Danny Lennon: Hey Krista, welcome to the show.

Krista Cassaza: Thank you.

Danny Lennon: It's my pleasure to have you on and I'm excited because I've been looking at quite a bit of your research and there's no doubt so much that we can get through with that. But before I delve into any specific things, could you just maybe give some background to the listeners and give them a brief overview of your own academic career and then your main areas of focus with regard to your research?

Krista Cassaza: Sure. I am currently an associate professor in the Department of Pediatrics at University of Alabama at Birmingham, specifically in the division of General Pediatrics and Adolescent Medicine, and I serve as the Director of the Nutrition Clinic in the Adolescent Health Center in Children's of Alabama. So my research is primarily focused on nutrition research, and by that I really encompass both diet and exercise, and so in particular during critical periods of growth, adolescent nutrition, meaning diet and exercise, and the impact on the musculoskeletal system. Now, that's in the context of obesity—for the most part, that's where my research has led—but also in terms of inflammation during chronic conditions and acute conditions in pediatric cancer, really how they impact the musculoskeletal system on metabolism, to me should be the main focus. We often take a adipocentric view and look at adiposity and obesity in terms of weight loss

or metabolic health, and so my research really focuses on optimizing the benefits of the musculoskeletal system through diet and exercise.

Danny Lennon: Yeah, and that's definitely something I want to get back into because this whole area of the musculoskeletal system is huge, like you mentioned, and we've briefly touched on it in various different podcasts before. Dr. Brendan Egan talked about sarcopenia, which obviously is a huge issue later in life. So maybe to start off though, I'd like to start with just obesity as a general topic because when we look at the overall information around tackling this huge topic we all know about, one of the my favorite breakdowns of what we know and what we don't know on the topic coming from research was a paper that you were actually the lead author on that appeared in the New England Journal of Medicine, I believe, and in that there were these like seven myths surrounding obesity which you highlighted, and I think actually a follow-up paper extended that out to maybe nine. Now, I don't want to get into all of those but maybe if we zero in on perhaps two or three of them, because I think they are particularly important to this whole conversation around obesity. So maybe we can take a couple of these things and look at them each.

In the paper, you talked about this flawed idea that small sustained changes in energy intake or expenditure can produce large long-term weight changes. Can you maybe highlight why this has become such a pervasive belief and then what the body of evidence actually tells us?

Krista Cassaza: Well, that is kind of how I shifted my focus towards the musculoskeletal system because, in fact, these small changes are sort of drowned in the foundation of the 3500 calorie rule, which researchers indicated by burning fat calorically required 3500 calories of heat to burn fat. So then we have since then extrapolated that to weight loss where we know that weight and fat are not mutually exclusive but we often think of that 3500 calories. And so from that if we think about a very modest or a potentially easy way to lose weight that the foundation of the dietary recommendations are one to two pounds per week in this very modest, if you can even call it that, weight loss, and what we see particularly in obesity is that one to two pounds of weight loss for one thing is not a real good motivation for anyone. If somebody needs to lose 100 pounds or even a kid—we have kids that need to lose 100-150 pounds—these one to two pounds of weight loss is often just not anywhere near where they need to be in terms of motivation, and particularly the improvements in health that need to occur aren't adequately engaged until much greater weight loss.

So taking these slow, sustained, mild reductions in weight loss really, for one, doesn't have any scientific basis. We can lose more weight than that and studies have shown that those that lose more weight quicker often either are equivalent in the long-term or lose more weight. And when we extrapolate that to kids particularly during growth and development and the adverse effects that the weight with these small changes can ensue on the musculoskeletal system, it just doesn't seem plausible nor does it seem a good recommendation for prolonging weight loss that in this anabolic stage particularly in kids, which was where my focus, why not have large amounts of weight loss, couple it with exercise so that you don't have catabolic responses to the musculoskeletal system, but get the weight off and that by itself serves as motivation psychologically as well as enhances the metabolic properties to utilize the nutrients that are being taken in?

Danny Lennon: Yeah, I think that's such a huge point when you talk around the psychological factor and really getting someone bought in for the whole process and the importance of, like you said, the early initial weight loss being a driver for continued momentum and continued behaviors, and that's a whole huge area which we can certainly get into. But then, people have this maybe perception that this slower, more gradual weight loss is "better" because it's more sustainable to be able to do, but again, quite a definitive statement without consideration of individual context. And so you've been able to point to literature that shows that this greater weight loss not only from that initial buy-in but even in the long-term has better outcomes, right?

Krista Cassaza: Absolutely. A lot of those studies were done by one of the colleagues on the paper and we've studied those randomized control trials and there is at worst no difference, but oftentimes there's a greater outcome in those that have larger weight loss and can sustain it. You know, that's the part of the thing that the whole surrounding and in my teaching philosophy and my research philosophy is challenging people to ask these critical questions and evaluate the evidence. So oftentimes when we think about not sustainable, that goes back to the very low-calorie diets in which there were 800-calorie diets below that which is required for basal metabolism, but a low-calorie diet in which it's sufficiently under the requirements but still can support basal metabolism coupled with exercise and just an improved diet quality such that the food that's taken in can be adequately utilized and delivered, that is what we're talking about, not just thinking that, "Okay, the very low-calorie diets with 800 calories are difficult to maintain and turn to ketosis and all this starvation response." We have to

actually evolve our thought processes with the evolving nutrition research, and oftentimes we get stuck in this one prevailing dogma and don't really ask the questions and too much focus on our cognitive biases and release what's evidence-based.

Danny Lennon: For sure, and I'm actually just so glad that you've made such a point of including the exercise piece in this because only recently, actually, we had Caoileann Murphy who's worked under Dr. Stu Phillips at McMaster and they've published data recently with like a 40% calorie deficit in people and induced weight loss and a lot of fat mass loss, but were able to not only preserve their lean mass but actually they've increased that through a high protein intake coupled with resistance training. So this exercise component, and it doesn't have to be…but like some sort of exercise component is huge for that, like you said, the musculoskeletal system. Can you maybe highlight just how much of a difference or not even if we can quantify but how important that kind of role of combining the two of those things instead of people trying to maybe polarize which one of these is better as opposed to seeing, "Well, they both have this synergistic effect?"

Krista Cassaza: Well, if you think about just skeletal muscle makes up 40% of the whole body and skeletal muscle is responsible for an estimated 60-70% of glucose uptake. So if we are just losing weight without enhancing the quality of the muscle, then you're losing not only the metabolic capacity of the skeletal muscle but also the cross-talk that ensues. And you started to say and then you kind of backed off that resistance training, it is in fact resistance training that we are really talking about in terms of the cross-talk because contraction actually allows the muscle to synthesize and release factors that enhance metabolism, whereas aerobic activity is important for caloric expenditure. We're really trying to shift our focus to metabolic improvement. It requires resistance training and allowing for not only the muscle to synthesize and release those factors but also in so doing makes the skeletal muscle a greater quality and can enhance glucose uptake. So for just losing weight by not taking in enough calories and doing aerobic activity, we're also losing muscle and in so doing losing some of the tissue that would actually help sensitize the other tissues and organs to the fuel that is circulating.

Danny Lennon: Yeah, yeah, I think that's a really important thing for people to bear in mind. And I will circle back to the whole musculoskeletal system in a bit, but it just kind of reminded me of something else that you mentioned in that paper that kind of ties in with these rates of weight loss, and that was around setting goals when it comes to obesity treatment and this perhaps

logical assumption in many people's minds that we need to be very realistic with the goals because otherwise patients may just get frustrated, and that in turn will lead to poor outcomes in the long-term. But some of your conclusions found that that was not necessarily the case with goal-setting, is that right?

Krista Cassaza: Yeah. So my colleagues Dr. Durant and Gareth Dutton did a few randomized control trials and in fact those that set higher goals were the ones that actually achieved greater weight loss. And if you think about it, oftentimes in clinical care with my patients, they want to set goals that are attainable and in doing so really don't push themselves to what they could actually do. With those that seem somewhat unattainable, the motivation and the drive to work harder and feeling like, "Even if I don't lose 50 pounds in three months, if I lose 30 pounds…" as opposed to somebody who sets that standard one to two pounds per week and then in three months they've lost 10-12 pounds. So you have a difference in the way that it's approached, and as a former athlete I like to take the athletic approach that, you know, bet on me, and I try to particularly in kids really establish that motivation and the desire to kind of compete against themselves to win the race even if it seems like it's kind of out there rather than to set a goal that they know that they can achieve because then there's no growth.

Danny Lennon: Yeah, for sure. And I think when it comes to looking at those fast rates of weight loss and having sizeable goals in a certain period of time, I think the important thing for people to bear in mind is when we're talking about obesity, just the spectrum of impacts on health it's going to have for someone being that overweight compared to, say, someone that's maybe going to be relatively lean and healthy that just wants to lose a few pounds, but also then on the flipside when they're trying to lose that weight, a greater amount of that weight loss is going to come from fat mass just because of their overall body fat percentage, right? So we have that bit of room to be able to push that deficit more and to look for those faster rates of weight loss.

So if we turn to now maybe the practicalities of actually effectively treating obesity, it's obvious that we need in some way to induce negative energy balance, and most commonly like we said, this is generally done via dietary restriction to reduce caloric intake, but I'm sure as most people listening are aware, simple telling an obese patient to just eat less is pretty ineffective as a strategy; otherwise, you probably wouldn't be in this situation. Can you maybe speak to this clear difference between knowing

the underlying issue, i.e. energy balance, and then that kind of disconnect to how to actually approach that in practice?

Krista Cassaza: Yeah. So in practice, obviously, very, very few obese people say that they eat five, six, seven, 10,000-calories…I mean, there are some that do. And so to the ones that say that they do, obviously they know they should eat less. But oftentimes, the caloric intake is not that substantially different from somebody that is not obese, and so to recognize that and to allow the obese person to really understand how the macronutrient quality and subsequently the micronutrient quality can have an effect on the weight loss so that it's not simply just the amount of calories but the quality of the diet. Something simple would be for us to talk about processed food. A continuous consumption of processed food or foods that are readily available and packaged have a different metabolic milieu that's associated with them. So when we approach this, we really need to look more at diet patterns. So of course calories are important, but looking at the patterns of the foods that are consumed including proteins with carbohydrate to enhance satiety and with the fats, the healthier fats, to decrease the inflammatory cascade, something Mediterranean-diet-like, I'm not endorsing any particular diet, but really an anti-inflammation diet which limits the processed food and brings the fatty acid profile closer in that 2:1 range with monounsaturated and polyunsaturated, and protein, quality protein, and more of the information provided that such that the dietary advice can be applied to something rather than the approach that's often taken in which we just say eat less, because eating less of something that is not nutritious really does not induce the changes that we want to change in metabolism, and therefore limits the capacity for weight loss.

Danny Lennon: Yeah, and I think this is perhaps why it's so important coming from your work of actually addressing the issue of skeletal muscle and the role that has to play as opposed to simply seeing obesity as this just more body fat, so to speak. We're actually looking at this whole physiological changes and so, like you mentioned there, we know things like someone’s protein intake or levels of inflammation or the amount of excessive sugar intake, all those things can, say, negatively impact either the sensitivity of muscle to muscle protein synthesis or affect it's insulin sensitivity, and then presumably all of those things have knock-on effects for body composition and then in terms of how people are going to partition energy, would that be fair to say?

Krista Cassaza: Absolutely, that's perfectly stated.

Danny Lennon: One of the things that particularly sticks in my mind from reading some of your work was there was an excellent line that I've actually regularly quoted to people when it comes to talking of obesity and people mentioning the genetic predisposition to obesity, and there was a line in there that I think said something like “heritability is not destiny.” And so while yes, like some folks’ genotype certainly means they may have more of a predisposition to gain weight and become obese, it doesn’t mean that they are doomed, and I mean the whole field of epigenetics shows us that our environment can influence certain gene expression, whether they get expressed or not. So what sort of considerations should people keep in mind with regard to our genotype and its effect on obesity or determining someone’s potential for obesity?

Krista Cassaza: Yeah, that's an area that has portrayed itself as very emerging, this epigenetics and nutrigenomics and personalized medicine, although we've had personalized medicine fed according to our genotype for a long time if you think about lactose intolerance. So it's not something that's new. We often find a gene that affects the metabolism differently in some people and there's a wide variability. Of course, there are over seven million snips and any of them can in fact be associated with some type of metabolic disease or obesity. The FTO gene is probably the one that has the most support for in terms of the obesity gene, although none of them really collectively represent a huge component of heritability. But even with the FTO gene, particularly in kids, it's been demonstrated that physical activity and increased improved diet quality can attenuate the effects of the FTO gene.

Similarly, we often talk about genetic predisposition, and so in my clinics and to my students, definitely genetics plays a role. Genetics plays a role in the fact that not only is it genetic in terms of genotype and epigenetic in terms of response to the diet that can be affected, but also genetic in the genetic influence on the environment. So obese parents indeed have obese kids oftentimes, but obese parents also eat and have physical activity behaviors that are very similar to their obese kids. So it's not just the genetic effects but it's the genetic effects that predispose them to a particular environment. So if you can counter that environment, you not only can counter the expression of the gene but also break that genetic passing on of sedentary behavior or poor diet quality. So it's not just one or the other or that it's nature versus nurture. It is a feed forward effect and a feedback system in which the basis or prevention or treatment goes back to what we continuously talk about, and that’s improving diet quality and

improving activity behaviors, which in effect turn some genes on. Again, it's very…not everyone responds the same, but at least you enhance your chances of having a better response to whatever genetic predisposition you have.

Danny Lennon: Yeah, I think that's such an important point because it removes this perhaps victim mentality, for lack of a better word, that potentially could be there if someone thinks, "Well, I'm just predisposed to this and there's nothing I can do about it," but suddenly when you see, well, actually your behaviors and your food environment that you set up around can essentially offset this genetic hand that you've been dealt, and I think that's just such an important thing for in terms of getting people to take action when they realize that.

Another thing that I do want to bring up that was actually in that paper I mentioned earlier was around some of the concepts that we see in obesity that come from observational associations that somehow then end up being taken as fact maybe just from a leap of faith as what we've seen in observation. And one big one that comes to mind that I'm sure my friend Martin McDonald is sick of addressing at this stage is this presumption we get based on some observational research that skipping breakfast will lead to fat gain and obesity. From your exploration of the data, what do you make of this kind of commonly peddled idea, not only that we see in the media but even in many corners of mainstream dietetics, right?

Krista Cassaza: Right. So yeah, mainstream dietetics, just this mere exposure effect as well as a cognitive dissonance suggesting that because breakfast as its name implies breaks the fast and enhances the body's cognitive capacity, that breakfast is a cure-all for everything because it's the most important meal of the day. And what we see is that those that don't eat breakfast, if they don't eat breakfast and we ask them to eat breakfast, then they've increased those calories which they don't compensate for at lunch. So the idea behind that is if you eat breakfast, you'll eat less at lunch, and it doesn't seem to be a compensatory response. Or, the counter is if you don't eat breakfast you're going to eat more at lunch, and if in fact you do eat more at lunch the magnitude of the difference between that's consumed at lunch often does not equate to that which would have been consumed at breakfast. So the large body of research that has occurred shows no difference in encouraging people to eat breakfast or, in fact, the differences that ensue are those that don't eat breakfast, when they start to breakfast, may gain weight because they have a greater caloric intake, or those that have eaten breakfast—it's oftentimes a switch in metabolism. So

those that don’t eat breakfast that start eating breakfast or those that eat breakfast that stop eating breakfast, that switch in metabolism induces an initial weight loss just from the altered metabolism.

But in clinical practice, I think the most important thing to recognize is that if in fact it does come down to simple energy balance, encouraging somebody to eat more calories than they're already consuming just because it's when they first wake up really makes no sense at all, and the research indicates that encouraging people to eat breakfast does not induce weight loss. It may improve their cognitive function and their task-related ability because of the glucose and brain connection, but in terms of weight loss, the data just isn't there.

Danny Lennon: Yeah, perfect. And I think the bigger picture then that even goes beyond that is when you take on an individual basis, for example, we know that when it comes down to good dietary habits probably perhaps one of the most important factors, if not the most, is overall compliance and adherence to that approach that someone has. So if that's the case, then if we have a situation where someone, say, prefers a daily intermittent fasting protocol for example where they actually just prefer not to have breakfast and that allows them to stick to an overall better-quality diet in general, then we're potentially missing out on using a useful approach for that person because we're stuck in this dogmatic thought that, oh, breakfast is the most meal of the day and you need to eat it.

Krista Cassaza: Absolutely.

Danny Lennon: One of the other things in that paper that's particularly interesting, and it kind of reminded me of it when I look at the weight loss maintenance registry, and so essentially it's registry that people may have seen that collates all these experiences of those who have maintained their weight loss, and when I look at the habits that people or behaviors that people reported, a high number of those reported a daily self-weigh-in. Now, with something like a daily weigh-in, on the flipside we have this kind of counterpoint that, oh, regularly weighing can make people too obsessed with a scale, number, or can be negative psychologically. So we have these kind of two opposite things where it seems to be a behavior that most of these people that have been successful have employed, but yet we still have a lot of people saying it's a bad way to go. Do you have any thoughts on something like the regularity of people weighing themselves or are using daily weigh-ins or is that something that you're been able to get good data on?

Krista Cassaza: One group did a lot of that research and what we see is that the research is equivocal on that. Some show that there's no difference and some show that actually people are better able to regulate their weight. In terms of my personal opinion, it kind of is, again, going back to that cognitive dissonance, one of the best approaches for a dietitian is to have people food diary, write down what they eat every single day so that they understand the food patterns and pretty soon they can understand what the intake is and the difference. And yet the flipside of that, which would be the reason somebody's doing that is to be able to monitor their weight, they oftentimes discourage. So daily weighing is accountability very similar I think to food diary-ing because the food diary is basically what you're taking in every day and you start to understand the amount of calories and the quality, and then that can be equated to shifts in body fluids, to shifts in body weight. And so in terms of the overall teaching effect of it, it to me makes no sense, but more importantly, the research indicates that there's difference in those that weigh versus not weigh or that daily weighing improves weight outcomes.

Danny Lennon: Yeah, I think just anecdotally I've found that combining those things of getting people to use actually more frequent measures like a daily weigh-in actually can be beneficial for a number of reasons for given individuals, I will say, but just anecdotally it seems to work well because they start to see that, "Yeah, well, my body weight fluctuates on a day-to-day basis," and so they no longer get kind of freaked out by one reading being higher than a previous one because they know it might just be a slight fluctuation in water, for example, from day to day. But it's good to see that there's certainly nothing to discourage one way or the other.

One of the things that I think is perhaps the biggest problem when it comes to either obesity or allowing someone to maintain their initial weight loss is, of course, weight regain after that weight loss. And we see this time and time again when we look at…if we consider anyone as being overweight as it's rare to find someone who was significantly overweight who has at least never lost some weight in the past through some type of diet. But the issue is then how they maintain that weight loss, and usually we see this kind of regain over time and the statistics can be pretty bleak on that. There have also been kind of further claims that the more periods of cycling between weight gain and weight loss that someone has that that can potentially negatively affect further weight loss efforts. Is there anything to back up this notion in the literature when you evaluated that kind of claim?

Krista Cassaza: A lot of that research is kind of unclear. Many of the studies have not taken into account the voluntary versus involuntary weight loss, and so it includes things like disease states. But for the most part, when we talk about weight regain and gaining weight back, anytime in a normal weight, in a normal metabolism, if you think about the periods of time in which somebody spends in energy balance or in a metabolically healthy state, so in terms of weight cycling, that would have a positive effect on metabolism. There's really no data that supports that more difficult to lose weight when you have weight cycling, and I would think that the positive effects of metabolism from those periods of time in which the body is in a metabolically healthy state would actually support the body's ability…I mean, just like with resistance training, so I think that although the data isn't really strong, anecdotally speaking it would make more physiologic sense that you actually have a benefit if you have been able to lose weight than if you've not been able to lose weight before.

Danny Lennon: And just before we start to wrap up here, I'd like to circle back to the musculoskeletal system in particular because much of your research has looked at the maintenance of quality of life through strengthening the musculoskeletal system. And like I mentioned at the top of the show, this has some crossover with a previous podcast, number 87, in which Dr. Brendan Egan discussed the issue of sarcopenia and how muscle mass and muscle function have a profound effect on both quality of life and then mortality. What do you think is the most important thing for people listening to bear in mind regarding strengthening the musculoskeletal system for improved quality of life? Is there kind of any set Cliff's Notes that we can leave people as a takeaway?

Krista Cassaza: Actually, so the musculoskeletal system, the maintenance of the musculoskeletal system, is the strongest determinant of morbidity, and just a recent study in February 2016 by McCloud demonstrated that all-cause mortality in those 60 and older with and without cancer was significantly greater in those that had greater muscle strength. What is really important is the strengthening of the musculoskeletal system can happen across the lifespan; however, it had the most direct impact during growth and development. So during growth and development, attaining peak bone mass and peak muscle mass is essential. However, in the plateau period of adulthood, maintaining musculoskeletal strength can extend the rate at which that plateaus before it starts to decline. Once you are in that catabolic state that occurs with aging, sarcopenia ensues; however, maintenance up until that time and even during that time can attenuate the

rate at which sarcopenia…and that is the fatty infiltration and then the subsequent muscle weakness ensue. And we see that this occurs faster in inflammatory states and sedentary activity or sedentary behavior. For example, some of my more recent research in pediatric cancer survivors in which the cardiotoxic drugs has limited their cardiovascular fitness, thus their physical activity is far below the recommendations and these kids are testing on the frailty scale the same amount as 60-70 year-old elderly adults. So just the continuous maintenance and improvement and optimization particularly early in life, of course, but never ever allowing for that physical inactivity and that disuse of the musculoskeletal system can prolong life significantly both in health and disease.

Danny Lennon: Yeah. I think it's such an important point you make around how like say peak bone mass, for example, is determined so early on in life, and then the importance of focusing on muscular health and muscular function and bone health like from early in life before we get to older age because, to a certain degree then, you're almost at a point where it's too late to kind of get to that potential and so you're only kind of fighting to attenuate those changes. And I think what it really ties into is what you mentioned really at the top of this show, is that if we simply look at issues in terms of adiposity and always just trying to decrease adiposity through severe restriction, then we're going to be negatively having these impacts on, say, muscle and bone that are going to have these bigger impacts later in life, right?

Krista Cassaza: Absolutely.

Danny Lennon: So that kind of brings us close…before I wrap up with the final question, maybe Krista you could just let people know where they can find more of your work online. Can they check out a ResearchGate profile or where can they go to look up more of the research you've got going on?

Krista Cassaza: So I have…my CV is many places on the UAB websites as a Nutrition and Obesity Research Center scientist and in the Department of Pediatrics. They could also just look up PubMed or they can email me with any kind of questions at kcassaza@peds.uab.edu and request any publications that they may find online, googled or so forth.

Danny Lennon: Perfect, and I will link up to all that stuff in the show notes for everyone listening so you can go and check out that. And Krista, that brings us to the final question we always end the show on, and it can be to do with anything outside of today's topic if you wish, and it's simply if you could

advise people to do one thing each day that would improve their life in some aspect, what would that one thing be?

Krista Cassaza: Go for a long bike ride up a lot of rolling hills.

Danny Lennon: Perfect, a great piece of advice. Hopefully people take that. Krista, this has been a great conversation. Thank you so much for coming on and discussing some of the conclusions you found from your work. I'm sure people will take a ton from it and I really appreciate your time.

Krista Cassaza: Thank you and I appreciate you reaching out to me.

Danny Lennon: So that was Dr. Krista Cassaza on the line. I hope you really got something from that episode and, maybe to serve as a bit of a recap, I think there were a few key main messages that I feel are important that we bear in mind about obesity and how we go about either treating it or just thinking about it in general. The first one that I think is super-important is that idea that heritability is not destiny and, as I mentioned in the episode, I love that quote so much because not only does it acknowledge that yes, there is a genetic component to obesity and some people are more likely to have a predisposition to it depending on certain genetic factors that we're still trying to work out, we still know that this is going to happen, but at the same time the whole area of epigenetics allows us to explain that and our environment influences expression. So even though you're predisposed with a certain gene, you can essentially switch on or switch off certain types of genes or how they're expressed due to the environment that you place yourself in. So that's why when we control things like our behaviors and habits and our food environment and regularly exercise and get a good-quality diet, all these other things, that essentially will allow us to maintain a lean body composition or avoid becoming obese even if there is a predisposition genetically to it.

The second point I think is really important is that slow gradual weight loss is not necessarily better all the time, and in the case of obese individuals in particular, it's probably a suboptimal strategy just considering, number one, how much body fat they do have to lose, the second thing around just their motivation and how we can enhance that and get some momentum going by some early weight loss that's quite radical, and then also when we consider that just because of how much body fat they do have to lose that even if they do experience rapid drops in weight regularly quickly, a decent proportion of that is going to come from fat mass as opposed to someone who's a lot leaner is probably going

to be more susceptible to losing lean body mass. And then, on top of that, even if there is a bit of lean body mass loss, when someone is so overweight that it's causing health issues just getting that weight down first of all and reducing that, and then afterwards, then we can start worrying about getting some lean body mass back on. So I think they're all reasons why particularly with very overweight and obese folks we can maybe not always think that, oh, it has to be this slow, steady weight loss of like a pound or so a week, and there are probably better ways to go about it.

Very similar to that, I think another important point was that large calorie deficits are not always a bad thing. Remember that context matters, so there are certain situations where they can be perfectly fine, and again, a number of different variables in terms of what person we're talking about, the timeframe, etc., etc. But it's not to say that a very slight deficit is always better than a large deficit or vice-versa. There's always a different context.

The other point that was I think something that has been mentioned in this show before is the whole thing of skipping breakfast can make you fat or more likely for someone to gain body fat, or if you skip breakfast you're definitely going to overeat during the day. The research doesn't bear that out and it really doesn't make too much sense to say that you have to eat breakfast and you have to have this meal even if you don't want to, otherwise you're going to gain body fat. And again, remember the whole context and it's what happens over the course of a day or even in the longer term.

And the final thing that I think is worth mentioning is that we shouldn't only think about reducing body fat when we're talking about trying to get people to a leaner body weight, particularly in the long-term, because a huge part of long-term success is likely dependent on musculoskeletal health. And so exercise is crucial, particularly resistance training, as well as consuming enough high-quality protein, which we've discussed in recent episodes with Kevin Tipton and Caoileann Murphy. But this whole exercise piece is so important and that's why I think there's a lot of disservice being done when people are trying to separate what is better, exercise or nutrition, or is it true that diet is like 80 or 90% of results, and all this kind of nonsense. It's like trying to separate them out is missing the bigger picture that they're both really important. And particularly when it comes to maintaining weight loss after a period of time, we see that in the longer term people who have a regular active lifestyle or have regular

exercise are much better able to maintain the body composition they've now got to after losing a significant amount of weight.

So all of that stuff I think is worth bearing in mind and hopefully serves as a bit of a recap or a summary for you guys. And with that, that's pretty much it for this week's episode. If you want to get in touch with me, like we mentioned before, the best place is right now or probably on Instagram, dannylennon_sigmanutrition. You can hit me directly up at my Snapchat, which is just lennondanny, all the one word. And then the usual places, Twitter and Facebook, you'll find me there pretty easily. And so whatever is easiest, please do send me a message and get in touch.

If you'd like to support the show, then please consider supporting us on Patreon.com/sigmanutrition and/or by leaving a review on iTunes. Either of those things makes a massive difference, and thank you to everyone who has done so and continues to support the show. With that, I will talk to you all next week. Thank you so much for listening.