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

Mike Ormsby, and we get to chat about all sorts of stuff. From metabolism talking about the flex diet cert a little bit the importance of aerobic training and also how resistance training can infect your body's ability to use fat as a fuel. The role of growth hormone and lipolysis Dr.

Zis lab does a lot of great work with something called microdialysis. So they can stick tiny little probes and measure what's going on in localized area. And we discussed a really cool [00:01:00] study that he's got going on that's been ongoing for quite a while. And also talk about mechanisms behind exercise, fat loss, resistance training, body comp, and even evening eating and its effects.

He is done some very cool studies. In that area also and in the flex four question I ask him for rapid fire, four things. If the goal is to only maximize fat loss, what would the average person in the general public do? So you can get that if you're on the insider newsletter, which is free, so it'll be delivered to you automatically.

If you are not, you can still enroll. Go to mike t nelson.com slash flex four. There'll be a link down below here, put in your email address that will subscribe you to the Daily Fitness Insider newsletter [00:02:00] list. And we will also send you the flex four with Dr. ORMs v's. Answer to that exclusive question.

A podcast is brought to you by Element. If you're looking for tasty electrolytes, I've been consuming a ton of 'em. I'm still down here in South Padre, Texas in the heat, doing some kite boarding and working. And then also I've been using a lot of ketones for my friends over at Teton. I had two right before I went kiteboarding last night, and really seemed to help with just cognition, but I didn't want to use anything that was a stimulant since it was the evening, and I still wanted to be able to sleep at night.

And worked great. So you can check out the links down there below. And then on the Teton, you can type in Dr. Mike at checkout and we will save you some dero. Full disclosure, I am an affiliate for Element and I am an ambassador and scientific advisor to Teton. So [00:03:00] without further ado, enjoy this podcast with Dr.

Mike Ormsbee.

Speaker 5: Oh, and side note this is a pretty informal conversation it'll start where just we drop you into the conversation we were having and that just rolls right into the podcast. So enjoy.

Dr Mike Ormsbee: Yeah. People texting and whatever else. Dude I know you've been super successful, man. I love watching what you're doing it.

Dr Mike T Nelson: Oh, thank you.

Dr Mike Ormsbee: How has metabolic Academy or whatever you call your program Yeah.

Dr Mike T Nelson: Flex Diet Search.

Yeah. It's, yeah, it's been going good. Yeah, so did pretty good in January and then we've got the physiologic flexibility that opens again March 17th. So it's taking, the concepts of Hey, once you get like a B student in, exercise, nutrition, and sleep, you're pretty decent.

You're not amazing, but you're pretty decent. Yeah. Like kinda what are like those next level. And so to me that's the classic [00:04:00] word is like hormetic stressors but adaptive homeostasis. So temperature pH changes, expanded fuels, ketones, lactate, and then O2 CO2 regulation. Nice. So how do you train both ends of those?

Again, not to change your body temp, but can you handle hotter environments? Can you handle colder environments? That type of thing.

Dr Mike Ormsbee: Man, that's just, I love, I wish I could just geek out on that. I feel like there's so much more learning I want to do and I'm always stuck in what we're currently doing.

'cause there's just so much to, to work on. So this year I've had a new goal starting like last October. I came off of sabbatical, I had sabbatical last spring and I was like, you know what? The institute needs me to focus on it because, and that's what I dedicated sabbatical to.

So I met with like directors of other similar institutes and tried to see like how they're running operation from top to bottom. And then really just promoting things differently. 'cause I. Our research is great, I think. Oh yeah. But it doesn't get read by that many people, so we move to what are some other ways we can bring [00:05:00] knowledge?

I was tired of people saying your institute's the best kept secret that there is. I'm like, it's not a secret led by Yeah.

Dr Mike T Nelson: I don't wanna be a secret man. I got a career. That's worst.

Dr Mike Ormsbee: I'm not trying to make it a secret. Doing a couple of these other ones, I did Andy's and then another guy called Thomas Delore reached out.

So I went out to Yeah, cool. Do his a couple weeks ago. And so yeah, it's been a fun little ride just getting involved in these a little bit and seeing how other people run their shop, which is cool.

Dr Mike T Nelson: Yeah, I had this talk multiple times with Bill Campbell over the years of, and I think he might have even suggested it, I think a couple years ago.

He is I think the future for academics is you will be the recruitment tool. Like you can't rely on the university per se. Like it has to be a good university. It has to have the labs, it has to have. The standards and everything like that. But because everything has gotten more social media and people are being more saturated, that they're gonna follow one person, they're gonna follow their work, and then they're gonna be like, oh, I want to go work in that dude or that gal's lab.

Dr Mike Ormsbee: Yeah.

Dr Mike T Nelson: And I think he's [00:06:00] completely right on that.

Dr Mike Ormsbee: Yeah. And you're seeing it rise above in different situations, right? So even companies, the company's not really what's known anymore. It's the CEO or the person Yes. Who's branded. And it is, I'm seeing it in universities too. So like you don't really know UCF, Bill Campbell.

Dr Mike T Nelson: Yes. Yep.

Dr Mike Ormsbee: You know what I mean? And so you're branding this different simultaneously, but it's a little bit like personal branding combined with institutional branding. And that those of us who are in the public a little bit. Don't really struggle to recruit students, but the people who are traditional academics don't care anything about that.

Just doing great work, but just nobody knows about it. That's where those folks are gonna struggle and that's, that whole model is shifting now. For sure.

Dr Mike T Nelson: Yeah. I just think those people, it's gonna be very hard for them to get students, and it's not because of the work or anything that they do, it's just if you think about the mind of a student who's gonna enroll and where did they get most of their information now, they're probably not at the stage where they're going and reading a ton of the primary research [00:07:00] and figuring out who did it.

They're on social media going, Hey, I saw this, cool professor put up this cool study. I wanna do that.

Dr Mike Ormsbee: Yeah. No doubt about it, man. You mentioned something, what is this cardio for meatheads or something?

Dr Mike T Nelson: Yeah, so I just, so I, in another course and so I had this

Dr Mike Ormsbee: To give to people.

Dr Mike T Nelson: Yeah. So it's a course I sell through my stuff and I've had this idea in my head for. Probably like five years. So I think when I started the Fiz flexer, I was probably in hindsight too early. No one was talking about cold water sauna was just a thing. And so now all the, some of that stuff is still a little bit more trendy.

And so I kept putting out feelers to my list off and on and I finally said, okay, I'm just gonna send out a note if people are interested. Bunch of people said they're interested. Great. So I'm actually gonna build out the course. And my argument was that most lifters probably don't do enough aerobic training.

And the reason, 'cause I kept getting clients who are like, I can't figure out why my recovery sucks. My HRV is in the toilet. My resting [00:08:00] heart rate's high, my blood pressure's kind of wonky and I can't lift as much as what I want to. And for a while I was like, oh, it's your nutritionist, this micronutrient in sleep and all that stuff.

Of course, all those things matter, right? So assuming I don't have any pathologies, and it took me probably a while to realize. Maybe I should look at what their VO two max is. And when I started testing on these people, it was not just bad, it was like outright horrible. It was like, in the low thirties, high twenties.

Yeah. One lady, I won't say her name, 22, I'm like, you're almost non-functional if you go any lower.

Dr Mike Ormsbee: Yeah. I'll tell you, we, we have so we recently, we had a very high level athlete come through off the charts in all of the explosive things, muscular strength, but the Arabic capacity was not good.

Really, and like a lot of people, but it. It was certainly like normal walking around college student kind of numbers and yeah. Oh, wow. That's [00:09:00] interesting. So I've seen that in Madden. And then one study that we're doing right now is in overweight women with overweight or obesity, and they're postmenopausal and we're whole, we're basically studying, we're trying to figure out all of the lipolysis and fat metallic Oh, cool.

Pieces to directly resistance training versus endurance training. And so we're putting these women through 12 weeks of training and then micro throwing everything at it. Isotopic tracers, we've got biopsys. Oh sweet. We've got microdialysis, we've got U glycemic hyper, and so many clams. We've got every tool you can imagine to figure out the fat metabolism piece.

Because as you probably know, like I've always looked at resistance training. I. From the view of a tool for fat metabolism.

I feel like I, we knew it was a tool for hypertrophy and growth and strength. And so to be different, some 20 years ago when I was doing my dissertation was, let's look at it from the other side.

And we were one of the original groups when I was doing [00:10:00] that work. And we still do that work to just flip it and look at the other side. 'cause the people that I knew at the time were basically either athletes or bodybuilders that were lifting all the time and the leanest people I've ever seen.

Now, obviously diet played a role, but I was really interested in the exercise effects of what resistance training would do specifically for pollis and ox. So we can go down that rabbit hole if you want.

Dr Mike T Nelson: Yeah. Do you, so I've looked at a lot of the data on the classic thing everyone brings up is, whenever you mention this, they talk about epoch, right?

And

Dr Mike Ormsbee: Yeah,

Dr Mike T Nelson: I'd be curious on one, what is your opinion of that? 'cause my biased opinion on the literature is. I'm not so sure that makes a big difference. If you look at some of the methodologies of how it was done and when they sample, I do think there is an effect, but I just think the effect is rather small.

But what is your thought since you're actually looking at all that stuff in high detail?

Dr Mike Ormsbee: Yeah. So I guess we should start with some of that history, right? So yeah. Totally early two [00:11:00] thousands. You're getting Chris Mel's group. You're getting Swanky's group. They're looking at.

How long does that epoch exist? And there was a significant increase in energy expenditure after exercise in terms of MLS of oxygen per minute consumed for a while. And then that EA paper, oh man. They were looking at two days post resistance training in

Dr Mike T Nelson: 48 hours, I think, if I remember right.

Yes.

Dr Mike Ormsbee: Still seeing it elevated. And so there was definitely like a theoretical basis that you had just a, you were just revving higher for a longer period of time. And so I think you're right in that people got real excited about that. But what we have to remember is like when you start eating and bringing other factors of life, those effects are probably muted tremendously.

This is a laboratory setting where everything's controlled. So on that, then you'd be like, all right, let's throw it out. It's probably not a great indicator of what's gonna happen for body composition and weight control, particularly for fat. However, if you're consistent, man, like I always say, consistency's [00:12:00] key.

If you're doing this day in, day out, like just yesterday, bumped into an old friend and i's oh, you're still fit, blah, blah, blah. I'm like, dude, I've been consistent for 30 years. Yeah, I haven't missed more than five days ever in 30 years. And that's for either a sickness or, a, some kind of weird circumstance.

And that doesn't even include, I'm certainly walking in there. It's just, I think it's consistency over all these years. And if you get in like the day-to-day effect, then, one-off exercise session doesn't really matter. It's what do you do all the time forever? And so those like early studies I think really paved the way.

And we started looking at that stuff a little bit early on and we started saying what happens to like. Catecholamines. What happens to like the effect of those? I don't know if you remember, this was way back, this was like I think it was early 1980s. There was a study looking at like Nautilus workouts versus walking.

And so it was like this Nautilus versus walking study. I think they were walking at pretty low four maybe four miles per hour. So you're still walking. [00:13:00] But and I, and for some people maybe that's a brisk pace, but it was walking versus that and the effect of no epi were significantly higher from the not a list workout than it was from walking.

And so there was like, alright, so maybe there's like a hormonal trigger that's actually pushing the mechanisms for what we would want, which is not just revved up energy expenditure, but actual fat metabolism. And so I, I feel like that was the basis from the hormonal. So we had the ex, the energy expenditure side, then we had the.

There's a hormonal aspect that is you have these circulating hormones. And then one of the things that I think is really interesting, Mike, is growth hormone. So growth hormone is elevated acutely and there's a lot of data that shows it doesn't do anything for hypertrophy and for growth. It's just around, maybe just needs to be in the background for optimal things to happen.

But people forget growth hormones, lipolytic.

Dr Mike T Nelson: Oh, a hundred percent. Especially in exogenous doses [00:14:00]

Dr Mike Ormsbee: especially and I'll say like consistently in our work and others growth hormones up and it's not doing much for the strength side, but it's

lipolytic and people always just don't even talk about the other half of the equation.

And and we can get to it, but some of our studies, the only differences we were seeing in certain outcomes was the growth hormone response and then. Theoretically then that was the one driving differences that we were seeing in lipolysis and ultimately fat oxidation between, different groups and so on that growth hormone side you said exogenous we use this technique called microdialysis.

Dr Mike T Nelson: And explain what that is for the listeners. Yeah, so

Dr Mike Ormsbee: Microdialysis is really neat. So you can anywhere that you can put a needle into skin, you can put a microdialysis probe. And so we just use like an 18 gauge needle. We can thread, we typically do the subcutaneous abdominal adipose tissue, so just like a belly fat pinch.

And then you put a small catheter in, you take the needle out, and you leave this [00:15:00] flexible tubing underneath the skin. It's really. Basically non-invasive after that first little poke. And then what's nice about that is you can directly perfuse drugs into that tissue and you get a real time look at what's coming out of the cells that are around where you put that probe in.

And so if we put it into fat, we're getting the interstitial concentrations of things coming out of the fat cells. And some of our studies, we'll put that into muscle, but mostly we're putting that into fat. And we'll do either abdominal or gluteal too. So we'll look at different regions for men and women and things like that.

And it in our hands it's just a really good technique. It gets you some cool information in real time for what's happening in that nstitute method and you can perfuse like growth hormone into it. And so people have done that. 1999 there was a really good study and they actually put growth hormone into the microdialysis probe in either your abdominal or femoral adipose tissue.

And if you. Growth hormone through the probe. They actually had an increase in glycerol [00:16:00] released from the fat cell.

So glycerol releases our indicator of lipolysis.

Dr Mike T Nelson: Lipolysis, yeah. Yeah.

Dr Mike Ormsbee: So it can't go back into the cell because it lacks glycerol kinase and so it has to go on to be metabolized. And so it's a little more stable than measuring free fatty acids, which would also be coming out of it.

'cause that can be ified. So we do glycerol as our marker. And so in this case, in basically perfusing growth hormone had a heightened level of glycerol indicating more lipolysis. So you're actually liberating fat from the fat cell and that's only one part of it. So that, that's occurring, but you now need to oxidize it.

So just because it's coming out of the cell, what are you then dealing with it? But setting up this story, it's alright, your energy expenditures up for up to 48 hours and that's basically as long as it's been measured, we have an increase in hormones, the catecholamines that should be driving lipolysis.

We have an increase in growth hormone, which should be driving lipolysis. When we look at directly putting growth hormone [00:17:00] into the tissue, you have an increase in lipolysis. So you're seeing mechanistically how resistance training should be lipolytic and driving that ultimate response.

And then, at that time there were good data on that sort of background, and then there were real what I think is the most important data. Outcomes. There were longitudinal studies. Yeah, there's

Dr Mike T Nelson: some cool body comp data chronically on it.

Dr Mike Ormsbee: Huge great data. And we've contributed to some of that.

So I early on worked for a guy named Dr. Paul ero, and Paul's a fantastic researcher up at Skidmore College. And I worked in his lab for a while. And so we were originally looking at training studies. So we do 12 week training studies where you would in, in some cases we were, look, I don't know if you remember the original Body For Life Oh yeah.

Bill Phillips. Bill Phillips stuff. So we were the first ones to look at that in a research study. So Oh, nice. Body for life to the, at that time, this was like early two thousands to the American Heart [00:18:00] Association guidelines.

And many different variables, but the crux of it was the bo the body for lifelong included resistance training three days a week.

It also included three days a week of high intensity interval training basically, and, but just 20 minutes. So it was six days of exercise, so resistance, every other day. And then a day off. And the American heart was five days a week, get some activity, get your steps in, that kind of thing.

And it was following the old school food guide pyramid at that time. And the body for Life one was high protein, multiple protein meals a day, six meals a day including the shakes were a meal. And so looking at these variables, the resistance training alone that provided outcomes for us that included way better res.

Like if you're choosing they all worked. So let me just say that everything was helpful for health and body composition, but there was a significantly. Better result if you're interested in fat loss for those that included resistance training and higher protein intake and those things.

So we're like, all right, in our [00:19:00] hands, we're seeing it. Multiple things involved, but resistance training seems to be key for it. And there was a whole bunch of studies that Paul's done in that space that look at either resistance training or including it as part of a multimodal exercise program over weeks.

And so yeah, that was just a really cool part that we saw was like and obviously there's tons of other data where resistance training increases muscle mass, decreases fat mass. Interestingly, in our hands, we don't know why, but we have seen it where, actually the men have a favorable response in terms of lean mass accrual, and the women have had a favorable response in fat mass loss.

And no one else interesting doing that, so I don't know what to make of it, but it we found it in our 2018 study looking at looking protein and six months of concurrent training, so resistance training and endurance training. And that led us to all these other studies again, that Paul led and we were involved with where Yeah it's working.

And then on top of that, in terms of what do you [00:20:00] do, how's resistance training affect fat loss? Is I was involved with the late Dr. Jake Kim. So he was a faculty friend of mine. Unfortunately, he passed away a year about just over a year ago. But his student was running a study where we were looking at, people that had at the, what you call at the time, morbid obesity. So they were going to the bariatric center to get surgery, Mike. So they were like, and then imagine, walking in and you see all these students there, Hey, instead of surgery come,

Dr Mike T Nelson: yeah,

Dr Mike Ormsbee: come up and do some training. And so many people did not want that.

But there were some that did. So we had enough people to run a study where we were able to split it into two groups. And do you know how, like the caloric intake of a medically supervised weight loss program.

Dr Mike T Nelson: I think if I remember some of the old programs, it was like crazy low, if I remember right.

Yeah. Like ridiculously low, like a thousand calories or some crazy shit, I think. Yeah. It was like 800 calories. 800, yeah.

Dr Mike Ormsbee: Was a, was like the meta fast, medically [00:21:00] supervised through these bariatric centers. That was what was delivered. And you can imagine going from like your normal intake to 800. Yes.

And it's primarily liquid. There are some food choices, like things you can chew on, but a lot of it was like wet like semi-solid or liquid type things. And so we saw that and we're like, first of all, we need more protein in these diets because if you Oh yeah. On a grams per kg basis, they were like 0.4 to 0.5 grams per kg.

'cause they were large individuals. And so if you did it in with, with that calculation, they were far below what they should be taking in and we said. Our, we actually like our IRB was like, from the data we could do harm here. Like we actually need to give more protein to these

Dr Mike T Nelson: people.

Yeah.

Dr Mike Ormsbee: So both groups got an extra bolus of protein every day for 12 weeks. And they ended up getting about 11, 1200 calories. So a little bit better with the extra protein we were providing in those diets. And so then the only difference was that one group did resistance training [00:22:00] and they came with our group and the other group did standard of care, which is more like calisthenics.

Sometimes they come back to the office and move chairs outta the way in like a conference room and do some chair calisthenics and things like that. And so after these 12 weeks, Mike, what? And this study I would love if it got more

pressed 'cause it's so good. Those people that did resistance training lost the same amount of overall weight as the other group.

So they all lost a ton of weight in 12 weeks. 'cause they're not eating very much. But when they looked at the composition of that weight loss. Only 4% of the weight loss. If you did resistance training came from your muscle.

Dr Mike T Nelson: Wow. That's like basically zero.

Dr Mike Ormsbee: But if you're in the other group, Mike, it was 25%.

Oh. So just by simply adding that in. And so if you look at then at the fat numbers, 96% of your weight loss came from fat, if you included resistance training. Whereas 75% came from fat if you did not. So again, now we're looking at like real outcomes. [00:23:00] That's the stuff people really care about. Is I don't care what the mechanism is.

Does it work? I don't, I just want to get there. And so we looked at some other work and like over a period of time there were, I don't know, two or three studies in 20, 20 to 20, 23 or four where they were looking at men and women and up to six months of aerobic or resistance or some kind of combo types of training.

And across the board, like one exercise good, two including resistance training. Good, and three, some combination. Great. Like the best results came from the combinations of including both modes of exercise. And that's actually what some of our earlier work was showing with those they were called prize studies.

Paul RCO coined those the prize study. So it was like protein resistance, interval training, stretching and yoga and endurance. So you got all modes nice besides in over that period of time. And so we saw all of that and we said okay, that's. That's great that it works, my, our, your science brain goes to well how what is [00:24:00] yeah.

What's exactly happening? And again, with this microdialysis technique, we're able to block or accelerate different receptors of the adipocyte. And so that's a fun technique for us where we can basically, we're either blocking the alpha receptors or the beta receptors. And when you do that, you can try to figure out mechanistically, like what is resistance training doing?

Is it affecting one receptor over the other? How is it different from endurance training? And so we ran a series of these studies, from my dissertation work all

the way through. Now we're still doing variations of this work. And in our original stuff we looked at, exercise trained men, and we put them under resistance training or not.

And, sometimes you have to run these studies even though you know the answer. It's I.

Dr Mike T Nelson: Yep. Resistance exercise works.

Dr Mike Ormsbee: It liberates it, it increases any energy expenditure. We match that. It increased fat oxidation, which was a new metric. 'cause it, up until now, we only looked at like lipolysis, just the mobilization, not the oxidation respiratory exchange ratio dropped.

All the things were going the right direction. And then [00:25:00] when we looked at the microdialysis angle to it yeah, immediately we saw an increase in glycerol. That lasted about an hour after the exercise, and then it came back to normal. Once again, like how meaningful was that hour? I don't know.

But if you start doing this consistent repeatedly, yeah, overall all the time, you can be good. And so we saw, in our study and others circulating free fatty acids are high, glycerol was high. So all the right things were moving in the right directions. Other people have done that too. And really cool stuff like how much rest should you have if you're gonna do aerobic and resistance on the same day.

One study looked at a 20 minute break between those or an hour and 20 minute break between those and it was like, alright, if you stack those only 20 minutes apart, you have a greater liberation of glycerol and free fatty acids. And then ultimately perhaps a better response if you're pairing those closer together.

And by the way, I don't know many people who have an hour and 20 to wait and can do another exercise round.

Dr Mike T Nelson: Yeah.

Dr Mike Ormsbee: So what they call ecological validity perhaps is different in [00:26:00] those. But our data we're in, at the beginning part were in men. And so we decided to do repeat those studies in women and we saw the same thing.

So men, women responding to the resistance training session with a, an increase in glycerol and fat oxidation. So we're showing both in these contexts. And so we kept thinking like, let's look at the blood, what do we do? And again,

catecholamines are up and growth hormone is up. And so so that's probably driving this.

And there's some other circulating factors that probably play a role that we're missing. Obviously, like we've never measured atrial ntri peptide, which probably plays a role. But that's something we just have never had the funding to measure. 'cause it's a little outside of the direct markets we wanted to look at.

But regardless, it's working. And so we're like, you know what? What's. What do you do with this? What do you do with that info? So it's, it is working great. Tell people to exercise, but we were curious about, like everyone that I've mentioned so far has already [00:27:00] been physically fit. What's the difference between someone with obesity and somebody who's lean?

And so then we started in on like series of studies looking at that side of it if you're obese, can you respond the same way? Is there any sort of blunt to this these mechanisms? And you probably have seen that with like your own clients over time. Like they, there's a different response and Oh yeah.

How they do it. It's it's almost like this, the people we work with that are in these situations are like, wait, so not only am I already overweight, but now I don't respond as well to all these things. And it's yeah,

Dr Mike T Nelson: it's, yeah. It seems like most of the responses from what I've seen are what I call like muted.

Like you give them both the same stimulus and the lean person, for example, like in response to fasting growth hormone goes up quite a bit. I remember to study, right? An overweight person needed a 48 hour fast to get the, and they still didn't even hit like the same levels of GH from someone who was healthy and lean fasting for 20 hours.

If you just, pick a marker, it's like everything is toned down and muted and less responsive. [00:28:00]

Dr Mike Ormsbee: A hundred percent man. And we looked at some of those data between lean and obese people at that point, and it was like oh gosh, I think it was tis work early two thousands and it wasn't resistance training, it was aerobic looking between lean and obese and microdialysis outcomes and.

The obese group had had an increase, but it was like 20% during the exercise bout, whereas the lean people were like, I think it was like 120%. It was. Oh

Dr Mike T Nelson: wow.

Dr Mike Ormsbee: It was just way, way higher. And then you again, you're like, why, what's the difference here? And it turns out with the aerobic exercise, if you block the alpha receptors with phentolamine then the the people that have obesity respond the same way.

So they have some type of hyperactivation of the alpha receptors, which is a break on lipolysis. And until you block that with a drug, which for us was phentolamine that study was phentolamine. We didn't do that one. Then you saw an elevation that matched and that's when things like him buying and things [00:29:00] came out.

Dr Mike T Nelson: Yeah, that's what I was thinking too. That's like the first thought I had.

Dr Mike Ormsbee: Yeah. So people were like, oh what? Natural kind of thing. Can you do that, would block those alpha receptors? And so that was the like time when your, him buying got popular for that mechanism. And as like the data aren't that strong on him buying.

That's

Dr Mike T Nelson: pretty mixed from what I've seen. So I tried looking at it a while ago and I was like, I mechanistically it makes a cool story. But

Dr Mike Ormsbee: it does. It does. Yeah. I don't, I, it's not something I would lean on for this purpose for sure. And honestly that was in the aerobic story and so when we were like what happens in the other side of this?

What happens with the resistance training side of it? And so we did the same experiment, but we, and when we gave Phentolamine everybody had a better response, but the people with obesity never caught up to the lean people. So it was only in the other kind of training in aerobic steady state exercise.

They caught up, but we don't know why. Maybe the intermittent nature of resistance [00:30:00] training or something was different where it didn't rescue the problem. It proved it a little bit, but it didn't fix it. And the lean people responded to it also. So in a cycling study, the lean people had nearly no different response with the phentolamine, whereas the obese did.

And our data with resistance training, it turned out everybody had a little better increase, but nothing was amazing about it. And so we again, we're like, oh, what's going on? We had the same markers, resistance training induced an increase in energy expenditure and all these other areas, but it was, the epi and norca responses were huge. And they were matched between lean and obese, but it was two markers and you probably guessed 'em already. Growth hormone, 'em, significantly different response from lean and obese and insulin

Dr Mike T Nelson: response. Yeah, insulin was what I was gonna guess as number one. Yeah.

Dr Mike Ormsbee: Yeah. And insulin was higher at every single time point in the people with obesity. So no matter if that's physiologically deriving a break on lipolysis or not, there's the presence of it being around with blunt lipolysis in some [00:31:00] way. And it it was like every single time point was different and they were not diabetic or pre-diabetic, but they did have higher insulin levels.

So maybe it means they're going that direction or it is just a powerful hormone, for this particular response. Anyway, growth hormone was driving that response and we're, we just got interested in and what does it mean? And even what does body fat do to this story, man? I had a student Tristan, his name's Tristan Raglan.

He was did this for his dissertation and he was interested in just how different kinds of body fat, even if you train a lot. So for example, you ever been to the finish line of Ironman or a marathon?

Dr Mike T Nelson: Oh

Dr Mike Ormsbee: yeah. And there's wildly different body compositions. Oh,

Dr Mike T Nelson: it's crazy. The first one I saw was like, what?

Dr Mike Ormsbee: Yeah it's eyeopening and you're sitting there and you're like, wow. Like at the end anyway, not the people that you look the fittest, it, it makes no difference. There's people wildly different body compositions coming in [00:32:00] at that point. So what we want to do is look at triathletes and who trained a lot.

So everyone had to train. And compete.

Dr Mike T Nelson: And we

Dr Mike Ormsbee: just brought 'em all in a whole bunch of tests here, including microanalysis on them. And then at the end of it, we dichotomized it just statistically into low and high body fat. And then we looked at how was that different in terms of the glycerol response.

And so even in that model, which wasn't direct, it was just observational, the people with a higher body fat, which wasn't even all that high, had a blunted response in lipolysis, even though they're true all the time. So there's something going on there for sure. We're writing that paper up now, hopefully to get published and carry on some more differences between those groups and things.

So yeah, at the end of the day, it looked like people with obesity or people that were lean probably have differences because of growth hormone insulin responses that are occurring. Yeah, we think that resistance training has somewhat of a different mechanism than aerobic training. And so finally at the end of all that we [00:33:00] wrote up a grant.

So myself and Dr. Hickner, Bob Hickner, who's big in Microdialysis great mentor of mine, he's at FSU as well. We teamed up to write an NIH grant, which we got funded for looking specifically at o obese postmenopausal woman that were pre-diabetic. So very specific group. And then this is the study we're running right now.

We're like four years into a five year federal grant to look at all those outcomes that I was mentioning earlier.

Dr Mike T Nelson: Oh, that's amazing. Do you, and mechanistic wise, do you think, I know this is a general statement, that lipolysis is a limiter in fat loss. My, my thought is I think I've gone back and forth on this.

I don't know how many times, like my current thought is. For most people, I might argue probably not. There was some early studies from the eighties you've probably seen from like the Gatorade Institute and stuff that looked at, glycerol appearance and all that stuff in overweight people. And the conclusion of all that was [00:34:00] yeah, there's definitely differences, but because you're still liberating enough fat in overweight people, it's not a rate limit.

That fatty acid oxidation is the rate limiter. You've got the counterargument of if we can get lipolysis high enough, we can get a lot of these glycerol and free fatty acids in the blood. Maybe 'cause of the Randall effect. We can push fatty

acid oxidation more because of that. What are your thoughts on that, since you've looked at a lot of this stuff in detail and I'm sure it's gonna vary depending upon, group and individual, lean, overweight, all that kind of stuff.

Dr Mike Ormsbee: Yeah. So it's really hard to interpret. I'll tell you.

Dr Mike T Nelson: Yeah. I keep changing my mind every five years.

Dr Mike Ormsbee: Yeah. It's and that's all right. It's hard to interpret. Yeah if I were to measure your glycerol coming outta your subcutaneous, abdominal adipose tissue, and it was high, I'd be like, oh, cool.

He's in a, he's in a metabolic state that, that we can get after it and use this fuel. But if you were someone who had who was afflicted with overweight and [00:35:00] obesity, now I have to think is, are you in a state where that's working or are you just not accepting fatty acids into your cells right now?

And you're just Right. Looking at a high level.

Dr Mike T Nelson: Yeah. Because we know that happens when you become metabolically inflexible type two diabetics. You look at their triglycerides in their blood and it's really high, and they're just stuck there. 'cause they can't get 'em out of the blood to put 'em anywhere again.

Dr Mike Ormsbee: Yes. And so that's the whole thing we have to balance here is, do, and actually what we're gonna try to measure in this study is both the influx and influx of fat. Oh, sweet. Yeah. So it's a very difficult to do. Yes. And we have a lot of tracer techniques we're trying to make work, so we'll see if it all pans out for us, but that will give us some answers.

I will say that one of the coolest parts about this, Mike, and there's not a lot on it, but there's some, is with resistance training, is how is the muscle, how are the muscle and the fat tissues talking to each other?

And so I told you that example for the bariatric center study [00:36:00] where you had this excellent response, but what is going on?

Is the muscle talking to the fat? Is fat talking to the muscle? And there's a couple of studies and like reasons to believe that's true. And I think that's probably one of the more exciting areas in this space is we know that inflammatory markers, cytokines have lipolytic activity.

So what happens? You train, you know you're gonna be damaged a little bit. You have this response that's releasing mykines and cytokines into the blood. Those are lipolytic. So now the weight training has another mechanism where you're releasing these factors that can go over here and cause lysis and maybe fat oxidation.

So I think that's an interesting area that's maybe underlooked at right now in terms of how these things are talking to each other. And then the other area, that was one of the coolest papers I have read in the last five years is from machetes group in 2021 and it looked at what was called like mechanical overload for promoting [00:37:00] extracellular vesicles to be released from muscle.

And they looked at this protein called Mir one that then ended up in the adipose tissue. And one was a break on a break so it would stop a break and allow lipolysis to carry on. And it was coming from muscle. Huh. And they did this in mice. So that, take that with, for what it's worth, but Sure.

It, it was where I was like, oh my gosh, there's something else talking here to the other tissue. We logically that makes sense. We just haven't seen a lot of it in the data yet. So I think between the mykines cytokines and perhaps this extracellular vesicle mechanism we could have a lot more data on how exactly resistance training is helping with the fat loss angle.

Dr Mike T Nelson: And we know the inverse is true, right? So if you have a lot of intramuscular, triglycerides jammed next to the muscle, like the old thing was, oh my gosh we looked at this and we see this and these people have, [00:38:00] insulin resistance at the muscle level. And then as they all of a sudden started looking at high level endurance athletes and they're like, oh shit, we see the same thing.

But these people don't have those dysregulated insulin. And then, I can't remember who did it, but they, I dunno if it was a tracer study or what they did, but they looked at the flow rate through the intramuscular triglycerides, and they found that the healthy people, even though the static picture was the same, they had more of these little fat droplets next to the muscle.

But the FLX through 'em was a lot higher, right? So they were using more local fat, they were depositing more local fat there, because that was an efficiency for the local mitochondria to do, fatty acid oxidation. Where in the overweight people it was just more of a storage depot that was static and wasn't doing anything.

And then you get, ceramides and you get all this kind of messed up mechanics at the muscle level too. So I thought that was interesting. My, my bias is that it would not surprise me if there are signaling [00:39:00] mechanisms in the muscle after resistance training that are trying to air quotes, reprogram it to use fat at rest because that is a healthier Yeah.

Metabolic state. Now how that happens, I'm not sure, but that's my guess as to an outcome and I have zero idea what's going on.

Dr Mike Ormsbee: Yeah. But that's the fun part about this.

Yeah. I find that in this type of science, it's still evolving in and in the other lane we're in is in like performance nutrition and that's still evolving.

And so that's exciting as someone in this area that like every time we designed something we're. We're like figuring out new info that's actually helping folks. Now I think at the end of the day though, like that mechanistic work is really neat but we already know it works. Yeah.

Dr Mike T Nelson: Yeah.

Dr Mike Ormsbee: You're, we're trying to figure out why but we know it works and I think it's gonna again, be consistency of exercise, consistency of your lifestyle habits.

So it's like, what do you do day in and day out over time? The whole thing about [00:40:00] you, you basically become the type of person you hang out with the most. In terms of like other people. And if that's your lifestyle, you got a great shot at this working in terms of maintaining a good enough or a good amount of muscle mass to also minimize excessive adiposity that could be detrimental to anything.

Over time. And there, there's a few meta-analyses that have been run on this. In 2021, there was one that came out looking at the effects of resistance training on adipose tissue. And I'll say over all the studies that were put into that paper. It just, like a lot of things, it shows an effect.

It's just small. If you eliminate the influence of sleep and food and stuff, you just try to isolate resistance training. There's an effect for lot for reduced fat mass, which is present and it's statistically significant, but it's not huge. And so you really have to pair all those other things together, I think to have something that's gonna be substantial.

But that's just the sort of the way it is. And it's like everything moves the needle a little bit and if you stack those things, you have the best chance for a win. [00:41:00]

Dr Mike T Nelson: Yeah. And I also think it's underappreciated that as you age, even if you're just doing resistance training and you can maintain more muscle mass, like how much better off you're gonna be, and then if you're carrying more weight on your frame, that is muscle.

Obviously you have to expend energy in order to move that around. Like you said, it may not matter that much, day-to-day, month to month, but you start looking at, years and decades later. I think that makes a huge difference. We know it makes a huge difference in terms of, functional outcomes and things of that nature too.

Dr Mike Ormsbee: No doubt about it, man. I don't know. I think it's cool. And then because you're starting that course, like this kind of feels really interesting to how it fits in there because yeah, there's other types of exercise needed, but resistance training itself, it's quite a powerful tool for that.

Dr Mike T Nelson: Yeah, and that's why I think it's interesting to try to, not really argue, but look at the mechanisms, but I think my one little pet peeve of social media is it feels like you could sell anything [00:42:00] now with a cool mechanism, even if it's in, one eyed, three-legged ferrets from a Petri dish or something that's there's something about the human brain that we love these stories and we want.

The physiologic mechanism. And most of it as like we talked about, is the inverse. Like we know what things work, we probably don't really know what mechanism, and there's gonna be multiple mechanisms. It's gonna be a multi redundant system. It's gonna be different whether you're lean or overweight or possibly gender or all that kind of stuff too.

So it's, I think it's easy sometimes to get sold on a mechanism and forget the forest because of the trees at the same time.

Dr Mike Ormsbee: A hundred percent. I remember hearing some lectures and Luis Burke got up there and she said, yeah something like PGC won Alpha doesn't win you a gold medal.

Dr Mike T Nelson: Yeah.

Dr Mike Ormsbee: So it just shows the mechanisms are cool, but like the outcomes are what matter, and we have the data to show that the desired result is occurring. So now I think we're working backwards to figure out [00:43:00] what's going on and maybe how you can accelerate, which is exciting. But in, in general, the approach is useful and better include resistance training in your strategy.

Dr Mike T Nelson: Totally. We've got a few more minutes. I just wanted to shift gears real quick and ask you one last question about eating in the evening because now it seems like, 'cause you've done research on this in terms of evening feedings and protein and overnight feedings and all that kinda stuff it feels like to me that eating in the evening now is somehow like taboo.

Like you need to wait four hours before you go to bed. And I don't know, just on my anecdotal, looking at tons of aura stuff through my own business, through rapid through clients I'll be darned if I can find any pattern. Anecdotally, I can show you cases where it does not make any difference in terms of sleep or heart rate or any difference.

And I can show you cases where some people just appear to be a little bit more sensitive to it, whether that's. Psychosomatic or they were told they [00:44:00] shouldn't do it and so now they're worried about it or I dunno, mechanism wise, I don't know. But I just find that there's far from a clear cut answer. And if anything I tell people, just don't worry about it to start.

If you feel like eating in the evening, go for it and we will, we'll adjust from there.

Dr Mike Ormsbee: Yeah. I think the thing that gets messed up is the definition of what we're talking about. Totally. Some people say would say don't eat at night, but what they mean is don't have your largest meal of the day right before bed.

And in general, that probably is a good idea because there are data that should Yeah. Do that. Over a long period of time, you're probably more likely to put on weight and eat more because in the evening you're a little less satiated from the same amount of food and you handle a little bit worse than earlier in the day for these large meals.

Dr Mike T Nelson: Yeah. And most people are not training before that either. If you're like an average population they're not doing a two hour session of, weightlifting and then going to eat.

Dr Mike Ormsbee: Yeah. And especially not at that time of night, like just just a weird so you have to define it a little bit.

And [00:45:00] in our work and the other work that shows either no change or benefits from eating before bed, it's a totally different de definition. So we are always two hours after dinner and within 30 minutes of going to bed. And it's a small, typically protein dominant food, and we're looking at 150 to 250 calories.

It's small. It's a snack. It's like a protein dominant snack that we've studied for 12 years on all this. So it's really just so once you define it, then it's okay, what, now what are we talking about? Because I agree, man, like I've seen all the social media and against my best judgment.

Sometimes I get roped into commenting on things and I'll always say I. In, in who? In athletes, non-athletes. At what time? What's the meal made of? Are you training tomorrow? Do you have a game tomorrow? Did you just finish a training session? Those are really important questions to ask.

For example, like some of our work looked at ultraman triathletes [00:46:00] over three days of exercise direct, and if, and they finish late at night, they finish Friday night. And if you don't eat and you start at 6:00 AM tomorrow, you're never gonna finish. So in some cases, not only is pre sleep eating something that you should do, it's required.

And if you don't do it, you won't finish your race or meet your goal. So it really, that context is really important. If we're gonna sum it all up quickly, it's that preslee feeding meal. Likely we'll do there's no data showing that would do any harm. Likely it will improve your total daily protein intake, which is problematic in a lot of people.

If you're an athlete and who a lot of times have trouble getting enough calories in a day, you get that bump so you can push yourself out of let's say low energy availability or something. And there are data that show that some performance metrics are ticked up a little bit over the next few days by using that technique.

So is [00:47:00] it magic? Definitely not. But it provides another fueling chance. It, and then on the other side, we looked at it from lipolysis where you're not gonna gain any fat from it. Your lipolysis rate is not blunted from it from the way we define it. And I think it's really just if you have clients that say, are afraid to eat at night, we have data to show that if it's a protein dominant approach, there's.

It's either gonna do absolutely nothing or it'll get you your protein intake a little bit higher. It could help a little bit with recovery if you do it consistently over time. Like other labs, Luke Van Loon's lab has shown that over 12 weeks and that with the resistance training program, it bumped up their total protein and it improve functional outcomes like strength and size.

Dr Mike T Nelson: Yeah, because the counter bro argument is, which is very nuanced, is if I got all my protein in during the day, eating more protein at night is not gonna help. Which. I would agree, but show me how many people are actually doing that in the real world. And it's like very small.

Dr Mike Ormsbee: Yeah. And [00:48:00] then it's help with what,

Dr Mike T Nelson: so yeah, exactly.

Dr Mike Ormsbee: Help with muscle accrued accrual. Like maybe that's right. But there are other reasons to eat protein. And I think that it's

Dr Mike T Nelson: not just all about my muscles. Oh

Dr Mike Ormsbee: yeah. This whole thing we've been talking about from the Fat oxs and lipolysis, like all of our work, longitudinal work with higher protein intakes leads to better outcomes for body composition and not just in a muscle weight from a fat loss perspective.

There's that angle. I'll say we're, where we're headed now is we got a lot of feedback from reviewers and comments and stuff where, what's it doing to my sleep? And you mentioned that in your clients. Yeah. Individual. So we see companies that put out devices that. Measur sleep, putting broad statements out

Dr Mike T Nelson: oh yeah,

Dr Mike Ormsbee: don't eat before bed.

And I'm thinking, oh my goodness. Like

Dr Mike T Nelson: I know

Dr Mike Ormsbee: in who and what and where. And so we are actually trying to tease some of that out. And there are actually some novel proteins on the market now that you probably have [00:49:00] heard of that are being promoted for sleep purposes. So the the main one that wrote like

Dr Mike T Nelson: some of the biop peptides of from whey and that type of thing.

Dr Mike Ormsbee: Yeah. So Alpha Lac albumin is the big Yep. And Alpha Lac is, it was novel in terms of a protein that is sold to us but it's not novel and that it's been in infant formula forever. And it's big part of like mother's milk. Because it's there's a high trytophan level in there. And so an infant formula has been around.

Now they're just isolating it and saying, take it before bed and it'll help with sleep. There are only two studies that I'm aware of on that topic now. They're both in rugby players and they both helped with sleep. And so we decided to look at it and compare it to other types of proteins, which wasn't, hasn't been done yet.

And so that's where we're at now. We're studying actually elite female athletes taking it for three nights instead of just one night, which is what a lot of the work was based on. And so we're wrapping that study up now to figure out is it a useful tool in that sense? And then we're also really focused on sleep, where we're designing studies now [00:50:00] for sleep outcomes as opposed to like looking at it as a third, like a tertiary outcome or something.

In the design, and I'll tell you everything to date with these types of small protein dominant meals has, doesn't show any problem. Yeah. A lot of it's absolutely no different. And we started with like paper and pencil because it wasn't what we were studying and we just said. Had you sleep and everyone's good.

And then that wasn't enough, obviously. So we got into the Pittsburgh Sleep Next questionnaires and these types of things, and then we started measuring it. We've used different tools for that. We've used like fatigue, science, whoop, actigraphy. We're just about to start with absolute rest.

Oh yeah. Shout out

Dr Mike T Nelson: to those guys. Yeah,

Dr Mike Ormsbee: so there's like different ways that we can measure these and they all have their pluses and minuses and they're not all grade at everything. So yeah we're teasing through those data. But what would be nice is to find out so that we can tell people, don't do this.

It's, it is not good for your sleep. Or it actually helps with sleep onset latency or something. So that's where we're aiming for like how this is gonna evolve. [00:51:00] The other piece, Mike, is we don't have like a. There's not a good study that gives 100, 200, 300, 400, 500, 600 calories and then looks at where's the, by which eating before bed becomes a helpful tool to a non-helpful tool.

We don't know that answer. We also don't know anything about the quality of the nutrients. So if we gave Isoc chloric doses of two things and one is a more complete food versus a incomplete food, now what? And those studies haven't been run. We actually have some grants that we're in review now to look at those topics that hopefully we'll get to run in the next year or two.

Dr Mike T Nelson: Cool. Yeah, that's awesome. I think there's gonna be a ton of newer data. I know different labs are looking at sleep and the other part I'm really interested in is sleep related to muscle loss or muscle gain. 'cause I think that's a highly unstudied area that we don't know. And if I were to just completely.

[00:52:00] Hazard a guess. I think there's a pretty big effect size there, but I have zero data to point to that.

Dr Mike Ormsbee: Yeah. But I think we're gonna need to lean on people who have data, like data sets that exist and

Dr Mike T Nelson: Yes.

Dr Mike Ormsbee: Trying to, bigger data sets because we do these really intricate studies, but our end is usually pretty low.

Dr Mike T Nelson: Yeah, super small. Yeah. Which is

Dr Mike Ormsbee: great for what we're doing and it meets power analysis and everything, but I think for people to be convinced we're gonna need to move from this lane to probably bigger data sets, but then you lose control. So it's where do you win here? But we'll probably have to piece that whole story together at some point for the sleep portion of it.

But we're working hard now trying to figure out piece by piece what we can in those lanes.

Dr Mike T Nelson: Yeah. That's awesome. Yeah. Awesome. Thank you so much. Where can people learn more about you? I know you've got some stuff on social media and other places.

Dr Mike Ormsbee: Yeah. Thanks Mike. My pleasure. It was fun to talk again, I think. Yeah. Always good to chat with you. I appreciate it was a while ago, so it's nice to do an update. Yeah, the best place is just at Mike Ormsby [00:53:00] on the different social media outlets. And then we can also, my lab is at F-S-U-I-S-S-M, so we're the Institute of Sports Sciences and Medicine.

So yeah. At Mike Ormsby or at F-S-U-I-S-S-M is where you can see like our research things that are going on. A lot of work that my students are doing, the way our fac like kind of inside look at what our research facility looks like. Yeah, those are the best spots.

Dr Mike T Nelson: And are you looking for any more graduate students or people who are listening who are students who are interested in graduate programs?

Dr Mike Ormsbee: Yeah, so we are, we're usually like spaced out several years because Yeah, I know you're

Dr Mike T Nelson: pretty booked up.

Dr Mike Ormsbee: Possible thing, but Yeah, like grad students always reach out and these outlets are great. 'cause if the stuff I'm talking about resonates with you, yeah. Feel free to, to find me on either those socials or just to shoot me an email and just be patient with a reply.

We'll, we'd love to entertain anybody who's a really good worker and wants to get involved with a really fun team. And the only thing I'll plug while we have it is that if people are really interested in this, I do have a course that's [00:54:00] through a company called The Great Courses.

Dr Mike T Nelson: Oh, cool.

I didn't know that. Yeah, tell us about it.

Dr Mike Ormsbee: Yeah it's neat. It's, we did it a couple years back and it's got the most basic title in the world. It's called Changing Body Composition Through Diet and Exercise.

Dr Mike T Nelson: Oh, I like it.

Dr Mike Ormsbee: So yeah, there's nothing sexy about it, but it's a, it's an academic course.

It's 24, 30 minute lectures. It's available on like Amazon Prime and stuff. You can find it on there. It's nothing flashy. It is the basics of science. You get 30 minute lecture on it and end with a practical note. And that's a good place to start. It's for everybody. It's not just for scientists or graduate students or whatever.

We get. Most of our traction is for people who just wanna learn a little bit more about these topics and that's one spot to, to check out some like practical things.

Dr Mike T Nelson: Cool. We'll definitely link to that and yeah, thank you so much. I really appreciate all the time and especially appreciate all the research and publication of all the studies.

And then I just get to sit here and read your work and ask you questions about it. It makes my life easy.

Dr Mike Ormsbee: I love it, man. I hope to see you at a [00:55:00] conference soon and I appreciate the invitation.

Dr Mike T Nelson: Yeah, thank you so much. Okay,

Dr Mike Ormsbee: bye-Bye.

Speaker 2: Thank you so much for listening to the podcast. Really appreciate it. Huge thanks to Dr. Mike Ormsby for coming on the podcast and sharing with us all the wonderful research he is doing. Make sure to check out all of his stuff. We'll put links to all his wonderful items down below. And huge thanks to him for just all the wonderful work that he is done over the past few years.

If you want to hear more from him he is actually one of the experts in the Flex Diet Cert, which will open again coming up very soon. It'll open mid-June 2025, and you can hop onto the newsletter and get all the information there. You can go to flex diet.com for more info, and then if you want, Dr.

Ormsbys Rapid Fire. Four things to maximize fat loss. You can go to the Flex four, [00:56:00] so go to the link down below here, put your email in, and then we will send that to you automatically that we will subscribe you to the Free Daily Newsletter where we have lots more information just like this. Try to make it also entertaining at the same time.

If you're looking for Tasty electrolytes, check out our friends at Element Down Below, and ketones if you're looking to get into a state of ketosis. Within, about 15 to 20 minutes without having to do a ketogenic diet. Maybe you're using this potentially for better cognition or you're using it for less fatigue.

Or we've had clients report back in that for even migraines. It's been quite helpful. Again, none of this is medical device or medical advice, just explaining what are some of the potential uses of it. So check them out down below. Full disclosure, I'm a scientific advisor and ambassador for [00:57:00] teon.

Use the code, Dr. Mike at checkout, save some money. And if you are interested in the Flex Diet cert, like I said, it opens very soon, so be on the lookout for that. Huge thanks to Dr. Sby again for all the wonderful information. Make sure to check out all of his great stuff. Thank you as always for listening to the podcast.

Really appreciate it. You could forward this on to someone you think that may enjoy it or tag us on social media so we can say thank you and also hit the little and subscribe and download and all those wonderful things that help keep the show going. Thank you so much. Really appreciate it.

Talk to all of you next week.

Speaker 3: You are my sunshine. My only sunshine. Why you old fool? What? I'm not your son. And my name's not shine. He calls me an old fool.