, if you want to be a super skeptic, if you want to be really devil's advocate, you would say, at worst, you would say, they're neutral. To claim that they're disease causing, that they're the cause of all the

diseases of the western world, I mean, incredibly difficult to justify that, just based on data in mice and something about chemical bonds being labile.

DANNY LENNON: It's wild really, the seed oil thing. We've touched on this before, but to see the level of disdain some people have, like, some people will literally name that as the number one worst thing someone can do for their health. It's kind of crazy. And again, like you say, there's this real hyper focus on mechanistic studies, and then this complete rejection of any nutritional epidemiology, which comes in handy if you are trying to ignore all that data in favor of animal studies, for example. But just the fervor around it is quite incredible at times, I really don't understand why it's such a big issue to some people. But yeah, that's one where people get extremely heated on.

GIL CARVAHLO: Another one that I've seen, another observation that I've seen people base this idea of the seed oils on is very similar to what we touched on with the olive oil in the Esselstyn and Ornish work. I've had people respond to my content on Twitter, for example, very angry, and they say, well, I removed seed oil from my diet, and I've observed all these benefits, so how can you say that the data mainly points to benefit of these foods. And when you explore that further, what they really mean is they removed a lot of ultra-processed foods that happen to contain seed oils. So yeah, you could hypothesize that it's the seed oil component that's causing disease. But to make that logical leap of causality is incredibly difficult to justify. And, again, that hypothesis that it's this particular component that's guilty and everything else is not a problem, you'd have to, again, look at the totality of evidence and make sure that all the pillars align and human outcomes certainly would weigh more – absent that pillar of evidence, it's incredibly difficult to give scientific substance to that claim. But I understand, people – the different opinions are not so much a disagreement on the evidence,

it's more that people are exposed to different sources of information. And if your experience is that you removed foods with seed oils and you see this incredible change in your wellbeing, and this is what you're being told night and day that seed oils are the problem, and you're not reading 500 studies on, be it observational or randomized control trials, because people have lives, they don't have, understandably, majority of the people, they're not going to sit down and read a thousand studies to figure out what's good for dinner. So it's completely understandable that they end up with this very firmly held belief.

And then the other thing I've realized, this is a bit tangential, but it ends up being completely relevant to nutrition is these different opinions, they're not so much on the evidence a lot of times, because you can show people 500 studies, it doesn't matter, they dismiss evidence a lot of time, not everybody, but it's very common to see. They will dismiss a meta-analysis of 40 randomized controlled trials, and an observational study with half a million people pointing in the opposite direction of what they've been told. And I've often thought, why is that, why is it that people aren't refractory to evidence. And I think there's a social component to it, it's not just, it's not as simple as here's the evidence, go change your mind, it's not that simple. There is a whole community aspect to it. There's a really interesting article by this guy, James Clear, who's a bestselling author, he wrote Atomic Habits; and he has this fascinating article, where he puts forward this idea that for people to change their mind, they're really changing their community, they're changing their social links. It's not as simple as changing their opinion in a vacuum. It's not an academic decision. A lot of times, and in nutrition, we see this all the time, a lot of times, your beliefs are firmly intertwined with the people you interact with. And so, if you are a low fat acolyte, then the people you interact with, your connections, the people you look up to, they repeat certain

messages. And if you're going to question those fundamental principles, you're also weakening those ties, you're putting in danger those connections and questioning your entire affiliation and your entire identity really. It's a lot more complicated than saying, well, here's the evidence. So clearly, that's wrong. Most of the time, it doesn't work, and I think it's because these decisions are linked to a lot more factors. But I don't have the solution for this. It's something that I like to have in the back of my mind, because obviously, as science communicators, this comes in handy.

DANNY LENNON: And one thing we've discussed before is this, where we'd ideally want evidence based decision making, sometimes in lieu of that, you actually see this ideology based decision making oftentimes, and sometimes people try to masquerade that they're looking at evidence, but really, like you say, it's based in some degree of ideology, there's obviously a feedback if it's from a particular group. And then there's also people that probably generally want to do good in some sort of aspect, but then obviously, that creates all degree of various different types of biases.

GIL CARVAHLO: I think it also gets incentivized by the social media, and these algorithms and how they work. A lot of times, positions that are outlandish are the ones that generate the most engagement, because not only are you going to hit a very specific target audience who goes, finally somebody is saying this thing that I've been thinking all these years and nobody says it, you're going to hit that target audience very powerfully. You're also going to hit the opposite target audience by virtue of outrage, who are also going to retweet or whatever, propagate your ideas and your content, even if it's to condemn it and to disagree. But the result, social media wise is still that those positions that are radical and extreme are going to propagate much more effectively than a position that's full of nuance and caveats, and maybe, and if you do this thing maybe, but look

at context, and look at the – that doesn't really stick in social media world. So there's a level of incentivization to be extreme and to be radical and to be provocative.

The other aspect is, I think people are – there's a tendency to extrapolate from our own view and our own experience, to a universal law. And I see this a lot, people have this tendency to say, well, if this diet worked for me, then surely it's the one true path. And if low fat worked for me, and you're doing a high fat diet, then you're an idiot, and vice versa. There's a strong tendency to extrapolate from what worked for us to this must be the only thing that works. And I don't know if it's because we feel like if there's many, many different options, our position is maybe less valid, I don't know if people feel threatened, less unique that their preference is not above all others. I'm not sure what the psychological route is, but there certainly seems to be an element of wanting their preference and their preferred diet, or the thing that worked for them to be universal.

DANNY LENNON: Yeah, there's certainly a kind of a worldview that you have to crack through before someone is open to actual evidence. And so, there's a few steps, I think, within that process, that makes it quite difficult. Before we finish up here, Gil, something completely divorced from what we've talked about today, I had noticed in some of your published work that you've published studies along with Antonio Damasio, who I know of primarily through his book Descartes' Error, and some of our audience may have read that as well. For those who haven't, essentially, Damasio is famous for showing how emotions play a central role in social cognition, in decision making, and a whole lot of other stuff, I don't want to reduce his work just down to that. But for me, one of these ideas that often when we think we're a rational person, and making all these decisions rationally, they are oftentimes just after the fact rational justifications that were emotional decisions in some way. And I may be getting that wrong,

but that's from memory, one of the ideas I took from it. But just I thought it was super cool that you had worked with him. Can you maybe just tell me briefly before we finish a bit about that time and some of the stuff you were doing?

GIL CARVAHLO: Yeah, I mean, we're still in connection, we're still publishing studies that, you know, research that we did. So I was a research scientist at his institute in LA for close to seven years, and we did work on the neurobiology of emotion, consciousness, feeling, so basically how feeling emerges, what is feeling and what are the neurobiological correlates of that. We just published a paper like a month ago just came out, trying to bridge that systems level to a more molecular and neurotransmitter level of neurobiology. But no, I think what you said is essentially correct that we have this idea that our decisions are purely rational, and we tend to overlook the emotional foundation which plays an enormous role, there's no doubt about that. And a lot of times, we're not even aware of the motivations and the different factors that play into our decision making. So yeah, we have this idea that reason and emotion are completely separate abilities, and that emotion is kind of a lowly capacity that maybe irrational animals have, but that we are above that, we don't – we can make decisions that are not emotionally based. And I think that's essentially a misconception, and I think Antonio agrees with this, is all our emotions, all our decisions are emotional, all our decisions are rooted in an emotional impetus.

And there are some really interesting data on people with the prefrontal cortex lesions, and they become emotionally defective, and one thing that's very apparent is they become unable to make decisions, even simple day to day decisions. They'll sit there to decide what they're going to wear or where they're going to go for dinner, and they'll sit there for an hour making lists of pros and cons, and they cannot make a decision, they cannot decide, they cannot choose. And so, the idea is that there's

something there – there's an emotional spark that's missing. At the end of the day, after you've looked at the facts, you need an emotional push to say, okay, this is my decision then, I'm going for this one, and those people are missing that apparently. And so, I think emotion is incredibly underestimated. It's very important, we can't do without it. And obviously, it's something that we didn't come up with, came from our ancestors and from other organisms that we evolved from.

But yeah, one thing that we've talked many times about is this idea of can we take this stigma away from emotion of being a bad thing, of being a distraction. No, emotion is incredibly useful and powerful; it's like a marriage, you have to learn to live with the other person. Right? And that doesn't mean that you become a pushover, but it also doesn't mean that you subjugate this person. The same thing with emotion, emotion is important, it's crucial, but we shouldn't be tools to our emotion, we shouldn't follow it blindly and just without any thought, but emotion is absolutely essential.

DANNY LENNON: It's such a fascinating topic, we could probably talk for hours about that. But we will wrap it up here. Before I get to the very final question that I always end the podcast on, can you let people know where they can find you on the internet and social media and all that stuff, if they want to keep up with all the work that you're doing?

GIL CARVAHLO: Yeah, so our YouTube channel is Nutrition Made Simple. I'm on Twitter as well. The handle is @NutritionMadeS3, and you can also find me – we have a Facebook group, which is also called Nutrition Made Simple, if you've searched that on Facebook. You can search my name, and all kinds of things will pop up as well. But if you can spell my last name correctly, you get a gift in the mail, because it's not easy, my parents mess it up sometimes. It's Gil, G-I-L, and it's C-A-R-V-A-H-L-O.

DANNY LENNON: And with that, we come to the final question that I always on the show on, again, can be to do with any topic that you wish. It's simply, if you could advise people to do one thing each day that may have a positive impact on any area of their life, what might that one thing be?

GIL CARVAHLO: Learn something new, especially if it's outside your comfort zone, and there's some discomfort around it. If there's a buzz of pain initially, usually discomfort leads the way to growth.

DANNY LENNON: a great way to finish, and with that, I want to say, thank you so much for taking the time to do this, first of all, but also for the great information you've given today; but also, that you continue to do in all your various forms online, I know it's very useful and valuable work that you're doing, so thank you.

GIL CARVAHLO: Thanks so much.

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