

[00:00:00] **Mike T Nelson:** Welcome back to the Flex Diet Podcast. I'm your host, Dr. Mike T. Nelson, and on this podcast, we talk about all things to increase muscle mass, improve body composition and performance, and doing all of it without destroying your health in a flexible framework. Today on the program, we've got a guest, Dr.

Paul Morgan. He is a senior lecturer, nutrition and metabolism. over in the UK there at Manchester Metropolitan University. This was a referral from my good buddy Dr. David Church, so I'll make sure to link to DC's episode below. And in this episode we take a little bit of a different spin on protein.

We've got lots of great episodes on protein. Of course, one of them featuring Dr. David Church there. And this time we're talking a little bit more about protein and aging. Even talking about is the maybe the RDA is possibly okay. Background on that and what it might be useful for. We do a long discussion about plant based diets particularly about obtaining sufficient protein and essential amino acids.

We even get in a little bit to about, is this best for the planet? Is it not? What are some other concerns we should think about from more of a global perspective? And then we also talk a little bit more about some of the pros and cons about protein research. And what I really liked about this conversation is it was very wide ranging and we looked at more of a global view of protein.

So a lot of times, and I know I'm 100 percent guilty of this, most of what I'm reading for protein is at the mechanistic level. We talked about the 100 grams of protein with Dr. Jorn Tromlin. We'll link to that one also. And mechanistically and how do you just add more protein to make your biceps bigger, which is great and there's definitely a role and a good thing to do for that.

If you want bigger biceps, you want to increase performance and everything else. But I liked about this chat was that we went a little bit outside of some of those parameters. We still hinted at them. and overall just had a good time chatting with him about all things protein once again, but from a slightly different angle.

And the podcast today is brought to you by LMNT. You can get element, which is my favorite electrolyte supplement at [drink LMNT. com forward slash Mike Nelson](https://drink.lmnt.com). We'll put a link down there below. If you are listening to this podcast right as it came out, A heads up that this will be one of the last days coming up to order the chocolate flavors of Element.

Last day to order that will be March 27th, 2024. It's a seasonal flavor, so last I heard it will probably be back again in fall, but if you're looking for the chocolate version of this, today would be the last time to get it. And when it first came out, I Didn't care much for it. They do have varieties of chocolate mint, which my wife loves.

That's her absolute favorite chocolate chai and chocolate raspberry And what I found was if you put the chocolate element in Coffee that doesn't taste very good. It all of a sudden tastes pretty damn amazing I realized this when I got stuck in Costa Rica several years ago due to the pandemic and I got Yeah, sequestered there for nine days, and I had some chocolate element, and I only had crappy decaf because I was cutting decaf out of my nutrition at that point.

And I found by adding the chocolate element to it, it was actually pretty darn good. The other part I've done too is adding it to protein. So I have some driven banana cream protein, and I put in a packet of chocolate element to that post workout. And I had Voila! Chocolate banana. It was actually really good.

So those are some other uses for that and they also will have all the standard element drinks for more of the cold weather. Today, I'm enjoying a raspberry which has been my favorite lately. So check that out. Go to drinklement.com forward slash Mike Nelson and you'll get a free sampler packet also. And if you are looking to order some of the hot versions, which again, you can use them cold.

I put them in a protein shake March 27th is the last day to do that. And we also have more podcasts coming up for you. A bunch of them have already been done and recorded. So I'm super excited to get all of those out to you. And as always, thank you so much for listening to this podcast. We really appreciate it.

and enjoy this conversation here with Dr. Paul Morgan.

Thank you so much for listening to the podcast. Really appreciate it. A huge thanks Dr. Paul Morgan for coming on the podcast and giving us a little different chat about protein, which I thought was great. We'll link to some of one of those papers he did recently. If you want to take a little bit deeper dive in some of the different angles there If you're looking to support the podcast, one of our sponsors is Element, which is my favorite electrolyte supplement.

Go to drinklment.com forward slash Mike Nelson. You'll get a free sampler pack. As I mentioned, depending on when you're listening to the podcast, if you

want the kind of chocolate varieties, which are best hot, like I said, I put them in a protein shake. March 27th, 2024 will be the last day to order that.

It'll probably come back again in fall. I would assume it is a seasonal variety, but all the other flavors of element are there. So check them out. Thank you so much for listening to the podcast. Really appreciate it. We will have many more podcasts coming out, some great topics, everything from GLP one agonist to things related to body comp performance.

sport supplementation and much more. So if you enjoy this podcast, you want to help us out, just hit the little subscribe button there, download the episode, helps us out with the stats. And if you've got just even a few seconds to leave us a review, that would be super helpful or forward it to someone who may enjoy this discussion.

If you post anything online to it, just make sure to tag me so I can say thank you. Thanks again. Greatly appreciate it. Talk to all of you next week.

My background is in sport and exercise science. And I think anyone that has a background in sport and exercise science often has quite an odd route into their final destination. If they stay in academia, that's my opinion anyway. So I started off just as a typical sport and exercise scientist applied, very applied.

I still love my football, or you guys would call it soccer. And worked in, worked in elite football for a few years alongside completing my Ph. D. My Ph. D. was at the University of Exeter, which was under the supervision of Professor Andrew Jones. I don't know if you know a third of him, but he's, most people know him now these days as the beetroot guy.

Right. Yeah, Dr. Andy Beetroot. Yes, exactly, yeah. Sorry. from an applied slash elite performance, you know, runners working with runners, that kind of stuff. And then I left there after a couple of brief positions, brief research and teaching positions and took on a, a postdoc position or research associate position with a guy called Lee Breen or Professor Lee Breen.

Now he is. He's based at, let's say, the University of Birmingham, also in the UK. And he's really a muscle protein kind of guy does a lot of tissue stuff and some dietary protein stuff. And I spent about four or five years with him, uh, leading on a number of different projects with the, with the main project really focusing in on how muscle is regulated in older obese individuals.

Which again might seem odd in the context of as we started this conversation, which is dietary protein. But ultimately during my time with Lee, my, my biggest interest was dietary protein. I've always had a keen interest in nutrition. So I am a nutritionist by background, I guess, more, more so than a sport and exercise scientist.

I really focus more on nutrition. And I started, uh, a faculty, what we call faculty positions anyway, in Manchester, again, in the UK, which is where I am now. In 2021, it was there really where I just almost solely focused on dietary or dietary interventions, but more so dietary protein. We still dip our toes in.

I might refer to our lab, but I think for the most part, whenever we refer to a lab, it's a, it's sort of a virtual entity, isn't it? It doesn't actually exist. Yeah. At least not for me anyway. We, we dip, uh, dip our toes in different stuff. So for example, we're working with some myositis patients at the moment.

Uh, looking how muscle is regulated in those patients and how we can combat impaired muscle regulation in those patients. So there are different things that we dip our toes in, but ultimately my main interest at the moment, as in, I'm going to say independent researcher. But none of us are truly independent, I don't think, but is, is dietary protein, and I have a real interest in dietary protein, particularly in the context of aging, and even more so, I guess it's very topical, but even more so in the context of sustainability.

And that's I guess where I am now. So. That was a brief overview. So that, that's probably why if you was to look at my research profile, it'd look a little bit diverse, but ultimately it's, it's not that diverse in its current context, if that makes sense. Yeah. And that's, it's also weird within, so my PhD is technically in exercise physiology, looking at heart rate variability, metabolic flexibility.

But the formal degree is from the Department of Kinesiology, which I never really use because no one knows what the hell kinesiology is. And if they do, they're like, oh, so you just study movement stuff? It's like, well, I didn't really do kinematics. I did more on the metabolism side. They're like, oh, well, that's, wait, what?

You know, it's like, it's confusing. It's just the way Universities are aligned and within each department there's, you know, we have people that did advanced mathematics with like motor development. And then we had people in the department I was in not even looking at performance, just, you know, exercise and the role in cancer, you know, so this is pretty, pretty diverse, always.

Yeah, for sure. And then how did you decide on protein? Were you just kind of looking around for interventions to reduce muscle loss or sarcopenia? Or was there something inherent about protein that kind of drew you towards it? I think, I think it's a couple of things for me. I can't quite pinpoint something specifically, but certainly spending the four or five years that I did with Lee.

And again, Lee being, you know, I would call him more of a muscle guy rather than a protein guy. And that seems a bit strange because they're, you know, they're linked quite close. He does a lot of disuse stuff. So we've got some nice publications in disuse, but the, the core theme generally for most of his work had some element of protein in it.

And it just, I think it just fascinated me. I always struggled certainly during my PhD. So my PhD was actually more muscular fatigue focused, and I just struggled to get a grips. I struggled to get a grips of the literature, which I guess is always difficult with any, any scientific. I don't even think we still know what the hell is going on.

I just have some idea but that's I just found it as a bit of a minefield and to be quite In honest truth, I got a bit fed up with people creating theories in fatigue you know, there seems to be 20 50 20 30 40 50 different theories that people make up and and I think I naturally just fell into fell into protein I've always had a real strong interest in nutrition So I always felt that even though even though I went into fatigue a lot of my stuff the core theme was still nutrition You And I still find when it comes to nutrition, this is just my own personal opinion.

I find carbohydrates and fats. If we look at the, just look at the macronutrients, I find them much more of a minefield than protein. I find protein much more easier, whether it's just myself or if it's just a, I don't know if this is a universal opinion, but just much easier to get on board with in terms of, Even stuff like building, you know, building hypotheses clinical relevance, I think protein is particularly important, it's particularly topical protein, when it comes to carbohydrates and fat, I just think it's a little bit tricky to disentangle in particular And particularly in the context of clinical nutrition.

And I knew that when I spent my time with Lee in Birmingham, that I was definitely moving down more the clinical route when it came to nutrition. So when it comes to research, sorry. So I knew that I was going down either whether it be clinical populations or aging, I guess, which we could call the clinical population as well.

So I think I just naturally fell into protein. in truth. It wasn't anything specific per se that made me decide to go down the protein route, but it's one that I'm certainly happy that I've gone down. There's some days less so than others. Normally, normally following Twitter interactions. I must say that's normally, yeah, you can't win.

So I'm thinking I should be in me and I'll call him DT, but me and Dave, we we say a lot, you know, you can't win on Twitter when it comes to protein. You know, this, this plant versus animal, I hate using the word versus, but I do say, because it's just easy. I think people relate to it. Yeah. You know, it's sort of like a, you have to be on one side of the other.

You can't sit in the middle. Now, unfortunately, many reasonable people sit in the middle. I would consider myself reasonable. Some people might disagree, but I'd consider myself someone that sits in the middle when it comes to the, a lot of the research we do. I don't, I don't have a particular strong affiliation to.

You know, plant based proteins or animal based proteins, but as soon as you sit in the middle, both sides seem to attack you from, from both angles. Yeah. And on Twitter, you only have so many characters to try to explain all the complexities that go into a single study, much less trying to talk about a consensus in the literature.

Like I, I only recently went back on Twitter, or X, or whatever it is now, and the main reason was a lot of people I know in research are, are only on there. And I realized that the interactions and some of the data I could get from them was like super useful, but just, I could, I could not be on the standard feed for more than five to 10 minutes because it was just seemed like all sides arguing about whatever was going on and no one could really get to a consensus.

So, yeah. We actually recently done a or sorry, we, it was myself that recently done a or as part of the documentary that went on national TV here. And they wanted me to talk about chicken feet, chicken feet being a rich source of collagen. Of course, as you know, it's sort of, I wouldn't say blown up in the UK, but.

There was a professional footballer that consumed chicken feet, went on the radio, said that they consumed chicken feet, and then of course people jump onto it. So That must be the secret to his success is chicken feet. That's the only reason he's professional. Certainly the success to, I think, a trend, a nutrition trend is making sure that it's affiliated in some way to a high level.

Oh, sure. So, but then, you know, that, that was, that was released on the 4th of January. So just under two weeks ago. And I even got a little bit of criticism there from random people on Twitter that obviously, you know, jumped in, tried to search what the documentary was and who was tweeting it. And even then, you know, they criticize you for all sorts, just for little things that you say, but even, even it's the same with the paper, isn't it?

You know, if you, you probably get three or four minutes of air time, but. You're probably actually recording that for three or four hours, which she was. But of course, in that three or four hours, you can't say as much as you actually want to say. But what happens is very small parts of that get out into the public and then you just get attacked for it.

And I mean, it's the same with a paper. It's the same with any kind of scientific communication. People just decide to attack you for any specific thing you say and don't always look at things holistically. Or, or at least Quotes are very hard with that. I think audio and, you know, I, my opinion, audio and probably TV or the, I don't want to say the worst because like you'll sit for three, four, five hours, they'll ask you everything under the sun.

And a lot of times in those cases, you sometimes kind of have to kind of sign your air quotes rights away that they can kind of edit it however they want. And that's a slippery slope and using unprinted stuff. You can request final review and kind of veto stuff. Most of the time, but it's yeah, I don't think people realize that, that they're taking multiple and in their defense, they're taking multiple sources, trying to figure out the best storyline and everything else, because they have to get viewers to watch it, which I get, but it, it's so easy just to pull out one sentence that's completely out of context and make it look like, Hey, look at this guy said this thing you're like, Oh no.

But there we go, such is life, such as being part of, I think, being a, being an academic and being a researcher, that's, yeah, you just have to deal with those things. But I still, I still classify myself as we would do in the UK as early career. So anything that I can do to raise my profile, I'm more than happy to engage with.

So, yeah, there we go. So, yeah. But I think that's good because it, it, now it seems like, This, the focus on academics is even more from, yes, you have to do the study. Yes. It's publisher parish, like all this stuff, tenure track, you know, at least in the U S but there seems to be a lot more emphasis on You also then have to go out and sort of publicize your own studies and talk about them and be on social media and do these other things in addition to doing the research,

running a lab, you know, whatever, all the other responsibilities you have, and most people I know, you know, want to do that because, you know, only like a handful of, you know, weirdos are going to read your research otherwise, but it also seems kind of like the, at least in the U.

S., the academic institutions, I think, have done a poor job of having any formal way of doing that. And they just sort of shoved it off on the people doing the study of like, Oh yeah, here's another list of 1700 other things you have to do once you're done with the study. Exactly. Yeah. And actually someone said to me just, just last week, actually, when we were talking about that, Whatever it ended up being two, three minutes on, on the, within the, within that specific episode that, that, that ed is that, that, that two or three minutes will probably have a bigger influence than any of my papers in that year, right?

Oh yeah. Yeah. There we go. So talking about chicken feet and other bits and plant based proteins, but not that that's a great area to get into as soon as, as soon as you talk about plant based protein, that's an area that people are. More than happy to attack you. So, uh, I have to be careful with what you say.

Yeah. But yeah, I've often joked that if, you know, kind of like yourself, if you're somewhere in the middle, you just get attacked from both sides, you know, it's even, even with kind of what I do with you doing some academic stuff, doing more, I would say coaching, training, education, that type of thing. Yeah.

I, you know, I get weird emails from random people. I don't know who are like, Oh, you've only published a handful of studies. I have published, you know, 40 studies. Do you need to do more research, whatever. And then you have the people with, well, I have 20 years more experience than you do, and you don't know what you're doing.

And like, I would never blame to be one or the other. I'm just trying to figure out like, what is the, the real life interaction? Like you're talking about with how do we make these things compliant? I think you could argue we have pretty good data now about how much protein you need. There's still a whole lot of unanswered questions, but what is kind of your thoughts in terms of the.

The compliance, because I would say, at least in the U. S. If you pulled the average person on the street and said, Yeah, if you're a 200 pound mammal, like how much protein do you think you should get per day? I think most people in the US would still say like 60 grams or the RDA. I would argue that they're still

afraid of almost over consuming protein and would probably err on a very lower protein diet.

So, just to come back to the question, is it in terms of, you know, what, what do you think, or what do I think my thoughts are in terms of You know the recommendations around the recommendations of protein or yeah in terms of I yeah, the two part question would be my assumption is I think you would agree that the Recommendation for protein should probably be on the higher side And if that's true, is it then a more of a compliance issue of getting?

more people to consume higher amounts of protein Yeah, okay. So I think first and foremost particularly for protein, I don't know if DC said this, cause we've talked about this in the past. I know he's actually talked about it more formally in papers as well, as, as have we in a, in a paper that I share with you after this podcast that we wrote together.

Awesome. The, the RDA, or I'll say the RDA at the recommended daily allowance or recommendations for intake of protein in terms of the macronutrients can often be quite misleading. So we, we we're not really in a good position already even before we start discussing compliance , I think this is a really important point to note.

And I say we do talk about this in our in our most recent review paper. And that's the RDA for protein, which for those that don't know that listen or that listen in it's about 0.8 grams per kilo per day. So you can equate that out to a typical individual 70 kilos ish. I'm about 70 kilos. That works out about 55, 50 grams a day.

It's not a lot of protein, right? But it's important to know that the RDA, at least for proteins, I'm not talking about carbohydrates and fats here. That is, that is based upon a normal distribution curve. And again, I'm sure I'm teaching you how to study that. Suck eggs here, but the way the standard distribution works, at least in the context of protein is you calculate currently based upon nitrogen balance techniques, you calculate the average protein requirement in a population for, to, to avoid protein deficiency, or in this case, nitrogen deficiency.

And then you add two standard deviations above the average requirement and that represents the RDA for protein. So In theory, that 0.8 grams per kilo per day represents sufficient amounts of protein for 97.5 percent of the population. So that is not, in other words, 97.5 percent of the population, if they consume the protein RDA, will avoid protein deficiency.

That also doesn't take into account a few things. So firstly, that there will be a small percentage of the population, and this is just a typical population. So looking at a general healthy population that actually require more than the protein RDA just to avoid deficiency. So what that means is that over the protein RDA, You could require over the protein RDA, and a lot of the research does support this, to get an optimal response in X outcome.

So whether that be, I don't know, muscle strength, or muscle hypertrophy, or a functional outcome. Some people, or a large percentage of the population, or even a small percentage of the population, I'm keeping it broad and vague on purpose at the moment, might require much more than the RDA. But also, I think we focus too much on, well, we might need more than the RDA, but actually, if you think about how a standard normal distribution curve works, that also means that under than the RDA, or, sorry, less than the RDA, also might represent a sufficient optimal or a maximal amount of protein that someone should consume.

So in other words, what I'm saying is people should take an individual approach to protein intake. The challenge with that is if people do take a truly individual approach to protein intake, that requires a very sophisticated approach in terms of equipment analysis and all that stuff. So it's unrealistic.

And that's why the RDA is the RDA. So I've gone a long way around there in saying that, yes, the RDA is 0.8 ish, depending on where you live, grams per kilo per day. But in theory, your specific protein requirement to avoid deficiency, and that's really important to avoid deficiency could be anything, but it probably is around 0.

8 grams per kilo per day. So it's not very helpful. But I, I used a few different terms there, so I used sufficient and I also referred to optimal and maximal. I'm not going to go into the differences between optimal and maximal because we could get into a bit of a minefield when it comes to protein nutrition, but ultimately you could get better responses again, whatever you want to call response.

So protein being an important nutrition or sorry, being important macronutrient for muscle regulation. You might be interested in muscle growth. If you wanted to see improvements in muscle growth, then maybe you would require more than the protein RDA in an aging population. For example, we have pretty good data now across the board to suggest that at least The caveat I'm going to throw here is just focusing on skeletal muscle, which is the area or the organ of interest that our lab is interested in.

The older individuals require more than the RDA and they require more protein relative to their body weight compared with younger individuals as we get older and older because of something called anabolic resistance. I'm sure you are fully aware of what anabolic resistance is. And I'm sure DC and other.

Guess on your podcast, we've talked about it before, but ultimately it refers to a dampened anabolic or muscle building response to typical muscle building or anabolic stimuli. So protein provision and exercise being the two main ones. So yeah, I've gone a long way around there and talking about the RDA.

What was the second, what was the original second question? It was about compliance, wasn't it? Yeah. A quick follow up on the RDA. Could you make a counterargument on, and I agree with all that, right? And I think the key there is we're talking about protein deficiency, right? And exactly what you said.

We're not talking about what might be a better case for someone who's trying to combat sarcopenia, muscle loss, athletes, et cetera. And I think that's where everybody gets kind of tripped up because I would agree if you look at the RDA for just. We don't have a lot of malnutrition of protein in the US, but if people are really trying to combat sarcopenia, I would argue that we're probably under consuming protein.

You could probably make an argument. We're probably not doing the right amount of exercise too. So again, it goes back to the context of what is the thing we're talking about? Like, what is the output we're trying to get, which, you know, especially on Twitter and other places that just gets thrown out the window.

Yeah, it absolutely does. But yeah, I think that's an important point, you know, when we talk about aging again, Or you said then that I actually another good point that you made that I'll come back to is when we talk about stuff like global nutrition, malnutrition, for example, I mean, yeah, there are individual, you need to take ideally an individual approach, even within a country.

But globally speaking, there'll be countries where you see general trends. And you're right. I don't think. Well, we're pretty sure that in most developed nations, you don't see protein. You don't see protein deficiency, not really. At least when you look at mean data, that doesn't mean one person isolation isn't protein deficient.

But also important to note that, you know, for example coming back to the RDA and coming back to the aging context, just to give some rough numbers again,

protein RDA 0.8, We think that older people should consume probably somewhere in the region of 1.2 to 1.6, maybe even a bit more grams per kilo per day.

But again, that is mean data, it's a mean recommendation. So it doesn't, I'm just going to take some random numbers that are probably, I think don't even probably exist, but just to, just to highlight the concept. Someone's protein RDA might be as low as 0.1 grams per kilo per day. I don't think that that's possible, but just to give you some context, it might be that in an aging individual, if you take that individual that's now older and their muscle is less responsive to protein, then their recommendation, their specific recommendation might still be under the population RDA.

So it's important to make that distinction, I think, that Because the assumption there is you're working off a normal distribution and you've got Exactly. details within that distribution. If you pull all the way down to an individual level, not talking about just the average, you, you of course, are going to have massive outliers on either end of the spectrum.

Of course, of course, we cannot, we can never give recommendations to account for those you know, that's, that's, that's physically impossible. But I just think it's a really important point to note because I think it's often disregarded when it comes to recommendation carbohydrates and fats, a little bit easier to disentangle protein, not, not so much particularly as protein, if you mount, you know, if you're malnourished when it comes to protein, then it could lead to muscle loss, which we know is really important in the context of aging.

Got it. And so would you agree that if we take the context of someone who is trying to not have much muscle loss with aging, like the recommendations you gave on the high end or almost twice of what the RDA would be again, if that's the context that you would be looking at, correct? Yeah, absolutely. So at minimum, really we recommend minimum 1.2.

And again, I, I, I should absolutely stress that 'cause we get lost in our own little fields, don't we? And our own little niche. Oh yeah, me too. . And that recommendation is based upon sket or muscle regulation. In some context it's based on lean tissue regulation, so the lean tissue regulation or requirements for lean tissue turnover.

Maybe more relevant in the context of whole body health. But when it comes to skeletal muscle, we're looking at it very much in a very specific lens. But the value of 1.6, which of course is double the idea, I did refer to 1.6. That value,

we, we, we seem to think that when we look across all the literature at least in a healthy, I'm wary of saying healthy older individual because DC will definitely say there's no such thing as a healthy older individual.

In fact, he, he wants referred to it being a bit of an oxymoron. There's no such thing as healthy aging. If you double, if you double the RDA to 1.6 we think that that pretty much covers almost every older individual in terms of what they would probably require to maximize muscle protein turnover or at least maximize muscle protein synthesis in, uh, the older population or the building of the maximal building of new muscle protein.

We think that that 1.6 also, although this is another really difficult discussion, covers a range of diets. In other words, going back to our original discussion, the 1.6 probably covers people following exclusive plant based diet. Now that's tricky because protein, again, talk about protein and then look at carbohydrates and fats.

It's very different because what protein, what essentially doing with protein is we're consuming protein, but we're digesting and absorbing amino acids. And again, I'm sure most of your listeners just teach them to suck eggs here again, but the protein is really just a vehicle to deliver the amino acids, isn't it?

You know, the actual protein dose per se is largely irrelevant. It's the amino acids that are the nutrients that are required by the body, not the protein per se. Hopefully that makes sense to the listeners, but. Ultimately, we have nine essential amino acids. Some people will call them indispensable amino acids, and they need to be consumed in the diet because we can't synth. Actually, another important thing to stress is we can't synthesize them in sufficient amounts.

It doesn't mean we cannot synthesize them. So we can actually synthesize all the amino acids. We just can only synthesize 11 of them in sufficient amounts, or at least what we define in a general healthy population as sufficient amounts. But yeah, hopefully that closes off there. I've gone a long way around to discuss it a little bit around the RDA there.

Yeah. And that, that gets down into, well, I've talked to DC and others, Stu Phillips and many other guys about this too, of within that, what is kind of the most important thing, right? Which most people would agree, maybe two to three grams of leucine per serving, six grams of essential amino acids. There's some debate about what exactly the amounts are from animals to humans, et cetera.

But, If you go down to the next level, you're looking at probably some high leucine dose and some amount of like the raw building blocks that your body is having a harder time manufacturing and sufficient doses. It just so happens that, you know, meat sources or what I tell clients, which sometimes they get offended to me, like any animal source, anything that had eyeballs on it, that you eat, like you're, you're probably going to get those types of amino acids.

If you start going into plants, like, yeah, there's different amounts in different plants, but it's. It's not as they're just not as abundant and like you said if you have a high enough dose Now you can kind of make up for some of those things because you are just physically consuming more of them That's it.

And I I guess i'll just clarify something there as well. And yeah, please I once said to someone on twitter if they listen to this i'll be surprised if they do They'll know exactly that i'm talking about them and it was it's a very very much a strong plant based advocate on twitter Dc will know exactly what i'm talking about I once said to her that when we were discussing about plant plant and animal based diets that I don't have a Dog in the fire, perhaps not the right words when it comes to When it comes to farm based, compared with animal based nutrition Again, because for the most part I sit in the middle with a lot of this stuff I see lots of benefits of plant based diets.

I see lots of benefits of animal based diets and actually myself i'm i'm not a vegetarian. I'm not vegan You I'm not someone that consumes a huge amount of meat, but I don't think it really matters. It doesn't mean that I have a conflict of interest just because I consume small amounts of, small amounts of animal based foods.

I find that ridiculous to people to suggest that you can have a conflict of interest because you consume small amounts of a given food, because that means that everyone has conflicts of interest with everything, which doesn't make sense. Yeah, and the, the vegans, uh, don't have a conflict of interest towards plants.

No, exactly. Nobody gets mad about that. No, and I would never judge them for that, but the point I just wanted to make really quickly is that if someone listens to this, that's a, listens to your podcast, I'm sure they do. That's a plant based advocate. They will probably come up with the argument that all plants contain all amino acids and they are 100 percent correct.

But they're also incorrect and I'll just provide a little bit of context there because it really, this argument really annoys me when I see it on social media. Is that

people come up with, I've seen the figure so many times now, they'll, they'll provide a list of animal foods, a list of plant based foods and so on.

And they'll show the amino acid compositions covering all of the 20 essential and non essential amino acids. And on the bottom, there's usually a percentage right from zero to a hundred percent. And what they'll show is that there's small amounts of. Sometimes more than that, depending on the animal, uh, sorry, plant based foods, for example, soy which is, you know, rich in or more rich in some of the, uh, essential amino acids compared to other plant based sources.

But it will show that there's a very small amounts of all of the amino acids and their argument will be, well, look, you can see here, all of the plants that listed here contain all of the amino acids. Well, yes, they do. there's negligible amounts of them in there. It's like me suggesting in the context of protein nutrition, it's like me suggesting to you saying, Mike, to get your carbohydrate intake because you're an elite athlete, you need lots of carbohydrates.

I won't get into that discussion. I want you to get all of your carbohydrates from consuming cheese. It's a stupid argument. Now, there is some caveats to this debate, and there is that, and that is that there are some ways around the plant based discussion in the context of amino acids requirements.

And that is that, for example, you can, you can consume plants that have complementary amino acid blends, so for, or amino acid profiles. So, You might consume at one plant that is low in one given amino acid essential amino acid and another that is rich in a given another amino acid and they complement each other.

And it's also important to note that we talk a lot on protein nutrition in isolated means. So we talk, uh, we might talk about, I don't know, uh, one given plant based food source, for example, being completely devoid of a given amino acid. But rarely do we consume foods in isolation and I think that's really important to note as well.

It doesn't mean that Animal and plant based diets are equal in terms of supporting muscle protein turnover But in theory they can be there's many other different ways around that challenge as well. So for example, you can You can isolate the protein out of for example Uh, potato. So potato has actually, potato protein has a really good amino acid profile.

It does actually. Yeah, you just need a lot of it. You just need a lot of it, yeah. You said you had stew on, I love stew. Stew's Stew, stew's obviously done some

potato protein stuff. So you can isolate that protein. In the context of I don't want to go into it just yet, but perhaps we can come on to it in a bit in the context of sustainability, I'm not sure that's appropriate when we're isolating small amounts of protein and then trying to scale that population wide and so on and so on.

But in theory, there are certain ways around that. So, for example, as I said, isolating it. Isolating the protein, you could fortify a given food source with a given amino acid. You know, you could use the complementary amino acid blend or profiles, sorry, with different food sources. But it is important to stress that we don't consume foods in isolation.

And I think that's really, really important in the context of where we often get lost. In protein nutrition. But yeah, hopefully I've covered a few different bits of what you could probably see is a little bit of one of my frustrations when it comes to social media and protein nutrition, but, uh, yeah, hopefully I've covered a few bits there.

Yeah. And I think that's very useful and you know, I've formulated some nutrition for higher level vegan athletes who are doing it for ethical reasons. I'm like, cool. That's great. I can't tell if they got any lesser results, but compared to someone who ate meat, so I'm not going to go to them and be like, Oh, you have to eat meat or, or else I, me personally, I didn't eat red meat for, probably 25 years of my life, you know, it just didn't appeal to me for whatever reason.

I'm not really sure why. But I will say that with those handful of vegan athletes, it, it does take more effort and you do have to know what you're doing. So you have to be a little bit more educated or hire someone who knows what's going on. You probably need to eat a little more volume of food. It's going to take a little bit more effort, but you 100 percent can do it.

And I think everybody wants to make this argument of like, well, you can either do it or not, or my argument is, you know, ethics aside, do what you feel is best. If you are going to go more of a plant based route, you can 100 percent do it, but it's going to take more education. Like you said, you probably want to look at amino acid combinations.

It's, it's going to be a little bit more time involved to do it correctly. It's not as simple as. Just eat more potatoes and you're fine. No, exactly, and I think it's also important sometimes you just need to think about things logically. I think, being scientists, sometimes we, we think about things a bit too much even practitioners and don't think about things logically So the reason I want to say

that is because if you just take things down to a biological level We know that if you look at biological adaptation things happen gradually So for example, even if you take something just that most everyday people that will listen to this book do they go to the gym?

You wouldn't recommend lift going to your first gym session, lifting 10 10 kg on, I don't know, the bicep curl. And then your next session, you lift 40 kilograms. That doesn't make any sense for obvious, for various reasons. The same goes for nutrition. And, and things have to be done gradually. And at least in the context of protein nutrition, I think it's really important because.

Although we need to do more work in this area, I think that there's probably, and most likely, certain biological adaptation that occurs to longer term exposure to X diet. For example, I'll just give an example, at least where my head is at, and we've tried to get money for this in the past, we got to the final stage actually of a grant application recently and didn't get the money, but if you, if you expose someone to high dose, high quality protein, So let's just say high dose animal protein over a longer period of time.

I have this working hypothesis and there is some work that's being done in this area that you will get less efficient molecular processes occurring, which relate to muscle protein regulation. So, for example if you look in some of the literature that feeds higher dose protein over longer periods of time, you see increased oxidation of amino acids at a given dose, suggesting that people handle protein nowhere near as efficiently as they once did.

Might relate to, for example, stuff like amino acid trans, uh, sensors and transporters. They might become less efficient just because you're flooding the system fairly regularly. with lots and lots of amino acids. Yeah, it's a biological adaptation. We adapt fairly easily to what we're exposed to in terms of, you know, from a human race.

So I've just got this, you know, working hypothesis that we probably see that with people that are exposed to higher dose or even just, you know, your one, 1. 2 grams per kilo per day, higher quality proteins over longer periods of time. Now, when you take an older population now, remember that we know older or as we get older we know our aging population above a vulnerable to muscle wasting, but you combine that with this whole, I guess, the predominant public message across.

Certainly across the developed nation anyway, which is we need to reduce our animal intake or foods, uh, animal food intake. We need to increase our plant

based food intake. I'm not sure a drastic change to an older individual's diet is the way to go. Whether that can be done over a longer period of time, maybe, but I would imagine if you take an older individual that was consuming 1.

2 kilo per day all across their life. And then they all of a sudden decided, you know what, I'm just going to go vegan. I would imagine that would probably be not very good news for muscle health in a population already vulnerable to muscle wasting. You can add into that that if you was to, if you was to change someone's diet from animal based to plant based or high quality to low quality, let's take out the animal versus plant, just for a moment, you go from higher quality to lower quality protein.

They're probably going to be consuming less protein naturally. because those foods tend to be less protein rich. The, for example, if I don't want to go to focus on it too much, but plant based protein, protein foods, sorry, tend to be less protein rich. And there's lots of good data on this now. So probably consuming less protein anyway, the lower quality proteins contain less of those essential amino acids.

They're actually containing less, they're consuming less protein and less essential amino acids. I would imagine that would be a bit of a disaster again in a population already vulnerable to muscle wasting. So I've gone a little bit around the houses there just to say that I think we need to be really careful with what we're recommending, particularly in a world which seems to be increasingly dominated.

By plant based recommendations. I think we just need to be careful with those recommendations. Yeah, and that's something I looked at oh, man years ago because it was just more anecdotal that what I my hypothesis was similar that if I was at home it was pretty easy for me to get higher protein regulate training all that kind of stuff when I was traveling Ooh, that was you can do it, but it's a lot harder more time consuming more expensive So if I knew I had like a big, like two or three weeks, especially if I'm going to be, you know, overseas and in different places I haven't been before, I didn't find much data, but I would kind of titrate my protein down over two weeks.

My thought being if there was any sort of adaptation, maybe I'll kind of mitigate part of it. Maybe I can kind of train my body to get by and a little bit less protein. And I think, and I can't find the study, I could have just completely made this up. I think there was an old nitrogen balance study from like Arctic Explorers or something like that that looked at this change between the high

protein and then they all of a sudden had like a super low protein intake for some reason and they did see basically excretion of more nitrogen.

Again, I could have completely made that study up but there's something stuck in my head about that that I can't find. I can't think of the specific study. Off the top of my head, but there are certainly studies out there that demonstrate that, that, you know, there is a certain period that is actually fairly short, you know, you meant reference.

Yeah, it was not real long where you see this adaptation. So, yeah, absolutely. Again, I think it's more than likely that you probably see positive adaptation. So I'm going to say positive. If you expose people to longer term plant based plant based. diets. So I would imagine if you have a long term vegan, they're probably as they get older, they're probably not impaired.

But things certainly those recommendations, if we're going more and more towards a plant based recommendation need to be certainly gradual when it comes in the context of

Yeah. And I've only seen a couple of clients who, when I just started working with them, had gone from animal based diet, relatively high protein, I wouldn't say not super high and for whatever reason decided they were going to go hardcore vegan approach. And I would say not the most intelligent vegan approach either.

Protein intake was very low, like essential amino acids were low. Uh, their performance during that transition wasn't very good. There was definitely a steep drop off and we could argue that's energy availability. It's a whole bunch of, you know, different things too, but I've seen that happen a couple of times.

Just an experience. Yeah, absolutely. I mean, you know, there's, I'm always wary too. I'll say bash because it's a bit informal plant based diets because I think there's many many positives of plant based diets I mean, there's many. Oh, definitely. In fact, I always say again I said earlier, but I'll say again, I don't consider myself someone that consumes huge amounts of animal Sorry, not animal based foods.

I'm gonna say meat animal based foods not so much because I would say consume a fair bit of dairy but meat per se, I don't consume a huge amount and I think there's lots of indirect, when I'm talking about muscle effects of plant based diets that can actually influence muscle health. You know, for example, there's, there's lots of good evidence to suggest that plant based diets improve

cardiometabolic health and, and undoubtedly if you improve cardiometabolic health, that's going to have improvements in muscle health.

So. I'm wary of saying that, you know, you have to follow an animal based diet for muscle health because you certainly don't, but there's just certain considerations to plant based diets that I think are particularly important and even more important in the context of aging and certain clinical populations, you know, diseased populations.

I would argue, and I don't know if you would agree, that switching to more of a plant based diet, you would almost inherently increase your amount of micronutrition, which you could argue is just beneficial for muscle health and just health, cardiovascular risk, like all that across the board. And I've just seen that in clients too, where more of a meat based diet is like, hey, maybe have some broccoli.

You know, but then when they, for whatever reason, switch to a plant based diet, micronutrition goes through the roof. And unfortunately, protein tended to drop too far off the other end. I mean, there obviously are, I 100 percent agree. I think that there are still some nutrients contained within meat or animal based products that are really difficult to get from a plant based diet.

I think the most obvious, the most obvious one publicly that jumps out is B12. Everyone talks about B12. But I think the one that jumps out for me being a muscle scientist is creatine. That, that, that one, you know, there's a lot of, this is slightly out of my comfort area now, but there's a lot of good research now going into the effects of creatine on cognitive health and cognitive function, particularly in the context of aging.

So I think there's certain nutrients in I'll say animal based foods, but predominantly meat. That are really really challenging to get from plant based diets. Not impossible in some contexts, but You could take it one step further and you could look at Specific or the way certain certain specific animals are are grazed or you know, they're fed A guy who I'm sure you're aware of I don't know if he's been on your podcast, but a guy called Stefan van Vleet has done lots of great stuff, whether he's looked at grain versus grass fed animals and the influence that that has on health, and he's done some really cool stuff to look at.

He's done some really cool metabolic stuff where he's looked at the phytochemicals contained within these products within these meat based products when they're fed a grass versus grain fed diet. And I think that's really important to note as well, that actually you can get certain nutrients.

depending on how they're fed, that can actually be quite rich in animal based foods that can actually be quite challenging, you know, in the context of, uh, trying to achieve those in a predominantly plant based diet, particularly in certain areas of the globe. You know, we haven't really touched on global malnutrition because it's an area of interest of mine, but I'm not, I certainly not an expert.

I'd be careful to say I'm an expert in anything, but certainly not an expert in global malnutrition, but I've connected quite a bit. Perhaps in the last year or two with a guy called Ty Bill, who you might know of, he works for the Global Health Alliance for Nutrition and does some really, really cool stuff in global malnutrition.

And, and just works a lot with, uh, Professor Leroy who's based in, uh, based in France. I can't remember where he's based in France now, but he's, they've, they've both done some really good stuff in terms of looking at. How important animal based foods could be across the globe. So, and I agree with this, actually, I think there's certain developed nations and probably most developed nations that on a population level could reduce meat intake both from a protein perspective and other nutrition perspective, because we probably over consume meat on a population level.

But that doesn't mean that we should abolish meat intake in those nations, but also globally. I think that's a really, really important message as well, slightly going away from protein there, but I just wanted to raise that because I think global malnutrition is a really, really topical part of my field at the moment.

Yeah. And, and I agree with like the, you know, components that are hard to get from a plant based diet, even one that's well formulated, like creatine is probably going to be at the top of the list. B12 obviously is going to be in there. We've had Dr. Scott Forbes on the podcast before, Dr. Rolfsen talking about, you know, the accumulation of creatine in, you know, neural and brain tissue now.

I remember talking to Dr. Roger Harris years ago, and his thought was that, you know, carnitine is probably the second biggest one in terms of, you know, beta alanine. And they were showing all sorts of new, you know, Research related to cognitive benefits of, you know, I was going to say, I'm sure there's, yeah, so we've we have I don't know if you've interviewed Professor Craig Sell before No, but I read a lot of his work.

Yeah, great stuff. Used to be based at NTU, uh, uh, sorry, that's, uh, a local university here, but he's now based, uh, I work very closely with him. We, we work at the same, in the same department. So he's probably one that maybe you could, you know, Maybe you could connect with, but he his background is beta alanine karnosine, you know, so he's, he's starting to look at, we're very fortunate to have an MRI in our department of free Tesla MRI.

So they're looking at some brain function stuff and looking at karnosine and I think they're looking at it in the context of heart, the heart as well. So they're looking to scan the heart and doing some really cool stuff with beta alanine karnosine, So it's a really interesting area. And like you say.

It's another important nutrient that I think can often get disregarded in that, that debate. I don't know if it's a debate. It's more of an argument, but yeah, but yeah, yeah, absolutely. Yeah. And then, I mean, I, I am not up to date on the environmental impacts or that type of thing either, but There's also a fair amount of land, at least in the U.

S., that just agriculture isn't going to work real well, but you could have free range cattle, you could have animals on it, too, and vice versa, right? There's probably some other land that Might be better for agriculture purposes too, so it's yeah, it's and that's well outside my wheelhouse So this is a this is an area that i'm going more and more into so i'd be wary to say again I'm an expert now, but this is the area that I really really enjoy.

I think it's quite impactful We've got a paper under review at the moment. It's just a review paper. It's not an experimental paper We are doing some experimental work, isn't it? You know, as soon as it's hopefully accepted, then I'll forward on to you. But yeah, it's basically looking, uh, I can't remember the title specifically, but it's sustainable protein, nutrition considerations in an aging population.

So it's just basically an overview of some of the sustainability considerations that, that we need to. consider alongside nutrient requirements specifically in the context of muscle when it comes to alternative protein sources. As in my opinion, there's a lot of misconception in this area. And that's the, I say misconception, I'm talking about the sustainability of commonly consumed protein rich foods.

And that's the, I think the common misconception is animal based foods are horrendous for the environment. Plant based foods are wonderful. When, when you look at the diet and you'll see these statistics, the statistics in the UK are

very similar to the U S there's something like dietary or food choices or the food chain right across the food chain accounts for something like 30 percent of greenhouse gas production.

Now it's important to not look at that figure and go, well, It's 25 percent or 30 percent or whatever it is. If we go for a plant based solely plant based approach, we can get that down to 0%. That's of course a load of rubbish. I was like, there's no way. Yeah, but I'm not, I'm not suggesting someone is saying hypothetically if he could.

Yeah. Hypothetically. It's important to remember that if you look across and I'm going to call, I refer to this in a couple of my papers, including that paper, we refer to this spectrum of protein quality. So lower quality proteins, most of them being the plant based and then the higher quality, most of those being animal based.

If you look across the spectrum of protein quality, you don't have a clear message or a mutually exclusive message. Continuum of low to high environmental cost that doesn't exist. What does exist is if you look at the absolute environmental consequences, we'll just focus specifically on greenhouse gas production.

You do have animal based foods generally produce more greenhouse gases and plant based foods generally don't consume as sorry, don't produce as many greenhouse gases. But that's a really simplistic way to look at the argument. There's loads of other contributing factors to environmental consequences.

There's also, if you look across the food chain, there's a number of different stages across the food chain that can influence environment, the, or that can impact the consequences associated with that specific food. So you've got the food production in itself. You've got the food processing, manufacturing, the distribution of that food.

The marketing elements related to purchasing of the food storage. So storage, for example, in the context of animal base, yeah. Animal based foods actually tend to have higher environmental consequences associated to storage because they're typically required to be refrigerated as opposed to plant as opposed to plant based foods, you've got the preparation and the consumption, the disposal.

Uh, recycling, upcycling of that food. So there's loads of different stages of the food chain that are associated with environmental consequences. Now you can take certain protein sources that are particularly high quality that don't have as

high of a carbon footprint. The classic examples, when you just look at it on an absolute level, our stuff like insects, fish, they're probably good examples.

Beef tends to be the highest, but what's important is when you look at these metrics, They need to be relevant to some sort of important nutritional metric for that given population. And when I say population, I mean, is it a population that is generally speaking protein deficient? a less developed nation, for example.

Or is it a population that actually consumed more than enough protein? Those kind of considerations need to be taken into account. Or is it a particularly aging population? Well, obviously you can start to look at this given population and start to break them down even further. You can look at very specifically an aging population.

But when you look at those metrics and you make them relative to When I talk about metrics, I'm talking about greenhouse gas production, for example, and you make those relevant to nutritionally relevant metrics, such as protein quality, then the picture starts to get a little bit sort of jumbled up. You have some plant based proteins that are here, some animal based proteins.

Meat, in terms of, uh, beef, still tends to be highest. There's many animal based proteins that are actually negligible in terms of their greenhouse gas production compared to others. Now, the argument doesn't stop there. We can't cover that argument in this podcast, but what we do do is we cover that argument in the paper.

So, hopefully I can share that paper with you. Yeah, that'd be great. See what you think and hopefully see what your listeners think, but what I really just want to say to finish off that argument or the debate and discussion is that it's so, it's hugely complex and people that try and oversimplify that argument, which they do, there's many people around that try and oversimplify that argument.

They, they probably are oversimplifying it for a reason, probably for an agenda, I would imagine. But if they are oversimplifying it, they're oversimplifying an argument that is far too complex and it cannot be simplified, or it cannot be oversimplified. And if we start to go from, which I think many plant based advocates are, going from where we are now, which is probably consuming too much meat in some nations, to consuming no meat, It's important to know that we don't really know what that, what that planet looks like.

In fact, You know, there are some researchers that have talked about this quite extensively. If you think about a planet in 50 years time, for example, that consumes no meat, just hypothetically, that planet is very different to what we see today. Oh yeah. Is that a healthier planet? I don't know. And if someone says they know, then they're talking absolute, excuse the word, but they're talking absolute BS, because we don't know, we really don't know, it's, it's too far of a reach to truly understand what that planet looks like.

But it looks very, very different to what it, what our current planet is. It might be that it's a wonderful planet, it's very healthy in terms of greenhouse gas productions, they're very, very low, I don't think it does look like that, personally. But I think it's just a, yeah, there's a lot of nuance that's required in this, in that discussion and probably, probably what's best for our planet, albeit I'm aware there's much better people that can discuss this than myself, because I'm just talking at it from a skeletal muscle health perspective, is there's probably somewhere in the middle.

We probably need to reduce meat intake, need to increase animal, uh, sorry, plant based foods, reduce animal based foods, but not drastically, just somewhere in the middle where we get a balance. In that paper, we talk about a nutritional to an environmental consequence trade off. And I think we need to find where that balance is, where the balance.

I think it's a really difficult question to answer. But where the balance is of how much animal based foods need to be reduced and how much, therefore, plant based foods need to be increased. I don't really know what the answer to that is, but I think it's not on a complete abolishment of animal based foods, in other words.

That's my own personal opinion, uh, particularly in the context of healthy skeletal muscle aging. I know that's a bit of a, you know, Whistle quick tour. I think of what my current opinion is on environmental consequences of Sorry of protein rich foods. It's a really really complex discussion that ultimately right at this moment in time We cannot say with confidence whether a predominantly animal or plant based art is any better for the environment and I think again if anyone says otherwise They're saying that based upon insufficient data.

Yeah, it reminds me of the phrase, which I'm probably bastardizing, is that there's no complete answer. There's only trade offs. Right? Because on, you know, one side of the spectrum, I just think that, at least in the U. S., if we went only to plant based sources, and that's the thing, both monetarily and everything is rewarded.

You're going to drive the agriculture business to be the most efficient. How much can we extract out of, you know, the land, all the things that they're currently doing now. But I just see that becoming more extreme, which that is probably going to have some environmental consequence associated with the two.

And if you just have. You know, mass factory farms of cows everywhere. I'll be not the best either, but I, it just seems like both sides want to have this stereotypical, like this is the only solution. And the only thing I've ever come up with, which is not my idea is go kind of go back to the way we did it 50, a hundred years ago, have smaller farms are kind of in charge of their land.

They're going to do crop rotation. They're going to have some cows. They're going to have other types of animals. It's going to be semi regenerative, people are willing to pay for higher quality food. It's, you know, that's a, it's a whole nother discussion. It is, but I think what you've done really nicely is almost hit the nail on the head, at least, at least where my head is at in the context of, I'm just going to focus on protein, but in the context of protein nutrition I think absolutely.

Yeah. I, I, and I do think animal based foods. Okay, we could go into the ethical discussion. Oh, sure. That's that's a personal opinion, right? I don't want to so I don't I don't think there's any need to go down that route People are always going to have an ethical concern. With consuming animal based foods Sure, I recently got into a twitter again debate as an argument really With again someone questioning my ethics of consuming animal based foods.

I get it. I 100 percent get it I did, I did answer or didn't answer, but as part of the discussion, I did suggest that, you know, if animals are on the, if animals are with us, with humans on earth, then what is their purpose beyond as a food source. Now, of course, that's a naive response. And I completely own up to that.

In fact, someone that was also involved in the discussion. accused me of being naive to ecology and other elements. I was like, yeah, I am naive to ecology because, uh, I don't know if you know, but I'm a muscle or nutrition, right? I'm a muscle scientist. I am completely naive to ecology. That's what it's really important that we have these interdisciplinary groups of people that take the approach that Is right for the environment and You cannot do that just based upon one You know muscle scientist that has to be done in a larger group but yeah, I think you've hit the nail on the head and I really like the You know the as you said, there's it's not really an answer.

It's not a yes or no There's there's a lot of trade offs and I think that is Absolutely, right in my my personal opinion. Yeah, but I do like your point that even when we're looking at environmental concerns We have to take into account How does that impact human health? Which I, you know, just at least me being on the fringe, I don't see that being discussed enough.

And I think that has to be an important part of the discussion, but nobody I'd say nobody, but very few people want to do that because that adds yet another layer of complexity onto something that's already very complex. And it just comes back to the whole, as again, I mentioned the metric of about 30 percent of our diet choices, right.

Being associated with sorry, 30 percent of greenhouse gas production in the UK. Same in the U S very similar in the U S. Being associated with food choices or diet choices across the food chain, that's never going to be 0%. There's always going to be greenhouse gas emissions or environmental consequences associated with that's not a bad thing.

There's been, you know, environmental consequences associated with food choices for years and years and years. It's a trade off, isn't it? You talked a little bit about regenerative farming and so on. I don't, again, this is going so far outta my comfort zone, but yeah, me too, . It's, it's it, what does our planet, if we continue along this trajectory in terms of greenhouse gas production, what does our planet look like?

It keeps warming and warming and warming. You get global warming. Again, I, I don't wanna say something that I would later regret, 'cause I, I don't really know enough about the area, but does our planet just adapt? I don't know. That's where I'm really naive. Does it adapt? I, I don't know. I it, it is. Is it I think it would adapt the catch is, I don't know if we'd have enough time.

Yes, that's a good, very good point. Yeah. Right. So I think you would adapt, but again, if that curve is probably not linear, it's probably something like that. And once you get on that steep end of the curve, there's just no time for adaptation. And if we look at biological systems, what do we know that they're very sensitive to PH changes, right?

So we know a lot of those things are tightly regulated. Again, do I have an answer as to what happens? I don't know, but there's definitely at least enough we know about physiology to say that It's a badge that's probably gonna happen. That's very true. Yeah, that is very true. And that's, that's a good point.

I guess that's, that's when we come into play, right? As, as physiologists. So, that's just to bring, just to bring, there was one point I, I promised myself that I was gonna mention to you today. Bring it back round to protein, specifically. And I think this is probably another reason why D. C. Suggested getting in contact with me because I feel like in the context of protein nutrition and musculoskeletal health, I generally have, I would classify them as fairly diverse viewpoints as to where we are with muscle protein metabolism.

I've spoken to some people, some more senior people, Stu, for example, I've spoken about. Some of these different opinions, but you have to be wary because they're a little bit out there with no, or not sufficient data to back them up. I don't really want to go into them per se. All I want to say, I've gone a long round, long way around here to say that a lot of what we know in protein metabolism, first, in my opinion, a lot of the basics of protein metabolism often contradicts itself.

And I think part of that reason is because. A lot of the work that we've done in protein metabolism has been around isolated, rapidly digested protein sources. In other words, not whole food sources. Yeah. And when I say, which is starting to change now, which is good it, but I agree with a lot of the early work is 100% based on that spoke or very high percentage.

I spoke to yarn tme I dunno if you've had yarn on the, he'll be on coming up. Yeah, yeah. Oh, perfect. He's great. Yeah. So Ya's great. Yeah, he's awesome. So you'll probably talk to him about his recent paper. We, we talked a little bit on nutrition, uh, sorry, nutrition on Twitter about his paper. I mean, I get on well if you want, so that was not a problem.

But we talked about, you know, that this whole, uh, 100 gram dosing of protein is the paper we're referring to. Sorry. Yes. Yeah. And we talked about this whole, well, we need more stuff that's doing whole looking at whole food and the responses to this. What does that look like? What's it look like across the day?

What's it look like in these different populations? Blah, blah, blah, blah, blah. I won't go into that too much, but all I really want to say is that when I refer to rapidly digested isolated sources of protein, I'm talking about any sources of protein. That are not whole food really so people will say you'll hear people like don layman for example I don't I mean, I know don professionally, but he won't really know who I am.

He will say something like casein is a slowly digested protein and he's right in the context of isolated protein. It's still rapidly digested because if you look at plasma amino acid concentrations. Yeah, compared to whole food with a mixed meal, that type of thing. Yeah, you see, so actually if we talk about whole food, you see negligible increases in amino acid concentrations postprandially.

You don't see that of isolated sources. It goes like that and it comes down quite rapidly. You don't see that with whole food sources. So we talk a lot about, for example, Don talks a lot about as do others, although this, this hypothesis is being questioned now. The leucine threshold or I can't remember what else they call it, but the leucine threshold where you need to reach a, or leucine trigger.

Yeah, you need to reach that within the blood or within the intracellular space. Quite rapidly to be able to trigger muscle protein synthesis and so on and so on and so on. All that stuff is quite attractive and I understand it. I think it has a good basis, scientific basis, in the context of isolated, rapidly digested sources.

I'm not quite sure how stuff like that hypothesis fits with typical habitual dietary patterns. Because again, if you look at any of this, so Nick Bird in particular has done a lot of whole food source stuff. You only have to, you only have to look at the, the increase in amino acids. Okay, they do increase postprandially with whole food.

you know, uh, meals protein rich meals. You do see increases in amino acids, but they're very small. They're almost negligible compared to isolated sources. So I think a lot of what we know and a lot of what we talk about, for example, the diurnal or sorry, the daily variations of muscle protein turnover, you know, muscle protein synthesis, muscle protein breakdown, what do they look like across the day in the context of whole food sources?

What does the maximal muscle protein building response look like in the context of whole food sources? What's it look like later on in the day? Where we've had exposure to amino acids gradually across the day because your body is gradually breaking down proteins to release amino acids and you see a gradual release of amino acids across the day. Do you get all these continued repeated stimulations of muscle protein system stuff like that?

I just don't think we know anywhere near enough that we talk about it like it's gospel. And I understand why I'm not going to question some of the people that have come before me that have done excellent work, you know, like the stews, like the dons, all of the Luke van Loons, all of those guys are much more impressive than me.

Of course they are. But I just think we always need to throw that caveat in that we need a lot more work in whole foods and what that looks like in the context of, of muscle, uh, muscle protein turnover. I think that's really, really, really important. I know there's going to be. More work done in that area.

So, you know, be interested to see it and And I think that'll have important implications for plant based diet recommendations as well But you know, we'll wait to see more and more of that work. Hope it could Yeah, I think what you hinted at too is that, I've talked to Stu about this, I even had him a quote from him on the article I wrote about Jorn's new study, and I had Jorn on the article quoted, and I had DC in there too, and that it was by design a hundred grams of an acute study to look at what was going on.

And Stu's point, which I agree with, is The acute responses don't always turn out to be the exact thing in the chronic response. However, that does hint that an acute response does put you closer to finding what is kind of the chronic response. But it's not this perfect one to one ratio that everyone sort of interprets it to be.

It's just, it's not, unfortunately, that simple. That also extends out to quality, protein quality. So you get some, you get some acute studies that show that even if you have an inferior amino acid profile with a lower quality protein dose and compare it to a higher quality protein dose, you might get fairly similar responses.

Again, this is dependent on the paper, but there's certain, certainly some papers that have demonstrated similar responses in terms of the muscle protein synthesis response. The problem with that is that I think acutely, there are many good reasons why or how. Small deficiencies in amino acids can be counteracted acutely.

Long term, I think an accumulation of amino acid deficiencies, should you have an amino acid deficiency, can only be bad news, in my opinion. But I think acutely it can be rescued, the response can be rescued. So I think we do need to be a little bit wary of some of these acute laboratory studies.

They're really good and obviously they need to be performed, but we just need to be a little bit wary of what that looks like in the long term. Yeah, my argument as a physiology as a whole is that in, in general, from multiple different areas, we have a ton of data to show that you're just not that fragile, like if you are a healthy human being, you are more robust than I think what people realize, like, yes, if you're chronically missing something, of course, you

don't have a building block, you're going to run into issues, but this thought that You know, oh my god, I only got 1.

85 grams of leucine and not 2. 2 Grams of leucine in my post workout shake within 30 minutes. Like all my muscles gonna fall off. It's like Get out of here I will just throw one one one thing that I would love to see with the whole food stuff Is work and I know this is happening or going to happen is Look at whether with typical habitual dietary patterns, I don't, whatever you want to call this, the refractory period or the muscle full effect, I think, I think Don calls it the refractory period.

And I think Phil Atherton's group call it the muscle full effect, whether that exists. With typical habitual dietary patterns. Now there's good mechanisms that play for why it exists. Most people think because it's a huge muscle protein intensity, sorry, is a hugely energy expending process that it cannot continue.

It cannot continue and continue, continue. So there's mechanisms, for example, AMPK activation that may. Play a role in down or so reducing muscle protein synthesis because it's so energy expending and I think that's good. I like the idea. I like the concept. I like the concept in the context of isolated, rapidly digested protein sources.

And that's because what happens with those is you flood the plasma. Yeah. You flood the plasma with amino acids and undoubtedly the body, I find it hard to believe the body goes, Oh, that's 30 grams of protein coming in. They actually go, well, that's a huge amount of, or a high concentration of given amino acid may be loosing and they, and then the response is regulated that way.

Now if you don't see that with whole food sources, which you don't I would imagine, You don't see a refractory period or muscle full effect with whole food sources, because the mechanism, which must be not protein, but it must be amino acid concentrations. That's the only one that makes sense that it must mean that that probably doesn't exist.

And I say, doesn't exist. A little bit cautiously because of course it exists exists when people consume rapidly digested isolated protein sources Just do a very small effect if it is there might not be detected So, and the only reason I wanted to throw that out there is because again, Phil, I don't know Phil that well, but it'll probably every, I'm sure every time I meet him, he forgets who I am, but he he's done some really good stuff.

Their whole group has done some really good stuff, but I think that. We far too often take that for gospel. I think we take this muscle full effect. I've even heard lay people refer to it before, and I'm like, really? Like, we shouldn't be taking that for gospel. Again, I like it as a mechanism. I like it as looking at what potentially biology can do in that specific context.

I think it's really cool. But whether it actually exists with typical habitual dietary patterns, maybe it does, but let's see first if it does before we start to take it for gospel. That's my own personal opinion on the refractory period or muscle full effect. But I think there's some work being done in that area.

I am pretty sure there's some work being done in that area. So I think it'd be, it'd be good to see. Obviously it's a, it's quite an expensive thing to do. You probably need intrinsically labeled proteins, that kind of stuff to be able to truly test this. Me and DC have got some wonderful plans.

Unfortunately, all of the plans cost millions of pounds. Yeah, someone needs to give us some money to do all this. But yeah, I mean, it's small steps, but I think the biggest steps you'll see moving forward in protein nutrition is looking at more sustainable means and whole food approaches. I think they're the two, in my opinion, hot topics in protein nutrition for muscle health.

That's that's where my head is at anyway. Yeah, if you were to add two more to that list of hot topics What would you add in terms of the realm of muscle protein research? I would agree with those two actually. Yeah I'm, not sure actually because they cover such a broad range, right the sustainability just covers The other additional one I would definitely include is alternative protein sources But alternative protein sources are only being sourced largely for sustainability issues.

I think, obviously, because developed nations are aging, aging nutrition is massive. And of course, muscle being hugely important in the context of maintaining, I don't want to say longevity because I don't really care about longevity. I think we live long enough quality of life, quality of life. Exactly.

Yeah. And health span. So I think muscle is really important for that. So I think aging there's, there's more and more work. This is more niche, but more and more work now being done into protein specific recommendations for muscle specific diseases. That's more niche. But I think that's going to represent a really, really important area in the context of protein nutrition as well.

The only other thing I just want, I'd extend on sustainability is a very specific portion of protein nutrition. And that is maximizing the sustainability of specific protein sources. So in order to take a protein source. And for example, I'm thinking about, I don't know if you know, Brian Carson based at the university of Limerick.

I don't. He's done some fish protein work. And what he's done is taken parts of fish that are regularly disposed of during the natural processes that it moves through the food chain, taken those parts that are just disposed of and looked at ways that you can improve the quality and What should I say?

The, the quality of the quality of that given food source, but also the palatability of that food source. So I really like that kind of work because that takes food that's currently wasted and looked at ways that you can maximize that use of that food for human consumption. And it's sort of similar in the context of, we joked about it earlier, but the chicken feet.

Yeah, yeah, that's taking a part of the chicken or taking part of an animal which is typically disposed of. Albeit it's consumed fairly regularly in parts of the globe. But if you take the UK, for example, we don't really consume stuff like chicken feet. And maximizing the use of that for human nutrition.

So I think ways that we continue to explore improving parts of regular protein rich food sources and making them more available more widely will represent a really important area for future protein nutrition research. As well. Awesome. Sustainability, again. Yeah, yeah. Awesome. Yeah. Well, thank you so much for all your time here and, uh, give us, where can people find more about you?

I know you're on the Twitter, the X, and best, best places for people to harass you. Yeah, exactly. Yeah. Twitter is my, but I, perhaps I can share my Twitter handle with you and you can upload it to. Definitely. We'll put all the links in the notes here. Off, off memory. I think it's underscore Paul Morgan. Yeah, we'll have it below.

Yeah, that's great. That's probably the best. I mean, people can always email me, but I think people generally just want to. An easy way of discussing something which is probably Twitter or let's say X. I'm not really on any of it. As you mentioned earlier, I think most academics aren't really on many social media unless they have links to industry, then perhaps they're on Instagram, but I'm not really an Instagram person.

But that's the best way and people can easily find my email as well if they search my name and institute online as well. Yeah, they're the best, best means. Cool. Awesome. Well, I thank you so much for all your time. I really appreciate you sharing all the knowledge and publishing all the work and arguing with all the crazy people on Twitter.

I'll share, I'll share the paper that I referenced. Yeah, we'll put all those in the notes for sure. That'd be great. He's a co author. It's, it's publicly available. So, you know, easy access and, uh, as soon as that sustainability paper is, is well, hopefully accepted which is not in collaboration with DC, but it's in collaboration with Brian Carson, as I mentioned earlier, and, and Olly Wittard, who's based at King's College once that's out and perhaps we can share that and people can have a read of that if they're interested as well.

Yeah, that'd be great. Well, thank you so much for all your time. I gotta run to my next podcast here But uh, I really appreciate it. That was great. It was a fun discussion. No problem. Yeah, we'll keep in touch. Yeah, we will do. Thank you so much. Appreciate it. Thanks, Mike. Speak to you soon. Bye. Thanks, bye.

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