Danny Lennon: Alan, thank you for first hosting me in your lovely home, but also for taking time to do this.

Alan Flanagan: It's a pleasure to host you and to be on the podcast Danny. Thank you for having me.

Danny Lennon: Well, I think we've already been talking probably nearly an hour so I regret not recording that. We can add some stuff right for people. But before we get into some of the things that I think we're planning to discuss, let people know about you and your background that maybe relevant to this conversation or just in general?

Alan Flanagan: So, my background is probably a little different to the way a lot of people come into nutrition. I've spent the last nine years working as a lawyer. I'm a barrister in Ireland and nutrition was always in my background as a hobby interest and something that I had a lot of interest in the science of, and I guess you could say I became a PubMed warrior early on, realized I didn't really know what I was doing and was quite wrong to research and wanted to formalize that process and start a path of education. And that led me to a Masters in Nutrition at the University of Surrey, which I finished earlier this year and now I am moving on to a Ph.D. at the same institution starting in January. And so, it's been a full transition from law into nutrition very much with a view to going into research and academia. And I guess with the legal background as I got more into nutrition and I became quite interested in policy and regulation and how they might combine with what we have

now as a evidence base in nutrition to improve population health and public health.

Danny Lennon: One of the first things I wanted to talk about was public health messaging in general, and I think this has probably been something I haven't really talked about all that much on the podcast. Maybe that's my bias because it's probably a weak area for me in that when generally people ask me what do we do to help this public health situation, I don't know, and I don't know what are the solution in this area. But beyond trying to get to that point just yet, I think maybe the only thing I've offered people is that public health messaging or information about nutrition we're going to give at a public health level is a distinctly different thing from me theorizing over what is an optimal diet for someone, right? What are your general thoughts when this topic crops up or what maybe other misconception people have or just want is the general way you get people to think through this idea of public health messaging?

Alan Flanagan: Yeah. I think you hit the nail on the head with the word misconception. I think a lot of the conversations that are happening in nutrition currently are very much debates around optimal diets, and is it better to be more plant based, what's the role of consuming animals in the diet, and arguments over fats and carbohydrates and these kind of things. And they frame conversations about nutrition in a very specific way that is relevant to population subgroups and not the population as a whole.

And when it comes to population health there's a couple of things that almost invalidate a lot of those conversations. The first is that we can argue over diet and the composition of diet till the carers come home, but the reality is the primary drivers of non-communicable disease are social-economic and environmental in nature. So, at a population level the conversations now are turning more to trying to address those factors to help population subgroups that are more vulnerable downstream.

So, the population level advice that we're giving is very much based off of what we know about nutrition to this point that is to a degree not necessarily that controversial. They are generally broader statements like consuming more dietary fiber or reducing saturated fat and replacing with unsaturated fat and these kinds of guidelines come in for a lot of criticism but the issue with the

guidelines is that they have very little relevance to the manner in which people are eating on the ground because the primary factors driving daily decision making in food choice have nothing to do with guidance and dictated to by financial circumstances, urban environment, and the built environment and other kind of social factors like that.

So, population nutrition advice is broad and blankish, but for the most part what we know about the responsiveness to health messaging is that it ties to social-economic status and education status i.e. people that have higher education level are more likely to be responsive to public health messages. So, you bring in a public health message to for example, reduce sugar sweetened beverage consumption the people that are going to be more likely to be receptive to that and to pay attention to it are more likely to be people that are paying attention a little more so to their health in the first place because they have the means, and the availability, and the access to do so.

So, there is a real difficulty with making public health and messages against the reality of trying to implement what the substance of the message is on the ground, and they are two entirely different things. So, public health messaging often comes in for a lot of criticism, but fundamentally and recently there has been commentary particularly in the UK that actually the dietary guidelines themselves have been causative of increasing trends in things like type-2 diabetes and obesity. But that's simply not the case because the dietary guidelines had nothing to do with the shifts in the food environment that occurred as a result of industry shifts and as a result of significant shifts in the kind of global food systems and food availability.

Danny Lennon: Yeah. I find that quite a strange argument that sometimes it's put forth of – and we could say, again if we look at the food pyramid we have here or we look at MyPlate or any of these type of guidelines we can disagree on certain things about that or things we would on an individual level change. But in general I think it's a bit of a stretch to say the reason why people have type-2 diabetes or we have this prevalence of obesity is because people are eating too many servings of whole grains or eating low fat dairy.

Alan Flanagan: Yeah.

Danny Lennon: And I think another perspective is I find it hard to think of what do people want the guidelines to look like. So, you'll always see oh this is what the guidelines look like but I did the opposite to this, so whether it's like super-high fat intake or something else and look all my blood markers are perfect and that's kind of like pointless. It doesn't mean anything?

Alan Flanagan: No. And part of the problem is, let's take the basics of most guidelines in say Ireland or the UK or even the States, if you look at the big picture aspects to them consuming say six servings of vegetables a day, non-starchy vegetables, consuming a certain amount of fruit and that's been categorized into a five a day category in some countries. And actually if you look at some of the observational research in this area one of the big features of observational research which we base lot of our public health recommendations of is it very much depends what's the unit of exposure in nutrition. So, if you look at the effect of one serving of vegetables a day there is an interesting story a 5% reduction in risk, so not significant but something but actually if you look at consuming five or more servings a day that's certainly a kind of 26% relative reduction in risk. So, the unit of exposure is important because these are the observations that translate into public health advice.

So, can we say that those guidelines which emphasize vegetable and fruit consumption are somehow inconsistent with health outcomes, absolutely not. They are based off of observations that are there and the factors that prevent their implementation have nothing to do with the guidelines themselves. So, at the most basic level the kind of non-contentious elements of the guidelines vegetable intake, fruit intake, and whole grain intake are based off very strong and consistent observations that we see in research. And there is nothing incorrect necessarily about them. It's just the manner in which we're trying to get the reality of those food based recommendations into population health. And one thing that has been the subject of some commentary in recent years has been that guidelines have been very much focused on nutrient-based recommendations and there is a consensus it seems emerging that in nutrition more food based directive recommendations are beneficial because people can engage with them. And this is something we've seen occur at the Nordic Nutrition Recommendations of 2012 which were brought in at national level in the Scandinavian countries are all very much food-based recommendations, you know eat these fats, eat less

of these, eat these types of – and they give specific recommendations in that respect. Male rapeseed oil the primary cooking oil, consume 30 gram one hand serving of nuts three times a week and this kind of thing.

Most of the evidence emerging is it's interesting in nutrition you would think that we have lots of food-based interventions and research, and we don't have as much as you might think. But what's there is quite encouraging that that level of directiveness is something that people can engage in rather than say for example, communicate eat more fiber. And that's where there can be a disconnect between public health intention and what's translated on the ground because if we take for example the threshold to label a food high in fiber is a fairly arbitrary threshold and that's set within a regulatory framework at the level of the EU. So, it might be 4 grams per 100 grams of other food serving, and what that can ultimately translate into is you might have a box of cheerios that on the front of it says high in fiber. It certainly achieved that minimum threshold that's set in a regulatory context, it communicates nothing about the healthfulness of the food product itself and that's where we can get into disconnect between what guidelines suggests and what actually is implemented on the ground. Whereas, what we actually want people to do is be consuming perhaps porridge in the morning instead of that bowl of cheerios, and these kinds of food-based swaps and directiveness that we can make to start to get people towards the diet pattern that we think is going to be beneficial for human health.

Danny Lennon: Yeah. There are probably two things. One that we'll probably discuss for most of the rest of the podcast is even when we're trying to formulate okay what things do we want people to change and where do we get evidence for these things that's kind of one conversation we'll get to. But before that one of the important points I think you've discussed is even if we did have consensus of these are the things we'd want someone's overall dietary pattern to look like, knowing what they are and even telling people what they are is very different from actually seeing that happen. So, at a level of trying to improve that where do you see a hope at a public level or what things need to be in place, so that we can see some of that stuff?

Alan Flanagan: I think when you look at most of our public health recommendations to-date have been very much targeted at the

level of the individual, and they very much tie in with what is now a fairly outdated and rejective narrative of non-communicable disease which is the personal responsibility narrative. Someone has diabetes because it's their fault and we know that with the factors influencing these situations that's not the case. So, the issue now is that a lot of the type of actions that we would like people to take are very much targeting them at an individual level, and so they are downstream interventions. I think the most successful interventions and the biggest return on investment is going to come from focusing upstream at the level of industry and regulation and we have examples of this from other domains in relation to not just public health but human health and environmental regulation is probably the best example of that. And there are recently some examples of movements towards this kind of upstream intervention and probably the most popular one would be sugar taxes.

Now, the difficulty with upstream interventions is the very purpose of them is to try and reduce social inequalities that are driving non-communicable disease downstream. They have to be framed quite well and be formulated quite well in order not to actually exacerbate those issues. So, if we look at sugar sweetened drinks as an example of this most of the evidence suggests that sugar sweetened drink consumption again ties to socio-economic status imposing a tax is likely to disproportionately impact the people who probably need an intervention like that the most. The other element to a sugar tax for example, is that it was brought in without necessarily expanding the advertising laws, so right now the focus is on foods or drinks that are high in one of sugar, fat or salt not a combination of the three. For the most part the watersheds only apply to television and they don't apply to the spectrum of media through which children and teenagers in particular engage.

And the other element to it is that there seems to be a bit of a pandering to the industry in a sense that most of the evidence accumulated from jurisdictions that piloted sugar taxes suggested that a levy of 20% will be needed to make any sort of meaningful impact on industry. Most jurisdictions have brought in 5% to 10% tax i.e. it's something that ultimately can be absorbed by industry and isn't going to make that much of a meaningful impact although there is some evidence that it's causing reformulation with certain companies.

So, that's one example of an upstream intervention, but we can actually expand that in terms of policy. There are a couple of probably low-hanging fruit to pick. One is that when it comes to making decisions in relation to what would benefit the landscape for diabetes and obesity, industry doesn't have a seat at that table. They are certainly entitled to be part of the solutions once those decisions are made, but they shouldn't be involved in the decision making process based on the evidence of what actually needs to be done.

The second thing is taking examples from other successful interventions. So, one of the best interventions in environmental regulation was a cap and trade approach. We could actually take that example and use it in relation to food, only in this case the emissions could be aspects of the food supply that we've identified in particular high energy density foods, and we could put a cap on what the levels of total energy or certain other nutrients of interest like saturated fat or sodium are and reduce the overall cap over time rewarding companies that are within that cap, and then companies that aren't have to purchase credits of companies that are – and overall effect is that there is an industry wide reformulation downstream. So, again you're reducing the energy availability in the food supply in a way that applies to all industry across the board. So, there's no one being necessarily unfairly penalized for being within those targets, they are being rewarded for it. And I think that that could be a very beneficial intervention and I think that ultimately as well regulation on factors like the reformulation of food products or beyond just I guess looking at this through the lens of negative aspects of the food supply but industry could be a big part of the solution in this. So, improving the nutritional quality of readily accessible foods or more convenient foods or daily staples in the diet as they stand at the minute can be a big step forward as well. In that sense it appears that mandatory regulation would be the way forward, and the reason is this. For example, in the UK in 2012 they brought in what was known as the Responsibility Deal. There was a voluntary opt-in scheme which was targeting improvements in the food environment and the nutritional composition of foods and industry gave it a thumbs-up and then didn't opt-in. And so, part of the reason behind that it seems that because if it's voluntary why would one industry player volunteer to potentially hamper their profits, whereas others may not. If it's mandatory the playing field is level and it seems like industry are more receptive to interventions that are brought in at a

regulatory level. If they are mandatory because it means it applies to everyone across the board and they're all on the same playing field.

So, in terms of reducing health inequalities downstream I think most of the beneficial interventions can occur upstream. I think that we do need to also have conversations then around just raising the standard of living generally but again these are more political conversations I think the nutrition at the minute.

Danny Lennon: Yeah. And just with that whole set of factors that's playing a role here it's quite clear the distinction between an individual level and this population dynamic because the things I think most people hear about when how does someone improve their nutrition well people tell them about getting educated around good quality nutrition, and learning more about that, changing their lifestyle. Whereas, what we're essentially discussing here is that's probably not going to work at a broad level particularly at the most at-risk groups. So, it's how do we take what they're currently doing and almost make it this subconscious shift or just an easy step to make these changes as opposed to using you have to get educated or you have to shift what you currently do?

Alan Flanagan: Yeah, exactly. And that's a really important point I think the education point, and there is a lot of focus on education and I think that fundamentally it's at a relatively classiest contention to say we just need to educate – the idea that people in low-income areas don't know that fruits and vegetables are good for them is a ridiculous proposition. The reasons and the barriers to consuming better diets, if you look at some of the research groups that have looked at this kind of thing, generally the consistent themes emerging are lack of time and lack of food preparations skills. And so for example, there was one well intention suggestion that while we use things like a sugar tax to then subsidize availability of fruits and vegetables in low socio-economic areas but there is a researcher in the UK that looked at whether that would be of any benefit and the reality is that people in low socio-economic areas probably don't spend enough time in food preparation because they lack the skills and the time in order for that beneficial well intended as it is to be of any really meaningful impact.

So, what we need to do is again with the upstream interventions focused on modifying the environment in people's favor, and then we might be able to see some inroads and we can apply

behavioral economics to this as well. There is an interesting study in the UK, which looked at modifying the choice architecture of a drinks display that you would see in spa or a convenience store such that within eye level and an arm reach where washers or non-calorically sweetened beverages and the full sugar versions or calorically sweetened drinks were either up the very top or down the bottom and the difference in sales was 30% reduction in sugar sweetened calorically sweetened drinks sales after a month. So, small subtle behavioral nudges like that can be very beneficial and eliminating price points confectionary displays, again simple intervention, you're not modifying or restricting choice. It's still available. It's just not in positions where it's deliberately playing on what we know now about the neuro-biology of eating. So, these are all aspects that can occur from upstream interventions, legislation or regulation that will modify the environment in people's favors downstream. Hence, at the end of the day we're kind of going back to our first principles approach of energy balance. Let's reduce total energy availability in the food supply and see how that ultimately – and these conversations around optimal diet composition etc, are much less relevant right now than the kind of environmental modifications that we can make in order to try and see some improvements in the situation in the short to medium term.

Danny Lennon: Yeah, I mean it's just so abundantly clear every piece today that's looking and tracking energy availability within the foods supply and it just tracks perfectly all these issues that we're having, and so like you say while we try and cap this or we're going to find out pretty soon that works, right? One kind of thing that's kind of bit distinct from that is we talked a bit about public health messaging and obviously we could talk a lot about various different policies and interventions at a government level. For people who maybe in a position where a lot of people are listening to them in a public sphere about nutrition and health. They're not working one-to-one but just a lot of people tend to hear their messages is there anything there that you think is relevant in terms of how some of that conversation should get framed that is likely to hit the center of the bull's-eye for the largest number of people that could be consuming – now I realize we also have this issue of the people who are consuming messages about nutrition or self selecting for people put in. Is there anything that anyone could do whether they are let's a doctor maybe they work in school, maybe they have access to these public health initiatives but they are not in

forming policy per se. Is there anything in terms of how they frame messages you think is most useful?

Alan Flanagan: Yeah, I think so. And I do see an evolution towards a situation where people in primary care type of and positions whether that's a GP or even schools. I think schools are a huge part of the solution here actually, because we're talking about having an environment where you can control for two meals that a child may receive a day. But in terms of other health care professionals that have daily interaction with people I think that one of the things about nutrition right now that is clouded is we have enough evidence for action. At the most basic level we can give people simple food based directions that are likely to make an improvement in their health based on a totality of evidence. So, simple things like consuming olive oil for example, as primary oil. Any doctor in a GP's clinic can say that, recommending regular consumption of nuts, recommending regular consumption of legumes or pulses, and again they don't require much by way of a food preparation you can drain them out of a can.

So, in general a lot of the advice that we have in terms of say consuming more unsaturated fat or consuming more fiber we can turn that into simple food-based advice in terms of maybe consuming oily fish a number of times a week or consuming regular nuts and seeds or consuming an olive oil or rapeseed oil as a primary added oil or cooking oil. These are simple food-based recommendations that are cored with our body of evidence that we have now. So, we can translate what we know about nutrition into public health at the level of – on the ground in terms of general practice or their health care professionals. And it think that the key feature there is to evolve food-based recommendations that are simple to translate for someone that may not necessarily have had any nutrition training, but they don't need to have it in order to deliver these relatively simple messages. And that is where we may ultimately still run into similar barriers in terms of preparatory skills or time and these variables but ultimately there are solution evolving even to that. So, if you look at the typical composition of a breakfast in the UK or in Ireland it's going to be largely focused on breakfast cereals, milk, and fruit juices and perhaps some whole fruit but that's an opportunity to have a meal modified towards a more whole grain version like oats. But you get companies now producing oats that you just simply add hot water to a pot. So, this is where industry is part of the solution, and so the idea that you need to become

Jamie Oliver in order to improve nutrition start is actually we're starting to get to a point where you don't even need a lot of skills to eat a better diet. Whereas, previously you did have to have some sort of nutritional awareness and preparation skills in order to improve dietary intake and now we're kind of getting to the point where that's not necessarily the case.

Danny Lennon: Do you think then it's more an issue of trying to find these incremental changes versus looking for this step-function change in someone's whole view on nutrition?

Alan Flanagan: Yeah.

Danny Lennon: Like you say whether that's using some instant oats as a better breakfast than a breakfast cereal as opposed to changing a complete dietary pattern?

Alan Flanagan: Absolutely. If you take someone who is consuming a liter of Fanta a day if they swap that for Diet Fanta that is a beneficial intervention at a population level. Now, the problem with the conversations in nutrition now is they are very much driven at certainly a social media level with a lot of people's opinions about certain aspects of a healthy diet, and so if I make the suggestion that I just made for swapping Fanta for Diet Fanta you'll have a section of people that will go up-in-arms because they'll say you can't recommend artificial sweeteners to someone. And it's like look we need to actually step back and look at the practicalities of improving diets at an incremental level over time and is that a beneficial intervention for someone in the population who is consuming a liter a day of calorically sweetened whatever it is beverage. Yes. There's absolutely no question over that, and we can start evolve imperfect solutions to the issues that we're facing a lot sooner than we can trying to reach this consensus on the "healthy human diet" and implement that at a population level, and it seems that that's what everyone is expecting from nutrition and the science off of it at the minute let's find the human diet and let's recommend it to everybody so they can go out and do it that is never ever coming ever. So, we need to start making improvements with the realities of the situation on the ground as they face people in everyday life who don't necessarily have any nutritional awareness and could be told by anybody that they have in their GP's clinic and they're describing their liter of Coke a day. Right now a doctor needs to be able to feel confident that he could say well actually maybe if you just – rather than say well you

should just drink water that might be the perfect solution, but that's not meeting the person at the level that they're at.

Danny Lennon: Yeah. It's kind of before we started talking about this game of like probabilities you could also apply that to the likelihood of someone adhering to a certain intervention. And as you say what's the likelihood of this person swapping from that liter of Fanta immediately to a liter of mineral water. Probably not as likely as just swapping to Diet Fanta, and I like that example because it's almost the same one I've given at seminars last couple of years of it's not a black and white thing of this is a good thing to be doing, this is bad. It's about every decision is going to be some sort of trade-off and understanding what is the net impact. So, in that case there is some downside let's drinking 1 liter of Diet Fanta versus 1 liter of water you could probably make a case. But that is completely outweighed by the benefit to doing what you were doing before.

Alan Flanagan: Absolutely.

Danny Lennon: The same example I used to give is if we tell people you shouldn't use tomato ketchup because there's going to be X amount of grams of sugar in there, right? It's like well what if doing that is allowing the person that you're trying to help eat more veggies or have broccoli?

Alan Flanagan: Right.

Danny Lennon: And if they didn't have that they wouldn't do it but the net benefit is there. So I think yeah people get too involved in like the isolated thing is this good or bad?

Alan Flanagan: Is this good or bad?

Danny Lennon: Because there is really a benefit.

Alan Flanagan: Yeah, to the individual?

Danny Lennon: Right.

Alan Flanagan: Yeah, exactly. And we can move to that place I think quickly enough and I think the barriers to implementing this kind of practical advice in many respect – yes there is the socio-economic, environmental factors you were talking about, but there is also

the perception that improvements in health are only achieved in a diet and lifestyle sense with dramatic overhaul and I think that's part of the popular way in which these "Transformations are portrayed." The reality is if you scrutinize some of the literature on physical activity or the incremental benefits to heart disease, diabetes, obesity endpoints in relation to say whole grain consumption, fruit and vegetable consumption. Yes it incrementally increases with more, but at the very least one to two servings or 30 minutes of very light to moderate activity has benefit. So, we need to be stripping this perception of hardcore lifestyle overhaul away from the public consciousness and making people feel empowered to simple changes that they can do. And in the UK now we're really encouraging example of the incorporation of lifestyle into medical care and health care has been the approval for parkrun to be on what's known as social prescribing, and hopefully social prescribing will expand but you now have the ability as a general practitioner for example, to prescribe someone to go to a local parkrun on the NHS and they get community, they get activity, they get fresh air in outdoors and some of the emerging case study examples of people that have gone and with this simple intervention have transformed their health. This is really encouraging stuff and I think we can make big inroads into where we're at right now with population health but I think we need to simplify, I think we need to empower people. Fundamentally I think the biggest problem is the conversations that make it seem like we know nothing about nutrition and human health, where I think that we're at a point where we do have enough evidence for action. It's now do we get that into action.

Danny Lennon: Yeah that's couple of really cool things about the whole idea of being able to prescribe activity that is obviously one that's very exciting, but I think it also maybe ties back into our previous point about food-based recommendations we also talk about nutrients. Now, if we have a level where instead of saying someone well just exercise more, you now have someone who is actually in a qualified position that they're actually going to listen to saying here is this specific place I want you to go, it's all going to be set up, and I think now you have something that's probably a bit more actionable?

Alan Flanagan: Yeah, absolutely. And it's something where they're going to be met at the level that they're at like you don't have to run in parkrun you can walk if you want to. So, there is a level there

that's going to be by nature inclusive and you're not going there and being met with a bunch of runners and the like who are strapped up – I am sure there are a few of them up the top, but it's this idea that yes you have something that's defined. It's not a kind of very ambiguous suggestion to eat less and move more which is kind of been the paradigm which we've looked at these issues. And that obviously doesn't necessarily – it doesn't mean anything for people, so being more directive and what we want people to engage with is something that fundamentally I do trust people and I think that no one wants to necessarily watch their health deteriorate and even if there are humans being humans even they are tiny subsets of the populations that don't care that's fine. They are the exception not the norm. So, I think that the more that we're creating accessible interventions and behaviors for people to engage with whether that's a food-based recommendation like adding a couple of table spoons of olive oil to their daily diet or activity based recommendation like going for a 30-minute walk or going to a local parkrun at the weekend. These are things people can engage with, and I think ultimately they'll have more return on investment as well.

Danny Lennon: Yeah. I do want to pull back to one thing you've mentioned just in your previous answer about this notion that we don't actually know what a good dietary pattern is and I think that is quite relevant because so far when we're trying to talk about any of this big picture stuff of how do we make things change at a population level whether these interventions, policies, and so on. It's starting with the presumption that well we know what endpoint we want to see people's dietary pattern get to. Now, I am sure you're very well aware there are plenty of people that may disagree with that, so even some of your previous statements about things that shouldn't be contentious by cool drink consumption for example, or the amount of saturated fat that might be advisable in the diet. These are things that can be very contentious, and so with one of this reasoning that probably ties into where we want to go with this discussion of a lot of these ideas are built on just observational work or data that doesn't really they feel as supported or that is counter to what they have come across, and with this notion that we still have a lot of research to do and we still – what is being purported by most general guidelines not in fact good dietary patterns. How would you respond to that type of inkling?

Alan Flanagan: Yeah. There has been this contention advanced that everything that we've known about diet and health today is just wrong and that the research agenda going forward has to be about writing this off course ship that's just an incorrect premise at a lot of levels. I think the first thing to say is that nutrition science is hard. It's a hard science to do because there are a lot of moving parts, the exposure is constant, people eat multiple times a day every day of their life and the evolution of nutrition science was born in a time where the public health concerns of the day very much related deficiency states associated with a single nutrient. So you had for example, beriberi in the Far-East, and you've some really interesting early nutrition science in the 1890s where they did an animal study in chicken white rice versus whole grain rice, and the chickens fed only white rice got symptoms of beriberi. They did an observational study then in the Dutch East Indies in prisons the type of rice being consumed seems to correlate to incidence of beriberi, and then they did a controlled intervention in a British prison in Malaysia and confirmed what they had found.

So, nutrition got off to a decent start at identifying factors that related to deficiency states and correcting them at a public health level. We had incidence of goiter associated with underactive thyroid quite rife throughout Europe in the early 1900s. It was identified that iodine was related to that and policy of iodized salt was brought in the early 1920s. Rickets and vitamin-D deficiency was identified and milk was fortified with vitamin-D in 1924. So, these were really early wins for the field of nutrition, but it defined looking at diet disease relationships very much through an isolated nutrient lens, and then in the 1960s and the 1970s we had the evolution of the biomedical model of evidence which is very – an entirely reductionist in its approach. Isolate a very specific compound, look at it in a very controlled circumstance for its effect on a particular pathway, for a very particular outcome and a lot of the confusion we have now in nutrition or lot of the ammunition that people have to be able to say we know nothing about nutrition, look at these inconsistencies is born not from necessarily a flaw with nutrition but with the rigid application of that model to the study of nutrition and health.

And there are a couple of reasons why that maybe you know nutrient status is going to be dynamic. There's one example that I think is quite illustrative of this and it was really consistent associations and observational research between dietary intake of vitamin-E and lower instance of cardiovascular disease and

Alzheimer's and dementia, and it was consistently associated with dietary intake. But of course if we step back from the reductionist thinking there and think of dietary vitamin E we're talking about nuts, and oils, and seeds, and food groups and foods we would associate with health and they have all their compounds like fiber and other micronutrients. A lot of the disconnect in nutrition comes from an observation in epidemiology that is then assumed to be an effect that should be found in a controlled trial, but actually they're testing different things because the observations in population research are from dietary intake mostly. What happens in a controlled trial setting is the isolated variable of interest vitamin-E for example, is packaged as a supplement and tested. And the vast majority, bar one, every trial on vitamin-E supplementation largely failed and this leads to an incorrect conclusion that this nutrient is not associated with health. In fact, that wasn't the hypothesis that was tested. What was tested was does an isolated supplemental version of nutrients have an effect. No. And so, we get to this kind of misleading or somewhat inconsistent conclusion and that leads a lot of people to suggest we know nothing about diet and health because this didn't have an effect in a RCT or this nutrient if we're basing our advice off observational epidemiology it's confounded. But actually when we step back at that one thing that we can't do probably ever in nutrition is a 50-year randomized controlled trial. You simply just couldn't pull it off.

So, observational research in nutrition has been really valuable and has been very informative, and has a misconception of being really divorced from a lot of findings in controlled trials and there are examples like the vitamin-E example. But actually a lot of our big picture questions about diet and health have been supported by controlled interventions in one way or another. So, we have now an acceptance for example the total fat intake in a diet is not necessarily relevant but the composition of fats are. Those observations came from epidemiology. We confirmed them in studies where you swap a percentage of energy from say saturated fats with unsaturated fats, and so there is consistency with either the Mediterranean diet or other diet patterns that then support this. So, observational research in nutrition has come in for a bad reputation, but it can be done very well. There are a couple of things that I think are important to bear in mind that I think people may not necessarily know about nutrition observation research. The macronutrient composition of diets in most people is largely stable over time. People make relatively

consistent food choices. Now, their day-to-day intake may vary somewhat but the averages over time are consistent.

So, actually when we're looking at the macronutrient associations at a population level they're more robust than people would think. But what a lot of people don't appreciate is that diet doesn't exist in a vacuum. Nothing exists low or high without something being displaced or replaced, and so let's take saturated fat as an example of this because it has been recently contentious. If you look at the population cohorts in which saturated fat intake was associated with heart disease. We were talking pretty high levels of intake 18% to 23% of energy from saturated fat. Obviously,, as a consequence of that beneficial fat subtypes like mono and poly unsaturated fats were displaced from the diet but they were the associations at higher levels of intake. So, if we look at observational epidemiology a lot of it will have cohorts that had that level of intake. Cohorts that maybe have lower levels of intake and part of the problem now is people are doing meta-analyses. They're merging altogether and getting a null association, when in fact the individual cohort study is more informative than the meta-analyses. So, we make recommendations for saturated fat intake based on those population research, but that's going to be supported by mechanistic studies on intermediates like blood cholesterol level, and then where the science did evolve and where we're at now that probably wasn't appreciated necessarily as much earlier is what replaces the saturated fat that you consume in the diet. And we can figure that out now by looking at diet patterns and research. So, again with the focus on nutrients epidemiology was very much looking trying to find to a degree a needle in a haystack, but if we step back and we look at the totality of diet and diet patterns overall we actually can look at a more relevant exposure but we can also then look at the constituents of that diet pattern and you would see the same thing. So, in the Mediterranean diet for example, which may have a higher total fat intake has been one of the diet patterns that supports removing an emphasis on total fat might have 45% calories from fat, but the saturated fat contribution is 7% to 9% give or take. So, consistent with our recommendations which don't again come off the floor because if you model reduction in total cardiovascular events it's around that 10% threshold of energy, so the recommendations maybe controversial to some people but they are actually based off a relatively robust totality of evidence that looks at population certainly the 1960s and the 1970s that may

hve been consuming 18% to 23% and what happens when you reduce that to around 10% for example, but now we're at a place where we're not simply focused on the reduction we're more focused on when you're reducing what are you replacing it with and that's where we're recommending more unsaturated consumption.

Danny Lennon: But that establishment of that association is the key part of that process to initially start it, which I think is – and to some degree I can understand, I've mentioned to you earlier talking to a doctor recently who had told me about – she doesn't like reading a lot of the nutrition literature because it's 'messy' and I can see to some degree as you illustrated the distinct differences when you're looking at medical literature why may feel that way, and certainly if there's epidemiology that's done poorly or like you say if there is a meta-analysis that's done poorly that can make things a bit more – muddy the waters a bit, but if we're about like good quality nutrition and epidemiology not only does it show some of these associations at least it shines light on here is an area where we're going to go explore.

Alan Flanagan: Exactly.

Danny Lennon: And we can work out mechanistically from there, and then beyond that I think what you kind of finish with is if you're looking at general dietary patterns for people to follow even if we need to still work out well why exactly is that reduction in saturated fat important, is it because we're introducing more of something else, is it specific types of saturated fatty acids that are more problematic than others? We can investigate all that stuff, but we know when in general we change this pattern that something is happening and now at least we have somewhere to explore.

Alan Flanagan: Yeah, absolutely. And I think that's really important because a lot of quite brilliant minds in nutrition right now are recommending that we shift to 'top-down' focus in research where we don't necessarily start by looking at the isolated compound but we look at diet patterns and the food groups within them and that doesn't mean that reductionist or mechanistic style research doesn't continue, it does. The question is do we have enough of a basis from look at diet patterns and food groups to make recommendations to people that are broadly consistent with what we know about the interaction between diet and health while the mechanistic research can continue going. And this is a

really important point because if we start looking at the nutrition at the level of diet pattern and food groups we can actually make recommendations for people or make conclusions to a degree based on the interaction between diet and health before a full mechanistic understanding of once that play is at work.

So, if we see interventions like PREDIMED with four tablespoons of olive oil a day or 30 grams of nuts, and we see the Mediterranean diet pattern and epidemiology we have enough when we put all of that research together to tell people to consume olive oil and ultimately that's the relevant exposure because people are going to consume the olive oil as a food itself whether oleic acids or the polyphenols having the effect is relevant that research can still go on in the background. But actually it's not a barrier to our implementation of what ultimately is going to be the exposure of interest which is the food.

Danny Lennon: I think that's the key thing with nutrition because we had kind of said earlier that one of the things that distinguishes from maybe other areas of science is that we need to make decisions right now, even in lieu of having that evidence that we would all ideally love to have we still have to make some sort of decision, right? Yeah, we can work out afterwards why it would be beneficial or not but we still have to make that choice regardless.

Alan Flanagan: Yeah. We have a fairly unique subject of inquiry for nutrition science in that what we're interested in is not an option for people to engage with and evidence-based or not people are going to consume food. So, need to be able to put together a big picture and we come to conclusions in nutrition never based off one line of evidence. It's always a totality that we consider as a whole. The other thing that I think is really important to compare or distinguish nutrition say to drug models of inquiry, the bio-medical model, is that the risk-harm analysis that we can come to or the risk-benefit analysis that we can come to is different because olive oil has fairly, just sticking with that example, little likelihood of killing someone. Whereas, obviously there is a degree of diligence involved in investigating drugs before releasing them for either over-the-counter use or prescription use that has to be achieved. But that consideration actually doesn't happen to the same degree with food, and so we can come to more pragmatic conclusions about diet and what we recommend to people when even in the absence of a complete understanding

of the food and its role in health we then ask is there a harm to making this recommendation. And the answer more times than not is going to be none. So an example I use sometimes for this is let's take our five-a-day campaign that countries have what does that mean? Five-a-day of what? For most people that means very little. So, that's an opportunity for a public health messaging campaign to perhaps evolved a more specific food-based recommendations, so that five-a-day typically is vegetables and fruit but you could modify that and make a specific recommendation for a banana a day for example, within that five-a-day.

Let's take some of the research on say dark skin berries and various health outcomes like cognitive benefits potentially, and also cardiovascular benefits typically associated with their polyphenol content. Is there gaps in that literature? Yes. Are the trials small in number and effect size? Yes. Is there harm to telling people to consume dark skin berries regularly? The absolutely worst case scenario is that people consume more fruit. So, these are the pragmatic ways in which we have to look at applying the evidence base that is there otherwise the vast majority of conclusions that we can come to now in nutrition are going to stay on a shelf in a journal and not make it into recommendations for the public and that's a real shame but it's also a misuse of the research that's there and we have enough within that to be able to make recommendations that may not necessarily have that effect. In 20 years time we might find out that these compounds have no benefit to brain or heart health, but it doesn't matter there maybe benefits to including them in the context of wider healthful diet pattern as a whole.

Danny Lennon: Yeah. You mentioned earlier about looking at things through this bio-medical lens and you mentioned earlier that distinction if we're looking at a drug versus a nutritional intervention, and that kind of leads into – while I think a lot of people trying to do good and trying to be involved within evidence-based practice look to the hierarchy of research we may have and rather than see that as each of these things can play a role it's kind of like all hail the meta-analysis and anything else we don't really understand yet or maybe a randomized controlled trial in a metabolic ward is great, but there's always some sort of limitation. What way would you try and get people to think about hierarchy of evidence in a more accurate way?

Alan Flanagan: Yeah. I think the first thing is that I see the hierarchy of evidence confused with standards of proof a lot and they're completely different things. The hierarchy of evidence is merely a reflection of what we've deemed to be quality of research, so a meta-analysis or a systematic review which incorporates preferentially randomized controlled trials is at the top of that. But that's simply an hierarchy of quality not necessarily a standard of proof, and people interpret it as a standard of proof because they assume that if a paper is on the top of that pyramid it therefore is a level of proof that should be satisfactory for whatever they're trying to advance and that's a really important distinction that I see people confusing and a good example of this from a human health perspective is smoking. There is never an RCT where a healthy people were assigned to 20 cigarettes a day and followed up to see if they had a lung cancer 10 years later. Yet most of us I think would be happy that smoking causes lung cancer and I use that word 'cause' specifically. So, the question is how do we arrive at that conclusion if there is no randomized controlled trial, if there is no meta-analysis that conclusion is based entire off observational epidemiology. So, it really comes down to what we mean by proof and what do we mean by cause? And in this case proof means a relative consensus of experts and cause means a causal increase in risk and we get a point where we are satisfied that this association is happening independent of other variables.

So, the idea of a standard of proof is different to the evidential hierarchy and we can come to conclusions on proof that are based on, yes, observational epidemiology in the case of smoking but that was a very clear kind of cult association. For the rest and for the nutrition in particular it's about considering the totality of evidence that's there and I think that what's happening now is that there's very much a focus on meta-analyses and RCTs within that there are two problems. The one is the RCT model applied to nutrition that in the reductionist model very much focuses on the isolated compound of constituent of diet. But it's also based off assumptions that are made for the conclusions of a randomized controlled trial to be valid in the bio-medical model they're based off assumptions. For example, that the intervention is very identifiable and that it's not subject to any confounders and that there's low risk of bias in these kind of things. Whereas, if we look at food even if there's one food it's going to have multiple characteristics to it at a macro, micro-nutrient, and bio-active food component level. So, food itself is a confounder. So, the RCT model doesn't necessarily apply – with drug trials as well there

are short term in duration, but you typically get a large effect size and you can do multiple trials that ultimately can be included in a meta-analysis where the trials are largely the same dose of the same drug, relatively similar durations, and you can come to a fairly confident conclusion on efficacy that informs clinical practice. That's very difficult to do with nutrition and recently meta-analysis has become the opposite of what it was designed for. Meta-analyses have traditionally been used to increase statistical power and the confidence in the conclusions, whereas in nutrition you are comparing like with like, you may not necessarily have – if you are comparing say for example, a high versus a low intake you have to define what that high versus low intake is and you have to make it relevant to where we see risks associated with disease. So for example, some of the recent, again sticking with the example of saturated fats, some of the recent meta-analyses didn't have any populations at either high-end of the extreme or within the range that we would associate with health outcomes. So you hodgepodge these different populations consuming say 11% to 15% and you end up with a really weak conclusion that ultimately gathers a lot of traction, but unless you had those extremes of intake in there you couldn't compare the hypothesis in the first place. So, meta-analyses in nutrition are really subject to misleading results because the populations might differ significantly, the food sources of intake might differ significantly, their levels of intake of whatever the variables of interest might differ significantly and the ultimate effect is to weaken the statistical power in the results. And you have all of these meta-analyses with null findings coming out, and it's because if you have four studies with a positive impact and four studies with a negative impact they largely cancel each other out in that meta-analysis and it's not an accurate reflection of what the evidence in relation to that particular research question is. And the problem I think stems obviously from the lack of RCTs as well in nutrition that that fit the bio-medical criteria. So, we see this a lot with the Cochrane reviews. Some of them are helpful but on the whole Cochrane reviews can be very unhelpful for the evidence-based nutrition because they apply an inclusion criteria that they would expect from a drug trial. What it means is there maybe 20 papers that they've identified on a particular research question and they end up including two in a meta-analysis and purport to find nothing. Well, of course because everything was excluded because of very stringent application of the bio-medical model in relation to bias and other things. So, what I would say is be careful with meta-analyses in nutrition. It's not that they're

redundant. They're not, but the inclusion criteria and the studies included. Meta-analyses are difficult to nutrition because you almost have to just go to every included study individually and look at it yourself before you come to a conclusion about the meta-analysis. That's a lot of work for people to do, and so it can be difficult and with RCTs I think the message for people is stop expecting that nutrition meets the bio-medical criteria for a randomized controlled trial. There is no placebo for food. There will never be a true placebo group in any nutrition intervention. The exposure of interest is food that is inherently confounded by other variables, but again that's something we get hung up on only in the purest reductionist model if we step back a bit from that and look at food as the exposure of interest we worry less about that. And we also need to consider that long-term randomized controlled trials in people because they are behavioral trials you are asking people to change behavior with nutrition. Behavioral trials have very big drop-out rates, so for the most part the tighter a control you want in nutrition the shorter the study duration is going to be and that is going to leave us with only certain things that we can make conclusions on like intermediate risk factors, blood cholesterol for example, but ultimately we still have a huge amount of value to obtain from long-term perspective cohort studies because they reflect the reality of what's going on, on the ground, and it can be done well. And when they are standalone cohort studies they can be very informative and that's where controlled trials can be beneficial in nutrition when we look at an exposure of interest does it say a risk factor but we look at it through the lens of food as the exposure of interest. So, things like the DASH diet research and spin-off of the DASH diet have been excellent examples. Here is the list of foods, and food groups to eat every week, let's look at what happens to your blood pressure, and then we can look at that and extrapolate that in relation to what we know about long-term diet patterns and we can come to conclusions for people to make. So, it's a pragmatic totality of assessment that doesn't get hung up on the strict application of the bio-medical hierarchy of evidence to nutrition and assume that a meta-analysis is gold because it's simply a meta-analysis when in fact probably in nutrition more than anywhere they're a tool for misuse I think now in my respects.

Danny Lennon: Right. I think it speaks to an idea that people hear a lot and hear people repeat back, but don't really follow and that when they talk about the totality of the evidence base and just not following

the idea of really it's this, where can we draw from these different areas recognizing the inherent strengths of each different type of literature we can put out and using that to piece together what's the most likely conclusion. A couple of things on what you said, I think with regard to meta-analyses definitely if they are done poorly or based on the studies that are selected it just makes things extremely difficult to pull apart. Like you said you had to go through and look through each study. It's not immediately obvious why a conclusion was came to, whereas you can limit that with individual studies, and then yeah people get super drawn into this is where I should focus my attention because this will pick up the real stuff as opposed to realizing when I am looking at where does this all fit in to a big picture. And most of it should be leaning in a certain direction and that's where I try to get people think about like essentially what we're trying to do in science is we're trying to have these questions – we're trying to decrease an uncertainty in a particular position but we're also trying to increase our confidence in, okay this is probably our answer, this is probability game and sure we can say that different piece of research are weighted differently. So, on their own they contribute more to which direction we lean into, but it's still a step you weighted against everything we have, and so sure you can say we can't put as much into one particular trial versus another but they all should be weighted in this total question I guess?

Alan Flanagan: Yeah, exactly and what we end up looking for certainly in nutrition is converging lines of evidence that give us like you said, when you step back and consider probability do these converging lines of evidence give us a probability that a certain direction with diet is potentially beneficial. And I think with nutrition the other consideration that's really important is we're not simply saying that this is right ever, because we won't get to that point with science. It's not what its purpose is. But certainly with nutrition because there is diet exists as the sum of its parts. It's no necessary that direction A is better than direction B it's that direction A may have less probability of harm. We are not saying that it's necessarily the absolute best way to go. So, I think if we say look at the conversations around fat with that lens we can actually see a good example of this practically. So, let's say for a minute that the associations with saturated fats at whatever level in the diet aren't necessarily as strong as we once thought they were that's one conversation. But the question is then is there a more plausible alternative for benefit, so could be say in that

sense that well even if saturate fats aren't as bad as we thought they were is there are better option? And with the evidence base that we have we could probably be more confident in saying that there is a better option in unsaturated fats. So, the latter question in relation to the harmful effects of saturated fats because less relevant to the fact that there is a better alternative available and that's what we can advice people to, even if the answer to the previous question remains controversial, imperfect or whatever. So, it's this idea that though that latter question for example, with saturated fat paralyzes our applicability of the evidence base and it simply doesn't. What we do then is we look at are there better alternatives, are there more plausible alternatives? And in that sense yes you can look at the diet pattern and epidemiology but you can also look at the short term intervention studies on – with impacts on blood lipids, blood pressure, insulin resistance and sensitivity and stuff like that, and you can say okay well there's a mechanistic plausibility probably points at unsaturated fat intake ins beneficial. So, even if there are question marks over the former question we can move on with that.

Danny Lennon: Right. It almost at some point but comes out a new point of like we're unsure but it probably doesn't matter.

Alan Flanagan: It doesn't matter.

Danny Lennon: We have a better solution.

Alan Flanagan: Because we have a better option, exactly. Yeah. And that is perhaps maybe a consideration that is unique to nutrition because one of the benefits of looking at nutrition through the lens of diet patterns is that there are multiple options for achieving a healthful diet pattern and that's why there is no universal human diet. That's why traditionally healthy Japanese diet differs to a Mediterranean diet not only in composition of foods but nutrient compositions. But they are both associated with healthful outcomes. So, the good thing about this is that there are always alternatives available and it maybe the alternative that actually is more convincing evidence than the evidence for potential harm for something. And if there is that alternative then that's something that we can act on and we don't need to be bogged down on the question over the particular strength of associations with the previous one.

Danny Lennon: Yeah. We talked about this before we started recording about how certain areas people can prevent or produce an alternative hypothesis for something and that's not to say we can show you it's definitely wrong. But there's a probability of different hypothesis being right and why would you hedge your bets on something that could be potentially detrimental. So for example, a diet super high on saturated fats like what's the risk-reward there, and you could think of all sorts of things. You could think of if someone says well I am not really convinced by the data on red meat for example, and sometimes it gets lumped in with processed meat. I think if you just have read me I should be healthy or all my blood markers are good, so a kind of whole diet is fine. Well, to some degree you should probably hedge your bets on what most we know is probably not a good idea, right? Again it gets into this whole idea of like what's probably right versus for one distinct individual?

Alan Flanagan: Yeah, exactly. And what's probably right is where we have more evidence than I think people think in nutrition. And right now what I think is problematic is the use of some areas of controversy to justify really extreme deviations from that kind of known knowns if we are punning Donald Rumsfeld. So, with a carnivore example which is a really good example of this, yes, if we tease out even in epidemiology unprocessed red meat versus processed red meat, which are the associations for processed red meat in the context of a healthful diet pattern that strong, no. And again with some controlled trials like Ball trial where people ate 140 grams of lean red meat a day in the context of a wider DASH diet pattern with legumes, vegetables, fruit, whole grains, high fiber. So, is red meat an healthy diet pattern a problem? Probably not. Is excluding all of those beneficial food groups we just listed and consuming only red meat likely to be beneficial? Probably not. So, there is a context in which a food exists in a diet pattern and that's a really important consideration. And this idea of well the associations with red meat aren't strong and red meat can be a healthy food, therefore I'll only eat red meat and not any of the foods that likely contribute to its healthful position in a diet is a position of a logic that I think unfortunately we find quite prevalent in nutrition and the conversations around it currently.

Danny Lennon: Yeah. I mean that's a whole rabbit hole. We have to spend a long time getting into, and really I could probably stay talking for few more hours about some of this stuff, but for the sake of your time and your sanity we will probably start wrapping up. Before I get

the final couple of questions Alan maybe a nice way to summarize this is for those people listening that's okay I'll try and get to the punch line what is – if Alan is saying that we have some pretty good clue of like good quality dietary patterns what would say is the stuff that you are very confident that we know that at a broad level these should be like a primary targets from a nutritional perspective that should be at least too controversial?

Alan Flanagan: Yes. So, I think we can make a couple of statements in that respect. The first is – I'll go with the most divisive one first, the first is that it's now relatively acknowledged that the total fat content of a diet is not relevant. So, a diet can be higher in total fat or it can be lower, neither are right or wrong and there's room for individual preference there. However, while the total fat content isn't necessarily a concern it is relatively clear that the composition of fats within the diet is. And whether we want to argue over the mechanisms the higher total fat diets that are considered protective like the Mediterranean diet are predominantly unsaturated in nature, in their fat sources and their composition. So, whether that is a reflection of saturated fats is not something we need to get to. We have the evidence from the pattern. So, a diet can high in total fat or low in total fat. In either scenario the composition of fat should primarily emphasize unsaturated fats from plant and marine sources. That seems to be I think a fairly representative statement in relation to the evidence.

Healthful diet patterns globally include dietary carbohydrate and I think that's an important statement to make with this current war on carbohydrate. What I find interesting about the people that make those statements is they go to pains to stress that fat quality matters. Yet they don't want to seem to extend that same thinking of line of thought to carbohydrate. You cannot find a single example at a diet pattern or population level of excluding carbohydrates for health outcomes. Every now and then you'll get someone who cites Inuit populations. There is a 2014 study in Canada that age matched Inuits to Danish controls and the life expectancy was 14 years lower in the Inuits with a really high levels of atherosclerosis evident quite early. I think this myth of robust health in the Inuit can be blown out of the water, and even beyond that they have just completely different genetic evolving. They have certain genes where they pretty much van even get into ketos it's something like super high blubber diet.

Danny Lennon: Well, fat diet.

Alan Flanagan: They just don't get in there because of these genetic mutations they've had over time.

Danny Lennon: Yeah, so it's like isolated popula…

Alan Flanagan: But you step back from that and healthful to even the Mediterranean diet which has become a popular reference point for low carb high fat advocates, contains at its core dietary carbohydrates. Now they are whole grain high fiber in nature and I think we need to move away from the kind of the noise around carbohydrate. We have more than probably more evidence of benefit to human health for vegetables, fruit, and whole grain carbohydrate than we do for any other constituent of diet and I think it's important to emphasize that. Now the source of that can come in multiple forms and does in different diet patterns. But fundamentally it's the actual whole grain carbohydrate itself and high fiber pulses and legumes. And I think that conversation around those food groups is becoming more important now that we start to consider planetary health and I guess the acceptability of our food sources. So, we have more I think than enough evidence to support that whole grain, unrefined carbohydrates form part of healthful diet patterns.

And then, in relation to protein intake which has become quite a macronutrient of interest recently when it was almost kind of just by the wayside previously. There are a lot of associations recently with say plant proteins for example. Actually that's an example where the reductionist focus in nutrition can be misleading because what plant protein is actually denoting is the foods that contribute to plant sources of protein which are primarily legumes, pulses, and nuts, and seeds. So, it's the foods that's the variable of interest here and the contribution of plant proteins in those diet patterns very much reflects the contribution of those food sources which also are high fiber and other micronutrients and polyphenols. So, consuming more of those foods will contribute a benefit to total protein intake that will likely benefit the diet pattern as a whole and again it's the foods that are variable of interest.

And then, I think in relation to protein for me the consideration is now are not necessarily the healthfulness. I think we can accept that there is a benefit to higher protein diets from the perspective

of weight loss and satiety. But I think there is room now to start to consider the environmental impact of our food choices and for me that's where when we look at the animal protein contribution to diet it's not necessarily the healthfulness of animal protein. I don't think we need to question that necessarily. What I think the considerations for the degree to which someone might include flesh protein sources in their diet be that meat, fish or poultry is more environmental in nature and I think that is an important conversation to start to have in nutrition generally.

Danny Lennon: Yeah. The sustainability piece is just going to get bigger and bigger I think over time and you see that even within industry where a lot of them are kind of moving conversations around that. But again another big rabbit hole we could probably get into, but in general even with protein I think the only area where you see is some of the epidemiology around longevity and you have certain groups at least that are – Valter Longo's group is one example, talking about lower protein intakes and so on. But again that becomes so other…

Alan Flanagan: That's a messy area too, yeah.

Danny Lennon: For the part certainly not universally accepted, I don't think. And well maybe at least within that area but then you think about co-morbidities related to loss of muscle mass and sarcopenia it becomes a bit more of a trade-off question again.

Alan Flanagan: Absolutely. And I think that again when we look at say diet patterns there is a general perception that the western diet pattern is very high in animal meat and protein, and it's certainly high in the context of fast-food availability and processed food availability but actually the total protein content to the diet isn't as high as –that would make you think. It's still in that 15% to 17% region, so it's not as high as the protein intake that is used in a lot of research diets and circulating back to the question over food quality and the source of it being important. So, when people say oh we eat too much meat as a society. Again that actually ties back to the socio-economic issues, because if you look at the meat consumption is drastically reduced in lot of western countries. It does tie to higher education status and most of the considerations it seems for people reducing meat consumption are environmental, so that's a positive. But the source of where we're deriving protein intake is from and that's where we can see some associations in epidemiology that very much might tie to a

high processes meat diet and a reliance then on pre-packaged meats or meats that have been cured, salted or otherwise processed in that sense or simply fast-food consumption. So, it is important to always bring to discussion around the nutrient back to what are the food sources and what are they at a population level. And certainly there is obviously a distinction between consuming a Big Mac on a daily basis or chicken nuggets, and consuming the unprocessed steak that someone bought from their butcher. They are not equivalent, but again the considerations are largely environmental, but I think it's important that we don't figure out I guess coming back to what we opened the podcast with, for people consuming that type of diet, the processed food diet there may simply be no other alternative that may very well be dictated purely by financial circumstances. It's interesting if you compare food systems from say the pre World War I era to now where previously the risk for low socio-economic sections of society was typically food shortage and malnutrition. And certainly if we use UK as an example that was solved by having settler colonies that people were able immigrate to, start a farm, bolster their family's nutritional status, and then that became a hope then for the Empire to trade back to. We've actually flipped that on its head through the evolution of the free trade and the neo-liberal global model such that the highest energy density diets are now available for the cheapest cost and the issue for low socio-economic areas in terms of risks from nutrition is over-nutrition and not under-nutrition. So, I think we need to be conscious that it is well and good for people that have the means to say for example say I am going to consciously reduce meat consumption and that's great if someone has the ability to do that. But we shouldn't be overly critical of consumption of fast-foods when there are large sections of society for whom it's simply not necessarily a luxury of an option.

Danny Lennon: Yeah. I think that's the biggest problem I have with lot of the claims that get put out that distract from that real deal that we've been doing, right? it just makes more noise and lends this idea that we don't even know what we should be trying to tell people to do or you're telling them stuff that's going to make them sicker.

Alan Flanagan: Yeah.

Danny Lennon: No, like there are other things that should maybe the focus.

Alan Flanagan: And you saw this last year Public Health England came out with this kind of calorie focused campaign and it got a lot of kickback, but I couldn't help but notice the demographic of the kickback. Oh we shouldn't be putting calorie labels on stuff because it'll make people feel guilty about it. I get that there is a section of society that may have a triggering effect of calorie intake of food but these messages aren't designed for your early 30s, fit health, diet conscious Instagramer, they're not. They are designed to try and help people who have no ability to have control over their food's environment and this is another unique aspect of the current environment that we never saw before. Where previously large sections of society would have had some role in the food supply either at production or even consuming their own food if you had a farm for example, the vast majority of people in society now actually play no role whatsoever in any stage other than in receipt as consumer. And again that's particularly so for people whose diets are the highest energy density diets and those high energy density diets tie directly to socio-economic status. So, it's not simply a question of education. It's the fact that there is actually no participation in the food supply whatsoever only on consumption. So, the only way we have to actually assist what is being consumed is by intervening in those production and what's ultimately coming at the backend. And that's where we end up modifying diets ultimately but we can't necessarily expect that to be happening at an individual level because they have no choice in what they're consuming, and that's the shift.

Danny Lennon: Yeah. Like I said we could talk about a lot of this for a long, long time I'm just mindful of that. So, before I get to the very final question for people who want to find out a bit more about you, about what you're doing, follow you online where are some places they can go and what kind of things you got coming up?

Alan Flanagan: Yeah. Right now, I just operate on Instagram actually @nutritional_advocate but I have been working on a website for the last kind of two or three months. So, the tech guys are dotting the Is and crossing Ts with that, so it should be live in the next two weeks and if people follow me on the Instagram they'll know when that's up. But that's it. I keep social media to one channel for the sake of my sanity.

Danny Lennon: Probably it's my choice I should tell you that. Excellent, so yeah I will link that up in the show notes so everyone go and check that

out, follow Alan and obviously keep an eye out for when the site goes live. You obviously have something exciting stuff coming up with the embankment of the Ph.D. so that could be something to follow along.

Alan Flanagan: So, I am starting the Ph.D. in January and that'll be interesting. That's in kind of chrono-nutrition area emerging. It's a human trial and going to specifically look at timing of food intake and whether the preferential distribution of a greater proportion of energy earlier in the day benefits energy expenditure, thermic effect of feeding, and then a forced jetlag protocol to actually see whether the effect is circadian or behavioral, so really exciting.

Danny Lennon: Yeah. I'll have to get you back to the discuss that one that's up and running because as listeners that are regular to the podcast will know this has been an area that I really love looking into an we've had a few cool people that discussed some of these concepts before, and so it'll be cool to see where some of that research goes. And the final question I always end the podcast on can be completely detached from what we've discussed today as a more general vague question of if you could advice people to do one thing each day that would have a positive impact on any are of their life what would that one thing be?

Alan Flanagan: Read. Read more, yeah I feel like reading is a dying art and I find that there is – I think that there's a lot of benefit to consuming information through different means, but there's a lot of wisdom in books and for me as someone who reads a lot of non-fiction lot of the time actually my kind of trend recently has been to try and get back and read more fiction and just kind of get the imagination and the brain a bit of a kick start and stop reading facts all the time. So, personally I just – I find huge value in reading and carving out time to read is nice kind of you-time I guess and I've always valued books and what you get out of them, so that's typically my thing is for a kind of a better brain and a kind of nicer perspective on life generally I think books are where is that for me.

Danny Lennon: I agree. I think it extends beyond the content of the book, even if it's a non-fiction book I tend to find people who invest more time in that can articulate their own ideas a bit better, and I was only chatting with a friend recently who has done the same, wanted to get more into some fiction stuff. Started reading some like Stephen King and he is really articulate guy but he is like once you

start doing this like you just – your minds shifts to how someone can frame a certain situation with words is pretty cool.

Alan Flanagan: Yeah, it is. It's an amazing skill.

Danny Lennon: So, Alan thank you so much man.

Alan Flanagan: Thank you for having me dude it's been great. I really enjoyed it.

Sign up to the Sigma Synopsis for FREE: https://sigmanutrition.com/sigma-synopsis/