DANNY LENNON:	So, let's not waste any more time and let's get straight into the interview with one and only Lyle McDonald.
	And we're live. Lyle welcome back to the podcasting. Thanks so much for taking the time out to do this. I really appreciate it.
LYLE MCDONALD:	Oh, no absolutely Danny. Thanks for having me again.
DANNY LENNON:	Yes, we've got plenty to talk about, and I think the reason I wanted to get you on to talk about one particular topic is because there's been different terms that a lot of people tend to throw around the place that I think maybe don't really understand the terms they're even using, and they talk about things like nutrient partitioning and fuel utilization, which again are of course things but the way people are applying them maybe a bit strange. So, I think what I really wanted to get into is maybe for us to dig a big deeper on number 1 this being an issue that I think is misunderstood by a lot of people, but number 2 there's probably a lot of applications of this that get misrepresented by certain gurus out there, no doubt which you've seen, and this is again a topic you've probably talked about in UD-2 as well, I think I remember.
LYLE MCDONALD:	Yeah, I think that was the main place, because that diet was really aimed at sort of trying to impact that for people that

don't have great nutrient partitioning, and I think there's couple of articles basically have pulled that chapter out of that book on my website. So, anything that I don't cover will be there. They could have probably updated somewhat, but you know that much has really changed.

DANNY LENNON: Perfect, so let's dive in. So, when we are talking about this term of nutrient partitioning or calorie partitioning number 1 just to get people on the same page; what are we talking about first of all, and then why have maybe so many people looked at this as some sort of holy grail of targeting with their diet?

LYLE MCDONALD: First, let me just give you a little bit of background, and I'll try to keep this from being tutti, that's right. So, we know – I'm sure everybody listening this is going to be energy balance equation, right. Energy balance just says you know calories in from food minus calories burned through you know resting metabolic rate, activity, NEAT all that stuff. The relationship of those two determine the change of energy stores in the body, and this gets a little complex when we think of it as body weight; 3500 calories surplus, 1 pound 3500 calories does that 1 pound, and it's not quite like that. This is I think one of the first places that people have gotten very confused, right. If you go way back to when these numbers came from, and we're talking 1920s-1930s thereabouts, the 3500 calorie value was only ever for body fat, right, and I've done the math on that, right, like metric listeners will go away to pound, well they won't because the pound doesn't mean anything. One pound is 454 grams, right? Just under a half-a-kilo. We know that a gram of fat has 9 calories per pound. Well, 9 times 454 are way more than 3500. It's like 4,000 calories or whatever it is, but a pound of actual body fat is only about 85% to 90% fat stores, right. So, by the time you basically map this out and take 454 times about .9 you get – it's like 400 grams of actual stored fat that's right, and 9 calories per pound 3500 calories. But anyway, so the energy balance equation gets really messed up, because people go, oh 3500 calories isn't a pound, therefore energy balance doesn't hold. Well, no and it's just being misunderstood, right. So, when we say the changes of the energy stores in the body we're referring to

how much energy a given tissue has, right. Water has no energy, right; I can gain 70 pounds of water the energy store of your body hasn't changed. You lose 10 pounds of water same fat. The energy balance equation is irrelevant, because we're adding a zero. To gain a pound of body fat it's right around the 3500 calories surplus, right, and if you lose that pound of body fat it will provide 3500 calories of energy.

Muscle gets more complicated, and this is really the big heat of this, right. A pound of muscle broken down for fuel only provides about 600 calories. It's about 125 grams protein, little bit of carbohydrate, and less of triglyceride but to synthesize that same pound takes about 2700 calories, right? So, let's say that you create – just to make the math simple, first let's call muscle 2500 calories, just to make the math a little bit easier. So, let's say you create a 10,000 calorie surplus. If you were gaining 100% fat you would gain right about 3 pounds, right, 3500 goes into 10,000 about 3 times. But if you were gaining 100% muscle you'd gain actually 4 pounds of body weight, right, because that's same 10,000 calories would equal divided by 2500 per pound of muscle equals about 4 pounds, and just under 2 kilos for the metric listeners. So, and of course if you gain water it doesn't matter if you were gaining just storing carbohydrate, right, 400 grams as a carbohydrate 1600 calories you would actually – plus the water you would gain a lot more body weight. So, people think of energy balance as being change in body weight. It's really changing energy stores, and here is why this is 4, right? Like I said, if you were gaining 100% muscle or losing a 100% muscle on a diet same thing, right, I'll say you've created 3500 calorie deficit. If you lost 100% fat you lose 1 pound of body weight, but if you lose 100% muscle you lose 6 pounds of body weight, because each pound of muscle it provides 600 calories. And I've actually always felt getting off topic, right, and all these rapid weight loss centers. But you want super low calories; they don't differentiate body composition. They just want the scale – and maybe tell you not to exercise, and I think the reason for that is we know for a fact that one thing exercise does is prevents the loss of body mass. You will lose the weight more quickly the more muscle you lose more normally in

body mass. You will lose weight more slowly the more fat you lose. They know people want to see the scale drop. They take the water off them, they want muscle loss, because weight will drop actually – okay so that's – and this is when it gets to the nutrient partitioning, and I'll say that on average like when they do these studies they assume that you're gaining or losing about 25% lean body mass is about 75% fat, and as I told you on the website somewhere like if you math that out for 3500 calorie deficit it's 75% fat, 25% muscle you lose not quite a pound of fat but clearly not 6 pounds of muscle. It's closer to the fat well it's like you lose like a pound-and-a-half – I'm not breaking out the calculator, but I hope that makes sense, right. If you're losing a ratio or if you're gaining a ratio it's the calorie value of that – the energy store value of that ratio.

Okay, so that's the basis of this. So, what is nutrient partitioning? Nutrient partitioning in the simplest sense says where the calories or the energy that you're eating is going, right? So, if you are nutrient partitioning very poorly you may be gaining 100% fat, no this never happens. There are certain situations where it can we're usually talking about like cancer, wasting diseases, super high dose corticosetroids, and I'll come back to that at the end. If you are gaining 100% muscle well that's the dream, right? That is a dream. If we're trying to gain muscle we can gain 100% muscle and no fat – with no body fat, excellent, that's the dream. Usually, it's somewhere in the middle of those two. I think Duchaine was the one who said this many, many years ago and I thought this kind of sums about the number of calories determines how much weight you're gaining, but the macronutrients determine how your body composition changes, right? So, we look at some of these silly examples people throw out, oh well calories don't matter because if ate 100% jellybeans it's not the same as lean protein like yeah, yeah, we get it that's just dumb as how like it's a stupid example, I mean, it makes the point, right? We can't synthesize a muscle without a sufficient dietary protein. If you ate 100% dietary fat you would actually gain you know 100% fat, since nobody does that it's sort of a stupid – like looking at the extremes is illustrative, but it doesn't really say

anything. This is people trying to basically argue for clean eating, because – and they can't come up with better examples. So, anyway, so that's the basis of nutrient partitioning where the calories are going in the body. Ideally they will all go to muscle if that's the goal. If you're trying to lose body fat we wish it would all come from body fat, and not lose any muscle, right? So, you can think of nutrient partitioning going both ways; calories coming in whether it goes to muscle or fat calories going out whether it comes from fat – I mean we lose other stuff. Actually organ mass can change. This has been kind of a recent thing. A researcher named Mueller has actually showed it in the first week of dieting your organs get little bit smaller, and this is part of a calorie drop like literally your liver can shrink and stuff. It's kind of crazy, you know, bone density changes a tiny amount like really in a practical sense we're looking at muscle mass and fat that's what I'll focus ongoing both.

DANNY LENNON: Brilliant, for sure.

LYLE MCDONALD: That's the basis of nutrient partitioning.

DANNY LENNON: Perfect, and before we kind of move this on I think there are two really important points for people to take away from that that centers around the – I don't even want to call it a debate, but people trying to falsify almost calories-in calories-out and the first one you laid out is that when we're looking at calories-in and calories-out we're essentially looking at the energy going in and out of the system. We're not trying to say this is perfectly predictive of body weight we're looking at energy moving in and out. Whereas, a lot of people who try and say it doesn't play out will kind of point the other direction. And then, the second point is like you said, people trying to make comparisons of this amount of calories from X food is not the same as this from Y foods, therefore again calories-in calories-out doesn't matter. Yeah, in certain cases it's going to be the macronutrient breakdown of those is going to influence body composition. So, from this framework we're now at you've outlined that there is kind of on average at least we've got this ratio of when there is going to be hypocaloric or hypercaloric diet the amount of weight that's going to be lost or gained has these kind of

different ratios of muscle and fat, and so when we look at these on an individual basis what's really influencing that ratio and I'm sure there is a number of variable but how much of that is purely going to be genetic of where that proportion swings, and just how far can that kind of those proportions swing?

LYLE MCDONALD: I don't know if I can quantify how much genetic – I can know is where I want to look at next like what variables go into this. Genetics is obviously a key, and genetics here could mean a lot of different things. It could be I guess muscle fiber type, it could – you know it could have something to do with number of energy receptors, and the scale to loss we're finding that they are genetic predictors of like who gains muscle, who is a responder, we know that there is a gene that is found in most top sprinters like this is really early days on the genetic stuff, and I can't claim they have really kept up with it on the review paper. Genetics still plays a factor and while all that's interesting it sort of doesn't matter, because at this point in the game we can't change it. So, it's one of those variables that's like, yeah genetics is great we can't control it, so let's move on, like I don't see any point in fixating on it. If you've got bad genetics, well tough there's nothing you can – the only thing you could do is optimize the other parts of the system.

Genetics would also include baseline hormone levels, and there is a old paper that's actually called "The Geneticss," and I think the spelled it G-E-N-E-T-I-C-S-S, because each letter is an acronym, I don't remember, this was years ago it's like the genetics of nutrient partitioning and it was things like growth hormone, estrogen, I don't know what N was for, T was clearly for testosterone, the C was for cortisol like someone was like let's look at that. The male testosterone can range from 300 nanograms per deciliter to – between 900 and 1100 depending on what usage. Well, someone within 1100 testosterone is going to gain muscle more easily than someone with 300 testosterone. This isn't even debatable, right? If you want you can look at the Basen Studies where they've used anabolic steroids at different doses. Two first approximation higher is better for the muscle gain standpoint. Chronically elevated levels of

cortisol tend to be bad thing, and some people just run higher cortisol. They're like – I don't even mean their lifestyle stress. They have what's called – it's like – research refers to like state depression and trait depression. The trait is the genetic component; you're just like trait – your cortisol is higher, and if it is state it means that you're not getting enough sleep, you're in a stressful work position. Some people are just going to have higher cortisol levels, because they are probably neurotic, anxious like they have certain characteristics that are biological that will impair muscle growth.

You know with growth hormone; for adults I don't think it's that relevant. Estrogen is interesting. Estrogen does have beneficial effects on muscle remodeling. I've been looking into the women's book I suspect very tangentially that some of the effect of the anabolic steroids and testosterone itself is via conversion to estrogen in within skeletal muscle, right? Drug users find that early on; anti-estrogens limited their muscle growth. So, estrogen plays a role, but it's hard, I can't really say exactly. It's got good things, and so these are all part of this. We know that it works in the other direction too. We know that there are genetic factors within fat cells that can be due to, who know, hormones sensitive lipase, perilipin levels – again I don't keep up with the genetic stuff, because while interesting I don't care. I can't do anything about it, so I would ignore. So, hormones are a key and most of that is not changeable, you know, within limits. If you're a high stress individual you find ways to relax via meditation, yoga whatever. It will help someone.

I think it's interesting to note that who are our typical hard gainers? Let's face it they are anxious neurotics, right, I don't want to get into the whole semantic type of thing because the whole ectomorph, mesomorph, endomorphs originally when they were first developed nobody seems to be aware of this. It had to do with personality. He wouldn't give a crap about muscle and lot of what he said I think is generally true. He said that the ectomorphs are typically higher strong, more anxious, lives in their head. Mesomorphs tends to be – I hate to use the word lazy , I don't want to promote that sloth lazy this model of – but they

didn't have any more weight better than them; mesomorph is somewhere in the middle, but if you look at the guys who are in line who are just like the hard gainers they are the ones asking a million questions; what should I eat, how should I trek, it's like dude just do it and take a breath, just dude some of that is just inherent to them, and that's affecting their hormones, it's affecting their overall physiology. So, hormones it can leave you so much with that's why drugs are awesome, right? Generally, you know, you want to fix the problems. If you've got a 300 testosterone and you've got chronically elevated levels of cortisol, because you're neurotic go be a runner – go be a distance runner because you're always going to suck. There is just – unless you fix it you are always going to suck and you can't get past that. And I think if you look at personality profile of endurance athletes they are neurotics, right?

DANNY LENNON: Right.

LYLE MCDONALD: I joke that runners are running away from the voices in their head, and I am not joking. Anyway go ahead.

DANNY LENNON: No, I just think it's a really important point when we bring up that there are these hormonal influences on say nutrient partitioning, and the fact that a lot of that isn't modifiable, because there are so many people that will try and promote to people of around fixing your hormones or optimizing your hormones. I'm sure a lot of lifestyle and nutritional factors can help if you've completely screwed them up, but for most people some minor changes to the foods you're consuming or some sort of supplement isn't really going to do all that much to modify, right?

LYLE MCDONALD: Yeah, I think now it's like our case, so a supplement it's really – it's interesting. It was very popular and very much fell out of a – nobody talks about anymore response like this was big want to say late '90s early 2000s, and what they found that it seemed to reduce certain kinds of stress relating cortisol like I don't think it impacts baseline cortisol levels, but if you got someone who for whatever reason is getting stressed or like it was popular for a while, and then just kind of faded out because I don't think it did very much. All the things that are

supposed to raise testosterone – he is the nutrient deficient zinc and that'll help and you know dietary fat, yeah you're not looking at enormous changes like you're looking at you know whatever 10% to 15%. If you take someone from 400 to 450 it might be worth a pound or two, like it won't hurt but the guy with a 1100 is the dude they can just look at their weight and get bigger like you're not going to change suck to not suck. You might move a guy from suck to suck less.

DANNY LENNON: Yeah, it's...

LYLE MCDONALD: So, that you know that's – and then there's other factors. A lot of hard gainers get into styles of training and eating that are promoted to them, and they're frankly are not probably as good or not ideal, right? I got very entrenched in the hard gainers philosophy I wrote for the magazine. Way back in the day this idea of super low volume just wrecking yourself every workout, and it's like and may not – you know guys like half field are like now the hard gainers needs to train more frequently and less intensely, because they're hard gainer and he has already got hard elevated cortisols is going in and just wrecking themselves to positive and negative failure doing two sets of body part is probably not doing themselves any favor. So, there are lifestyle things, but again these are minor in the big scheme. Honestly getting on hormone replacement or taking steroids would do you a lot more than trying to alter your hormones by 10% each direction.

DANNY LENNON: For sure, and just while we're on hormones one that tends to get brought up within the discussion is around insulin, particularly centered on the insulin sensitivity in different tissues. And again some people – again some of this is of course going on, but you have some areas; one that particularly springs to mind is the whole premise of carb backloading that people talk about, of these differences in muscle and fat and you're trying to target this with your carbohydrate intake to try and favor this nutrient partitioning, and again a lot of that mechanistic stuff in that – at least what I've seen in that area was nonsensical, but there is still something to it. So, when we consider insulin

sensitivity where does that fit into this picture, and again is it one of those things?

LYLE MCDONALD: Yeah, some of that, and a lot of the carb backloading thing or the idea of, you know, it was taken too far, but there are obviously elements of truth to it, and I'm actually remind me to come back to the end, because that's going to be a subset of something I'm going to discuss in a second.

All right, we had genetics, can't do much about it. Hormones can do a little bit about it. One of the primary factors; this is the place for people really have misinterpreted the literature. There's a guy named Gilbert Forbes. He wrote about this for like 20 years, like he was the body composition guy, just one of those dudes that this versus that, and he looked at nutrient partitioning, and if anybody gets a literature on this you'll come across a concept called the P-ratio. P-ratio I'm going to explain simply, but the details are more complicated that what I'm going to say but they are not practically important. Think of the P-ratio as the amount of lean body mass that you gain like the percentage of the total weight that you gain when you're gaining weight and lose when you're losing weight, right? The actual definition is; it's the relative amount of energy that you're gaining as protein mass. It's that energy balance nonsense, but it simpler just think of it as the amount of muscle, right? So, if you've a P-ratio of 1 to 3 like you're gaining you're gaining 1 pound of muscle for every 3 pounds of weight. You're gaining 2 pounds of fat for a pound of muscle that's a shitty P-ratio. If you're losing fat that 1 to 3 means that for every 3 pounds of body weight you might lose a pound of muscle that's also a bad ratio. So, the higher the P-ratio the better in terms of – well when you're gaining you want a high P-ratio when you're going, you want a low P-ratio when you're dieting. Well, Forbes found a couple of things. One he found that for any given individual the P-ratio going up and going down was almost identical, right? Basically you gain – the amount of lean muscle mass that you gain when you're gaining is about the same as you lose when you're dieting, right? Thus is the balance of universe maintained, and people find that out the hard way. When they're gaining – if there's a kind of person that gains a large proportion of fat and not a lot of

muscle they tend to lose muscle very easily like they are basically screwed coming and going. If you've got bad genetics and bad hormones well you're screwed coming and going. So, there has been debate over that, and I'm going to get into diet and the big factor.

What he also found was that the biggest predictor in his model was initial body fat percentage, and this is where people have really gotten a screw about this. So, what he found was that the higher your body fat the more fat you lost and the less lean body mass, and the lower your body fat the less fat you lost and the greater percentage of lead body mass. So, imagine like here is body fat percentage and here is theory – basically it does this, so here you lose a lot of fat and not a lot of muscle and here is any male who has got the single digits can attest you; the risk of muscle loss is very real.

There also appears to be a gender difference. Women tend to lose less muscle mass than men, and there's probably two reasons. One is physiological in that they do use more fat for fuel on average than men, but a lot of this is because they are fatter on average, right? In women at 20% which is about the equivalent of man at say 13%, right? If you're a dieting woman from say 20% to 10% at any given level she's got more fat than the men dieting from 14% to 4%, they're not fizzy competitors here. So, I think I'd have to look at the data, but I think if you look at the P-ratio of men at 20% body fat and women I believe it's the same. Don't swear me to that, but it's basically the reason women lose more fat less lean body mass is because they have more fat and less lean body mass predominantly. So, that body fat percentage is really the key factor, so we know that if someone is obese they can do anything, right? They lose lean body mass as water, some connected tissue, like I'm talking to get about muscle mass. They lose very little muscle mass as they get little bit leaner, right, they go from say 35% to 20% to 25% it is still kind of a sweet spot. Yet it's going to be pretty hard to lose a lot of muscle mass, right? Talk to a male at 8% and he maybe – depending on what else he is doing, he maybe hemorrhaging muscle, right? People back in the day they'd find it was a pound of muscle for every 3 pounds of fat like

muscle mass – there's actually met a couple of recent case studies in female physique athletes. They've got a contest lean with a zero lean body mass loss, which sort of points that out. It's very rare for men to do that.

So, two things come out of this. One is that – well and if we think about this even in terms of insulin sensitivity resistance we know that with obesity insulin resistance is almost always present. Well, what does insulin resistance really mean? It means that the fat cells – insulin doesn't stimulate fat storage, but it doesn't inhibit fat mobilization, right? Obese people have lot of fatty acids floating around their bloodstream. They hypertriglyceridemic, hypercholesterol like everything the nutrients no longer have anywhere to go. Well, when you start exercising, guess what? Those calories come straight from the fat cells, and if they happen to be exercising it looks like they lose fat and gain muscle, they frequently do. I note also that at least in some studies testosterone replacement, especially in low testosterone men tends to cause muscle gain and loss of body fat, right, that's the condition I didn't – technically nutrient partitioning. If you were partitioning calories to muscle while pulling calories out of fat cells you would lose fat while gaining muscle and that's truly liberating; very rarely happens, you know, drugs can do it, fat beginners can do it. You find me someone a male at 12% body fat who's been training for several years who can pull this off I'm probably not going to believe you, because we know that it's hard to lose fat when you're lean. It's hard to gain muscle when you train. You're telling me you can do both at the same time, no I don't buy it, at least not in large amounts. So, anyway, so as body fat percentage comes down fat loss get harder, harder, and harder as you get more training. So, what people – what Forbes found was, okay if you're fat and diet you lose mostly fat, and not a lot of lean body mass. But if you regain weight you gain mostly fat and not a lot of lean body mass you end up where you've started. If you're lean – and let me qualify this, if you're naturally lean, if you're naturally lean and gaining weight you gain a high proportion of lean body mass and not a lot of fat, but if you diet again you end up kind of where you started in general. Now, people have

interpreted this as, hah you should diet first to get lean before you gain muscle and this is backwards, right? Because we know that beyond a certain point we know for the fact that the adaptations to fat loss are among other things slowing your metabolic rate, increase of appetite, increased fat storage like anybody who says, oh I'm 8%, I dieted at 8% and I get this big anabolic – no you're not. Your body is trying to store fat. So, if you're naturally lean – and again this is genetic, you're that dude who was just walking around at 11% your whole life. Yeah, if you're trying to gain muscle you're just going to be bigger and stay lean, and if you've dieted down because you're fat kid good luck because your physiology – so anyway – so Forbes found that basically while people differed between individuals for any given individual the value was about the same. You lost the proportion you're losing is you gain in the reverse proportion, and you're just doing what people do they bulk and diet, and bulk and diet and they just end up – all the muscle they gain it goes right back off and they don't really change much.

Now, years ago, right, this brings us into the two big factors. Diet plays a role in this, right? When Forbes was doing all this data they were looking at people who were in weight loss programs regaining weight. Looking at very generic diets; this is '70s and the '80s, right, nobody knew anything about anything. What they were doing we know now was inefficient. There is at least one paper that I've seen that when you've dieted someone down if they start to regain weight, if their protein intake is high enough they will gain a larger proportion of lean body mass. Okay, well done. I mean, it's easy to say well done in hindsight, right, because we know now but that makes sense. Protein is very unlikely to be stored as fat. If you're eating a higher proportion of protein and regaining weight, well you're less likely to gain fat and kind of by definition you're more likely to gain muscle, if that makes sense. So, higher protein intake – and we know, right, Eric Helms wrote that excellent review in lean athletes, we know now, it's not even debatable, higher protein intake during dieting spares lean body mass loss, keeps appetite under control, maintain blood sugar. For an

obese individual higher maybe 1.5 grams per kilo, right about double what's normally recommended. For lean males that may get up to 3 grams per kilo or even higher, right, you may be looking at nearly 1.5 grams per pound of lean body mass when they are a little bit lower they don't lose as much muscle, so they don't have to be quite a sight. But even that points about when you're fatter you're just at less risk. You don't need as much protein, the body is using ton of fat for fuel. As you get leaner the body wants to use more protein for energy. Well, if you get a dietary protein they'll probably use that. So, we know that you higher protein intake during dieting and weight gain will alter this ratio. Forbes's data wasn't examining that. He also showed that – and I just want to bring this up that very low calorie diet tended to cause a greater proportion of lean body mass loss and this is really repeated a lot. Well, when they were doing very low calorie diets they were given like 400 calories, and maybe half of that was protein. So, they were getting 200 cal – they were getting 50 grams of protein for god sake. Of course, they were losing muscle. It had nothing to do with calorie level. It had to do with the diet being moronic, and here I will pep my book. My Rapid Fat Loss handbook is a crash diet. They used to run enough protein. People don't lose lean more – I don't care about how well the calories are. People do not lose lean body mass, because the protein is sufficient. So, anyway that's the basic premise. So, we know that that your macros can impact on those. Sufficient dietary protein is the key. It's always the key.

DANNY LENNON: Right.

LYLE MCDONALD: In all of my books right now I'm just like there's the women's book. One of two things that women take from this book – get enough protein. Everything else is negotiable. We know that if match protein the rest of the diet doesn't matter for fat loss like protein is the key, which is hilarious because it derives from the Greek word proteios, which means the first. They do it and we forgot. Okay, so protein is the first key.

The second key – now we come up to exercise, right? So, years ago, I came across this review paper and I cannot find it for the life of me, so I wonder if I've dreamt it, and it said

like they track these women over weight gain and weight loss, and weight gain and weight loss like they keep entering the same studies because they keep failing. And it had this really funny throwaway statement that said, we tracked a woman like over 5 or 6 weight loss studies and we found that she gained and lost the exact same proportions every time, except for one study that used a intensive exercise program and they never followed up on it, like I read this you know, oh this is what you all are missing. This is the – but the reviewers just throwaway sentence didn't follow up on it. Well, what do we know now? If there is a single factor that we can use to impact on P-ratio and nutrient partitioning, and I'll talk about some timing and other stuff, because this all leads into that, it is the exercise. Even in the obese, even aerobic activity they gain a little bit of muscle, beginners actually do from aerobic exercise, no may be mitochondrial or maybe – but it doesn't matter. Even if it's all they do it will decrease the amount of lean body mass loss, right? Because exercise sends signal to the muscle that says, keep this, to put it very badly, but it's sending a signal – a physiological signal that says, this is important – and we know that it may not increase the weight loss but it increases the proportion of fat loss. Well, guess what? It works the other way. If you're trying to gain weight; if you're doing it by just overeating you're going to gain by whatever genetics say. We know for a fact that resistance training – proper resistance training by which I mean enough volume, heavy enough to matter, not pissing around with 5 pound weights for the ladies that are listening to this, proper challenging weight training sends a signal that says, if you're gaining build muscle, if you're losing keep muscle. So, right there we have probably the two largest factors that can be modified, which is sufficient dietary protein intake and resistance training.

I'll talk also about calorie levels. I want to address these Garth Studies, because I think they're really important in this but one of things that we know that resistance training does, but only back up, I talked about insulin resistance in obesity. Typically it's whole body, right? When you start to overeating liver becomes insulin resistant, skeletal muscle

becomes insulin resistant and what that means is that body can't store calories there, right, muscle glycogen is full, intra-muscular triglyceride is full; what happens when your gas tank gets full, keep pumping gas and it spills out. Well, if muscle can't hold nutrients anymore they only got one place – well they've got two places to go, you can piss them out which doesn't happen unless you're seriously diabetic or they could store to fat. Eventually the fat cells get so big that they are – insulin resistance is an adaptation to obesity. People have this backwards, but it's not the cause. Well, more complicated than that. Insulin resistance develops as you get obese. Insulin sensitivity improves as you lose weight. Being insulin sensitive predicts weight gain, not the other way. Being insulin resistant predicts weight loss. People have this fact – because if you think about it, if the fat cells that may become insulin resistant they're like, wow no more calories. They are just like get these away, because they can't store or they make more fat cells. Well, resistance training probably more than anything else improves local insulin sensitivity, right, now this is the dream. Certain drugs do this; Clenbuterol for example and growth hormone they cause fat cell insulin resistance, but if you're training you've got good skeletal muscle and insulin sensitivity or if you can't store calories here – you can't store calories they could basically get shunted from one or the other. If there is fat you gain muscle, magic. Testosterone does the same thing it ramps up protein synthesis and it has all these benefits in the muscle that the muscle starts pulling more calories on. And part of that is due to improved insulin sensitivity. Exercise depletes muscle glycogen. Resistance training can potentially impact intra-muscular triglyceride that's more an aerobic thing. And we know for a fact like they – I've got a great study in my protein book, which was they had people deplete muscle glycogen from endurance training, and then they just fed them an ungodly amount of carbohydrate. It was like 2,000 calories of carbohydrate in one meal. It all went to the muscle. Fat gain – fat storage was zero, because after resistance training, after glycogen depleting exercise the body's first priority is to store calories to refill the depleted nutrients. Well, more calories going into the muscle less calories going into fat cells. So, there is the

insulin sensitivity link in a general sense, right? So, we know that like some resistance training – and this is the key, right? As you lose weight, first your fat cells becomes more insulin sensitive then – again if you're not exercising then your muscles become more insulin sensitive, then your liver. It works in reverse. When your fat cells become more insulin sensitive they try to restore fat. Resistance training to store fat again and rebuild fat stores. Resistance training has this local effect in skeletal muscle, and that's the key.

So, this is where sort of the carb backloading of the nutrients timing thing came from, right? Fir you had you know you spread your calories out. It was like well let's cluster some calories around training and it was cluster all your carbohydrates around training, and then carb loading was like consume all your calories after training – all your carbohydrate calories. There is some truth to this. There is a logic to – if we know that skeletal muscle is pulling in calories more effectively around training there is a logic to consuming more calories around training, certainly. Of course, we also know that with resistance training the changes are long – they are not instantaneous and they don't end instantaneously, right? We know that in beginners protein synthesis is aimed for what 36 hours. Insulin sensitivity doesn't come back down instantaneously, so this idea that you have to put all your calories right after training that's kind of – it's a little bit flush. There were other issues with backloading. There is some evidence that insulin resistance changes throughout the day, but it's in diabetics. Diabetics have a lot going on, and resistance training even though – we eat all the carbs in the morning that if you were insulin sensitive. Well, great if you're training in the evening you're bumping your insulin sensitivity – these studies don't use exercise and exercise changes the system completely. If you're training daily your insulin sensitivity is staying higher pretty much all the time, right? For people who have insulin resistance like women with PCOS things like that I recommend that it's better for them to get daily activity; even it's all training weight training, cardio-weight training, cardio doing that daily keeps – insulin sensitivity effects are

not permanent from exercise. So, you need to do it more frequently.

But there is also a genetic factor in insulin sensitivity. I think this is where you were getting at when you asked that question. Even with the same body fat, even with the same activity – and no I don't have this study, I read it 15 years ago, and insulin sensitivity can vary like tenfold between two individuals. Actually, you can take two individuals that look identical; same body fat, same muscle mass. One maybe very insulin sensitive one maybe very insulin resistant, and this affects how their body handles nutrients. Right years ago, Dan Duchaine who listeners may or may not know of early steroid era, early training era, one of my mentors, right, we've got this whole thing about the pump. Is the pump involved in growth, no it's not? However, he made the point that muscles that get pumped easily tend to grow though, which – and these are different things. The pump is not mechanistically causal, but if you get a good pump in a muscle that's probably – that's a good – you know and he talked about when he was puberty, right? Normal steroid cycle he would just get pumped as hell, and as he got older and his insulin resistance went down genetically and age related he couldn't get the same pump, and I think if listeners pay attention the muscle groups that pump up really easily probably are the ones that grow the best, because it's also not unheard of for people to have certain muscles grow better than others, right. You can have some people – everything is good, their biceps are or their quad whatever it is and that's a lot of factors. But in that sense that local insulin sensitivity genetically can be having an effect, so for whatever reason you've got a muscle group that's just not good or you've just got bad insulin sensitivity in general that's probably part of that genetic component, right? My Ultimate Diet 2, so we started with all this. It uses the manipulation of diet and calories and stuff to try to temporarily jack up whole body skeletal muscle and insulin sensitivity with your depletion phase, right, depleting muscle glycogen increases insulin sensitivity, we do workout which improves local insulin sensitivity – whole body with your carb load, because we know that that maybe involved in the

overall anabolic response, and we hit the muscle full body hard again, and we do it all over, right? So, this is the way to try to get around people that are genetically inferior in that sense, and again there were partitioning effects. Deplete muscle glycogen when that happens body's first priority is restore muscle glycogen. You can eat an absolute butt load of carbs for 24 hours, right? Double maintenance and you won't gain fat for about 24 hours, because it's all going into your depleting muscle. Training is directing it better, then that's setting you up for really strong heavy tension workout which stimulates growth and you keep the calories coming in for little a while, and then you cut them back and go back to dieting. It's almost carb backloading on a larger scale, which is why – well some of the underlying ideas of carb back – it is on longer scale. No, it's not just this one meal. It's deplete – train – 36 hours of just loading it up, hit it again moderate carbs go back to normal before you start gaining fat. That's where the insulin sensitivity certainly plays a role. Some of that is genetic; again we can modify that with training absolutely, dietary choices to a degree, right? High saturated fat diets tend to impair insulin sensitivity, excess sugar – chronically elevated insulin due to lots, and lots, and lots of refined carbohydrates can. Some people – this is anecdotal, I do know if they feel like – if they find just that they have poor insulin sensitivity they often grow better with less fat gain on more moderated carbs, because again the carbs kind of aren't getting stored in the muscle or liver effectively you might even come back. So, there is kind of – and it does play a role, but not hormonally.

DANNY LENNON: Yeah, that's one of the areas I actually wanted to ask you about, because there's been some research and some conflicting research in that area as well. But just before there's plenty there to dive through that I just want to recap on a couple of points for people listening because they were particularly important. One the research around the P-ratios and just how much people are going to change during those cutting and gaining phases typically, and the importance of – when you outlined that if people were to go by what's in those studies, and they gain, and then they lose back down and end up in a similar position is based on both the dietary

and the exercise regimens either not being existent or just being poorly done in those studies or it's not going to be what's indicative of what we'd advice someone to do i.e. high protein diet in combination with resistance training which is going to be providing that stimulus to hold on to muscle or to gain muscle. So, I think that was important piece.

On the insulin sensitivity side I think one really important point that you've pointed out, again, that is very misunderstood is around the actual storing of excess body fat. Not actually being so much of a problem for the body per se at least, but it's actually the lesser of two evils, right? You have all this influx of energy overload you've nowhere to put it. You don't want it in the blood stream, so you're going to jam it into a fat cell as lesser of two evils. So, it's actually a beneficial adaptation?

LYLE MCDONALD: Yes, and kind of in that thing and one of the things that can occur in obesity it's called the 'ectopic fat storage' and what that means is when the fat cells can't store anything else fat starts getting stored in bad places like the liver, like the pancreas and this is what causes some of that damage – that long-term damage. So, yeah we know hyperglycemia – chronically elevated blood sugar levels, right, can cause advanced glycation end products. It causes damage to the tissue. Normally, the body will regulate it very well, but as if you can't like – and a good example – well extreme example something called 'lipodystrophy'. Liopdystrophy; these folks do not have fat cells. They've genetic reasons that causes them to not make fat cells. They are essentially the most insulin resistant you can be, because they have nowhere to store excess calories and all their health parameters just go completely screwy, and they also don't produce leptin which is a whole separate to do. There are some diseases where you can get partial lipodystrophy where you start to lose fat specific areas that could cause severe insulin – and for the same reason. The calories are stored to get them away from the blood stream and ideally keep them away from other tissues. When you run out of space and that's extreme obesity we're talking about 35%-40% body fat. It's going to go somewhere else and it places it back somewhere else is not a good thing.

DANNY LENNON: Yeah. I did want to circle back to the insulin sensitivity and selecting carbohydrate intakes, because like I mentioned, there has been some very different pieces of research over the past 10 years at least that I've seen that have tried to split people out into – people within that group who are insulin sensitive versus insulin resistant, and seeing what they responded to better in terms of carbohydrate intake. Some of those studies showing those insulin resistant folks doing better on the lower carbohydrate intake and insulin sensitive people doing better on higher carbs; other studies not showing that. Anecdotally, we know that people can improve their insulin sensitivity mainly through weight loss, but also just generally healthier diet I suppose on both low carbohydrate and higher carbohydrate diets. So, when we get into this whole area where do you fall on people trying to match carbohydrate insulin sensitivity and where that might play in?

LYLE MCDONALD: Again, I want to address that, because I just started really writing an article series. I just want to make a couple of final points about all this Forbes ratio, and this P-ratio, tagging the importance of training, right? Paper came out May, 2017. If you wonder why I've been looking away it's because I've been looking for this paper. It has the incredible title of "Do Dynamic Fat and Fat Free Mass Changes Follow Theoretical Driven Rules in Athletes." Right, they wanted to see if this Forbes predictions that are very mathematical. There are some really entrenched papers that are just – they're math wags trying to compare the Forbes theoretical to real world. They are pretty close for non-training people on poor diets. So, 70 athletes were evaluated. Divided those lost of gained 1.5% body weight. They measured body composition yoda, yoda, yoda. The conclusion – and these were athletes on fairly heavy training; handball, volleyball, basketball, triathlon and swimming. So, the athletes that lost body weight used 90% of the energy from fat mass. On those gaining body weight 95% was directed to fat free mass. When body weight is lost dynamic changes in its composition do not follow established rules and predictions used for leaner, overweight, obese, non-athletic populations. And this is the first study where they actually looked at

athletes rather than the general public. Even that one throwaway Ron made the point resistance training throws these numbers off, and these people were on heavy training. They didn't lose a ton of weight, and I want to touch on that, then we'll go to insulin sensitivity, right? So, the difference – those who gained 1.5% body weight increased fat free mass; 2.3 kilos about 5 pounds over prior season or something like that. So, they weren't gaining or losing super quickly or super slowly, but it points out that when you combine heavy training with proper diet sufficient protein and stuff those Forbes numbers quit and pulled out. So, again protein, resistance training that these are the two factors that we can truly control to the best of our ability. Genetics, hormones, wants you to take drugs, insulin sensitivity relates to training in the next topic, but those are really the big two. And I imagine these guys are probably training daily, because that's what athletes do. But clearly that could make the difference.

On the topic of the rate of weight loss I think that's another issue. There's been a couple of papers; they're really good. A researcher named Garth over in Europe land he studying the lead athletes and that's really rare, because it's really difficult to do, and she's looked at two things. One it had to do with the rate of weight loss that you want fast or slow, and changes in body compositions stuff like that, and then she also looked at weight gain. And overall she found that a slower rate of weight loss in these athletes allowed them to make slightly more gains in strength. They did gain some lean body mass, which goes against something I said, the two things. Number 1, these were not lean athletes. The average body fat percentage was like 22% and the men were at least 18. These were not lean athletes. Number 2, lot of these athletes were not performing upper body resistance training and the women mainly gained the muscle and mainly in their upper body. They were essentially newbies from a upper body perspective, but it did show that basically like you know the faster rate of weight loss their diet was over more quickly, and unfortunately they didn't look at, well what if they had then trained normally for the rest of the time, right? If the fast weight loss is done in 6 weeks and a slow weight loss to

12, what if the fast weight loss had dieted hard for 6, and then trained normally for 6. They didn't do that I can only speculate, but as equally was important the weight gain study. What they did they had athletes either – the athletes either ended up doing a pretty large surplus or not very much at all, and what they found was that both groups gained about the same amount of muscle. But the group with a big surplus gained about 3 times more body fat, and this goes to the issue of where diet does play a role, right? Macros are important make no mistake, but you cannot force feed muscle gain, right? You can't, you can try, and you get fat. People who'd go the old bulk and rough find this out the hard way. When they start doing these enormous surpluses they don't gain muscle any quicker, but they gain fat a hell of a lot faster and this changes as you go. Beginners can gain muscle relatively quickly, relatively, they can handle larger surpluses. They may be gaining – what's Eric's numbers, 1% of their current body weight. It's for male 2 pounds of muscle a month thereabouts. For female maybe half of that, and immediate levels after a year or so it's cuts in half. Male may gain a pound of muscle a month. Once they are advanced half-a-pound of muscle if you're lucky. If you gained 5 pounds of muscle in a year you're doing damn well, since it only takes that 2700 calories to gain a pound, while still gaining a pound a month that means you need 2700 calories surplus per month, so 100 calories a day. If you go I got to bulk I eat ice cream every night. I eat 1,000 calories a day that's 900 calories that have to go somewhere else. So, that's where calorie level does play a role, but I just basically wanted to point out training, protein is the key. If you're getting to be more advanced or if you're getting leaner, you know, and Eric does those and this is the women, you slow down the rate of fat loss because trying to maintain faster rates when the body can't mobilize this well energy is got to come from somewhere.

DANNY LENNON: That was a perfect breakdown. I think that was an important point. I actually like Eric's phrase he uses when it comes to the calories and gaining of calories being permissive as opposed to calories predicting how much you're going to gain which is obviously nonsense based on what you just said.

LYLE MCDONALD: And even then just to mention there's been a couple of really interesting studies, I'm sure you've seen them, where they just gave these people enormous amounts of protein like 4.4 grams per kilo.

DANNY LENNON: I know it's Antonio's.

LYLE MCDONALD: Jose Antonio has done some of this work, and they were just piling that on, and what they're finding is that their predicted body weight is not occurring. I think there are a couple of things. I suspect these guys are just having their appetite running so hard. It's really hard to eat enough when you're protein intake is that high, you know they're using food questionnaires, but protein higher thermic effect. It has to get converted to glucose, and then it has to go through all these pathways, you know, if you're going to overeat something it should be protein, which again just brings us right back to that point; of all the macros we can argue day-in day-out about carbs, and fats, and that's all context dependent but protein is just not even remotely debatable. So, anyway that was Eric protein I like to go.

DANNY LENNON: Yeah, I know. It is actually interesting when you look at how most of the debates on macro-nutrients are carbs versus fat, and then when you really look at it protein is the main one for body composition change at least. I actually saw Stu Phillips post something today to that effect. It's been the main one, so...

LYLE MCDONALD: Yeah, he has been doing protein research, since about forever.

DANNY LENNON: Right.

LYLE MCDONALD: I actually met him once down in Galveston when he was doing the essential amino-acid stuff in protein synthesis; just super good guy. He has been in the field for 2 or 3 decades, so he is definitely one of the men when it comes to protein.

DANNY LENNON: yeah, for sure. So, just before we do run out of time to get to the insulin sensitivity piece we're essentially looking at how much merit you feel there is to the influence of carbohydrate intake, because some people put a lot of stock in it and

saying anyone who is insulin resistant must be on low carbohydrate intake, and in the end that kind of makes sense, right? Lower carbohydrate intake should affect...

LYLE MCDONALD: It doesn't but to your point, right, so when you're insulin resistant it makes sense. Body doesn't handle carbs well, moderate carbs, right? That's been – I've paper years ago and it was the optimal diet for the treatment of the metabolic syndrome. It was like moderate protein, moderate your carbs, lots of mono unsaturated fats like zonish ratios 30-40-30 somewhere in that rough range, but at the same time same thing for women with PCOS that's been – but again we've also got studies that showed, oh you can do the same thing on high carbs. Go get these people 60%-70% carbohydrates and it works just as well, and that's kind of a weird disconnect, except that it's not. I wrote a long like a 4-5 part piece about this on my website if people wanted lot of details. Well, when they do that – when they get these studies with very high carbs they are giving all very minimally refined low glycemic index, and I'll explain that real briefly, very complex carbohydrates, right? That's not what people eat in the real world. It's just not.

Before I come back to that, glycemic index, this has been bubbling around the training world for 2 decades, right? Glycemic index was developed for diabetics back in the '80s I'm going to say, and what it is a representation of is; okay after you eat the blood sugar goes up and it comes back down. Glycemic index first they test a test food – they used to use glucose, now they use white bread, right? White bread is defined as 100, right, the number doesn't mean anything. Think of it as 1. It is just the baseline number, and what it's a measure of is it's called the area under the curve of blood sugar, right, so if you track blood sugar levels and you draw curve over it and you did calculus, and you come up with a number and that's the area under the curve. This is just scientific nitpicking whatever it's the overall blood glucose response to white bread, and you them a test food maybe it's a candy bar, maybe it's ice cream, maybe it's sweet potato you measure blood sugar again, you figure out that area under the curve the ratio of that to the test is GI. So, glycemic index of 80 80% of the blood sugar response of

white bread. GI of 120 120%, right so this is like hah, diabetic planning, glycemic index. They've been arguing about this for years, because number 1 you're giving 100 grams of carbohydrates or 50 or whatever the test is, right? People like carrots like high glycemic index, right, try to eat 50 grams of adjustable carbohydrates as carrots, just do it and let me know how that works out for you. But there is other weirdness a) if you add protein or fat, protein especially, right, protein will lower the glycemic index, dietary fat by slowing digestion will too. Now, this led to some real idiocy in the '90s people were like, oh if you're going to eat a ton of sugar add fat to it to lower the glycemic index, right, because adding water to sugar makes it better. Like people just missed the force for the treats.

DANNY LENNON: yes.

LYLE MCDONALD: Ice cream has a very low glycemic index, because it's got a lot of dietary fat in it. So, we had all these really weird – there was also this high individual variance. A paper came out earlier this year and it was like individual response to glycemic index but as weight loss, right, and this is the problem we don't have any way to measure that effectively. The study was interesting. They did like six different measures in the lab, well great how does this help anybody. It's interesting, but there's huge individual variance. The presence of other macronutrients plays a role. Whenever they do it they are feeding people the test meal the first thing in the morning, fast it, there is a second meal effect. If food is already in your gut from an 8 am meal and you eat again what changes? Training changes this. Actually, the more aerobically well trained you are the lower they glycemic index, why? You are more insulin sensitive, right? So, where everybody got wrong with this is that they assumed that the blood glucose response predicted the insulin response, right? Insulin bad, no not really about whatever from a fat loss, fat gain standpoint insulin bad. Everyone seeing that glycemic index was essentially – and they actually did a different study called 'the insulin index' they only did one paper on it and walked away. Well, here is the interesting thing, protein lowers the glycemic index of carbs, but it increases the insulin response. Well, nobody would tell me that adding

protein to carbs hurts fat loss, and yet it increases the insulin response, huh that's interesting. Not to mention there's even one paper I've got, right? Blood glucose can come in from the liver or it can go into the muscle, right, it's a dynamic system, right? All we're seeing like imagine a bucket water is coming in one direction and going out another direction, and it showed that a low glycemic index food caused an earlier and larger insulin response than the high glycemic index food, right? Let me say that again, you lower glycemic index food caused a faster sooner insulin response. What that did is it pushed blood glucose out of the blood stream faster, so the blood glucose coming in didn't raise all of a sudden. So, low glycemic index food raises insulin more. Huh, we seem to have a problem here going from the physiology to the interpretation. Now, they basically walked away with glycemic index. It's complicated, it's not physiological, because nobody eats a carb – well some people do, nobody really eats a single carb 50 grams first day I guess it's not relevant.

So, let me talk about the glycemic load. Glycemic load is the glycemic index minus the total amount of digestible carbohydrates, right? So, if you eat 10 grams of carbohydrates with a glycemic index of 50 that's a 500 glycemic load. Of you eat 50 grams of carbohydrate of a 10 glycemic index that's a 500 glycemic load. This is basically the total load of glycemics – of carbohydrates you're putting into the system.

So, let's go back to the diet thing. We know that moderate carbs improves insulin sensitivity and helps the weight loss when you're insulin resistant, and yet these studies on high carbs show the same, but these studies on high carbs have a low glycemic load, because even though the total carbs are higher they are using very low glycemic carbohydrates that actually people don't eat. Athletes will eat it. General public don't eat this way. So, basically the two ways to lower glycemic load are; keep carbs the same and choose a lower glycemic index or screw glycemic index and just eat less total carbs, and for most people I think that's the easier approach, right? That doesn't mean to go pure low carb, right? I'm looking at 40% carbohydrates you know that might be a

gram or a gram-and-a-half per pound; unless you're doing a ton of training that's plenty, right? An endurance athlete might need 10 grams per kilo. For the average person training for an hour 3 or 4 times a week who is not training – you know 2 to 3 grams of carbohydrate per kilo is more than enough, and it's funny that what the bodybuilders for years when you're dieting dot 2.2 grams per kilo about a gram per pound of carbs, hah, hah but science wins again. But they figured out empirically like that was a good enough amount. It gave enough to train, it let protein be sufficient, dietary fat keeps you full, and then if you wanted to gain you went to 2 to 3 grams per kilo or 2 to 3 grams per pound, 4 to 6 grams per kilo because you needed more calories. These are not bad values for the average person again doing average training.

DANNY LENNON: Right.

LYLE MCDONALD: So, we know that generally lot more complex higher fibers, lower glycemic index – you know if you're insulin resistant you want to eat high carbs yeah it probably matters, but again by the time you had protein, fat and fiber digestion is slowed, the glycemic index just really become pretty damn irrelevant, right? And don't mishear me I'm not saying don't fall into old pop it hard if it fits your macros thing. I am not saying to eat as many junk carbohydrates; someone who going to listen to this podcast to go Lyle said eat table sugar. No I am not, what I'm saying is that this might low obsession about a glycemic index of 60 versus 40; if you're on a gram-and-a-half per pound of carbs some 3 grams per kilo it doesn't matter. You're splitting to such minor hairs at this point that it's really just not relevant, even around training, right, we've got this whole the nutrient timing thing which Alan Aragon and Schoenfeld the guys that wrote that great paper and everyone took out of context. Everyone took out, they just oh, nutrient timing doesn't matter. No that's not what they said. They said it depends on context; if you didn't eat before workout nutrient timing damn well matter. If you're an athlete training twice a day nutrient timing damn well matters, if you're an average trainees nutrient timing is not the big concern, right? It was – a lot of a nuance was missed totally. So, even if you were looking at a endurance

athlete, when we saw all these studies a high glycemic index carbs digest quickly, push glycogen synthesis because of high insulin, and this is good because you need to get carb reloaded and for the most part it doesn't matter because it's context specific. If you got 24 hours between workouts for the same muscle it doesn't matter which carbs you eat unless you get the right amount, right? And physique athletes – bodybuilders are not training the same muscles every day generally speaking. If you train your legs – if you just blast them out on Monday and you're not training it again until Thursday you do not need to worry about rapid glycogen re-synthesis. In 4 days you will be fine. Now, when this matters is when you've got an endurance athlete or strength athlete is training two muscles training twice a day within 8 hours exhaustively they've got a very limited – because the high glycemic index glycogen re-synthesis maybe only matters for the first 4 hours and after that it's just total carb intake. You've only got 8 hours to refill glycogen yeah that matter, you maybe elite – you've got a Tour de France athlete, you've got someone doing a competition in the morning, and again 8 hours later it matters enormously. And studies have shown if you just eat a normal meal after your workout; a normal solid meal, it restores muscle glycogen, and turns on protein synthesis just as well as your prefect drink of glucose, high molecular weight glucose polymers and weight whatever predigested weight protein volume you want to put down assuming you've eaten beforehand. There's actually all that data that eating beforehand is probably better, because even the fastest digesting meal takes about 30 minutes to get into the blood stream. If you ear an hour before a workout and that's still digesting 3 hours later well I've got news for you, you've got carbs that mean a last available immediately and way more immediately then you should eat after. So, yeah you could eat a whole meal after your workout, you can eat nothing for couple of hours as long as you've eaten beforehand, you know, like Martin Berkhan and for reasons I'm not entirely clear on, you know, he recommends like 80% of your total calories post-workout, I don't know entirely – and I don't know his rationale. I'm curious, I don't necessarily see the point, although it's – I doubt I am going to support, but in a

sense intermittent fasting is kind of a carb backloading approach. You might have a small meal before and you eat most of your calories after. Well, based on what we know about nutrient partitioning there is some logic to that, but again adaptation, recovery; growth is not an on-off switch. It is occurring continuously and I think that's the reasons why intermittent fasting by and large is better for fat loss. I think for muscle gain we know that splitting your nutrient intake is better than a couple of big meals that has been shown at least in one paper. Four meals spread across the day was better for maintaining protein synthesis than two bigger meals. I'm not trying to harsh on intermittent fasting I'm just kind of making some points that there is logic to putting – you know when you're dieting and don't have a lot of calories to work with I think there is a lot of logic to putting relatively more calories around training, because we need – in that resistance training is the key to preventing muscle loss you need to be able to sustain that workout, which is often very difficult when you're dieting you just don't have the energy for it. You may not have a lot of carbs to work with, right? If you're a small woman and you've only got 130 grams of carbs per day that's not a lot, you know a gram per pound, 2.2 grams – it's not a lot of carbs to work with. Putting proportionately more around the workout, and then having a little bit more fat with the other meals to keep you full, you should have already macros here. Big, big guys a big 180 pound male he has got more carbs and he knows what to do with. Eating 100 before and after is overkill, but he may want to eat 50 before and after and spread the rest up.

There is also a paper that came out, right, protein breakdown increases when we diet. It's as much that we can't turn protein synthesis on as well as protein breakdown and it showed that a protein drink after workout does – they use the word rescue, which I found it rescues in the increase in protein breakdown when dieting. I think dieting is a little bit different than gaining. Gaining you're eating more calories, you're eating more frequently generally. Dieting you've got less to work with and I think – and even there, so if you walk fast adjusting carbs around training, great, it doesn't matter, probably not. I think if it matters there's still lot of people

aren't hungry after a workout in that sense liquids maybe better, but again if you'd eaten beforehand and you want to wait through 3 hours to eat a meal you're fine, your muscles won't fall off. I promise.

DANNY LENNON: Perfect. Well, I'm just conscious of time, so I'm going to start wrapping up. There is one question I did want to maybe end on that I think might be kind of pertinent to some of the things we've just discussed there around the glycemic response or even the insulin response to meals, because we've obviously talked about in the context of people that are insulin resistant, and I'm just wondering because so many people put stock in their glycemic response to a certain meal, and I mean there is this a lot of people now going around getting their own blood glucose monitors. They are testing their blood sugars after certain meals, tracking that over time, collecting data and I'm just wondering in your opinion for people who are say healthy, have a normal insulin response to meals can deal with that properly or not; insulin resistant or overweight. Is there any real merit to having to go to the lengths of either tracking their blood glucose response or their glycemic response for a meal even matter in that if it does up to a certain level or shoots up high they can deal with that effectively does it matter or...?

LYLE MCDONALD: My gut says, no. I think this is just one of those sort of current obsessive compulsive things that athletes – and it's funny, you know, the people that really get involved in this are the ones that aren't very successful. Successful athletes don't care about this crap, right? These are the people who want to try to optimize every percent which is not a bad thing, but you know all the insulin resistant stuff, insulin sensitive stuff again most of that comes out overweight, inactive individuals. Does it apply to athletes? Usually not, at least not to the degree I think people wanted to, like I said, being well trained improves insulin sensitivity, training regularly improves insulin sensitivity unless you're doing something ridiculous like eating it out you know a 80% diet with high sugar and high fat, which apparently the general public does, you know, they're eating an appalling diet and just one of my little errands everyone is like, oh it's high fructose corn syrup and sugary water and sugar. Okay look,

go look at a typical overweight person and what they get at the Mini Mart it's not just the soda man. They are eating a high fat high sugar diet. To blame the sugar is missing the forest for the trees completely. Yeah, it's not helping you're adding a million calories of sugar water, but their lifestyle is bad, their overall diet is bad to fixate on this one little thing is just missing the forest for the trees. So, I think we're looking at the extremes. You've got the modern western diet among the inactive stressed obese people. We've got lean regularly active athletes, and so I don't – well you know there's some interest now on like some people are overproducers – early overproducers of insulin, is that possible in lean athlete I guess, but even then measuring blood glucose isn't going to tell you that because the blood glucose is the balance between what's coming in and what's coming out. You're producing lot of insulin maybe your blood sugar response they look great, but you maybe just pushing it out more quickly or maybe you're digesting it more slowly. I think by the time you're looking at any reasonable athletic diet, which every meal has plenty of lean protein, moderate amount of carbs, so glycemic load is generally lower, moderate amounts of fat and here we're looking at – years ago I found a paper and it was like somewhere between 7 and 14 grams of fat per meal gave the optimal result and here is why. Lower the math the meal digested too quickly you've got a faster blood sugar response. Higher than that introduce slight insulin resistance and you've got a higher blood sugar response. So, somewhere in that middle range it's about right. If you look at a smaller female might go for 7 grams and across 4 meals – 4 or 5 how many meals a day, I'd say if you're eating 10 grams of fat across 5 still gives you 60 grams of fat that's a reasonable amount. Some larger folks may go a little bit higher; 14 grams of fat across 6 meals you know that's 84 grams of fat for big male that's completely reasonable that might be that 25% to 30% fat that optimizes testosterone or whatever. So, you know by the time you do that 25% fat you're going to have easily 30% to 35% protein if you're eating even a gram per pound probably. Well, what's that 30 plus 16 that's 40% carbs that maybe 1 to 2 grams per pound depending on your

activity level and I think at that level of intake I just don't see it mattering that much.

DANNY LENNON: Perfect. No, that answers everything perfectly and wraps up I think a good conversation with I think a plenty of takeaways for people. So, just before we do just close this out is there anything you want to let people know about maybe you mentioned the injury book, anything else that you want to mention that you're working on, I mean, that sort of stuff?

LYLE MCDONALD: The women's book is still grinding around 3 years later. Actually I've got two chapters left to go, so I swear it's coming.

DANNY LENNON: It's on the home stretch.

LYLE MCDONALD: I just some templates to draw out, I know I've been saying that for – you know my first book I told people it's 2 more weeks for about a year. So, it's just that kind of project. Women they're complicated. I did put recently for those who don't know I broke my leg in February, roller skating accident, got bumped. Broke my fibula, tore two ligaments, major surgery and that kind of prompted me I wrote this little bit it's like 40 pages long book on nutrition for injury recovery that I just released 10 bucks Kindle PDF. There are some things – actually you've mentioned Stu Phillips he's got a couple – he has written a couple of really excellent review papers all on nutrition for injury recovery. Excuse me; I pulled from them very heavily, so that's just like a little e-book for Lyle McDonald complete us or if you get hurt. It's funny I had two emails from people who were like man you wrote this book and I got injured and I'm like god I hope I didn't cause that. I guess it was just like weird timing.

DANNY LENNON: That's hilarious.

LYLE MCDONALD: So, that's out. I want the women's book out before the end of the year mainly because female dieters are going to start getting for physique competition, so crossed fingers and that's all I got.

DANNY LENNON: Perfect, and for everyone listening I'm going to link up all that stuff in the show notes, particularly on the injury book which I definitely recommend after reading Lyle kindly send it to me and I can vouch that you will definitely get some value whether you're a coach or someone who is an athlete that maybe suffering from an injury which you will inevitably do, and so with that Lyle I just want to say thank you so much for being so kind with your time and also for your information. It's very much appreciated as well as the work that you continue to do, so thank you so much.

LYLE MCDONALD: Thank you Danny.

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