DANNY LENNON: Eric, welcome to the podcast my man.

ERIC HELMS: It's good to be back. This is – how many times I've been on now?

DANNY LENNON: This must be I guess, third time, at least.

ERIC HELMS: In my mind it's like 20. I think it's just because I have dreams about you and I think about you regularly, but

DANNY LENNON: Yeah, PTSD more like it...

ERIC HELMS: Yeah, nice turnaround [laughs].

DANNY LENNON: So yeah, let me try and reverse some of that. Let's hope we have this as a positive experience for you, and I will see what I can do.

ERIC HELMS: Fingers crossed.

DANNY LENNON: So for those listening we are going to take a couple of research papers, dive into them and let Eric essentially pick them apart and try and take some lessons from them and give you a deeper insight to some of these papers. So, for anyone listening, I am going to link to both of them in the show notes of this episode, so you can pull up these at any time you want, have a read through or even go back after this conversation and see what you can maybe glean from

those papers yourself. So the first one, we are going to talk about is actually one of the papers that Eric has reviewed in the previous episode of MASS which is a monthly research review, Monthly Applications in Strength Sport. And in that study – it was a paper out of Brazil from 2017 titled protein overfeeding is associated with improved lipid and anthropometric profile, that's Lower Malondialdehyde Levels in resistance trained athletes. So with that said, Eric, let's get into this. Maybe first best place to start is through give people a rundown of what the researchers are setting out to examine in this exactly, what was the kind of research question they were looking to maybe answer by setting up this type of study.

ERIC HELMS: Yeah, that's a good way of framing it. These researchers were essentially trying to differentiate between high protein and not high protein – it's disingenuous to call it low protein. So high protein and not high protein approaches to bulking with air quotes around that in bodybuilders. So essentially, what they did was that they did a nutritional survey of a bunch of bodybuilders and then based on the survey data, they decided are you bulking, do they meet a certain set of criterion, and then okay, what was your protein intake. And then among bulkers, they separated them into a higher and lower protein set of groups and then they compared, basically health markers for the most part and body composition values. This is a cross-sectional study. I think it's important to point that out. They didn't go in there and actually feed bodybuilders different levels of protein and see how their health and body composition markers changed over time.

This was just kind of a snapshot, which really limits your ability to determine causality and you have to be very cautious or you should be cautious, I should say, in your conclusions. And unfortunately, as you and I both know, a lot of the times when you are looking news headlines, this is the kind of thing where causation is either implied or directly stated when either the researchers themselves did that as well unfortunately or they didn't, but the news media went ahead with it. So just kind of want to put that on the table upfront.

DANNY LENNON: Yeah, that's actually a very good point and at risk of sorting our conversation going off on one tangent just to reiterate on the issue around cross-sectional studies. Obviously, there's a huge limitation there because you just mentioned that. So maybe just address for people who are thinking now, well, what's the kind of point in the study or often that comes up when someone publishes a new study or work is put out, it's very easy for people not within research to start picking apart holes in limitations and saying, why do they do this, this is stupid, etc., etc. So can you maybe talk about the value in a study like a cross sectional study? What is the strengths that it brings against those kind of inherent limitations we just mentioned?

ERIC HELMS: Yeah, certainly. I think a lot of the times when people pick apart those kind of limitations and go why didn't they just do X, Y, and Z, golden, perfect study – they are not aware of the true practical limitations of doing research, and the concept of what I call the research chain, air quotes again, where essentially you start with observational data and then you look with cross-sectional data and you move from mechanism to application and if you leave out elements of that chain you don't have the full picture. So for example, if we just jump the right to an applied study and we went right where it's going to take a bunch of people that lift weights, given two protein values, and then see what happens, we wouldn't be able to discern the mechanism.

So there's a role in these short term studies where they look at blood markers and see differences and things like that, because that is a hypothesis generating piece of work, and if there's no relationship whatsoever, that can also tell you, maybe it's not even worth manipulating, not to say that it couldn't be. And those big population based studies, like epidemiology are also hypothesis forming, because you can't expect to be able to take 2000 people and do an RCT. And it's very difficult to get a group of bodybuilders to manipulate their diet or training, but if you can just see what they are already doing, and then get them into the lab for a couple of sessions, and collect some

data, that might be the only way to get appreciable sample size to actually get data in the first place.

So, you've probably noticed and your listeners will probably notice if they've been paying any attention to the research that there's been a ton of case studies done in bodybuilders since say the last five years, maybe six or seven, maybe more. And case studies are single subject designs where they track them and look at variables and how they change and relate to one another, and the reason why there's been so many case studies is because there's been an interest in bodybuilding in terms of, especially like how natural bodybuilding methods can apply to the general population. And I think more and more people are interested in kind of looking like something like bodybuilder these days. And so there's research trying to inform the public about that, but the only way they can do it is by doing these case studies because it's so hard to get a larger group.

So in certain populations, I guess what I am trying to say is that you have to choose the model that actually is completable if you want to get in the lab and complete an ethics application and get it approved and actually run studies. So sometimes it's not a matter of what's the best study, it's what's the study you can do and then how do you make that study as good as possible given the practical limitations.

DANNY LENNON: Yeah, awesome. I think that's an important context to place around this. So back to the study we mentioned so far – essentially, we've got this cross-sectional study that we have people stratified based on a survey. So we are looking at bodybuilders. You mentioned that it's going to be looking at bulking and we have two groups, a very high protein and then a bit lower protein, although that's still pretty high compared to maybe RDA cutoffs for example. So, to dive into some of that for a bit more details for those who are interested, when we talk about this survey they set up, who was that looking at and then how did they make those distinctions of what bulking was first of all and then what were those kind of cutoffs exactly for the protein?

ERIC HELMS: Right. Yeah, so in the stuff I just talked about, that is apparent when you see the inclusion criteria. So for who they are looking at, they looked at male bodybuilders and they defined a bodybuilder not by just someone who was lifting weights for the purpose of improving the way it looked but who'd actually competed in the championship level event. So that's a very small number of people. So we are talking about people who actually went through the process of competing and getting on stage, donning the speedos and joining the brotherhood of competitive narcissism that I am a proud member of.

So that in and of itself is going to limit your sample size. Then from there, they gave them a food questionnaire. They brought them through basically a guided questionnaire if this was done anything like your standard kind of – which is not enough data for me to definitively say this is what happened, but the equivalent in your country of a dietician sits down with you, who's also a researcher and they go through a certain number of days, and the study is specifically, I think it was a three-day food recall with one of the weekend days, two of the normal days and they gathered basically a detailed record of everything you ate and then they did some statistical analysis of that and compared it to the health markers.

So to determine whether or not you were bulking, you had to meet two criteria. One is that you were at least two standard deviations above your maintenance calories that they predicted based on the equation. And then two, that that was at least 50 kcals per kg. So a good chunk of food. So this would actually eliminate a lot of people who are doing a more kind of slower bulking approach or a smaller maintenance phase. Also, just because I know the question will come up, the only people they included, who met the inclusion criteria were those who had not been using anabolic steroids for at least eight months, because obviously that could affect things like health markers and the outcomes as far as the success or lack of success in a bulking strategy, whether you are using anabolic steroids or not. So these are at least recently drug-free individuals. This is not to say that every single one of them was only eight months' drug free. I think, that would probably include a lot of people who were in

much longer time periods of drug-free. In fact, I don't know, many competitive bodybuilders who are enhanced, who go a full eight months without taking anything. That's pretty uncommon.

So anyway, then from there that's how they decided whether or not you were bulking and then they basically stratified people based on whether they were above or below the cutoff of 1.7 gm per kg of protein intake on a day to day basis. And interestingly enough, this resulted in two groups with very different means. One mean was about 1.6 gm per kg that was the lower protein group, which is actually kind of like the high-end of most sports nutrition guidelines. Then the other group was at 3.1 gm per kg, which is closer to that kind of like 1.5 gm per pound marker for any American listeners. So we are looking at – so almost twice the intake of the other group in terms of comparing the two values, which is basically how they broke those groups down.

DANNY LENNON: Yeah, and that makes for kind of interesting conclusions as we will probably talk about later on. And I think probably the extent of over-eating probably has a lot of important implications that we will discuss as well. So, to start looking at what exactly they were measuring, what are some of the main kind of metrics that they looked at?

ERIC HELMS: Couple of things to note of interest was that the training differences between these groups, at least in the snapshot were the same. When they surveyed them, as far as how long they've been training, how long they've been bodybuilding, how many days per week, and how many minutes per day, minutes per week did they train, there wasn't any significant differences between those values. So of course that could affect your body composition a certain way. It would modify your training. So that's a good thing to know. We can at least say that their training was similar enough.

Then as far as the body composition differences, they looked at body fat percentage and the fat mass and waist circumference. So those are probably the most valuable metrics for what we are talking about. There

were some others, like, age and height, but I doubt protein is modifying their height, and things like that!

DANNY LENNON: I wish!

ERIC HELMS: So, yeah, exactly.[laughs] I know Danny personally so I can laugh at that joke, yeah. You know, you are actually a perfect height for a bodybuilder. Let me just put that out there.

DANNY LENNON: But not a perfect body composition unfortunately.

ERIC HELMS: Come on Danny. You are pretty lean bro.

DANNY LENNON: I think I am a non-responder to muscle hypertrophy. I've joked with Gar about this. Nothing will happen.

ERIC HELMS: Nice. But at least you look good right. You are lean, you've got beautiful eyebrows. I think you got a lot going for you. You shouldn't be so self-deprecating.

DANNY LENNON: Okay, maybe next year.

ERIC HELMS: Exactly. So they also looked at energy intake differences and differences in macronutrient intake, fiber to kind of look at what other things could be affecting this, because I think it's important. When you say this study looked at protein intake, you start to – it's almost confirmation or availability bias I should say that when you decide these are the metrics you are going to look at, it doesn't mean that the other metrics didn't matter or even something that you didn't measure couldn't have had an impact on it in these cross-sectional studies. Any metric that you may not realize could influence the outcome or you did measure but just didn't put an emphasis on could have affected or been the causative factor or one piece of the causative factor puzzle. The difference between this and RCT is that in RCT you make sure everything is the same except for the one thing you change. That way even if there's variables you aren't aware of, if you got a large enough sample size, and you made sure that everything else was the same about these two groups, you can be pretty damn sure that the one variable that was changed was the causative factor.

DANNY LENNON: Awesome.

ERIC HELMS: So yeah that's kind of – I didn't include that as clearly before when I was talking about the difference between an RCT in a cross-sectional study. I think that's probably the key point people should take home. And then finally, in addition to the body composition stuff they looked at biomarker differences. So they looked at a host of variables including the one that was in the title, Lower Malondialdehyde which I could barely pronounce and that I had been only introduced just when I read it, but also cholesterol, HDL, LDL VLDL, triglycerides and then their atherogenic index. So basically, a bunch of heart health metrics is what they examined.

DANNY LENNON: Sure. And just on the Malondialdehyde, I too had to look this up, the first time coming across it in this study and it seems that it's a macro of oxidative stress. Is there any particular reason why that became so important than this study or at least important enough for them to put it in the title why they were looking at oxidative stress particularly in this kind of overfeeding model?

ERIC HELMS: I have a feeling and this is purely a feeling that if I was a health researcher and if I was involved in the field, this would be a novel marker. And these things come around, you know, like C-reactive protein and when that's sort of popping up or mTOR as a signaling pathway, depending on your field as new pathways emerge and as new things are identified by the more mechanistic researchers, then they become a little more novel. And that's kind of like it's your golden ticket to making sure you get published sometimes, but more importantly, it may provide new information and new markers. So, for example, this may 10 years from now become something that your doctor actually tests and they can give you either a higher level of reliability or an earlier detection for risks of things, a parallel in the diabetes research realm, is that there are researchers who are looking at shapes and curves of insulin, not just blood glucose levels as earlier predictors for type 2 diabetes and metabolic risk. And so that may change over time. And this could be something similar to that, but that is speculation because I am a strength conditioning researcher. So somebody says bodybuilders is in the

title, I am going to read it, but if it's from a group that primarily does cardiovascular research then I am probably going to be scratching my head like you were when you read that.

DANNY LENNON: Sure. And obviously there's a lot of stuff that I did look at within here for all those results, what were the kind of standout things that you particularly wanted to take from this or at least make people aware of all the results?

ERIC HELMS: Yeah, I think the big picture stuff before we go into like – I don't think we really – I think we should go into like specific outcome measures because I don't think it's necessarily informative, but overall we saw similar lean body mass levels between groups, similar training and – but the differences were that the body composition probably favored the higher protein group, they had a lower body fat percentage with the same level of lean body mass. In addition, they had across the board healthier biomarkers. So, more favorable ratio of "good and bad" cholesterol, lower total cholesterol, better Malondialdehyde Levels. I feel like I am a four-year-old when I try to say that word. But overall, they seem to have healthier biomarkers and a leaner body, consuming a higher protein intake. And again, these were similar energy intake, some of the interesting differences were that the carbohydrates were slightly different between groups, they were slightly lower in the higher protein group, so I am sure if you have a bias towards lower carbohydrate diets, you would say that's the reason. But they weren't really low, they were just lower. It was just bit of a calorie exchange when you think about it. And dietary fat intakes were similar, and I believe fiber intakes were also similar.

So it's certainly kind of an eyebrow raising outcome that you would have a pretty substantial difference in body composition. I think the specific numbers, I will pull it up really quick, just to make sure I have the body fat numbers right – you had an average body fat percentage of just under 21% in the normal protein group, and then about 14.3% in the high protein group. So it was a non-insignificant amount of body fat being different between the two groups.

DANNY LENNON: And looking at the difference in body fat, it probably makes sense when you look at the kind of lipid profile and those health markers, like that's kind of something you'd almost suspect to be right, but maybe the interesting thing people might be thinking about is if we are seeing similar caloric intakes at this kind of level of bulking but yet vastly different body, levels of body composition. And again, because of the nature of the study, it's hard to elucidate why, but can you maybe speculate at least on some of the reasons why you think higher protein may lend itself to more favorable body composition in this scenario where both of these groups are going to be overfeeding to quite a large extent – and I think that kind of becomes important as well.

ERIC HELMS: Yeah, so there's a couple of ways to look at this and things that I think as someone who's kind of been engaged in the bodyline culture for a long time. And one really important limitation of the dataset was nowhere did I see that they asked how long have you been bulking. So still, it would require a systematic difference between people who choose high and lower proteins for that to be the cause if you think about it. That would mean that most people who are on a high protein diet, did shorter bulks or for less time period than those who were on the more moderate protein diet. But it's certainly possible, because the one thing I was thinking about was all right, you know, if I just eat and I eat a lot, what does my protein intake level fall? And it's typically not as high as when I consciously seek out protein, and it's still high enough though.

So I don't know how engaged with the research some of these bodybuilders were. I don't know if they knew they were eating 1.6 or they just assume they were eating enough or – because most bodybuilders wouldn't think of 1.6 gm per kg of protein is high enough. So it maybe that they were just on the "See-Food" diet and these were the bodybuilders who, in the offseason just weren't moderate with their diet. And they were like, they'd only need to eat a lot and train hard, and they did that. And maybe they get the food scale out when it comes time to step on stage. And maybe that's what differentiates the two groups and the groups on higher protein were the ones who

were still tracking, seeking high protein foods, being a little more exacting and it was more of those differences in personality that led to maybe more accurate tracking.

So therefore, a lower total surplus or less sustained surpluses or just more on awareness of what their body composition was doing, those could all be playing a role here. Or it could be the protein intake, and I think that can – basically what I think the most likely hypothesis, if we go down the rabbit hole was the protein intake, the true difference that resulted in these differences.

Then we have to look at some of Antonio's research, which you are probably pretty familiar with, where they compare groups eating high protein intakes, between 1.6 to 2 gm per kg to groups eating close to 3 gm per kg or higher. And kind of across the board we see depending on the study, either a less fat gain at similar calorie intake levels or even over the long term some fat mass loss in groups that are, you know, if we look at a long enough study, that Antonio did, and groups that are taking a higher protein intake. So what I thinks happening there is just that it's modified – they are trying to please the researchers, because I actually don't think that one gm per kg difference in protein is such a powerful difference to start making body fat loss happen or to circumvent thermodynamics. I think if you are in at a surplus, you are going to be gaining some body fat over time, almost inevitably.

But, what a higher protein intake does, especially when you get very high is those small differences in the thermic effect the food could add up, slow down the actual surplus, so you are effectively increasing your energy expenditure side of the equation. It's also much more satiating, so it could be that you are not licking your bowl clean and you are not quite finishing everything and you are being a little more accurate with your tracking, while the people on a lower protein intake are actually underestimating their intake a little more. So I think those are probably the factors which kind of add up over time when you are looking at like – for example, I think Antonio is a six-month study, that might not be captured in something

like eight weeks but when you triple that time length, that's when you might see a difference in body fat percentage over time, between the higher and lower protein group, if that is indeed a factor or the key factor on why these differences showed up in this study.

DANNY LENNON: Yeah. And I think even if we were to presume that, that is the case. I think there's, for practical takeaway at least from people, we have to realize that that might mean that you could conclude if you are going to overeat to this extent, higher protein or at least very high protein maybe more beneficial. However, that's different to what you would do in a say, "optimal scenario " because I would presume looking at the degree to which they over-ate on this, if you as a coach were to start recommending to your clients, how much of a calorie surplus they should be in, it would probably be quite significantly different to the numbers at least put in this study, right?

ERIC HELMS: 100%, yeah. Just because we surveyed or they surveyed some bodybuilders and found, hey, here's what they were doing, and that seems to be a difference in the higher protein intake, it doesn't mean, hey you should do that. I think that's a big misconception sometimes with research. This is more like, well, in this scenario, if a bodybuilder is doing something that in my opinion that I probably shouldn't be doing in the first place, then this can make a difference. But if you were to look at the body of evidence on weight gain and what rates of weight gain are related to higher rates of body fat accrual. So there's not a ton of research out there but some of the most relevant research is pretty interesting. Man, for my drug-free lifters, even who are on the kind of newer side of things, they are not gaining much faster than say 1 or 1.5% of their body weight per month.

So a fair, in that range, like a kg per month is what a lot of people might be like targeting at most. But yeah, when there are two standard deviations about your maintenance and eating 50 kcals per kg, you are probably gaining faster than that. That might be more like 2 kg per month if not higher. So that's a pretty endemic rest approach. So yeah, so if I was to give someone recommendations for gaining weight, it

would probably be something along the lines of, hey, put yourself in a 200 to 300 calorie surplus per day and try to gain at a reasonable rate or roughly around 1% of your body weight per month, while also taking in at least kind of the 1.7 gm per kg of protein level, probably a little higher than that in the offseason, and modulate that, your intake based on both protein and calories based on your rate of weight gain and whether or not you are putting on body fat too quickly.

So, I do think, based on Jose's research that while you probably don't – you are not going to benefit in terms of the muscle gain standpoint from a super high approach in intake. If you are struggling and gaining body fat too quickly and find yourself not that satiated even when you are in a big surplus, why not experiment with an intake as high as say 3 gm per kg? We know that's probably safe unless you have any kind of clinical concern.

DANNY LENNON: Cool, yeah. I think that's maybe a good place to transition to our second study because it kind of has some sort of parallels in that when we are trying to look at for applications to people in gaining phases. So far we've looked at maybe based on some of the stuff there's at least some theoretical reason that if you are going to be overeating to quite a large extent, it might be efficacious to overeat on protein as opposed to more of the other macronutrients potentially to kind of protect again some of those negative effects. But on the flip side, and what's probably more related to the second study is we can maybe start looking, like we just addressed there, at the degree of the overeating instead and maybe some of the impacts that are going to happen there. So for people listening the second study we are looking at is a paper by Joseph Beals and colleagues, I think it was University of Illinois, 2016, titled anabolic sensitivity of postprandial muscle protein synthesis to the ingestion of a protein dense food is reduced in overweight and obese young folks. And so I wanted to get to this study because like I said, I think it builds off the back of what we just discussed and some of the negative effects that may come when there is not only a high degree of bulking or probably the end effects like excess fat accumulation. And this study isn't looking so much at

health markers so much, but more as the kind of anabolic response, although admittedly not in kind of trained athletes and lean necessarily. So, where is the best place to start and essentially what was going on with the study and kind of again that question of what we are really looking at here.

ERIC HELMS: Yeah, I think, once again, we should frame who you are looking at and how to look that up. So I think that's something you always have to consider when you are reviewing research. And this was a group of three groups of 10 individuals stratified, men and women, by their body fat percentage or I guess, in this case, their BMI, so they had normal weight or healthy weight I should say, overweight and obese individuals. So that was BMI is between 25 and 30, if you are overweight, people under 25, if you are healthy weight and over 30 if you are obese individuals. And then while this wasn't a cross-sectional study, because there actually were time points they measured here and there was an intervention, this was a short term mechanistic study.

So this study in total looked at about 300 minutes of time. So we are looking at five hours, right. So it's certainly not something that's going to tell you what's going to happen over a six-month bulking period or something like that. These were untrained individuals, so they are not bodybuilders by any means but this is what I would definitely classify the mechanistic study. So they actually were doing – this is a tracer study, so the way we look at protein kinetics, the way that amino acids function in the body and what pathways they go through, where they are being incorporated or not incorporated, whether blood levels in branched-chain amino acids rise, etc., etc., etc., It's all done through what's called tracer based studies, where they put in your body – it sounds bad, like radioactive tracers, it just means that we can track where they go and watch their kinetics. Then afterwards you turn into the Hulk, which is really cool.

And then they do something, so whether that's they have you do resistance training and then see how protein feeding affects that or just that gives you a protein feeding in and of itself and see how the

kinetics or the movement of those proteins act, and then of course in this study, they were comparing the way they acted between healthy overweight and obese groups over that kind of five-hour window.

DANNY LENNON: Cool, yeah. And so we have these three different groups and obviously, again, in this study, they looked at a ton of different stuff. Probably what we are going to discuss most is the effect on MPS and maybe mTOR Complex 1, some of the other anabolic signaling stuff, but they also looked at things like glucose and insulin and insulin resistance index which we can probably skip over because it's nothing really surprising about what they found there that they have glucose and insulin and the insulin resistance index was all a lot higher in the obese group, again, something we've kind of seen. So some of the more interesting stuff kind of pops up when we start looking at the muscle protein synthetic response and some of those other anabolic signaling markers. So one of the big things we see is this change between basal MPS response and then after this feeding. Can you maybe talk about essentially how they set that up to measure over that kind of five-hour time point you mentioned?

ERIC HELMS: Yeah. So I think a cool thing they did in the study to set it off is that they had them eat a protein source that's representative of what one would probably eat for dinner, so they had a lean pork shoulder enough to provide about 36 gm of protein and I think they had 5 gm of fat in it, as opposed to a lot of the tracer studies out there, where they will be feeding them either soy, whey or casein, which is more kind of the sports nutrition side of it. So this is much more representative of kind of the response you get after a meal, which is A, pretty cool, and I think it brings more validity to it. So yeah, they looked at baseline differences and then they looked at changes over time. And essentially, they saw a lesser response in muscle protein synthesis in not only the obese, but also the overweight individuals.

And what you'd also mentioned is the mTOR differences, and these were kind of – this was kind of intriguing to me as it almost parallels the way insulin response works in diabetics or pre-diabetics, in that,

mTOR levels were higher at baseline in obese and overweight individuals. So it gives you this kind of indication if it's like a compensatory effect for this reduced anabolic response to protein feeding. And that's the same way that insulin works. So if we are having trouble getting glucose into the cell, that means we have to pump out more insulin to try to force it in there, essentially. So I wonder if that's at least not the exact same mechanism but it's a similar thing that's happening is mTOR is running on its fifth gear to try to ensure that the person can still function as far as gaining and losing appropriate massive lean body mass based on their activity, but that there's some impairment going on at the cellular level. And that is certainly what the author speculated is that this is kind of anabolic resistance, it's probably something to do with the actual health of their muscle proteins and their ability to metabolize nutrients in response to protein feedings is becoming damaged over time by the state of their nutrition and health.

Now, kind of the public health interesting little marker here or nugget here, I should say, from – kind of that piggybacks on what I said before, the last study is that while the main differences in baseline were visible in the obese group, the overweight group had a similar response to the obese group when fed protein, which means maybe you could actually get an indication of metabolic health earlier when someone is overweight by using a protein feeding ironically, even though the root of diabetes is related to metabolism of carbohydrate. So who knows? Maybe in 20 years or something like that, we will be giving protein feedings to people to actually measure the muscle protein synthesis response to see if they are at risk of metabolic disease in the future. I don't know. I think we are a long way off from that kind of speculation, but this is interesting, in that, that you could kind of get an earlier detection from a changed marker versus a baseline marker using protein in the overweight group versus the obese group.

DANNY LENNON: Yeah. I agree there's some really fascinating things there, especially the way you framed a couple of those has got me thinking as well. One of the interesting things that kind of stood out to me was when we look at that MPS response to the feeding, I think it was like

1.5 or 1.6 times the MPS response in the healthy group compared to the others, which again, maybe some people aren't all that surprised about that we have these healthy people, probably going to have better functioning. But when you look at just how much MPS went up after the feeding in those other two groups, it's almost no change to kind of baseline, like, with 36 gm of protein, in that kind of five-hour window, that was kind of crazy to see to me at all, like, blunting it maybe, but to see almost no change was kind of crazy.

ERIC HELMS: Yeah, that's very true. I probably undersold the differences when I said blunt it. And it makes you wonder, what is the process by which these groups have differences in lean body mass, because that wasn't predictable like in baseline, you know that healthy weight people have less lean body mass than the overweight people, which had less lean body mass than the obese people. So clearly they are still able to – it's not like you are seeing a decrease in lean body mass over time as people are getting fatter, like there are some physics realities, because as you gain more mass, you have to have the lean body mass actually move and typically you see an increase in lean body mass, so someone gets fatter until they get morbidly obese and can't move and then it starts to fall again. And that's just the physics of moving more weight. Imagine basically, you are always doing a squat walkout.

However, probably the way that lean body mass is accrued based on this data is a little different, it sounds like it's this constant drive to generate protein with that kind of elevated baseline mTOR levels, and then not really responding very well to meals. While in a healthier person it's like, oh, here's amino acid availability, let's see what we need to do with that, to keep muscle levels at their current level for health, but that's probably not happening with these people. I would imagine, also because chronic inflammation is something you see in those that are obese that there's this – basically a higher catabolic rate always and a higher anabolic rate always. So there's constant fight and the cellular turnover is probably higher across the board everywhere, which has a host of other issues. That's why you tend to see kind of all cost mortality higher in people who are obese and overweight which

is interesting. So yeah there certainly seems to be a few more things going on that this study really just kind of poked a few windows at that we could look through and kind of get a picture of, well, that's interesting, what does that mean, what are the implications of.

DANNY LENNON: Yeah, I mean, there are so many ways we could go with that and for example, when you mentioned inflammation, that was one of the areas my mind went off to purely thinking about how this anabolic resistance is kind of just paralleled and what you see in say sarcopenia in elderly and their kind of response to protein feedings, and a lot of that has kind of implicated you to increase inflammatory markers and cytokines and stuff like that. So I certainly think there's a basis where again trying to tease apart some of these mechanisms, again we can just pull it generally broadly back to overall health. One of the things that if we try and think of some practical applications for maybe those listening are people who aren't in a obese category for example, might relate down to with this kind of trend we saw with increased body fat meaning this kind of reduced muscle sensitivity to these protein feedings over time. And I think it kind of fits into something – I know you've mentioned and talked about quite a lot in the past of you can't force-feed muscle gain. And so this excessive amount of overeating, which ties into our first study perfectly of excessively going past beyond that 200-300 calorie surplus you mentioned is probably going to be not anymore beneficial but detrimental because you will gain on body fat, but even beyond that, now we are seeing maybe the excess body fat can in turn affect muscle sensitivity to future gains. Is that something that we...

ERIC HELMS: That's right.

DANNY LENNON: Can you maybe talk a bit more about that from where we see in other areas?

ERIC HELMS: Yeah, that's something that's been kind of speculated in the fitness community for a long time. And there was even a paper back in the day by Forbes that basically described a relationship between the higher your body fat intake gets, the lower the percentage of

lean body mass gains will be. And then the lower your body fat level gets, the more risk at losing lean body mass with dieting is. Now, I've certainly – the latter, we definitely know, it's true. We know that from looking at studies on bodybuilders and my anecdotal experience working with bodybuilders is, man, it's really tough to hold down the muscle when you are moving from say 9% body fat down to 6% body fat that things get – that's the kind of danger zone. However, I don't know how – I don't want to do any scaremongering with your bodybuilders out there who are like, oh, I can't get over 15% body fat. Because there's a big difference between an overweight individual who does nothing physically, the sedentary individuals in the study, and a bodybuilder who would say, 20% body fat.

And in fact, if you read the discussion by Beals, they suggest that hey, obviously the accrual of fat free mass is not being affected by these differences in body fat levels, but maybe the quality and the metabolic health of muscle is at the micro level due to these differences in body fat. And probably the way to fix that is just to become physically active, to actually have those cells doing something, depleting themselves and needing to take up fuel sources, kind of the same way that as soon as you – so their study is showing that after a week of being on a diet, an obese person with diabetes can actually reverse their diabetes to the point where they are no longer diabetic if you were to do a test on them, they are still obese though.

So many of the – you could almost look at obesity as like a symptom of being in a constant nutrient surplus for a long time. Not to say that once you get obese that doesn't also cause things and cause problems in your body, just the weight is going to affect heart health and things like that. But some aspects of obesity are basically symptoms, I think that's a useful way to frame it – symptoms of being inactive and eating in a nutrient surplus for a long time. So if you were to correct some of those causative factors that result in that symptom, even if the symptom doesn't go away, your health can improve. So, I would be, let's say dubious to believe that bodybuilders in like say the 15 to 25% of body fat composition levels or power lifters wouldn't be able to put on muscle or would have

degraded responses to training if they are training four or six times a week and have a very active musculature that is using and depleting nutrients constantly in various intensity levels.

That said, you probably just don't want to get that high in body fat when your number starts with a 2, unless you are like a super heavy weight power lifter and you know that that's resulting in a better overall performance, and you are okay with some of the potential health risks of doing that, and that's worth it to you. So yeah, I guess, I am just concerned, I don't want to give fuel to the fire for the bodybuilders who are like damn it, I knew I couldn't get over 15%, let me just carry on with my sub-clinical eating disorder.

DANNY LENNON: Yeah, I totally agree and I think that's probably important to point out that even if there was maybe some slight drawbacks of getting even beyond 20%, it's probably nowhere near what we are talking about here with anabolic resistance and obesity, probably a couple of reasons. One is that, as you know, obesity even compared to overweight and excess body fat accumulation is just this completely different physiology, like it's not just more body fat, it's just a completely different metabolic arrangement. And secondly, I just pulled up the table just as you were talking there to check and I think the mean body fat percentage in the healthy weight group in that study was 22.2%.

ERIC HELMS: Great point.

DANNY LENNON: So, again, no need to kind of scaremonger around it. When you get properly into those kind of obesity rangers and like you mentioned, which is a really good point, probably with the addition of little to no activity, is where we are really seeing this kind of anabolic resistance as opposed to anyone who gets a bit more fluff that he isn't probably going to be enabled to build anymore muscle. So, yeah, glad that you cleared up. And Eric, I've taken more time than I was planning on you. So maybe with that said, is there anything else we didn't mention with that or any maybe just a couple of the takeaways from that you would like to remind people of that we didn't cover or just to wrap up on that before we finish up?

ERIC HELMS: Yeah, I think the big takeaways are that it's important exercise, and overall between these two studies, you don't need to be in a massive nutrient surplus to gain muscle, we know that from other research. And there could be potential downsides to doing so in addition to just getting your body fat so high that you are going to have to do something to look the way you want and turn that bulk around. But especially, those who have family members who are overweight and you are worried about them in their later health, and their ability to maintain healthy muscle, just getting them doing anything is a great way to go. Don't come at them too much with your bodybuilder bias and think they've got to lift weights or they've got to power lift or etc. If they want to go swimming, if they want to go on a jog, if they want to do Zumbas, whatever, if you can get them active, it will probably have a huge mitigating effect on some of these outcomes we saw in this study. So, yeah, that's probably my main takeaway point for anyone listening.

DANNY LENNON: Perfect. Awesome. And before I let you go, tell people where they can find you on social media, the internet, all that type of cool stuff.

ERIC HELMS: Awesome, thank you Danny, as always, for having me on, it's always a pleasure. And if you want to find me, well, especially if you like nerding out on interpreting research, I would highly recommended checking out Monthly Applications in Strength Sport as myself, Dr. Mike Zourdos and Greg Nuckols', monthly research review where we cover a research directly applicable to strength athletes and bodybuilders and enthusiasts and the coaches, if you want to check out my stuff, I am helms3dmj on Instagram and we've also got a YouTube channel with my coaching company 3D Muscle Journey with my colleagues and that's YouTube.com/Team3DMJ.

DANNY LENNON: Sweet. And I will link up to everything Eric just said in the show notes for everyone listening, and that rounds us up. Eric, thank you so much for taking as much time as you have today, and for the great information again. It's a pleasure.

ERIC HELMS: My absolute pleasure man, thank you for having me on.

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